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Hookah and Alcohol Use among Young Adult Hookah Smokers: A Mixed Methods Study

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Abstract

Objectives—Hookah tobacco smoking has grown steadily in popularity among young adults in the United States. Little attention has been given to the relationship between hookah smoking and another behavior that is common among young adults – alcohol use. The purpose of this study was to examine hookah and alcohol use among young adults.

Methods—Forty young adult hookah smokers (55% female) participated in focus group sessions on hookah use beliefs and a brief survey examining hookah and alcohol use including drinking alcohol before, during, or after smoking hookah.

Results—Quotes from the focus groups indicated that alcohol use may promote hookah use among individuals who have little or no hookah smoking experience. Alcohol use, binge drinking, and alcohol use before, during, and after hookah use were common among the participants regardless of legal drinking age status. Nearly half of the participants preferred to drink alcohol while smoking hookah due to the improved physical and social effects they associated with combining the 2 behaviors.

Conflict of Interest Statement

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Human Subjects Statement

This study was approved by the University of Florida Institutional Review Board.

The authors have no conflicts of interest to declare.

Conclusions—For some young adult hookah smokers, alcohol appears to enhance the hookah smoking experience and may play a role in hookah smoking initiation. Future research and interventions should address the association between hookah and alcohol use.

Keywords

hookah tobacco smoking; alcohol use; young adults

The increasing trend of hookah use in the United States (US) has become a growing public health concern. Recent studies have reported that many believe hookah smoking is less addicting than cigarettes,^{1–3} less harmful than cigarettes,^{2–5} and more socially acceptable or "cooler" than other tobacco products.^{1–3} Whereas these studies provide insight into the cognitions of young adults regarding hookah use, they only address a small domain of hookah use. Although hookah smoking is associated with cigarette smoking, ^{3,6–13} there are aspects of hookah smoking, such as its social components, that are particularly important and appealing to young adults. For instance, when examining motivational factors for smoking hookah, one previous study found that 29% of hookah smokers identified partying/ socializing and 25% of hookah smokers identified relaxation as motivating factors for smoking hookah.¹⁴ Similar studies have reported that hookah users view hookah smoking as a way to socialize with friends¹⁵ and that many college students view hookah smoking need further investigation.

Alcohol use may play a role in hookah use among young adults. Given that many young adults drink alcohol,^{16–19} research that establishes a positive association between hookah and alcohol use may indicate that many young adult drinkers could be at risk for hookah use. These associations have been found between other tobacco products and alcohol. College students smoke more cigarettes when they are in social environments and when drinking alcohol.²⁰ The limited research on hookah and alcohol use indicates that many young adult hookah users also engage in alcohol use.^{14,15,21} Those who drink alcohol are more likely to be hookah smokers compared to non-drinkers^{12,22,23} and many hookah smokers drink alcohol and attend traditional bars in the same evenings and nights they also attend hookah bars.²⁴ However, these studies do not attempt to describe the experience of drinking alcohol before, during, or after smoking hookah. With early research indicating hookah and alcohol use may be associated similarly compared to other tobacco use and alcohol use, it is important to understand the nature of how hookah and alcohol use fit together. To gain a greater understanding of how and why young adults engage in hookah and alcohol use, focus groups that included a survey component were conducted with young adult hookah smokers to examine the attitudes, beliefs, and behaviors concerning hookah and alcohol use.

METHODS

Recruitment and Inclusion Criteria

Hookah users were recruited to participate in focus groups to discuss their experiences with hookah smoking by posting advertisements with study information on a university campus near dormitories, dining halls, in academic buildings; and in community settings including

bus stops, bars/night clubs, recreational facilities, and notice boards near hookah smoking establishments. Individuals who were interested in participating in the study then contacted research staff to sign up for the study.

Participants needed to have some experience with smoking hookah for the study and therefore, were eligible if they had smoked hookah at least once in the past 3 months. To examine hookah use perceptions among young adults, participants were also required to be between the ages of 18 and 24. This age range coincides with Arnett's²⁵ "emerging adulthood" developmental period when individuals often experiment with new behaviors including substance use. Participants were organized into groups based on school status (college students and non-college students) and frequency of hookah use (lighter/infrequent hookah users and heavier/frequent hookah users) to promote more homogenous focus groups. "Lighter/infrequent" hookah users were defined as individuals who typically smoked hookah 3 or fewer times per month and "heavier/frequent" hookah users were defined as those who typically smoked hookah more than 3 times per month. These subgroups were not established with planned comparisons in mind, but rather, so that participants with similar levels of hookah smoking experience would be grouped together from a broad sample of young adult college students and non-college students. Because the purpose of this study did not require participants to have long-term experience with hookah smoking, an extensive history of hookah smoking was not obtained beyond assessing use in the past 3 months and typical use over the course of a month.

Focus Group Sessions

This study was part of a larger study to develop survey items on hookah use. In this study, 40 hookah smokers participated in 6 focus groups ranging in size from 5 to 9 participants. Three focus groups included infrequent hookah users and 3 included frequent hookah users based on participant screening data recorded prior to conducting the focus groups. Due to the exploratory nature of this study, researchers aimed to develop a focus prompt that would promote participants to provide a wide array of structured responses that related to hookah tobacco smoking outcome expectancies. Therefore, participants were asked to identify as many words or phrases that they associated with the prompt "Hookah smoking is..." This prompt was based on a similar study aimed at examining cigarette smoking outcome expectancies.²⁶ During this initial phase of the focus groups, participants were asked to express ideas that they associated with hookah smoking. The participant-generated words and phrases were recorded on a display board and participants were encouraged to elaborate on and describe their personal experiences that exemplified their responses to the focus prompt.

Following this initial task, the groups then discussed whether each term was positive or negative. The groups organized the terms into categories derived from previous research, which included "social," "acceptable," "entertaining," "harmful," "toxins," and "other." Finally, the participants ranked each word or phrase within each category based on importance to that category. Whereas the nature of this task was designed to be structured and generate lists of terms and ideas related to hookah smoking, researchers encouraged

participants to describe how these terms were related to their own hookah smoking experiences in detail.

After completing the word/phrase generation and organizing tasks, participants were asked to recall and describe their first hookah smoking experience. Researchers prompted the participants to describe how they felt (eg, nervous) when trying hookah smoking for the first time, where participants' first hookah smoking experience occurred (eg, in a hookah bar/ café, a friend's house, etc), who the participants were with, and any other details about the experience participants wanted to share. Participants were then given the opportunity to share any hookah related thoughts or questions to complete the focus group portion of the study.

The focus groups were audio-recorded and transcribed. The transcriptions were reviewed to identify responses related to hookah and alcohol use and to generate themes. Because we hypothesized that alcohol use may modify the physical and psychological hookah smoking expectancies, we noted focus group responses related to physical or psychological effects of hookah use, alcohol use, or the combination of hookah and alcohol use. These analyses were justified based on the results of a survey that was adminstored immediately following the focus groups that examined hookah and alcohol use as well as how alcohol use modified the hookah smoking experience. For example, focus group responses related to hookah use providing a "buzz" or promoting "relaxation" were identified and retained for generation of themes. Based on the survey responses, these outcome expectancy beliefs were associated with hookah use and also were modified when hookah and alcohol were used together. Additionally, other focus group responses related to hookah and alcohol use themes not specifically examined in the survey also were retained for theme generation. All hookah and alcohol related statements were reviewed by the research team and then summarized to explain the common themes.

Post Focus Group Survey

Upon completion of the focus group activity, participants were asked to complete a Webbased survey. Each participant used an electronic tablet provided by study staff and completed the survey before leaving. The survey contained items that examined demographics, hookah use, alcohol use, and alcohol use before, during, and after hookah use behaviors and beliefs. The hookah use questions asked participants to report use in the past 30 days, past 12 months, and overall lifetime. Alcohol use questions examined frequency of alcohol use (days used in an average week) and binge drinking (times in the past week males had consumed 5 or more alcohol beverages or times in the past 2 weeks females had 4 or more alcohol beverages).^{27,28}

Researchers hypothesized that hookah use among study participants would be associated with alcohol use and that alcohol use may modify hookah smoking expectancies. Therefore, in addition to examining the prevalence of alcohol use before, during, or after hookah use and the beliefs associated with drinking alcohol before, during, or after hookah use, a subset of the hookah and alcohol use items asked participants to identify if they preferred smoking hookah while drinking alcohol. Participants who indicated they preferred to smoke hookah while drinking alcohol were asked to identify their beliefs about combining hookah and

alcohol. Participants could indicate that the combination of hookah and alcohol was preferred because it provided a stronger buzz/high, greater relaxation, a more fun experience, or because it was what their friends did. Participants also were provided an "other" response option regarding reasons for combining hookah and alcohol. The "other" response option included a free response space where participants could provide any beliefs related to combining hookah and alcohol not included as a response option on the survey.

Because the focus group survey contained items that addressed hookah and alcohol use, administering the survey prior to the focus groups may have influenced the discussions during the focus groups to concentrate on alcohol use. Therefore, the survey was administered after the focus groups were conducted to prevent biasing the focus group discussions. Hookah and alcohol use items from the survey were analyzed and used to assess the initial hypothesis that alcohol use may modify the hookah smoking experience. The results of the survey were then used to guide the qualitative analysis of the focus group responses. Using this mixed method approach provided a justification for examining hookah and alcohol use and also allowed for collection of exploratory qualitative responses from the focus group portion of the study that were not influenced by questions from the survey. Using SPSS 21, frequency analyses and chi-squared tests of association were conducted to assess the relationship between variables. Fisher's exact tests were used to determine significance when expected counts were below 5 in the tests of association.

RESULTS

Participants

Demographics of the participants are displayed in Table 1. Participants ranged in age from 18 to 23 years old with a mean age of 19.2 (SD=1.4). Most of the participants (77.5%) were under the age of 21 (legal drinking age in the US). The majority of the participants were female (55.0%), white (72.5%) and non-Hispanic (70.0%). All participants reported both lifetime and past year hookah use; nearly three-fourths (72.5%) reported past 30-day use. The sample was approximately divided evenly between infrequent and frequent hookah users with 55% of participants reporting hookah use 3 or fewer times per month and 45% of participants reporting hookah use more than 3 times per month.

Hookah and Alcohol Quantitative Findings

Alcohol use was common during a typical week among participants, with 85.0% reporting consuming some amount of alcohol and 42.5% drinking alcohol 3 or more days per week. In addition, 70.0% of the sample reported binge drinking at least once in the past 2 weeks. The trend of frequent alcohol use was true for participants both under and over the age of 21. Among participants under the legal drinking age, 80.6% typically drank alcohol at least once per week and 64.5% reported binge drinking in the past 2 weeks. Binge drinking was not associated with college student status ($\chi^2(1) = .31$, n.s.) or infrequent vs frequent hookah use ($\chi^2(1) = 4.25$, n.s.).

Nearly three-fourths (72.5%) reported drinking alcohol before they smoked hookah either sometimes, most of the time, or always. Additionally, 70% reported drinking while they

smoked hookah and 70% reported alcohol use after they smoked hookah either sometimes, most of the time, or always. Though alcohol use before, during, or after hookah use was common among the overall sample, a minority (20%) reported no alcohol use during or around hookah use sessions. This group included 7 females who smoked hookah once per month or less and one male who smoked hookah more than once per month; all were under the legal drinking age. In addition to not engaging in alcohol use in combination with hookah use, these participants were significantly less likely to report alcohol use in general ($\chi^2(1) = 17.16$, p = .001).

Many (41%) indicated that they preferred to smoke hookah while also drinking alcohol; of these, 62.5% reported getting a stronger buzz/high, 50% reported feeling more relaxed, and 68.8% reported having a more fun experience when they combined hookah and alcohol use. Participants did not provide any additional reason for combining alcohol use with hookah smoking in the available free response "other" category. Both alcohol use and hookah and alcohol use sample characteristics are displayed in Table 2. There were no significant differences in preferences to combine hookah and alcohol between college students and non-college students ($\chi^2(1) = 3.60$, p = ns) or between infrequent hookah users and frequent hookah users ($\chi^2(1) = 0.08$, p = ns). These findings provided the needed justification to pursue a qualitative analysis of hookah and alcohol related themes from the focus group discussions.

Hookah and Alcohol Qualitative Findings

Positive physical effects—One theme discussed in all 6 of the focus groups was the positive physical effect of hookah smoking. Although the groups used different terms including "buzz," feeling "light-headed," "dizzy," or having a "head high," all groups reported some type of a pleasurable physical outcome associated with hookah smoking. When trying to rank words and phrases in the "acceptable" category, one male participant made the following statement: "I would say buzz. Pleasant buzz – that's the whole reason I smoke it - cause it feels nice." Another male participant described the positive physical feelings associated with hookah smoking as a "pleasant head buzz," whereas in the following conversation participants used other words to describe the feeling:

Male participant 1: You get light-headed.

Moderator: Light-headed.

Male participant 2: Dizziness.

Female participant: You just kind of like, chill.

Male participant 1: You take like deep breaths so it's like [demonstrates deep breathing] it's like relaxing in 2 ways.

For some participants, combining alcohol use with hookah smoking magnified this feeling. Many (41%) of the participants preferred to combine alcohol use with hookah smoking, 10 of whom (63.5%) specifically reported that adding alcohol use to hookah smoking provided a better/stronger buzz: *Female participant*: "It's [hookah smoking] like sober fun, in a way." *Male participant 1*: "It also can be drunk fun. To mix it."

Relaxation—Another important theme that was reflected in both the qualitative statements and the survey was the association between hookah smoking and relaxation. Participants in all 6 focus groups identified "relaxation" as an important positive outcome expectation associated with hookah smoking. As shown below, several participants described the pleasure and extreme relaxation that resulted from hookah smoking:

Male participant 1: ... *it feels like I'm going limp because I'm so relaxed at that point.*

Moderator: *Do you guys ever get that feeling too? Is that associated with the head high?*

Male participant 1: Pretty much.

Male participant 2: I would put it more with the relaxing.

Male participant 1: I feel like a lot of times if I'm standing up, like, when I'm sitting down it's more just in my head, but when I'm standing and I take a big hit then it's like I feel like it kind of goes throughout my entire body.

Male participant 2: Yeah.

Moderator: So you are saying it's more of a relaxing feeling?

Male participant 1: When you are referring to the body goes limp, you feel like relaxed and feel like just kind of slouching in your chair a little bit and leaning back. I think that's positive.

Some participants enjoyed the addition of alcohol to improve the relaxation effects. Eight of the participants (20%) reported preferring to drink alcohol while smoking hookah because it made the experience more relaxing. The following quote from a male participant illustrates this point: "Like when you drink alcohol and smoke hookah, at least for me, it just relaxes me. Like when I drink alcohol, it's like an upper kind of. And when I smoke hookah it kind of brings me down."

Complementary behaviors—Some participants specifically commented on how hookah smoking and alcohol use can fit together. For instance, this conversation shows how hookah smoking can be an activity that is done with or without alcohol:

Moderator: So hookah is something to do while drinking?

Male participant 1: *Like it could also complement it. Like if you had a beer for example.*

Male participant 2: It's a complement.

Moderator: It's complementary to other substances?

Male participant 1: Yeah.

A female participant further described how hookah smoking can complement a party focused around alcohol use:

Female participant: Well, it's like, I mean just imagining, if you had like a party in your back yard, you like have it on your table so people can like sit there and relax and be watching the beer pong. Or if they don't want to play beer pong they can just sit and smoke.

According to these participants, young adults can enjoy hookah smoking while they are also drinking alcohol, or use hookah smoking as a break from alcohol use and related behaviors.

Inhibition reduction and initiation promotion—During the focus groups, participants were asked to comment on how nervous or confident they were when they smoked hookah for the first time. Participants varied in their levels of nervousness and confidence with some reporting that smoking hookah for the first time was not intimidating whereas others reported being anxious. One participant, however, described how alcohol made it easier to try hookah for the first time:

Female participant: I actually went with someone [another participant] in the room and we went to a very dirty place, but luckily, we were, I wasn't nervous cause I was aided partly from alcohol, which made the nervousness go away. I mean, I'm not gonna lie. Like, it made it easier. And, I just, I was just a part of it. And it was fun. It was also in a very big group, people I was comfortable with. Had I not gone with people I was comfortable with, I probably would have been more nervous and embarrassed when I didn't know what I was doing. Yeah, it was fun.

This participant appeared to have at least some level of apprehension about trying hookah smoking for the first time. In the scenario she described, both the alcohol and supportive group of friends made initiating hookah use less intimidating and perhaps even more enjoyable.

Alternative behavior with similar appeals—There were some participants who identified hookah bars as an alternative location for those who were not legally old enough to drink alcohol but were old enough to legally smoke hookah:

Female participant: I was saying earlier, I feel like it's an alternative because for minors like we can't go out and drink and have a good time.

Male participant: Yeah.

Female participant: But we can go to like hookah lounges and there's like music and lights.

In this sense, hookah bars represented a way for young adults to experience a similar atmosphere as would be found in a traditional bar without needing to be of legal drinking age. However, the survey findings, which showed that 85% of the sample reported alcohol use, suggested hookah bars may be a replacement for traditional bars for some young adults, but hookah smoking was not a replacement for alcohol use itself.

Cross-group comparisons—In general, group characteristics (college student vs noncollege student and infrequent vs frequent hookah users) did not strongly affect the types of responses participants provided. All of the 4 group types identified positive physical effects

and relaxation as main reasons for smoking hookah. There were no meaningful differences between college and non-college student groups; however, the more experienced hookah smokers often had more specific descriptions of their hookah experiences. For example, more time was spent in a group of experienced hookah smokers discussing the different tricks such as "French inhaling" (re-inhaling smoke leaving mouth through one's nose), "ghost inhaling" (allowing a cloud of smoke to leave mouth and re-inhaling it), or "shotgunning" (inhaling smoke from the hookah and exhaling the smoke into someone else's mouth by touching lips like kissing). This pattern was also true for alcohol use in that all groups reported alcohol use, but the more frequent hookah smokers were often more specific with describing their alcohol use experiences as well as how hookah and alcohol could fit together. For instance, an infrequent hookah user simply explained that drinking alcohol while smoking hookah "made it easier to inhale," whereas a frequent hookah user described how the alcohol served as an "upper" which counteracted the relaxation effects of the hookah smoking. At least in the perception of the frequent user described here, the physical effects of hookah use and alcohol use could be understood and controlled to achieve a desired effect. A summary of the themes emanating from the focus groups appears in Table 3.

DISCUSSION

Results showed alcohol use was common among hookah smokers and many hookah smokers associated positive beliefs and experiences with combining alcohol use and hookah smoking. Hookah smoking and alcohol use were perceived to fit well together and the 2 behaviors often were performed together. Some young adult hookah smokers believed alcohol use modified the subjective effects of hookah smoking. Overall, those who preferred concurrent use indicated that the addition of alcohol to hookah smoking made hookah smoking more pleasurable. Participants described party environments where party-goers could travel back and forth from alcohol use to hookah use. Even those who viewed hookah bars as an alternative for minors not old enough to drink alcohol in public settings legally understood that the hookah bar and traditional bar atmospheres were similar and appealing for young adults.

The finding that being under the influence of alcohol can make trying hookah for the first time easier, as one female participant's quote illustrates, represents a concern. It is unclear whether this participant would have tried hookah without having consumed alcohol already, but she indicated that drinking alcohol decreased some of the nervousness associated with smoking hookah for the first time. This connection between alcohol use and hookah smoking initiation also was found in a previous study of college females.²² More research is needed to understand how alcohol may modify the experience of hookah use initiation as well as tobacco use in general.

This study had several limitations. First, the small sample size and inclusion of a sample from a single city limits the generalizability. However, the sample included participants ranging from 18 to 23 years of age with both college students and non-students from diverse racial and ethnic backgrounds. Additionally, research indicates that young adults, especially college students, report high prevalence rates of hookah smoking^{2,3,6,12,23,29–32} and non-

Hispanic Whites with higher education and higher household income are at greater risk for hookah use.^{21,33–35} This would suggest that the makeup of our sample was representative of the at-risk population for hookah use as identified in the literature. Also, multiple reviewers were not used to identify hookah and alcohol related themes from the focus group transcripts; however, selection of themes was guided by the findings from the quantitative survey that the focus group participants completed.

In contrast, the study had several strengths. Whereas other studies have examined attitudes, beliefs, and behaviors associated with hookah smoking, this is the first study to look at outcome expectancy beliefs and behaviors specifically associated with combining alcohol use with hookah smoking. Although much of the previous research on hookah smoking attitudes and beliefs has been survey based, this is the first study to use a mixed methods approach to provide quantitative and qualitative descriptions of why hookah smokers combine hookah smoking with alcohol use. Additionally, 6 separate focus groups were used to elicit words and phrases related to hookah smoking.

There was a small group of participants that did not report any alcohol use before, during, or after smoking hookah. Whereas this group differed from the overall sample in that they were mainly lighter hookah smokers, less likely to report alcohol use, and predominately (87.5%) female, perhaps more can be learned from these types of hookah smokers in future research. Our findings alone are not enough to suggest that alcohol use can cause an infrequent hookah smoker to become a frequent hookah smoker, but it does show that alcohol use behaviors differ between infrequent and frequent hookah smokers. Previous research has shown that tobacco dependence and alcohol dependence are highly correlated. Hence, a reasonable hypothesis is that increased use of hookah may be associated with increased alcohol use and vice versa. More research is needed to examine these associations among hookah smokers and whether alcohol plays a role in hookah use experimentation.

These findings also are not sufficient to warrant regulations controlling the sale of alcohol in hookah smoking establishments, but they do warrant further investigation. Many hookah smokers may be at risk for increased hookah use when alcohol use is also involved before, during, or after hookah use. For some, the combination of the 2 behaviors is more enjoyable than hookah smoking alone. This potential risk for increased hookah smoking comes with the potential for increased risk of negative health outcomes associated with hookah smoking (eg, carbon monoxide poisoning,^{36–44} communicable diseases,^{45,46} cancer^{47–50}). If hookah smoking continues to gain popularity and becomes available in locations and events where alcohol is typically consumed, the risk for hookah smoking also may increase. Future research should examine the link between alcohol use and hookah smoking further. Studies of this type will help ascertain whether or not using alcohol and hookah together increases hookah smoking independent of alcohol use.

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References

- Smith-Simone SY, Curbow BA, Stillman FA. Differing psychosocial risk profiles of college freshmen waterpipe, cigar, and cigarette smokers. Addict Behav. 2008; 33:1619–1624. [PubMed: 18783890]
- Primack BA, Sidani J, Shadel WG, Eissenberg TE. Prevalence of associations with waterpipe tobacco smoking among U.S university students. Ann Behav Med. 2008; 36:81–86. [PubMed: 18719977]
- Eissenberg T, Ward KD, Smith-Simone S, Maziak W. Water-pipe tobacco smoking on a U.S college campus: prevalence and correlates. J Adolesc Health. 2008; 42:526–529. [PubMed: 18407049]
- Smith SY, Curbow B, Stillman FA. Harm perception of nicotine products in college freshmen. Nicotine Tob Res. 2007; 9:977–982. [PubMed: 17763115]
- Jackson D, Aveyard P. Waterpipe smoking in students: prevalence, risk factors, symptoms of addiction, and smoke intake. Evidence from one British university. BMC Public Health. 2008; 8
- Barnett TE, Smith T, He Y, et al. Evidence of emerging hookah use among university students: a cross-sectional comparison between hookah and cigarette use. BMC Public Health. 2013; 13:302. [PubMed: 23560649]
- Heinz AJ, Giedgowd GE, Crane NA, et al. A comprehensive examination of hookah smoking in college students: use patterns and contexts, social norms and attitudes, harm perception, psychological correlates and co-occurring substance use. Addict Behav. 2013; 38:2751–2760. [PubMed: 23934006]
- Czoli CD, Leatherdale ST, Rynard V. Bidi and hookah use among Canadian youth: an examination of data from the 2010 Canadian Youth Smoking Survey. Prev Chronic Dis. 2013; 10:120290.
- Brockman LN, Pumper MA, Christakis DA, Moreno MA. Hookah's new popularity among US college students: a pilot study of the characteristics of hookah smokers and their Facebook displays. BMJ Open. 2012; 2
- 10. Bover Manderski MT, Hrywna M, Delnevo CD. Hookah use among New Jersey youth: associations and changes over time. Am J Heath Behav. 2012; 36:693699.
- Sterling KL, Mermelstein R. Examining hookah smoking among a cohort of adolescent ever smokers. Nicotine Tob Res. 2011; 13:1202–1209. [PubMed: 21896886]
- Sutfin EL, McCoy TP, Reboussin BA, et al. Prevalence and correlates of waterpipe tobacco smoking by college students in North Carolina. Drug Alcohol Depend. 2011; 115:131–136. [PubMed: 21353750]
- Jordan HM, Delnevo CD. Emerging tobacco products: hookah use among New Jersey youth. Prev Med. 2010; 51:394–396. [PubMed: 20817023]
- Braun RE, Glassman T, Wohlwend J, et al. Hookah use among college students from a midwest university. J Commun Health. 2012; 37:294–298.
- Smith-Simone S, Maziak W, Ward KD, Eissenberg T. Waterpipe tobacco smoking: knowledge attitudes, beliefs, behavior in two U.S. samples. Nicotine Tob Res. 2008; 10:393–398. [PubMed: 18236304]
- American College Health Association. American College Health Association-National College Health Assessment II: Reference Group Executive Summary 2012. Hanover, MD: American College Health Association; 2013.
- Wechsler H, Dowdall GW, Davenport A, Rimm EB. A gender-specific measure of binge drinking among college-students. Am J Public Health. 1995; 85:982–985. [PubMed: 7604925]
- Wechsler H, Lee JE, Kuo M, et al. Trends in college binge drinking during a period of increased prevention efforts. J Am Coll Health. 2002; 50:203–217. [PubMed: 11990979]
- Hingson RW, Zha W, Weitzman ER. Magnitude of and trends in alcohol-related mortality and morbidity among U.S. college students ages 18–24, 1998–2005. J Stud Alcohol Drug. 2009; 16(Suppl):12–20.
- 20. Witkiewitz K, Desai SA, Steckler G, et al. Concurrent drinking and smoking among college students: an event-level analysis. Psychol Addict Behav. 2012; 26:649–654. [PubMed: 21895348]

- Dugas E, Tremblay M, Low NCP, et al. Water-pipe smoking among North American youths. Pediatrics. 2010; 125:1184–1189. [PubMed: 20457679]
- Fielder RL, Carey KB, Carey MP. Predictors of initiation of hookah tobacco smoking: a one-year prospective study of first-year college women. Psychol Addict Behav. 2012; 26:963–968.
 [PubMed: 22564201]
- Jarrett T, Blosnich J, Tworek C, Horn K. Hookah use among U.S. college students: results from the National College Health Assessment II. Nicotine Tob Res. 2012; 14:1145–1153. [PubMed: 22318687]
- Soule EK, Barnett TE, Curbow BA. Keeping the night going: the role of hookah bars in evening drinking behaviors. Public Health. 2012; 126:1078–1081. [PubMed: 22819668]
- Arnett JJ. Emerging adulthood: a theory of development from the late teens through the twenties. Am Psychol. 2000; 55:469–480. [PubMed: 10842426]
- 26. Hendricks PS, Brandon TH. Smoking expectancy associates among college smokers. Addict Behav. 2005; 30:235–245. [PubMed: 15621395]
- Wechsler H, Austin SB. Binge drinking: the five/four measure. J Stud Alcohol. 1998; 59:122–124. [PubMed: 9498324]
- Wechsler H, Nelson TF. Binge drinking and the American college student: what's five drinks? Psychol Addict Behav. 2001; 15:287–291. [PubMed: 11767258]
- 29. Goodwin RD, Ginberg A, Shapiro J, et al. Hookah use among college students: prevalence, drug use, and mental health. Drug Alcohol Depend. 2014; 141:16–20. [PubMed: 24882367]
- Grekin ER, Ayna D. Argileh use among college students in the United States: an emerging trend. J Stud Alcohol Drugs. 2008; 69:472–475. [PubMed: 18432392]
- Rahman S, Chang L, Hadgu S, et al. Prevalence, knowledge, and practices of hookah smoking among university students, Florida, 2012. Prev Chronic Dis. 2014; 11:E214. [PubMed: 25474386]
- 32. Primack BA, Fertman CI, Rice KR, et al. Waterpipe and cigarette smoking among college athletes in the United States. J Adolesc Health. 2010; 46:45–51. [PubMed: 20123257]
- 33. Barnett TE, Curbow BA, Weitz JR, et al. Water pipe tobacco smoking among middle and high school students. Am J Public Health. 2009; 99:2014–2019. [PubMed: 19762667]
- Palamar JJ, Zhou S, Sherman S, et al. Hookah use among US high school seniors. Pediatrics. 2014; 134:227–234. [PubMed: 25002664]
- 35. Smith JR, Edland SD, Novotny TE, et al. Increasing hookah use in California. Am J Public Health. 2011; 101:1876–1879. [PubMed: 21852640]
- Ashurst JV, Urquhart M, Cook MD. Carbon monoxide poisoning secondary to hookah smoking. J Am Osteopath Assoc. 2012; 112:686–688. [PubMed: 23055468]
- Cavus UY, Rehber ZH, Ozeke O, et al. Carbon monoxide poisoning associated with narghile use. Emerg Med J. 2010; 27:406. [PubMed: 20442182]
- Clark SFJ, Stephens C, Farhan M, et al. Multiple patients with carbon monoxide toxicity from water-pipe smoking. Prehosp Disaster Med. 2012; 27:612–614. [PubMed: 23174041]
- Karaca Y, Eryigit U, Aksut N, et al. Syncope associated with water-pipe smoking. BMJ Case Report. 2013
- 40. La Fauci G, Weiser G, Steiner IP, et al. Carbon monoxide poisoning in narghile (water pipe) tobacco smokers. Can J Emerg Med. 2012; 14:57–59.
- Lim BL, Lim GH, Seow E. Case of carbon monoxide poisoning after smoking shisha. Int J Emerg Med. 2009; 2:121–122. [PubMed: 20157455]
- 42. Ozkan S, Ozturk T, Ozmen Y, et al. Syncope associated with carbon monoxide poisoning due to narghile smoking. Case Rep Emerg Med. 2013
- Turkmen S, Eryigit U, Sahin A, et al. Carbon monoxide poisoning associated with water pipe smoking. Clin Toxicol. 2011; 49:697–698.
- 44. von Rappard J, Schönenberger M, Bärlocher L. Carbon monoxide poisoning following use of a water pipe/hookah. Dtsch Arztebl Int. 2014; 111:674–679. [PubMed: 25346357]
- 45. American Lung Association. [Accessed May 6, 2015] Hookah smoking: a growing threat to public health issue brief. Smokefree Communities Project (on-line). Available at: http://www.lung.org/

stop-smoking/tobacco-control-advocacy/reports-resources/cessation-economic-benefits/reports/hookah-policy-brief.pdf

- 46. Knishkowy B, Amitai Y. Water-pipe (narghile) smoking: an emerging health risk behavior. Pediatrics. 2005; 116:113–119.
- 47. Aoun J, Saleh N, Waked M, et al. Lung cancer correlates in Lebanese adults: a pilot case-control study. J Epidem Glob Health. 2013; 3:235–244.
- 48. Gupta D, Boffetta P, Gaborieau V, et al. Risk factors of lung cancer in Chandigarh, India. Indian J Med Res. 2001; 113:142–150. [PubMed: 11558323]
- 49. Koul PA, Hajni MR, Sheikh MA, et al. Hookah smoking and lung cancer in the Kashmir Valley of the Indian subcontinent. Asian Pacific J Cancer Prev. 2011; 12:519–524.
- 50. Lubin JH, Xuan XZ, Cai SK, et al. Risk of lung cancer among cigarette and pipe smokers in southern China. J int Cancer. 1992; 51:390–395.

Table 1

Participant Demographics

Characteristic	% (N) Total N = 40	
Age, mean (SD)	19.2 (1.4)	
Sex		
Male	45.0 (18)	
Female	55.0 (22)	
Race		
White	72.5 (29)	
Black	7.5 (3)	
Asian or Pacific Islander	10.0 (4)	
Other	10.0 (4)	
Ethnicity		
Hispanic	30.0 (12)	
Non-Hispanic	70.0 (28)	
Occupation		
Full Time College Student	75.5 (30)	
Recent High School Grad	12.5 (6)	
Full Time Work	10.0 (4)	
Part Time Work	15.0 (6)	
Unemployed	5.0 (2)	

Note.

Participants could select more than one occupation category.

Table 2

Participant Alcohol Use and Hookah and Alcohol Concurrent Use

Characteristic	% (N) Total N = 40	
Weekly alcohol use		
At least one day per week	85.0 (34)	
Three or more days per week	42.5 (17)	
Binge drinking in past 2 weeks		
Overall	70.0 (28)	
Under 21	64.5 (20)	
21 and over	87.5 (7)	
Drink before you smoke hookah		
Never	27.5 (11)	
Sometimes	57.5 (23)	
Most of the time	5.0 (2)	
Always	10.0 (4)	
Drink while you smoke hookah		
Never	30.0 (12)	
Sometimes	60.0 (24)	
Most of the time	5.0 (2)	
Always	5.0 (2)	
Drink after you smoke hookah		
Never	30.0 (12)	
Sometimes	60.0 (24)	
Most of the time	5.0 (2)	
Always	5.0 (2)	

Table 3

Key Themes

Themes	Subthemes
Positive Physical Effects	Buzz
	Dizzy
	Light-headed
	Feels nice
Relaxation	Body going limp from deep relaxation
	Full body relaxation
Hookah and Alcohol are Complementary Behaviors	Fun to combine hookah and alcohol
	Combining hookah and alcohol changes the physical effects
	Alcohol can make hookah smoking more relaxing
	Can choose to use hookah and/or alcohol at parties or social gatherings
Inhibition Reduction	Alcohol can reduce the nervousness associated with hookah use experimentation
	Anxiety reduction with novice hookah users
Alternative Behavior with Similar Appeals	Hookah bars provide a social atmosphere for those under legal drinking age