

# Reasons for Use of Electronic Cigarettes, Cigars, and Hookah in Pregnant Women in Rhode Island: A Preliminary Study

NATASHA A. SOKOL, ScD; ANNA ALIKHANI, MSW, MPH; NANCY C. JAO, PhD; EVA SHARMA, PhD; LAURA R. STROUD, PhD

## ABSTRACT

**BACKGROUND:** The current study examined reasons pregnant women in Rhode Island use non-cigarette nicotine/tobacco products during and prior to pregnancy.

**METHODS:** Of the 124 pregnant women in Rhode Island enrolled in the study, 91% self-reported ever using e-cigarettes, hookah or cigars, and reasons for their use. We compared responses between participants who used these products during pregnancy (prenatal) and those who used prior to pregnancy (lifetime) for each product separately.

**RESULTS:** Participants reported using e-cigarettes as a cessation aid, hookah for entertainment, and cigars as a vehicle for marijuana consumption as primary reasons for use. There were no significant differences in reasons for using hookah or cigars between prenatal and lifetime users, but prenatal e-cigarette users were more likely to report affordability as a reason for use compared to lifetime e-cigarette users.

**CONCLUSIONS:** Differential reasons for use by tobacco product may have implications for targeted interventions in pregnant people in Rhode Island.

**KEYWORDS:** pregnancy, reasons for use, e-cigarettes, hookah, cigars

## INTRODUCTION

In-utero exposure to nicotine and tobacco is known to have teratogenic effects.<sup>1</sup> While rates of cigarette smoking during pregnancy have declined in the US, rates of non-cigarette nicotine/tobacco products (NCNTP) use during pregnancy have either remained stable or increased.<sup>2-4</sup> Due to differences in state laws, there are geographical variations in state-specific prevalence of NCNTP use during pregnancy.<sup>5</sup> While much emphasis has been placed in Rhode Island on tobacco regulatory policies,<sup>6</sup> there is little examination of NCNTP use among pregnant people in Rhode Island. For instance, while one study found that e-cigarette use among pregnant people in Rhode Island had decreased from 4.7% (2015–2016) to 2.4% (2017–2018),<sup>7</sup> no studies to date have examined use of other NCNTP products (e.g., hookah, cigars) in pregnant people in Rhode Island.

Despite stable or rising rates of use, little is known about reasons for use of NCNTPs among pregnant people. Much

of the extant research focuses on e-cigarettes. This literature has largely identified smoking cessation or relapse prevention and harm reduction to the pregnant person, fetus, and others as primary reasons for e-cigarette use in pregnancy,<sup>8,9</sup> paralleling e-cigarette studies in adults, where key reasons for use are as a safer and healthier alternative to cigarettes and as a potential smoking cessation aid.<sup>10</sup> NCNTPs are also available in a variety of flavors, which may make them more appealing; flavors are a top reported reason for NCNTP use – particularly hookah and e-cigarettes – in studies of adult populations.<sup>8,11</sup> In addition, in studies of general populations, dependence levels, reasons for use, and cessation intentions tend to vary by product, suggesting very different pathways toward intervention for each NCNTP.<sup>10,12,13</sup>

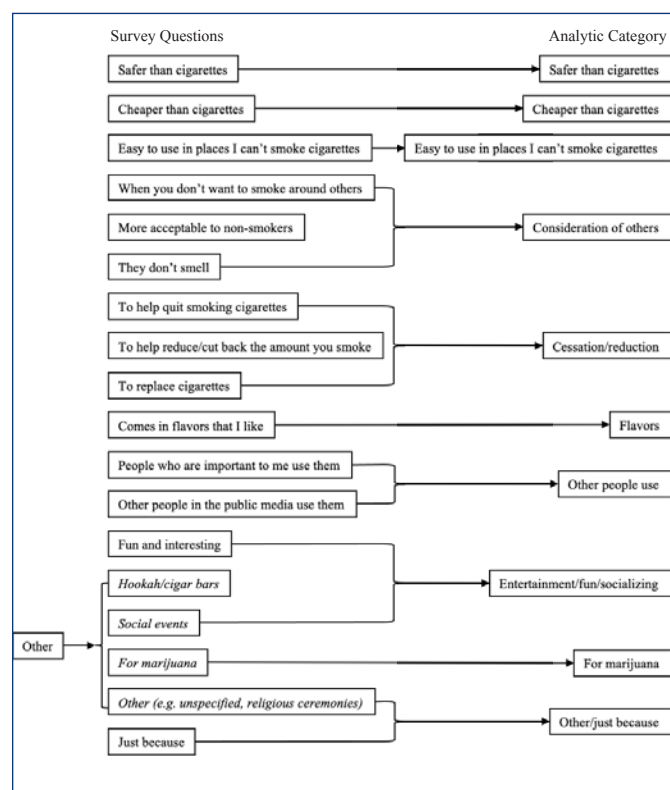
Despite the importance of elucidating differential reasons for use of NCNTPs during pregnancy for development of tailored intervention efforts, to our knowledge, no studies have specifically examined reasons for hookah or cigar use during pregnancy in the US or Rhode Island or e-cigarettes in Rhode Island. Given the known health impacts of NCNTP use during pregnancy,<sup>1</sup> and evidence for stable or increased use during pregnancy over time,<sup>2-4</sup> the current study sought to understand reasons for use of e-cigarettes, hookah and cigars in a sample of low-income, racially and ethnically diverse pregnant women in Rhode Island. Our aim was to compare reasons for use of NCNTPs between pregnant women who reported lifetime but no current use of NCNTP, and those who reported NCNTP use during pregnancy.

## MATERIALS AND METHODS

Participants were 124 pregnant women from the greater Rhode Island area who were English-speaking, primarily low-income, and with diverse racial and ethnic identities. Participants were drawn from a parent study examining the impact of cigarette smoking during pregnancy on fetal development. Participants were over-sampled for prenatal cigarette use with no exclusions based on other tobacco product use. Recruitment took place at obstetrical offices, health centers, and community postings in Rhode Island. Participants in the parent study provided written informed consent to participate in a substudy conducted at  $M_{\text{gestation}}=34$  weeks focused on use and perceptions of several NCNTPs (e-cigarettes, hookah, cigars). All participants provided written informed consent; study procedures were approved by local Institutional Review Boards.

One hundred and thirteen (91%) of the participants surveyed reported using e-cigarettes, hookah, or cigars in their lifetimes. We examined reasons for NCNTP use by prenatal versus lifetime (ever used prior to pregnancy) use groups for each product. Reasons for using each product were assessed using the prompt “What are the reasons why you use(d) [the product]?” Participants were instructed to select as many reasons as applied from a list of 15 options, which included an optional text response (Box 1).<sup>10</sup> The original reasons were consolidated into nine categories, and a tenth category was added based on text responses: 1) safer than cigarettes; 2) cheaper than cigarettes; 3) usable when smoking is not permitted; 4) consideration of others; 5) cessation/reduction aid; 6) flavors; 7) entertainment/fun/socializing; 8) others use; 9) another reason/just because; and 10) for using marijuana.

**Box 1.** Classification of reasons for use from original survey questions to analytic categories



**RESULTS**

**Table 1** shows sample characteristics among respondents who reported ever using any of the three NCNTPs (N=113; n=58 for e-cigarettes; n=78 for cigars; n=103 for hookah). Rates of prenatal and lifetime use (respectively) were 8% and 47% for e-cigarettes; 13% and 84% for hookah; and 12% and 63% for cigars. Most participants (75%) reported having ever tried two or more NCNTPs. Of the 36 participants who reported using NCNTPs prenatally, n=4 (11%) reported using two or more products.

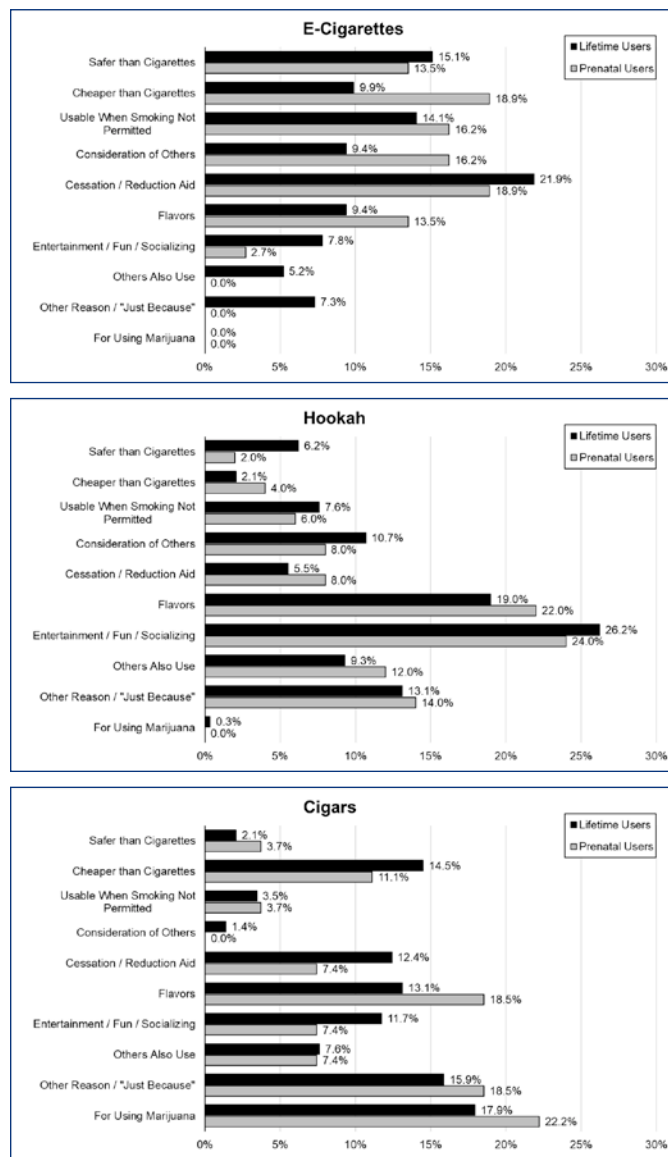
**Table 1.** Sample characteristics

	Overall (N=113)	Lifetime E-Cig Use (n=58)	Lifetime Cigar Use (n=78)	Lifetime Hookah Use (n=103)
	Freq. (%)			
Hispanic ethnicity	40 (35.4)	15 (26.3)	25 (32.1)	39 (37.9)
Race				
White	46 (40.7)	27 (47.4)	32 (41.0)	39 (37.9)
Black	25 (22.1)	11 (19.3)	18 (23.1)	22 (21.4)
Another race	29 (25.7)	12 (21.1)	18 (23.1)	29 (28.2)
Multiracial	13 (11.5)	7 (12.3)	10 (12.8)	13 (12.6)
Employed	73 (64.6)	36 (63.2)	50 (64.1)	70 (68.0)
Annual HH income <\$30,000	68 (63.0)	33 (60.0)	47 (63.5)	61 (62.2)
<b>Education</b>				
Less than HS	23 (20.4)	14 (24.6)	14 (18.0)	20 (19.4)
HS/GED	34 (30.1)	14 (24.6)	22 (28.2)	32 (31.1)
Some college/ associate's	50 (44.3)	27 (47.4)	39 (50.0)	46 (44.7)
College or greater	6 (5.3)	2 (3.5)	3 (3.9)	5 (4.9)
Used e-cigs during pregnancy	10 (8.1)	10 (17.2)	7 (9.0)	9 (8.7)
Used cigars during pregnancy	15 (12.1)	6 (10.5)	15 (19.2)	15 (14.6)
Used hookah during pregnancy	16 (12.9)	7 (12.3)	10 (12.8)	16 (15.5)
<b>Mean (SD)</b>				
Gestational age (weeks)	34.1 (1.6)	34.2 (1.6)	34.0 (1.7)	34.2 (1.5)
Parity	0.9 (1.1)	1.0 (1.3)	0.9 (1.2)	0.8 (1.0)
Age (years)	26.3 (4.5)	26.3 (4.4)	26.6 (4.7)	25.9 (4.4)

Note. HS, high school; GED, General Equivalency Degree; E-cig, electronic cigarettes ; HH: household income

Reasons of reported prenatal and lifetime use by product among pregnant women from the greater Rhode Island area are shown in **Figure 1**. The primary reported reason for lifetime use was as a cessation aid (22%) for e-cigarettes (**Figure 1A**); for entertainment/fun/socializing (26%) for hookah (**Figure 1B**); and to consume marijuana (18%) for cigars (**Figure 1C**). The primary reported reason for prenatal use was as a cessation aid and affordability relative to cigarettes (both 19%) for e-cigarettes; for entertainment/fun/socializing (24%) for hookah; and to consume marijuana (22%) for cigars. Participants who used e-cigarettes prenatally were more likely to report affordability (19%) as the reason for use vs. those who reported lifetime e-cigarette use (10%) ( $p<0.001$ ). No participants reported using e-cigarettes as a means to use marijuana. No differences in reasons for use emerged between prenatal and lifetime use groups for hookah or cigars.

**Figure 1.** Proportion of sample (n = 113) reporting reasons for (A) e-cigarettes, (B) hookah, and (C) cigars use based on history of use (lifetime vs. prenatal use)



**DISCUSSION**

This study aimed to understand reasons for use of e-cigarettes, hookah, and cigars among pregnant people in Rhode Island. The present study is the first, to our knowledge, to explore reasons for using hookah and cigars during pregnancy in the US. Consistent with findings from studies of general populations, pregnant people in Rhode Island reported differing reasons for use by product: smoking cessation was the most common reason for use of e-cigarettes, entertainment/fun/socializing for hookah, and to deliver marijuana for cigars. Consistent with non-pregnant populations,<sup>10</sup> pregnant women perceive e-cigarettes as a safer and healthier alternative compared to smoking conventional

cigarettes – although this was a more popularly endorsed reason for lifetime versus prenatal use. Hookah is widely considered a social activity with low perceived risk.<sup>14</sup> Findings from the present study that key reasons for hookah use in pregnant women were for social reasons and flavors parallel studies from general populations pointing to social factors and flavors as key reasons for hookah use,<sup>15,16</sup> along with affordability.<sup>17</sup> Our finding that consuming marijuana was the most common reason for cigar use in pregnant women is consistent with findings from a nationally representative general sample showing that blunts are more commonly smoked than unadulterated cigars among pregnant people and women of reproductive age in the US.<sup>3</sup> Blunts are cigars that are partially or fully hollowed and filled with marijuana, or marijuana wrapped in cigar wrappers. Because cigar wrappers are made of tobacco, blunts deliver both tobacco and marijuana to people who smoke them.

Study findings should be considered in the context of limitations. The generalizability of these results may be limited due to convenience sampling methods. The current sample is also higher risk than the general population due to socio-demographic and behavioral factors. The self-report measure of reasons for use was retrospective, and is subject to recall bias, as well as forms of desirability bias. In addition, we did not have adequate sample size to assess for differences between reasons for use of tobacco products in pregnancy versus lifetime. We also did not specifically assess product switching during pregnancy or the postpartum period.

While overall, study findings suggest that the reasons for use of NCNTPs do not differ strongly between prenatal and lifetime users, results highlight differing reasons for use by type of NCNTP among pregnant women. These findings underscore the importance of assessing for use of multiple NCNTPs in addition to cigarette smoking during pregnancy. Findings also highlight the need for targeted education and health communication efforts to address misconceptions and risks for each NCNTP among pregnant people, especially for individuals who switch from cigarette use to NCNTP use due to perceived diminished risk. For instance, while individuals may be using e-cigarettes during pregnancy for smoking cessation, there may be no fetal health advantage to switching to e-cigarettes – especially as the prevalence of preterm birth, small for gestation age, and low birthweight has been shown to be similar between those who smoked e-cigarettes compared to combustible cigarettes.<sup>18</sup> In addition to implementing evidence-based strategies for cessation, healthcare professionals who treat pregnant people who smoke should consider tailoring behavioral counseling strategies based on each type of NCNTP and potential reasons for using.<sup>19</sup> For instance, cessation strategies targeting increasing social support and reducing the amount of time spent in social places that are associated with NCNTP use may be especially effective for individuals who use hookah during pregnancy. Similarly, evidence-based interventions targeting marijuana

use may be particularly helpful for cigar users who may be using blunts, such as incorporating behavioral components of motivational interviewing or contingency management.<sup>20</sup>

Although we did not address significance of differences between prenatal and lifetime reasons for use, findings that reasons for use did not differ substantially between prenatal and lifetime use for specific NCNTPs suggests that policies and interventions intended to decrease use by addressing reasons for use in the general population may also serve to reduce use in pregnant people. Further, given known adverse effects of NCNTPs on maternal and offspring health, policies designed to reduce NCNTPs in the general population would also impact maternal use and maternal and offspring health. Future research is needed to confirm lack of differences between reasons for use in lifetime versus prenatal periods in larger samples. Additional research is also needed to investigate switching between NCNTPs, from NCNTPs to cigarettes, and from tobacco use to marijuana use during pregnancy and in the postpartum period.

## CONCLUSION

The present study revealed differential reasons for use by NCNTP in pregnant women in Rhode Island. Elucidating reasons for using NCNTP provides essential information for developing tailored cessation strategies at individual, local, and state-wide levels to engage marginalized populations in Rhode Island. Recent moves by the US Food and Drug Administration to ban menthol cigarettes<sup>21</sup> and reduce nicotine in cigarettes to non-addictive levels<sup>22</sup> makes research focused on NCNTPs particularly timely and relevant. While many cities in Rhode Island (i.e., Providence, Central Falls, Barrington, Johnston, Middletown) have established local restrictions banning the sale of flavored tobacco- or nicotine-containing products in 2012,<sup>23</sup> Rhode Island began regulatory steps to prohibit the sale of flavored e-cigarette products to curb youth use in 2019, and permanently banned flavored e-cigarettes in 2020.<sup>24</sup> Given that flavors is an important reason for use across NCNTPs, but particularly for hookah, the establishment of state-wide regulations to prohibit the sale of all flavored tobacco products could further facilitate reduction of tobacco dependence and disease in Rhode Island,<sup>25,26</sup> including among pregnant people.

## References

1. England LJ, Aagaard K, Bloch M, et al. Developmental toxicity of nicotine: A transdisciplinary synthesis and implications for emerging tobacco products. *Neurosci Biobehav Rev*. 2017;72:176-189.
2. Obisesan OH, Osei AD, Uddin SMI, et al. E-Cigarette Use Patterns and High-Risk Behaviors in Pregnancy: Behavioral Risk Factor Surveillance System, 2016-2018. *Am J Prev Med*. 2020;59(2):187-195.
3. Coleman-Cowger VH, Pickworth WB, Lordo RA, Peters EN. Cigar and Marijuana Blunt Use Among Pregnant and Nonpregnant Women of Reproductive Age in the United States, 2006-2016. *Am J Public Health*. 2018;108(8):1073-1075.
4. Kurti AN, Redner R, Lopez AA, et al. Tobacco and nicotine delivery product use in a national sample of pregnant women. *Prev Med*. 2017;104:50-56.
5. Liu B, Du Y, Wu Y, et al. Prevalence and Distribution of Electronic Cigarette Use Before and During Pregnancy Among Women in 38 States of the United States. *Nicotine Tob Res*. 2021;23(9):1459-1467.
6. American Lung Association. State Grades: Rhode Island. <https://www.lung.org/research/sotc/state-grades/rhode-island>. Accessed February 11, 2022.
7. Rollins LG, Sokol NA, McCallum M, et al. Electronic Cigarette Use During Preconception and/or Pregnancy: Prevalence, Characteristics, and Concurrent Mental Health Conditions. *J Womens Health (Larchmt)*. 2020;29(6):780-788.
8. Coleman BN, Rostron B, Johnson SE, et al. Electronic cigarette use among US adults in the Population Assessment of Tobacco and Health (PATH) Study, 2013-2014. *Tob Control*. 2017;26(e2):e117-e126.
9. Kapaya M, D'Angelo DV, Tong VT, et al. Use of Electronic Vapor Products Before, During, and After Pregnancy Among Women with a Recent Live Birth - Oklahoma and Texas, 2015. *MMWR Morb Mortal Wkly Rep*. 2019;68(8):189-194.
10. Rodu B, Plurphanswat N. E-cigarette Use Among US Adults: Population Assessment of Tobacco and Health (PATH) Study. *Nicotine Tob Res*. 2018;20(8):940-948.
11. Smith-Simone S, Maziak W, Ward KD, Eissenberg T. Waterpipe tobacco smoking: knowledge, attitudes, beliefs, and behavior in two U.S. samples. *Nicotine Tob Res*. 2008;10(2):393-398.
12. Dunbar MS, Shadel WG, Tucker JS, Edelen MO. Use of and reasons for using multiple other tobacco products in daily and non-daily smokers: Associations with cigarette consumption and nicotine dependence. *Drug Alcohol Depend*. 2016;168:156-163.
13. Rostron BL, Schroeder MJ, Ambrose BK. Dependence symptoms and cessation intentions among US adult daily cigarette, cigar, and e-cigarette users, 2012-2013. *BMC Public Health*. 2016;16(1):814.
14. Momenabadi V, Hossein Kaveh PhD M, Hashemi SY, Borhaninejad VR. Factors Affecting Hookah Smoking Trend in the Society: A Review Article. *Addict Health*. 2016;8(2):123-135.
15. Kothari S, Berg CJ. Reasons for use, potential use, or discontinued use of hookah among US young adult college students. *Tob Prev Cessat*. 2018;4.
16. Villanti AC, Johnson AL, Ambrose BK, et al. Flavored Tobacco Product Use in Youth and Adults: Findings From the First Wave of the PATH Study (2013-2014). *Am J Prev Med*. 2017;53(2):139-151.
17. Nyman AL, Sterling KL, Weaver SR, Majeed BA, Eriksen MP. Little Cigars and Cigarillos: Users, Perceptions, and Reasons for Use. *Tob Regul Sci*. 2016;2(3):239-251.
18. Regan AK, Pereira G. Patterns of combustible and electronic cigarette use during pregnancy and associated pregnancy outcomes. *Sci Rep*. 2021;11(1):13508.
19. Diamanti A, Papadakis S, Schoretsaniti S, et al. Smoking cessation in pregnancy: An update for maternity care practitioners. *Tobacco induced diseases*. 2019;17:57-57.
20. Sherman BJ, McRae-Clark AL. Treatment of Cannabis Use Disorder: Current Science and Future Outlook. *Pharmacotherapy*. 2016;36(5):511-535.
21. FDA Proposes Rules Prohibiting Menthol Cigarettes and Flavored Cigars to Prevent Youth Initiation, Significantly Reduce Tobacco-Related Disease and Death [press release]. April 28, 2022.
22. FDA Announces Plans for Proposed Rule to Reduce Addictiveness of Cigarettes and Other Combusted Tobacco Products [press release]. June 21, 2022.

23. City of Providence. Summary of Tobacco Ordinances, Bans and Fine Structures. <https://www.providenceri.gov/healthy-communities/summary-tobacco-ordinances-bans-fine-structures/>. Accessed January 6, 2022.
24. Rhode Island Department of Health. Licensing of Electronic Nicotine-Delivery System Distributors and Dealers (216-RICR-50-15-6): Prohibition on the Sale of Flavored Electronic Nicotine-Delivery System Products. <https://rules.sos.ri.gov/regulations/part/216-50-15-6>. Accessed July 26, 2022.
25. American Lung Association. Rhode Island Highlights. <https://www.lung.org/research/sotc/state-grades/highlights/rhode-island>. Published 2021. Accessed February 11, 2022.
26. DaSilva M. (2022, January 26). Rhode Island earns mixed reviews in tobacco control report. WPRI. <https://www.wpri.com/health/rhode-island-earns-mixed-reviews-in-tobacco-control-report/>.

### Authors

Natasha A. Sokol, ScD, Center for Behavioral and Preventive Medicine at The Miriam Hospital, Department of Psychiatry and Human Behavior at Alpert Medical School of Brown University, Providence, RI.

Anna Alikhani, MSW, MPH, Center for Health Promotion and Health Equity, Department of Behavioral and Social Sciences, Brown University School of Public Health, Providence, RI.

Nancy C. Jao, PhD, Department of Psychology, Rosalind Franklin University of Medicine and Science, North Chicago, IL.

Eva Sharma, PhD, Westat, Rockville, MD.

Laura R. Stroud, PhD, Center for Behavioral and Preventive Medicine at The Miriam Hospital, Department of Psychiatry and Human Behavior at Alpert Medical School of Brown University, Providence, RI.

### Acknowledgments

NAS was supported by the National Institute on Alcohol Abuse and Alcoholism (T32AA007459) and the National Institute on Drug Abuse (K01DA054324). NCJ was supported by T32HL076134; ES was supported by internal funds from Westat. This work was also supported by the National Institute on Drug Abuse and the Center for Tobacco Products of the U.S. Food and Drug Administration (5R01DA036999-02S2 to LRS and 5R01DA045492 to LRS and Lori Scott-Sheldon, PhD); National Institute on Drug Abuse (5R01DA036999, 5R01DA045492, and R01DA044504 to LRS) and the National Institute of General Medical Sciences (1P20GM139767 to LRS).

### Disclaimer

The authors have no conflicts of interest to declare. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health or the Food and Drug Administration. NIH, CTP, and FDA had no role in the study design, collection, analysis or interpretation of the data, writing the manuscript, or the decision to submit the paper for publication.

### Correspondence

Natasha Sokol and Laura Stroud

Center for Behavioral and Preventive Medicine

The Miriam Hospital, 164 Summit Ave. Providence RI 02906.

[natasha\\_sokol@brown.edu](mailto:natasha_sokol@brown.edu)

[laura\\_stroud@brown.edu](mailto:laura_stroud@brown.edu)