



# Hookah use among college students: Prevalence, drug use, and mental health



Renee D. Goodwin<sup>a,b,\*</sup>, Alice Grinberg<sup>a</sup>, Jack Shapiro<sup>a,b</sup>, Diana Keith<sup>c</sup>, Michael P. McNeil<sup>d</sup>, Farah Taha<sup>a</sup>, Bianca Jiang<sup>a</sup>, Carl L. Hart<sup>c,e,f</sup>

<sup>a</sup> Department of Psychology, Queens College and The Graduate Center, City University of New York (CUNY), Flushing, NY 11367, USA

<sup>b</sup> Department of Epidemiology, Mailman School of Public Health, New York, NY, USA

<sup>c</sup> Department of Psychology, Columbia University, New York, NY, USA

<sup>d</sup> Health Promotion and Student Health Department, Columbia University, New York, NY, USA

<sup>e</sup> Department of Psychiatry, Columbia University College of Physicians and Surgeons, New York, NY, USA

<sup>f</sup> New York State Psychiatric Institute, New York, NY, USA

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## ABSTRACT

**Background:** There is consistent evidence that hookah use is as, if not more, harmful than cigarette use. Yet, hookah users underestimate the potential deleterious effects of hookah use. This study examined the rates of hookah use and associated demographic characteristics in a sample of undergraduates at a small Northeastern university. This study also examined the relationships between hookah use and other substance use, mental health problems, and perceived levels of stress.

**Methods:** Data were drawn from the Spring 2009 American Health Association–National College Health Assessment (ACHA–NCHA) at one small, Northeastern university ( $N = 1799$ ). The relationships between hookah use and other substance use, mental health problems, and perceived stress levels were examined using logistic regression analyses.

**Results:** Hookah use (in the past month) was reported among 14.1% (253/1799) of this sample of undergraduates. Hookah users were more likely to use other substances, including cigarettes, cannabis, alcohol, cocaine, and amphetamines. The strongest associations emerged between hookah use and alcohol and cigarette use. There were no significant associations found between hookah use and any mental health problems or perceived stress levels.

**Conclusions:** Hookah users are significantly more likely to use other substances, including alcohol, cigarettes, cannabis, cocaine, and amphetamines compared with non-hookah users. In contrast to cigarette smoking, hookah use does not appear to be associated with mental health problems or perceived stress levels in this sample of undergraduates. Further investigation into the prevalence and correlates of hookah use is needed in representative population samples.

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## 1. Introduction

Hookah use is growing in the United States and appears particularly common among young people (Barnett et al., 2013; Jarrett et al., 2012; Jawad et al., 2013; Smith et al., 2011). According to recent estimates, the prevalence of past month hookah use (or water pipe tobacco smoking) ranges between 9.6 and 20.4% (Dugas

\* Corresponding author at: Department of Psychology, Queens College and The Graduate Center, City University of New York (CUNY), 65–30 Kissena Boulevard Flushing, Queens 11367, USA. Tel.: +1 718 997 3247; fax: +1 212 342 5168.

E-mail addresses: [renee.goodwin@qc.cuny.edu](mailto:renee.goodwin@qc.cuny.edu), [rdg66@columbia.edu](mailto:rdg66@columbia.edu) (R.D. Goodwin).

et al., 2010), which surpasses cigarette use among undergraduate student populations (Brockman et al., 2012; Fielder et al., 2012; Grekin and Ayna, 2012). Previous research has consistently found that hookah use is most prevalent among young people, with the average age of onset ranging from 15 to 24 years of age (Barnett et al., 2013; Brockman et al., 2012; Daniels and Roman, 2013). In a longitudinal cohort study of first-year college students, Fielder et al. (2012) found that 29% of students initiated hookah use before college and 23% initiated within the first year of college. Findings are mixed, however, regarding the other demographic characteristics that are associated with hookah use. According to Smith et al. (2011), hookah use in the United States is highest among non-Hispanic whites with at least some college-level education. Conversely, in a sample of college students from the Southeast,

Barnett et al. (2013) found that Hispanics were most likely to ever have smoked hookah, to have smoked in the past year, and to currently smoke hookah compared with students from other racial/ethnic backgrounds.

The increase in hookah use among young people, as cigarette use has concurrently declined, may be explained in at least two ways. First, unlike cigarettes and alcohol, hookah is currently unregulated in the United States, thereby making hookah cheaper and more readily accessible (Primack et al., 2012) to young people who would otherwise be restricted from purchasing other tobacco-based substances. Second, the potential health risks are likely underestimated by users (Daniels and Roman, 2013; Jacob et al., 2013; Nuzzo et al., 2013; Shaikh et al., 2008). According to Jawad et al. (2013), hookah users believe hookah smoking is less addictive than cigarettes (Jacob et al., 2011) because the nicotine in shisha, the molasses- or fruit- flavored tobacco product that is customarily smoked in a hookah, is filtered through water. Further, because shisha is filtered through water, it is also believed that the carcinogenic, respiratory, and cardiovascular risks that have been linked to cigarettes are considerably lower with hookah (Jacob et al., 2011; Primack et al., 2012).

However, evidence suggests that hookah use may pose a similar or even greater health risk than cigarette use. According to the World Health Association (2005), the amount of tobacco inhaled in a 45-min hookah session is comparable to the amount of tobacco smoked in 100 cigarettes (Primack et al., 2012). A single hookah session lasting between 30 and 60 min has been found to significantly increase plasma nicotine concentrations and carbon monoxide, the latter of which is found in much higher levels in hookah than in cigarette smoke (Jacob et al., 2011).

Hookah use has been associated with several pernicious outcomes including increased risks of leukemia (Jacob et al., 2011), pulmonary and cardiovascular dysfunction, as well as cancer of the lungs, esophagus, bladder, and stomach (Shaikh et al., 2008). Ancillary health risks have also been reported. According to Barnett et al. (2013), there is a higher concentration of carbon monoxide in second-hand hookah smoke than there is in second-hand cigarette smoking. A large majority of users go to hookah cafes (WHO Study Group on Tobacco Product Regulation, 2005), where fumes from the charcoals that heat the shisha and the smoke exhaled by patrons are concentrated in tight, enclosed spaces. Additionally, hookah is viewed as a social and recreational activity in which several people smoke from the same water-pipe mouthpiece. As such, there is an increased risk of contracting an orally transmitted disease, such as tuberculosis, herpes, and hepatitis (Shaikh et al., 2008).

In addition to the physical health risks, hookah use is associated with other substance use. In convenience samples of college students, hookah, cigarettes, and alcohol have been found to be used in concert (Barnett et al., 2013; Jarrett et al., 2012). Although there is scant evidence on the directionality of use, alcohol use was found to predict the initiation of hookah use in a study among first-year female college students (Fielder et al., 2012). In another study, college students who reported ever using cigarettes were 15.7 times more likely to also report ever using hookah (Barnett et al., 2013), although there was no information on the direction/sequence of this pattern of use. However, in the same study, the majority of hookah users (65%) did not use cigarettes. Because hookah is unregulated, it is conceivable that previous cigarette users might switch to using hookah as a cheaper, more accessible alternative that contains the same level of the addictive agent (nicotine) and carcinogenic compounds. Consistent with these observations, Jawad et al. (2013) found that hookah served as a replacement for nicotine in cigarette smokers by decreasing cigarette-induced cravings and withdrawal symptoms.

Despite findings that hookah use is associated with detrimental outcomes, a number of important areas remain unexamined.

First, while cigarette smoking has been regarded as a “gateway” to alcohol and illicit drug use, it is unclear whether and to what extent hookah use is similarly associated with increased use of other substances. Second, research on the associations of hookah and other substance use has been limited to alcohol, cannabis, and cigarettes. It is unknown whether hookah use is associated with use of other illicit drugs, such as cocaine and/or stimulants. Third, cigarette smoking is strongly associated with increased levels of mental health problems such as major depressive disorder and several anxiety disorders. It is unclear whether there is an analogous relationship between hookah use and mental disorders.

Against this background, the current study aims to contribute to existing knowledge in this area by addressing these unanswered questions. First, the study will investigate the rate of hookah use and associated demographic characteristics among undergraduates at a small, Northeastern university. Second, the study will investigate the relationship between hookah use and alcohol and illicit drug use. Third, the study will investigate the dual relationships between hookah use and mental health problems and perceived stress among students.

## 2. Methods

### 2.1. Sample

Data were collected during the Spring, 2009 using the American Health Association-National College Health Assessment (ACHA-NCHA; American College Health Association, 2009). The ACHA-NCHA is a national survey that consists of approximately 300 variables assessing student health, health-related behaviors, access to health information, and health-related outcomes. It has been evaluated extensively for reliability and validity in U.S. college students (American College Health Association, 2006, 2008).

The present study included data from a sample of undergraduate students from a small highly competitive private institution in the Northeastern US. All enrolled students in the primary undergraduate academic school were invited to participate in the study and received email invitations via their campus email account. Up to three reminders over the course of a three week period were sent to non-responders. Participants had the option to be entered into a drawing for gift certificates from a travel provider or the college bookstore upon completion of the survey. A total of 1841 surveys were received (31.4%). A total of 1799 were available for analysis with complete information on relevant variables.

### 2.2. Measures

**2.2.1. Hookah use.** Using the question stem, “Within the past 30 days, on how many days did you use \_\_\_\_\_?” respondents were queried about past 30 day hookah use. Response choices ranged from 1: never used, 2: have used, but not in the past 30 days, 3: 1–2 days, 4: 3–5 days, 5: 6–9 days, 6: 10–19 days, 7: 20–29 days, to 8: used daily. For these analyses, hookah use was dichotomized (0 = no use in the past 30 days; 1 = any use in the past 30 days) in order to conserve power.

**2.2.2. Other substance use.** Using the same question stem for each item, “Within the past 30 days, on how many days did you use \_\_\_\_\_?” respondents were queried about past 30-day use of each of the following substances: cigarettes, alcohol, marijuana, cocaine, methamphetamine, other amphetamines, and other illegal drugs. Response choices ranged from 1: never used, 2: have used, but not in the past 30 days, 3: 1–2 days, 4: 3–5 days, 5: 6–9 days, 6: 10–19 days, 7: 20–29 days, to 8: used daily. For these analyses, each type of substance use was dichotomized (0 = no use in the past 30 days; 1 = any use in the past 30 days) in order to conserve power. Students also reported past year (yes/no) use of non-medical use of prescription drugs including antidepressants, sedatives, and stimulants.

**2.2.3. Mental health.** Participants were asked, “Within the past 12 months, have you been diagnosed or treated by a professional for” mental health conditions including anxiety disorders, depression, panic attacks, phobia, substance abuse/dependence or other dependence (e.g., gambling, internet, sexual). Response choices ranged from 1: no, 2: diagnosed but not treated, 3: diagnosed and treated with medication, 4: diagnosed and treated with psychotherapy, 5: diagnosed and treated with medication and psychotherapy, or 6: other treatment. For these analyses, major depression, any anxiety disorder, and/or substance dependence was considered present if the respondent reported any diagnosis or treatment (2–6) and absent if a negative response was given (1).

**2.2.4. Stress.** Levels of stress during the past 12 months were assessed with a single question, “Within the past 12 months, how would you rate the overall level of stress you have experienced?” with responses ranging from 1: no stress, 2: less than average

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