

UC San Diego

UC San Diego Previously Published Works

Title

Hookah tobacco use and stressful life events in a sample of young non-daily cigarette smokers

Permalink

<https://escholarship.org/uc/item/6fr2m2vd>

Authors

Brikmanis, Kristin
Doran, Neal

Publication Date

2017

DOI

10.1016/j.addbeh.2016.08.002

Peer reviewed



Published in final edited form as:

Addict Behav. 2017 January ; 64: 1–5. doi:10.1016/j.addbeh.2016.08.002.

Hookah Tobacco Use and Stressful Life Events in a Sample of Young Non-Daily Cigarette Smokers

Kristin Brikmanis and Neal Doran

Department of Psychiatry, University of California, San Diego

Abstract

Introduction—Understanding factors that influence hookah use among young adults is important given its increasing popularity and health risks. The purpose of this study was to examine whether young adult non-daily cigarette smokers use hookah for stress regulation. We hypothesized that greater perceived stress and greater stressful life events would predict probability and frequency of recent hookah use.

Methods—Participants (n=598, 50.7% male) were non-daily smokers aged 18-24 years (M=20.5, SD=1.8), who completed a baseline assessment online or via mobile phone as part of a longitudinal study. Participants had been non-daily smokers for at least six months but had never been daily smokers.

Results—Thirty-one percent of participants reported using hookah over the past 14 days. Fulltime students were more likely to have used hookah recently. More stressful life events and more frequent alcohol use predicted likelihood and frequency of hookah use ($p < .05$). Perceived stress was not associated with hookah use.

Conclusions—Findings suggest that hookah tobacco use is related to frequency of stressful life events but not perceived stress among non-daily cigarette smokers. Tobacco prevention and intervention programs should address hookah use and should include adaptive strategies for coping with stressful events.

Keywords

tobacco; hookah; stress; young adult

Young adult hookah tobacco use is increasing, with recent prevalence estimates ranging from 28-33% (Johnston, O'Malley, & Bachman, 2015; Salloum, Thrasher, Kates, & Maziak, 2015). Among adolescents, use doubled between 2013 and 2014 and some studies have

Corresponding Author: Kristin Brikmanis, B109, 8950 Villa La Jolla Drive, San Diego, CA 92037, Tel: 858-882-1519, kbrikmanis@ucsd.edu.

Contributors: Neal Doran designed the study and assisted with statistical analysis and manuscript preparation. Kristin Brikmanis conducted literature searches and statistical analyses and led the preparation of the manuscript.

Conflict of Interest: The authors have no conflicts of interest to report.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

suggested hookah is now more popular than cigarettes in younger populations (Arrazola et al., 2015; Gilreath et al., 2016). Hookah use has health consequences comparable to cigarettes (Maziak, 2011; Soule, Lipato, & Eissenberg, 2015). Hookah tobacco is addictive, and smoking it exposes users to harmful toxicants (Cobb, Ward, Maziak, Shihadeh, & Eissenberg, 2010); one 45 minute session is associated with greater carboxyhemoglobin levels and smoke exposure, and similar nicotine levels, compared with one cigarette (Eissenberg & Shihadeh, 2009). Hookah use has long-term health risks, including respiratory issues and lung cancer (Akl et al., 2010). However, many young adults perceive hookah as less harmful, less addictive, and more socially acceptable than cigarettes (Berg et al., 2015; Heinz et al., 2013). These perceptions increase risk of use (Montgomery et al., 2015).

Another concern is the possible effect of hookah use on cigarette smoking. Hookah use may promote cigarette initiation among non-smokers (Salloum et al., 2016). A prospective college study found that hookah use predicted initiation or resumption of cigarettes among never and former smokers (Fielder, Carey, & Carey, 2013). Additionally, it may result in increased cigarette smoking among existing smokers. We found that hookah use predicted increased cigarette consumption over six months among young adults (Doran, Godfrey, & Myers, 2015). These concerns highlight the need to understand factors that influence hookah use.

Hookah use in young adults has been associated with demographic factors and other substance use, but relatively little is known about psychosocial correlates. Hookah has been associated with personality traits, including impulsivity and social comparison orientation (Berg, Schauer, Asfour, Thomas, & Ahluwalia, 2011; Doran & Trim, 2015; Fielder, Carey, & Carey, 2012). Hookah use has also been related to cognitions, including affect regulation expectancies (Doran & Brikmanis, 2016). While these studies have begun to explore psychosocial predictors of hookah use, further investigation is needed.

Stress is important in many models of substance use (Kassel, Stroud, & Paronis, 2003; Sinha, 2005, 2008). According to the stress-coping (Wills & Hirky, 1996) and self-medication (Khantzian, 1997) models, substance use is a maladaptive strategy for regulating stress and affect. Stress has been linked to multiple substances, including cigarettes, and predicts initiation, progression, maintenance and relapse (Kassel et al., 2003). Stress is likely associated with other tobacco products, but little is known about its relationship with hookah. In a college sample, stress relief was one of the most common motives for using hookah (Holtzman, Babinski, & Merlo, 2013), suggesting it may be a stress management strategy.

Research examining stress and hookah use among young adults has focused on subjective stress and yielded mixed findings, with users reporting higher stress levels in some studies (Berg et al., 2011; Grinberg, 2015) but not others (Fielder et al., 2012; Goodwin et al., 2014). The present study sought to address these inconsistencies by examining hookah use and both subjective and objective stress measures. We hypothesized that greater perceived stress and more stressful events would predict greater probability and frequency of hookah use in the past two weeks in a community sample of young adult non-daily smokers.

Methods

Participants

Participants (n=598, 51% male) were young adults aged 18-24 years (M=20.5, SD=1.8) who enrolled in a longitudinal study of non-daily cigarette smoking. Half identified as exclusively Caucasian, 16% Asian American, 26% Hispanic or Latino, and 5% from multiple backgrounds. Eligibility criteria included smoking cigarette at least monthly for six months but no lifetime history of daily cigarette use for one month or longer, California residency, and owning a smartphone or having reliable internet access.

Procedure

Online advertisements were used to recruit participants. Interested individuals (n=7671) completed a brief online assessment of eligibility. Approximately 15% met eligibility criteria; 53% of eligible individuals enrolled in the study. The primary reason for ineligibility was current (48%) or past (31%) daily smoking. Staff emailed individualized links to eligible individuals (n=1121) who, if interested, provided informed consent and completed the baseline assessment online or via mobile phone app, for which they received a \$25 gift card. The University of California, San Diego Institutional Review Board approved procedures. Data were collected over 12 months beginning in March 2015.

Measures

Demographic characteristics assessed included age, sex, race/ethnicity and current student status. Due to small cell sizes, race was collapsed into four categories: Caucasian (n=267), Asian American (n=96), Hispanic or Latino (n=153), and other (n=52).

Tobacco, alcohol, and marijuana use in the past 14 days were assessed using the Timeline Followback (TLFB; Sobell & Sobell, 1992, 1996). For each of the 14 individual days preceding assessment, starting with the day before assessment, participants reported whether they used hookah, e-cigarettes, smokeless tobacco, cigars, cigarillos, and marijuana. Number of alcoholic drinks and cigarettes were also recorded for each day. The TLFB has been validated for online use (Pedersen, Grow, Duncan, Neighbors, & Larimer, 2012; Ramo, Hall, & Prochaska, 2011).

Stressful life events were assessed using a modified version of the 45-item Life Events Scale for Students, or LESS (Nikolova, Bogdan, Brigidi, & Hariri, 2012). LESS respondents indicated whether or not specific events had occurred in the past 12 months. Items included financial and legal problems, interpersonal conflict, life and school difficulties, life transitions (e.g., moving homes, pregnancy, marriage), and loss. While the LESS was designed for college students, 40 of 45 items are equally applicable to non-students 18-24 years old. Exceptions include beginning college, failing courses, changing college programs, and getting kicked out of college. In the present sample, LESS scores did not differ by student status.

Perceived stress was assessed using the Perceived Stress Scale-10 (Cohen, 1988; Roberti, Harrington, & Storch, 2006), which evaluates respondents' sense of control over their lives during the past month. Higher scores indicate greater perceived stress.

Analytic plan

Preliminary bivariate tests were used to assess relationships among demographic, clinical, predictor and outcome variables. Logistic regression was used to assess whether stress predicted odds of any hookah use. Because the modal number of use days was 0, negative binomial regression was used to assess whether stress predicted frequency of hookah use (Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2013). All analyses were conducted using Stata IC 13 (StataCorp LP, College Station, TX), with $\alpha=.05$.

Results

Preliminary analyses

Demographic and clinical characteristics are shown in Table 1. Nearly a third (31.4%) of participants reported using hookah over the past 14 days. Those with recent hookah use averaged of 3.1 (SD=3.2) days of use. Additionally, 33.8% of participants used e-cigarettes, 15.2% cigarillos, 7.2% cigars, 5.7% smokeless tobacco, 54% two or more nicotine and tobacco products, and 57.5% marijuana.

Any hookah use was associated with being male and a full-time student, and greater alcohol consumption ($p < .05$). Frequency of hookah use was associated with male sex, number of cigarettes, and number of drinks ($p < .05$). Therefore, sex, student status (full time vs. other), cigarettes smoked, and alcoholic drinks were included as covariates in subsequent analyses.

Hookah use

Logistic and negative binomial models are shown in Table 2. Sex, race/ethnicity, cigarettes smoked, and perceived stress were not associated with odds of recent hookah use. Full-time students were 78% more likely to have used hookah recently [Odds Ratio (OR)=1.78 (95% confidence interval 1.23, 2.60), $p=.003$]. Alcoholic drinks predicted likelihood of hookah use, [OR=1.01 (1.00, 1.02), $p=.003$], with each additional drink associated with a 1% increase in the likelihood of hookah use. The odds of hookah use were significantly associated with exposure to stressful events [OR=1.05 (1.01, 1.10), $p=.007$], with each additional event predicting a 5% increase in odds of use.

Sex, race/ethnicity, student status, cigarettes smoked, and perceived stress were not significant predictors of hookah frequency. Greater alcoholic drinks was associated with hookah frequency ($z=2.84$, $p=.004$). More stressful life events predicted more frequent hookah use ($z=2.20$, $p=.028$).

Discussion

This study examined the link between stress and hookah tobacco use among young adult non-daily cigarette smokers from the community. As expected, exposure to more stressful

events was associated with greater odds and frequency of hookah use. In contrast, perceived stress was not associated with use. Consistent with previous research, (Berg et al., 2011; Doran & Trim, 2015; Goodwin et al., 2014) alcohol use also predicted hookah likelihood and frequency. To our knowledge, this is the first study to examine the relationship between stressful life events and hookah use.

The observed relationship between exposure to stressful events and hookah use is consistent with studies suggesting a dose-response relationship with tobacco use (Cheney, Oman, Vesely, Aspy, & Tolma, 2014). These data provide support for accumulation of risk models, which suggest exposure to more stressful events increases risk for unhealthy behaviors (Lynch & Davey-Smith, 2005; Pearlin, Schieman, Fazio, & Meersman, 2005). Such models also allow for specific developmental periods in which exposures have greatest impact or associated behavior is most likely (Ben-Shlomo & Kuh, 2002); in the case of hookah, this appears to be adolescence and young adulthood. The present study suggests that each additional stressor is associated with 5% greater odds of hookah use among non-daily smokers.

Findings suggest that objective and subjective stress have disparate relationships to hookah use, which may explain inconsistencies in the literature. Previous studies have also found tobacco use to be predicted by the number but not the perceived impact of stressful events (Cheney et al., 2014). In this sample, stressful events and perceived stress were only moderately correlated ($r=0.23$, $p<.001$). One interpretation is that an accumulation of stressors had an impact that was not consciously perceived. Young adults may be using hookah to cope with stressful events without realizing the extent to which these events have affected them, particularly when the events occurred more distally. Longitudinal research is needed to more clearly delineate the relationship between such exposure and hookah use.

Hookah use was common in the current sample, which is concerning given its association with smoking progression (Doran et al., 2015). Young adult smokers may be at increased risk for hookah use and related consequences. College students may be particularly at risk in that they appear more likely to use hookah than same-aged peers. Consistent with previous studies (Lee, Bahreinifar, & Ling, 2014), full time students were more likely to report recent hookah use: they made up 60% of the sample but 68% of hookah users.

A number of characteristics of this sample and the study methodology may limit the extent to which our findings are generalizable. For example, all participants reported recent cigarette smoking; while hookah users are more likely to use cigarettes and other products (Grinberg & Goodwin, in press; Montgomery et al., 2015; Shephardson & Hustand, 2016), some do not. Additionally, the sample included relatively few African Americans, whom initial evidence suggests may use hookah at lower rates than other groups (Jones & Cunningham-Williams, 2016). Both issues could lead to overestimation of hookah prevalence. On the other hand, we assessed hookah use over the past 14 days, whereas longer intervals are more common (Sutfin et al., 2011), potentially leading us to underestimate prevalence relative to other studies. To the extent that our estimate of prevalence is not accurate, it may lead to mis-estimation of the association between hookah use and experiencing stressful events.

There are other limitations to the present study. Young adult tobacco use is unstable (Schweizer, Roesch, Khoddam, Doran, & Myers, 2014), and these data may not reflect participants' regular patterns of hookah use. Additionally, because proximity to hookah bars was not assessed, it is unknown whether this could explain why students were more likely to use hookah. Previous research has found that hookah bars are more common near college campuses and that distance to the nearest of hookah bar is inversely related to hookah use (Sutfin et al., 2011). Finally, stress and hookah use were assessed cross-sectionally. Consequently, the temporal relationship between stress and hookah was not examined.

Findings suggest stressful life events are associated with hookah use among young adult non-daily smokers. Stress-exposed individuals may benefit from programs that teach alternative strategies for coping with stress in order to prevent or reduce hookah use. Longitudinal research is needed to better understand the relationship between stress and hookah use, and the impact on use of other tobacco products.

Acknowledgments

This research was funded by the National Institutes of Health grant R01 DA037217 (Doran).

Role of Funding Sources: Funding for this study was provided by a National Institute on Drug Abuse grant to Neal Doran (R01 DA037217).

References

- Akl EA, Gaddam S, Gunukula SK, Honeine R, Jaoude PA, Irani J. The effects of waterpipe tobacco smoking on health outcomes: a systematic review. *International Journal of Epidemiology*. 2010; 39(3):834–857. DOI: 10.1093/ije/dyq002 [PubMed: 20207606]
- Arrazola RA, Singh T, Corey CG, Husten CG, Neff LJ, Apelberg BJ, et al. Cox S. Tobacco use among middle and high school students—United States, 2011–2014. *MMWR Morb Mortal Wkly Rep*. 2015; 64(14):381–385. [PubMed: 25879896]
- Atkins DC, Baldwin SA, Zheng C, Gallop RJ, Neighbors C. A tutorial on count regression and zero-altered count models for longitudinal substance use data. *Psychology of Addictive Behaviors*. 2013; 27:166–177. DOI: 10.1037/a0033147 [PubMed: 22905895]
- Ben-Shlomo Y, Kuh D. A life course approach to chronic disease epidemiology: Conceptual models, empirical challenges and interdisciplinary perspectives. *International Journal of Epidemiology*. 2002; 31:285–293. [PubMed: 11980781]
- Berg CJ, Schauer GL, Asfour OA, Thomas AN, Ahluwalia JS. Psychosocial factors and health-risk behaviors associated with hookah use among college students. *Journal of addiction research & therapy*. 2011; doi: 10.4172/2155-6105.S2-001
- Berg CJ, Stratton E, Schauer GL, Lewis M, Wang Y, Windle M, Kegler M. Perceived harm, addictiveness, and social acceptability of tobacco products and marijuana among young adults: marijuana, hookah, and electronic cigarettes win. *Substance use & misuse*. 2015; 50(1):79–89. DOI: 10.3109/10826084.2014.958857 [PubMed: 25268294]
- Cheney M, Oman R, Vesely S, Aspy C, Tolma E. Prospective associations between negative life events and youth tobacco use. *American journal of health behavior*. 2014; 38:942–950. [PubMed: 25207519]
- Cobb C, Ward KD, Maziak W, Shihadeh AL, Eissenberg T. Waterpipe tobacco smoking: an emerging health crisis in the United States. *American journal of health behavior*. 2010; 34(3):275. doi: 10.5993/AJHB.34.3.3 [PubMed: 20001185]
- Cohen S. Perceived stress in a probability sample of the United States. 1988

- Doran N, Brikmanis K. Expectancies for and Use of E-Cigarettes and Hookah among Young Adult Non-Daily Smokers. *Addictive behaviors*. 2016; 60:154–159. DOI: 10.1016/j.addbeh.2016.04.008 [PubMed: 27155241]
- Doran N, Godfrey KM, Myers MG. Hookah use predicts cigarette smoking progression among college smokers. *Nicotine & Tobacco Research*. 2015; ntu343. doi: 10.1093/ntr/ntu343
- Doran N, Trim RS. Correlates of other tobacco use in a community sample of young adults. *Addictive behaviors*. 2015; 51:131–135. DOI: 10.1016/j.addbeh.2015.07.023 [PubMed: 26255638]
- Eissenberg T, Shihadeh A. Waterpipe tobacco and cigarette smoking: direct comparison of toxicant exposure. *American journal of preventive medicine*. 2009; 37(6):518–523. DOI: 10.1016/j.amepre.2009.07.014 [PubMed: 19944918]
- Fielder RL, Carey KB, Carey MP. Predictors of initiation of hookah tobacco smoking: A one-year prospective study of first-year college women. *Psychology of Addictive Behaviors*. 2012; 26(4): 963. doi: 10.1037/a0028344 [PubMed: 22564201]
- Fielder RL, Carey KB, Carey MP. Hookah, cigarette, and marijuana use: a prospective study of smoking behaviors among first-year college women. *Addictive behaviors*. 2013; 38(11):2729–2735. DOI: 10.1016/j.addbeh.2013.07.006 [PubMed: 23934004]
- Gilreath TD, Leventhal A, Barrington-Trimis JL, Unger JB, Cruz TB, Berhane K, et al. Howland S. Patterns of Alternative Tobacco Product Use: Emergence of Hookah and E-cigarettes as Preferred Products Amongst Youth. *Journal of Adolescent Health*. 2016; 58(2):181–185. DOI: 10.1016/j.jadohealth.2015.10.001 [PubMed: 26598059]
- Goodwin RD, Grinberg A, Shapiro J, Keith D, McNeil MP, Taha F, et al. Hart CL. Hookah use among college students: prevalence, drug use, and mental health. *Drug and alcohol dependence*. 2014; 141:16–20. DOI: 10.1016/j.drugalcdep.2014.04.024 [PubMed: 24882367]
- Grinberg A. Subjective well-being and hookah use among adults in the United States: A nationally-representative sample. *Drug and alcohol dependence*. 2015; 153:242–249. DOI: 10.1016/j.drugalcdep.2015.05.020 [PubMed: 26099176]
- Grinberg A, Goodwin RD. Prevalence and correlates of hookah use: A nationally representative sample of US adults ages 18-40 years old. *American Journal of Drug and Alcohol Abuse*. in press.
- Heinz AJ, Giedgowd GE, Crane NA, Veilleux JC, Conrad M, Braun AR, et al. Kassel JD. 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. *Addictive behaviors*. 2013; 38(11):2751–2760. DOI: 10.1016/j.addbeh.2013.07.009 [PubMed: 23934006]
- Holtzman AL, Babinski D, Merlo LJ. Knowledge and attitudes toward hookah usage among university students. *Journal of American College Health*. 2013; 61(6):362–370. DOI: 10.1080/07448481.2013.818000 [PubMed: 23930750]
- Johnston, L.; O'Malley, P.; Bachman, J.; Schulenberg, JE.; Miech, RA. *Ann Arbor. Institute for Social Research The University of Michigan*; 2015. *Monitoring the Future national survey results on drug use. 1975-2014: Volume 2, College students and adults ages 19-55.*
- Jones BD, Cunningham-Williams RM. Hookah and cigarette smoking among African American college students: Implications for campus risk reduction and health promotion efforts. *Journal of American College Health*. 2016; 64:309–317. [PubMed: 26829515]
- Kassel JD, Stroud LR, Paronis CA. Smoking, stress, and negative affect: correlation, causation, and context across stages of smoking. *Psychological bulletin*. 2003; 129(2):270. doi: 10.1037/0033-2909.129.2.270 [PubMed: 12696841]
- Khantzian EJ. The self-medication hypothesis of substance use disorders: a reconsideration and recent applications. *Harvard review of psychiatry*. 1997; 4(5):231–244. DOI: 10.3109/10673229709030550 [PubMed: 9385000]
- Lee YO, Bahreinifar S, Ling PM. Understanding tobacco-related attitudes among college and noncollege young adult hookah and cigarette users. *Journal of American College Health*. 2014; 62:10–18. DOI: 10.1080/07448481.2013.842171 [PubMed: 24313692]
- Lynch J, Davey-Smith G. A life course approach to chronic disease epidemiology. *Annual Review of Public Health*. 2005; 26:1–35.

- Maziak W. The global epidemic of waterpipe smoking. *Addictive behaviors*. 2011; 36(1):1–5. DOI: 10.1016/j.addbeh.2010.08.030 [PubMed: 20888700]
- Montgomery SB, De Borba-Silva M, Singh P, dos Santos H, Job JS, Brink T. Exploring Demographic and Substance Use Correlates of Hookah Use in a Sample of Southern California Community College Students. *Californian journal of health promotion*. 2015; 13(1):26. [PubMed: 26688673]
- Nikolova YS, Bogdan R, Brigidi BD, Hariri AR. Ventral striatum reactivity to reward and recent life stress interact to predict positive affect. *Biological psychiatry*. 2012; 72(2):157–163. DOI: 10.1016/j.biopsych.2012.03.014 [PubMed: 22534456]
- Pearlin L, Schieman S, Fazio E, Meersman S. Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior*. 2005; 46:205–219. [PubMed: 16028458]
- Pedersen ER, Grow J, Duncan S, Neighbors C, Larimer ME. Concurrent validity of an online version of the Timeline Followback assessment. *Psychology of Addictive Behaviors*. 2012; 26(3):672. doi: 10.1037/a0027945 [PubMed: 22486334]
- Ramo DE, Hall S, Prochaska JJ. Reliability and validity of self-reported smoking in an anonymous online survey with young adults. *Health Psychology*. 2011; 30:693–701. [PubMed: 21574709]
- Roberti JW, Harrington LN, Storch EA. Further psychometric support for the 10-item version of the perceived stress scale. *Journal of College Counseling*. 2006; 9(2):135–147. DOI: 10.1002/j.2161-1882.2006.tb00100
- Salloum RG, Haider MR, Barnett TE, Guo Y, Getz KR, Thrasher JF, Maziak W. Waterpipe Tobacco Smoking and Susceptibility to Cigarette Smoking Among Young Adults in the United States, 2012–2013. *Preventing chronic disease*. 2016; 13doi: 10.5888/pcd13.150505
- Salloum RG, Thrasher JF, Kates FR, Maziak W. Water pipe tobacco smoking in the United States: findings from the National Adult Tobacco Survey. *Preventive medicine*. 2015; 71:88–93. [PubMed: 25535678]
- Schweizer CA, Roesch SC, Khoddam R, Doran N, Myers MG. Examining the stability of young adult alcohol and tobacco co-use: A latent transition analysis. *Addiction Research and Theory*. 2014; 22:325–335. DOI: 10.3109/16066359.2013.856884
- Shephardson RL, Hustand JTP. Hookah tobacco smoking during the transition to college: Prevalence of other substance use and predictors of initiation. *Nicotine & Tobacco Research*. 2016; 18:763–769. [PubMed: 26259986]
- Sinha R. Stress and drug abuse. *Techniques in the Behavioral and Neural Sciences*. 2005; 15:333–356. DOI: 10.1016/S0921-0709(05)80063-X
- Sinha R. Chronic stress, drug use, and vulnerability to addiction. *Annals of the New York Academy of Sciences*. 2008; 1141(1):105–130. DOI: 10.1196/annals.1441.030 [PubMed: 18991954]
- Sobell, LC.; Sobell, MB. Timeline follow-back: A technique for assessing self-reported alcohol consumption. In: Litten, RZ.; Allen, JP., editors. *Measuring alcohol consumption: Psychosocial and biochemical methods*. Totowa, NJ: Humana Press; 1992. p. 41-72.
- Sobell, LC.; Sobell, MB. *Timeline followback: A calendar method for assessing alcohol and drug use*. Toronto: Addiction Research Foundation; 1996.
- Soule EK, Lipato T, Eissenberg T. Waterpipe tobacco-smoking: a new smoking epidemic among the young? *Current pulmonology reports*. 2015; 4(4):163–172. [PubMed: 26756025]
- Sutfin EL, McCoy TP, Reboussin BA, Wagoner KG, Spangler J, Wolfson M. Prevalence and correlates of waterpipe tobacco smoking by college students in North Carolina. *Drug and alcohol dependence*. 2011; 115(1):131–136. [PubMed: 21353750]
- Wills, TA.; Hirky, AE. Coping and substance abuse: A theoretical model and review of the evidence. In: Zeichnec, M.; Eudler, N., editors. *Handbook of coping: Theory research, and applications*. New York: Wiley; 1996.

Highlights

- Nearly one-third of young adults reported hookah use in the past 14 days
- Hookah use is related to exposure to stressful life events but not perceived stress
- Exposure to more stressful events predicted greater odds and frequency of use

Table 1

Demographic and clinical characteristics by past 14-day hookah use.

Variable	Cigarettes only	Cigarettes + hookah	Total
n	410	188	598
Age, M (SD)	20.5 (1.9)	20.3 (1.5)	20.4 (1.8)
Sex, % male *	47.1%	58.5%	50.7%
Race/ethnicity, % Caucasian	51.0%	46.8%	49.7%
Student status, % full time student **	56.1%	67.6%	59.7%
Total cigarettes smoked in past 2 weeks, M (SD)	12.9 (18.9)	16.0 (22.0)	13.9 (20.0)
Total alcoholic drinks in past 2 weeks, M (SD) **	16.4 (20.5)	23.0 (23.5)	18.5 (21.7)
Stressful life events, M (SD) *	8.1 (4.6)	9.1 (5.0)	8.4 (4.7)
Perceived stress, M (SD)	20.1 (6.6)	19.4 (6.3)	19.9 (6.5)

*
 $p < .05$ **
 $p < .01$

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 2

Logistic and negative binomial models predicting hookah use

Predictor	Coefficient	Standard Error	z-score	Odds Ratio (95% ci)	p-value
Logistic model predicting likelihood: model $\chi^2(7)=34.85, p < .001$					
Sex	-0.36	0.19	-1.91	0.70 (0.48, 1.01)	.056
Race/ethnicity	0.11	0.09	1.27	1.12 (0.94, 1.32)	.203
Student status	0.58	0.19	3.02	1.78 (1.23, 2.60)	.003
Cigarettes smoked	0.002	0.005	0.51	1.00 (0.99, 1.01)	.610
Alcoholic drinks	0.01	0.005	2.93	1.01 (1.00, 1.02)	.003
Perceived stress	-0.02	0.02	-1.07	0.98 (0.96, 1.01)	.287
Stressful life events	0.05	0.02	2.69	1.05 (1.01, 1.10)	.007
Negative binomial model predicting frequency: model $\chi^2(7)=31.08, p < .001$					
Sex	-0.27	0.20	-1.38	-	.168
Race/ethnicity	0.16	0.09	1.86	-	.063
Student status	0.21	0.20	1.09	-	.277
Cigarettes smoked	0.01	0.01	1.73	-	.084
Alcoholic drinks	0.02	0.02	2.84	-	.004
Perceived stress	-0.01	0.02	-0.56	-	.572
Stressful life events	0.05	0.02	2.20	-	.028