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Social and substance use correlates of adult hookah use, 2016

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Abstract

Introduction—Hookah prevalence has been increasing in U.S. adults. This study examines correlates and frequency of hookah use in a national sample of U.S. adults (18–44 years).

Methods—Data were drawn from Wave 10 (October 2016) respondents aged 18–44 years from the Truth Initiative Young Adult Cohort Study (n=4,085). Weighted bivariate analyses were used to estimate correlates and frequency of hookah use, and differences between past 30-day and noncurrent hookah users on social and substance use (alcohol, marijuana, and other drugs) correlates.

Results—Twenty percent of the sample ever used hookah, and 2% used hookah in the past 30 days. Compared to never users and non-current users, a significantly greater proportion of ever and past 30-day hookah users reported past 30-day e-cigarette, tobacco, and substance use (p 's<0.01).

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Note. The first author conducted the work presented here while at Schroeder Institute for Tobacco Research and Policy Studies at Truth Initiative but is currently at Battelle Memorial Institute.

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Eighty-one percent of past 30-day hookah users had at least one close friend who also used hookah, and 35% self-identified as social/occasional smokers. The majority (68%) of past 30-day users reported hookah use on fewer than five of the past 30 days, and 58% engaged in two or more hookah sessions on those days.

Conclusions—Ever and past 30-day hookah use are associated with concurrent tobacco, e-cigarette, and substance use. They are also correlated with peer hookah use and self-identification as a social/occasional smoker. Even infrequent hookah sessions can expose users to health risks. Research identifying contexts in which hookah is used and how it is used with other substances is needed to inform interventions to reduce hookah use.

Keywords

Hookah; social smoking; adults; tobacco; waterpipe

1. Introduction

Hookah (also referred to as waterpipe, narghile, and shisha), tobacco smoking (HTS) has increased globally and in the United States (U.S.) over the past decade (Kasza et al., 2017; Majeed, Sterling, Weaver, Pechacek, & Eriksen, 2017; Salloum et al., 2016). An analysis of 2012–2013 National Adult Tobacco Survey data estimated 3.9% of adults 18 and older in the U.S. use hookah “every day”, “some days”, or “rarely” (Agaku et al., 2014). More recent studies analyzing population-based data found 16% of adults in the U.S. have ever used hookah, 10% used in the past year, and 1.5% used in the past month (Majeed et al., 2017; Robinson, Wang, Jackson, Donaldson, & Ryant, 2017). Hookah is frequently used in social settings, with use more prevalent among males, young adults aged 18–24, college enrollees, and alcohol, other substances, and tobacco products users (Cavazos-Rehg, Krauss, Kim, & Emery, 2015; Haddad, El-Shahawy, Ghadban, Barnett, & Johnson, 2015; Mermelstein, 2015; Villanti, Cobb, Cohn, Williams, & Rath, 2015).

Prior studies have shown hookah users inaccurately believe hookah is less harmful and addictive compared to cigarettes, despite evidence indicating a single HTS session can expose users to higher levels of nicotine and toxicants than cigarette smoking (Akl et al., 2010; Cobb, Ward, Maziak, Shihadeh, & Eissenberg, 2010; Ramoa, Shihadeh, Salman, & Eissenberg, 2016). Although only 10% of past year hookah users report daily or weekly use (Robinson et al., 2017), co-use with other substances and tobacco products is high (Cohn, Ehlke, Cobb, & Soule, 2017; Fielder, Carey, & Carey, 2013), posing additional health risks to users.

Studies have focused primarily on HTS in college students (Lipkus, Reboussin, Wolfson, & Sutfin, 2015), youth (Lee, Hebert, Nonnemaker, & Kim, 2015; Sterling & Mermelstein, 2011), or young adults (Rath, Villanti, Abrams, & Vallone, 2012; Salloum et al., 2017; Villanti et al., 2015), yet this study is intended to expand the knowledge of HTS patterns and correlates in a broader age group. Although one recent study reported U.S. population data characterizing HTS frequency and use patterns (Robinson et al., 2017), there is limited evidence on patterns and correlates of HTS in the U.S. adult population. This study, using

2016 data, builds from prior work by assessing social, tobacco-related, and substance use correlates in data from a national sample of U.S. adults (18–44 years).

2. Methods

2.1 Study Sample

This study used data from Wave 10 of the Truth Initiative Young Adult Cohort Study (collected October 2016), a nationally representative longitudinal cohort. Details on the study sample and design have been described previously (Rath et al., 2012). Briefly, the cohort is comprised of young adults aged 18–34 at study entry drawn from GfK's KnowledgePanel®, an online panel of adults ages 18 and older (<http://www.gfk.com/products-a-z/knowledgepanelr-north-america/>). The baseline survey (Wave 1; n=4,215) was conducted in July 2011, with subsequent assessments occurring approximately every 6 months. The cohort is refreshed at each wave for sample size retention. African American and Hispanic communities were oversampled to ensure sufficient sample sizes. The validity of this methodology has been reported previously (Chang & Krosnick, 2009; Yeager et al., 2011) and KnowledgePanel® samples have been used broadly in studies in the peer-reviewed medical literature (Fowler, Gerstein, & Barry, 2013; Jenssen, Mitra, Shah, Wan, & Grande, 2016).

This analysis focused on a subset of n= 4,085 respondents (weighted) who provided information on HTS patterns at Wave 10. By Wave 10, participants ranged in age from 18–44. Online consent was collected before survey self-administration. This study was approved by Chesapeake Institutional Review Board, Inc.

2.2 Measures

2.2.1 Hookah Tobacco Smoking—All items used the following language to describe HTS: “tobacco or shisha in a hookah or waterpipe” or “hookah/shisha/waterpipe (hookah tobacco).” An image of the product was provided to enhance reports. The outcomes analyzed were ever and past 30-day HTS. Ever HTS was defined as having ever used the product, “even one puff,” in one’s lifetime. Ever users were further categorized as either past 30-day or non-current users (ever used hookah, but not in the past 30 days). Past 30-day use was defined as reporting using on at least one day in the past 30 days (ever and past 30-day use groups were not mutually exclusive). We also examined lifetime and past 30-day frequency of use, and duration of use. Respondents were asked how frequently they visit a hookah lounge/bar/restaurant and the number of their four closest friends who use hookah. Regular HTS (defined in the survey as using “at least once a week, for at least a month”) and age at first regular HTS were examined among ever users.

2.2.2 Harm and Addictiveness Perceptions—All respondents were asked about perceptions of harm (“a lot” or “a little less harmful”, “about the same”, and “a little” or “a lot more harmful”) and addictiveness (“more likely, about the same, or less likely to cause someone to become addicted as regular cigarettes”) of hookah compared to cigarettes.

2.2.3 Demographic Factors—Respondents provided information on their age, gender, race/ethnicity, and education.

2.2.4 Tobacco Use—Respondents were asked separately about past 30-day use of cigarettes, cigars, little cigars/cigarillos (LCCs), smokeless tobacco, and e-cigarettes. Images of these products were included to aid self-report. Respondents were asked, “Which of the following best describes how you think of yourself?” with response items “Smoker”, “Social Smoker”, “Occasional Smoker”, “Ex-smoker”, “Someone who tried smoking”, and “Non-smoker”. For analyses, this item was collapsed to “social/occasional smoker” (yes) with all other categories coded as “no.”

2.2.5 Alcohol, Marijuana, and Other Drug Use—Respondents were asked how often they currently use alcohol, marijuana, and other drugs (“cocaine, heroin, ecstasy, meth, etc.”), with response options of “Not at all”, “Some days”, and “Every day”. Respondents who indicated use “some days” or “every day” were asked how frequently in the past 30 days they used each substance. Current or past 30-day use of each of these substances was categorized as past 30-day use (yes/no).

2.3 Statistical Analyses

Analyses were conducted using Stata/SE version 14.0, and data were weighted to offset non-response bias. Bivariate chi-square analyses were used to estimate correlates and frequency of never, ever, and past 30-day HTS (among a sub-set of ever users), and differences between past 30-day and non-current hookah users on past 30-day alcohol, substance, and other tobacco product use, as well as social correlates. Additionally, multinomial logistic regressions were run for each HTS outcome, controlling for age, gender, race/ethnicity, and education.

3. Results

Correlates of never, ever, non-current, and past 30-day HTS are presented in Table 1. In the sample, 20.5% (n=938) of respondents ever used hookah, and 2.5% (n=85) were past 30-day users.

3.1 Never vs. Ever HTS

In the multivariable model, respondents who completed some college were more likely to be ever hookah users than never users (aOR=3.53, $p<0.01$) (not shown in tables). Past 30-day substance use was significantly higher among ever users compared to never users (Table 1). Ever users had significantly higher prevalence of cigarette, cigar, LCC, smokeless tobacco, and e-cigarette use compared to never hookah users. Significantly more ever users self-identified as social/occasional smokers compared to never users. More than one-third of ever users had at least one of their four closest friends use hookah, compared to 16.5% of never users ($p<0.01$). Approximately three-quarters (73.8%) of never hookah users reported hookah is less or about as harmful as cigarettes. Thirty-nine percent of ever users reported hookah is “a lot” or “a little less harmful” than cigarettes. Compared to ever users,

significantly more never users responded hookah is about the same or more addictive than cigarettes.

3.2 Past 30-day vs. Non-Current HTS

Past 30-day hookah users had significantly higher use rates of past 30-day marijuana and other drugs compared to non-current users. Significantly more past 30-day users self-identified as social/occasional smokers compared to non-current users. Eighty-one percent of past 30-day users had a close friend who used hookah compared to 29.9% non-current hookah users ($p<0.01$). Forty-two percent of past-30 day users reported hookah as “a lot” or “a little less harmful” than cigarettes. Over 80% of non-current hookah users and past 30-day users reported hookah is “about the same” or “less likely” to be addictive than cigarettes. While adjusting for demographic variables, age at first use was not significantly associated with past 30-day use. However, respondents of non-white race/ethnicity and males were significantly more likely to report past 30-day use ($p's<0.03$) when controlling for other demographic variables and age at first use.

3.3 History of HTS

Table 2 provides frequency and duration of HTS for ever, past 30-day, and non-current hookah users. Three-quarters of ever users used hookah on 10 or fewer separate occasions in their lives (Table 2). Among past 30-day hookah users, 15.4% used hookah on at least 100 occasions in their lifetimes, a significantly higher proportion than non-current users (2.2%). About half of past 30-day users used hookah on 1–2 days in the past month, and 19.8% used hookah on 10 or more days. Within the last month, 42.2% of past 30-day hookah users engaged in a single hookah session per day, and 43.7% of these sessions lasted less than 10 minutes. Past 30-day hookah users were significantly more likely to have visited a hookah lounge/bar/restaurant at least 10 times compared to non-current users (17.7% vs. 5.5%, $p\text{-value}<0.01$). One third of past 30-day users reported regular HTS. Of those identified, 68.0% of past 30-day users described themselves as presently using hookah regularly.

4. Discussion

This study both confirms previously published findings and expands the current knowledge of HTS correlates by examining the broader context of HTS in a nationally representative adult (ages 18–44) sample. Prevalence estimates for 2016 are similar to published estimates in recent years (Kasza et al., 2017; Majeed et al., 2017; Robinson et al., 2017). Also, consistent with the literature, ever hookah users were more likely than never users to have at least some college education; use alcohol, marijuana, or other drugs in the past 30 days; currently use other tobacco products and e-cigarettes; consider themselves a social or occasional smoker; and think hookah is less harmful and addictive compared to cigarettes (Cavazos-Rehg et al., 2015; Griffiths & Ford, 2014; Haddad et al., 2015; Lipkus, Eissenberg, Schwartz-Bloom, Prokhorov, & Levy, 2011; Sharma, Clark, & Sharp, 2014; Villanti et al., 2015). There are inconsistencies in the literature regarding race/ethnicity as a risk factor for hookah use, but we found a significant association between non-white races/ethnicity and past 30-day hookah use (Haddad et al., 2015).

Several findings have emerged from our sample. First, we confirm social context is important in a large national sample of young adults. Most past 30-day users reported having a friend who uses hookah, suggesting social influence and acceptability of adult HTS. Consistent with earlier work from this cohort, past 30-day users are also more likely than non-current users to consider themselves a social/occasional smoker (Villanti et al., 2017). These data suggest hookah is likely a social phenomenon and is being used somewhat differently than other tobacco products (Akl et al., 2015; Castaneda, Barnett, Soule, & Young, 2016; Sharma, Beck, & Clark, 2013; Sharma et al., 2014).

Second, we found hookah users have a limited history with HTS and currently smoke infrequently. Most respondents who reported ever HTS had done so 10 or fewer times. On use days, just under half of users engaged in a single session, of which 43.7% lasted less than 10 minutes, which is shorter than the typical session duration previously reported (Rahman, Chang, Hadgu, Salinas-Miranda, & Corvin, 2014; Robinson et al., 2017; Salloum et al., 2017). While the rate of regular use (i.e., at least once a week, for at least a month) is low (8.3% of ever users), these findings must be considered in the context of high rates of co-use with other tobacco products and substances which may increase risks of tobacco-related harm and addiction.

Third, hookah is perceived as a more acceptable product with minimal harm or addiction potential. Forty percent of hookah users in our sample believe hookah to be less harmful than cigarettes, and 30% believe hookah are less likely to cause addiction. These misperceptions should be addressed in prevention efforts, as well as access to hookah. As past 30-day hookah users attend hookah bars/lounges more frequently than non-current users, expanding indoor air laws to these venues could minimize HTS and exposure to harms associated with tobacco use. A defining feature of hookah is its wide availability of flavors, so future studies should examine if flavors have an impact on perceptions and use patterns.

This study has several limitations. This is a cross-sectional analysis of one wave of data, so causation cannot be assessed. Particular survey items about HTS (e.g., regular use, number of occasions used) were not available in prior waves of the survey, preventing us from examining trends over time. Additionally, HTS status was determined by self-report.

The findings from this study suggest social factors influence HTS in U.S. adults, and HTS often occurs in combination with other substances. Even infrequent hookah sessions can expose users to health risks (Akl et al., 2010; Cobb et al., 2010; Ramoa et al., 2016). Research identifying social contexts in which hookah is used and how it is used with other substances is needed to inform interventions to reduce HTS in youth and adults, especially given low levels of perceived harm and addictiveness by users.

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Highlights

- Hookah use is correlated with concurrent tobacco, e-cigarette, and substance use.
- Half of past 30-day hookah users use infrequently (1–2 days in past 30 days).
- Peer hookah use is common among hookah users.
- Users misperceive hookah as being less harmful and addictive than cigarettes.
- Hookah use is correlated with self-identification as a social/occasional smoker.

Table 1
Correlates of Hookah Use by Use Status, among U.S. adults aged 18–44, prevalence (n=4,085)

Variable	Never hookah users (Unweighted n = 3,147)	Ever hookah users (Unweighted n = 938)	Non-current hookah users (Unweighted n = 853)	Past 30-day hookah users (Unweighted n = 85)
	%	%	%	%
Overall	79.5%	20.5%	18.0%	2.5%
Sex				
Male	49.0%	50.9%	49.0%	65.4% ^b
Female	51.1%	49.1%	51.0%	34.6%
Age category				
18–24	22.6%	23.2% ^a	22.7%	26.9%
25–34	55.2%	62.6%	62.1%	65.2%
35+	22.2%	14.2%	15.2%	7.9%
Race/ethnicity				
White, NH ^c	56.2%	56.7%	60.7%	26.8% ^b
Black, NH ^c	12.6%	12.5%	11.2%	22.5%
Other, NH ^c	9.4%	9.3%	9.0%	9.9%
Hispanic	21.8%	21.5%	19.1%	40.8%
Education				
Less than high school	9.9%	5.2% ^a	3.6%	17.1% ^b
High school	25.4%	17.2%	16.1%	26.0%
Some college or greater	64.8%	77.7%	80.3%	57.0%
Alcohol use (every day or some days, past 30 days)	49.5%	80.9% ^a	80.8%	85.1%
Marijuana use (every day or some days, past 30 days)	7.7%	26.0% ^a	23.7%	44.3% ^b
Other drug use (every day or some days, past 30 days)	1.0%	3.6% ^a	1.6%	18.8% ^b
Current use (past 30 days)				
Cigarettes	12.9%	27.1% ^a	23.5%	55.4% ^b

Variable	Never hookah users (Unweighted n = 3,147)	Ever hookah users (Unweighted n = 938)	Non-current hookah users (Unweighted n = 853)	Past 30-day hookah users (Unweighted n = 85)
	%	%	%	%
Cigars	1.6%	6.3% ^a	2.9%	32.0% ^b
Little cigars/cigarillos	3.1%	8.4% ^a	4.5%	38.2% ^b
Smokeless tobacco	1.6%	3.7% ^a	1.9%	17.1% ^b
E-cigarettes	2.6%	9.2% ^a	5.7%	35.7% ^b
One or more of four closest friends use tobacco or shisha in a hookah or waterpipe	16.5%	36.1% ^a	29.9%	81.1% ^b
Harm perceptions of hookah compared to cigarettes				
A lot less harmful	2.7%	4.8% ^a	3.6%	13.6% ^b
A little less harmful	17.7%	33.0%	34.1%	26.5%
About the same	53.4%	42.9%	44.1%	36.2%
A little more harmful	9.9%	10.2%	10.0%	12.2%
A lot more harmful	13.2%	7.1%	7.0%	7.4%
Is hookah/shisha/waterpipe (hookah tobacco) more likely, about the same, or less likely to cause someone to become addicted as regular cigarettes?				
More likely	13.7%	8.7% ^a	8.3%	12.3%
About the same	64.1%	52.3%	52.2%	55.1%
Less likely	18.1%	36.9%	38.0%	30.2%
Do you identify as a social or occasional smoker?				
No	95.2%	87.3% ^a	89.8%	64.6% ^b
Yes	4.8%	12.7%	10.2%	35.4%

^aComparing never users to ever users: p-value < 0.01^bComparing current (past 30-day) users to non-current users: p-value < 0.01^cNH= Non-Hispanic

Hookah measurements for ever, non-current, and past 30-day hookah users, among U.S. adults aged 18–44, prevalence (n=938)

Table 2

Variable	Ever hookah (Unweighted n = 938)		Non-current hookah users (Unweighted n = 853)		Past 30-day hookah users (Unweighted n = 85)		p-value
	%	95% CI	%	95% CI	%	95% CI	
Overall	100.0%		88.1%		11.9%		
Age at first hookah use (Mean [SE])		21.2 [0.2]		21.2 [0.2]		20.9 [0.7]	P = 0.8406
Lifetime hookah use frequency							P < 0.0001
1 time	28.7%	(25.4, 32.1)	30.5%	(27.1, 34.2)	14.8%	(8.1, 25.5)	
2 to 10 times	49.2%	(45.6, 52.9)	50.4%	(46.6, 54.2)	40.8%	(29.6, 53.1)	
11 to 50 times	15.9%	(13.5, 18.7)	14.8%	(12.3, 17.5)	24.3%	(15.2, 36.4)	
51 to 99 times	2.5%	(1.7, 3.7)	2.2%	(1.4, 3.5)	4.7%	(2.1, 10.1)	
100 or more times	3.8%	(2.4, 5.7)	2.2%	(1.3, 3.7)	15.4%	(8.0, 27.7)	
Past 30-day hookah use frequency							
0 days	88.1%	(85.2, 90.6)	100%	N/A	N/A	N/A	
1 or 2 days	5.8%	(4.3, 7.9)	N/A	N/A	49.1%	(37.2, 61.1)	
3 to 5 days	2.3%	(1.3, 3.9)	N/A	N/A	19.0%	(11.1, 30.6)	
6 to 9 days	1.4%	(0.6, 3.2)	N/A	N/A	12.2%	(5.5, 24.6)	
10 to 19 days	0.7%	(0.3, 1.6)	N/A	N/A	6.1%	(2.6, 13.3)	
20 to 24 days	0.5%	(0.1, 2.0)	N/A	N/A	4.2%	(1.0, 15.6)	
25 to 30 days	1.1%	(0.5, 2.8)	N/A	N/A	9.5%	(3.9, 51.5)	
Past 30-day hookah session frequency per day							
1 session					42.2%	(30.7, 54.7)	
2 to 10 sessions					31.9%	(21.4, 44.8)	
11 to 50 sessions					11.3%	(4.9, 24.0)	
51 to 99 sessions					5.0%	(1.6, 14.5)	
100 or more sessions					9.6%	(3.8, 22.1)	
Past 30-day hookah session length							
Up to 10 minutes					43.7%	(31.9, 56.4)	

Variable	Ever hookah (Unweighted n = 938)	Non-current hookah users (Unweighted n = 853)	Past 30-day hookah users		p-value
			%	95% CI	
11–30 minutes			18.8%	(11.4, 29.4)	
31–60 minutes			21.3%	(21.3, 12.7)	
1–2 hours ^a			8.3%	(3.7, 17.6)	
More than 2 hours			6.3%	(2.3, 16.1)	
On how many separate occasions have you visited a hookah lounge/bar/restaurant?					
I have never visited a hookah lounge/bar/restaurant	27.8%	28.3%			
1 time	31.4%	32.0%			
2 to 9 times	33.9%	34.2%			
10 or more times	7.0%	5.5%			
Ever regular hookah use					P < 0.0001
Yes	8.3%	4.6%			
No	89.5%	93.7%			
Unsure/Decline to state	2.2%	1.7%			
	n = 61	n = 39	n = 22		
Age at first regular hookah use (mean [SE])	20.9 [0.8]	21.3 [0.8]	20.3 [1.3]		P = 0.9316
Current regular hookah use					P = 0.0007
Yes	37.7%	6.8%			
No	62.3%	93.2%			

^a Survey item includes overlapping levels for "1 hour"

* Note: Table displays column percentages.