Comparison of the locations where young adults smoke, vape, and eat/drink cannabis: Implications for harm reduction

Connor B. Jones[a],*, Madeline H. Meier[a], Dustin A. Pardini[b]

[a] Department of Psychology, Arizona State University, PO Box 871104, Tempe, AZ 85287-1104, USA
[b] School of Criminology and Criminal Justice, Arizona State University, 411 N Central Ave, Suite 600, University Center, Phoenix, AZ 85004, USA

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ABSTRACT

Background: Cannabis vaping and edible use are increasingly popular methods of cannabis use. These discreet methods could increase risk of cannabis-related problems by facilitating cannabis use in a wider range of settings.

Methods: A sample of 1018 college students were recruited to complete a survey about their health and behavior. Participants who used cannabis in the past year (35.1%, n = 357) answered questions about their cannabis use, including where they were the last time they smoked, vaped, or ate/drank cannabis, and their experience of cannabis-related problems.

Results: Compared with cannabis smoking, participants were more likely to have vaped cannabis (15.8% smoked vs. 24.6% vaped; X^2 = 4.59, p = .032), and were slightly, but not statistically significantly, more likely to have used cannabis edibles (17.5% smoked vs. 24.2% used edibles; X^2 = 3.57, p = .059), in locations other than a private residence. For example, participants were more likely to have vaped cannabis in a car than to have smoked cannabis in a car (8.8% vaped vs. 3.5% smoked; X^2 = 4.26, p = .039). More frequent cannabis vaping was associated with driving while high on cannabis, even after accounting for overall frequency of cannabis use and other covariates (OR = 1.22, p = .047). More frequent cannabis vaping and edible use were associated with various cannabis-related problems, but, in general, these associations became statistically non-significant after accounting for overall frequency of cannabis use.

Conclusions: Cannabis vaporizers and edibles facilitate cannabis use in locations that require discretion. Increased availability of cannabis vaporizers and edibles could increase risk of cannabis-related problems by enabling use in more settings.

1. Introduction

Cannabis vaping and edible use are increasingly popular methods of cannabis use that offer alternatives to traditional cannabis smoking (Borodovsky et al., 2017; Jones, Hill, Pardini, & Meier, 2016; Lamy et al., 2016; Morean, Kong, Camenga, Cavallo, & Krishnan-Sarin, 2015). Although these non-combustible methods of cannabis use might reduce the adverse respiratory effects of cannabis smoking (e.g., bronchitis) (Lynskey, Hindocha, & Freeman, 2016; Tashkin et al., 1987; Taylor, Poulton, Moffitt, Ramankutty, & Sears, 2000; Tetrault et al., 2007), they might also present important public health risks (Borodovsky et al., 2017; Budney, Sargent, & Lee, 2015; Lee, Crosier, Borodovsky, Sargent, & Budney, 2016). For example, vaporizers and edibles facilitate cannabis use in prohibited locations by minimizing the distinctive cannabis odor produced by cannabis smoking and by disguising use through

resemblance to legal products, like e-cigarettes and baked goods. In fact, both adolescents and adults report that an important reason for choosing vaporizers and edibles is to conceal cannabis use (Etter, 2015; Friese, Slater, Annechino, & Battle, 2016; Friese, Slater, & Battle, 2017; Giombi, Kosa, Rains, & Cates, 2018; Jones et al., 2016; Malouff, Rooke, & Copeland, 2014), which could facilitate cannabis use in risky locations, such as in a car. Our internet search of cannabis websites (e.g., grasscity.com) suggests that at least some cannabis users are choosing vaporizers and edibles specifically so that they can use while driving. For example, in an online forum discussion of cannabis vaping and driving, one person wrote: "But it wouldn't really smell because of the vape… I'm skeptical about lighting up a joint in a car, but I'd imagine that vaping would be fine, right?" (FreeYourSoul, 2013). Although driving while high on cannabis is illegal, such prohibitions may be ignored and may be quite difficult to enforce if discreet methods of

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cannabis use allow individuals to hide use from authority figures (e.g., police).

Moreover, as cannabis vaporizers and edibles facilitate cannabis use in a wider range of settings, frequency of cannabis use could increase (Budney et al., 2015; Lee et al., 2016), thereby increasing risk for cannabis-related problems, such as physical dependence and impaired control over use. The prevalence of cannabis use disorder is linked with frequent cannabis use (Coffey et al., 2002; Noack, Höfler, & Lüken, 2011), and, in a prospective study of adult cannabis users, more frequent cannabis use at baseline was associated with a greater likelihood of having a cannabis use disorder three years later, even after accounting for demographic characteristics, family history of substance use disorder, and psychiatric disorders (Blanco et al., 2016). Thus, cannabis vaporizers and edibles might allow cannabis users to use cannabis more often, and in high-risk situations (i.e., while driving), which might increase risk for developing symptoms of cannabis use disorder (e.g., tolerance, withdrawal, using more than planned), as well as other cannabis-related problems.

This study had two primary aims. Our first aim was to test the hypothesis that cannabis users are more likely to vape cannabis, or use cannabis edibles, than to smoke cannabis in locations where discretion is important, including in a car. To test this hypothesis, we conducted within-person comparisons of the locations a person last smoked, vaped, and used a cannabis edible. Our second aim was to test the hypothesis that more frequent cannabis vaping and edible use are associated with increased risk of driving while high and more cannabis-related problems, even after accounting for sociodemographic factors (age, sex, race, SES), more substantive factors (sensation seeking, age of cannabis use initiation, frequency of binge drinking and drug use), and overall frequency of cannabis use.

2. Methods

2.1. Participants

Participants were bachelor's and master's-level students from a large southwestern university in the United States. The university is located in a state where medicinal cannabis use is legal but recreational use is not. Students had the opportunity to complete an anonymous online questionnaire about college student health and behavior for course credit or extra credit in the fall of 2016 and spring of 2017. There were a total of 1018 respondents, of which 98% (n = 998) completed the survey. Participants' mean age was 22.15 (SD = 5.94) and 62% (n = 634) were women. Fifty-five percent of the sample was White/Caucasian, 26% Hispanic or Latino, 12% Asian, 6% Black/African American, and 1% American Indian or Alaska Native. The majority of participants (75%) were from middle class to upper class families. These demographics closely resemble the demographics of the student population at this particular university with one exception: women were overrepresented in this study (62% vs. 49% in the undergraduate population). Analyses report on the 357 participants (35.1%) who had used cannabis in the past year. The past-year prevalence of cannabis use in this sample is similar to that reported among college students in the Monitoring the Future study (37.9%) (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2016). Among past-year cannabis users, participants' mean age was 20.62 (SD = 4.14) and 61.9% (n = 221) were women. Sixty percent of past-year cannabis users were White/Caucasian, 23% were Hispanic or Latino, 8% were Asian, 8% were Black/African American, and 2% were American Indian or Alaska Native. Sixty-nine percent of past-year cannabis users were from middle to upper class families. Missing data were limited because participants were automatically notified if they skipped a question and were given another opportunity to answer the question. Across all analyses, only 2–7% of participants were missing data, as noted in the tables. This study was approved by the University Institutional Review Board.

2.2. Measures

2.2.1. Past-year frequency of cannabis use, cannabis vaping, and edible use

Past-year cannabis users were asked how often they used cannabis in the past year, how often they used a cannabis vaporizer in the past year, and how often they used a cannabis edible (ate or drank) in the past year. Response options were: no use in the past year (scored '0'), < 5 times (scored '1'), > 5 times but less than once a month (scored '2'), about once a month (scored '3'), once a week (scored '4'), a couple times a week (scored '5'), nearly every day (scored '6'), and more than once a day (scored '7'). The percentage of participants who endorsed each response option is as follows: 0.0%, 47.5%, and 37.3% did not use, vape, and eat/drink cannabis, respectively; 31.1%, 26.7%, and 46.6% used, vaped, and ate/drank cannabis < 5 times; 11.5%, 9.0%, and 8.8% used, vaped, and ate/drank cannabis > 5 times but less than once a month; 8.4%, 6.7%, and 5.7% used, vaped, and ate/drank cannabis about once a month; 16.3%, 5.3%, and 1.1% used, vaped, and ate/drank cannabis once a week; 17.7%, 3.7%, and 0.3% used, vaped, and ate/drank cannabis a couple times a week; 10.1%, 0.8%, and 0% used, vaped, and ate/drank cannabis nearly every day; and 5%, 0.3%, and 0.3% used, vaped, and ate/drank cannabis more than once a day.

2.2.2. Locations where cannabis was used

Past-year cannabis users reported where they were the last time they smoked cannabis; where they were the last time they vaped cannabis; and where they were the last time they used a cannabis edible (i.e., ate or drank cannabis). Location was coded as private residence (i.e., at an apartment/house, in a dormitory) vs. all other locations (e.g., in a car, at a bar or club, at a restaurant, concert, park/woods/hiking trail, etc.). The majority of participants used cannabis in a private residence the last time they used regardless of cannabis use method. For example, of the 341 participants who smoked cannabis in the past year, 80.3% (n = 274) last smoked cannabis in a private residence; of the 187 participants who vaped cannabis in the past year, 74.3% (n = 139) last vaped cannabis in a private residence; and of the 222 participants who used a cannabis edible in the past year, 74.4% (n = 165) last used an edible in a private residence.

2.2.3. Driving while high on cannabis

Past-year cannabis users reported whether they had ever driven a car while high on cannabis. Forty-seven percent (n = 168) of past-year cannabis users reported driving while high on cannabis in their lifetime.

2.2.4. Cannabis-related problems

Cannabis-related problems were assessed with the Marijuana Consequences Questionnaire (MACQ) (Simons, Dvorak, Merrill, & Read, 2012), a 50-item self-report measure that assesses cannabis use consequences in eight domains: physical dependence (sum of four 'yes/no' items, coefficient alpha = 0.73, M = 0.66, SD = 1.08; example item: "I have found that I needed larger amounts of cannabis to feel any effect, or that I could no longer get high on the same amount that used to get me high"), impaired control (sum of six 'yes/no' items, coefficient alpha = 0.73, M = 1.30, SD = 1.53; example item: "I often have found it difficult to limit how much cannabis I use"), academic/occupational consequences (sum of five 'yes/no' items, coefficient alpha = 0.68, M = 0.47, SD = 0.95; example item: "The quality of my work or schoolwork has suffered because of my cannabis use"), social-interpersonal consequences (sum of six 'yes/no' items, coefficient alpha = 0.66, M = 0.91, SD = 1.09; example item: "My boyfriend/girlfriend/spouse/parents have complained to me about my cannabis use"), self-care (sum of nine 'yes/no' items, coefficient alpha = 0.80, M = 1.33, SD = 1.86; example item: "I have not had as much time to pursue activities or recreation because of my cannabis use"), self-perception (sum of five 'yes/no' items, coefficient alpha = 0.68, M = 1.20, SD = 1.30; example item: "I have felt guilty about my cannabis use"), risk behaviors (sum of eight 'yes/no' items, coefficient alpha = 0.62,