

Who Volunteers for Cannabis Research? Examining Potential Research Participation in Cannabis Research among Emerging Adults

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ABSTRACT

Research on cannabis users has the potential to suffer from volunteer bias. The sensitive nature of substance use might play an influential role in studies investigating cannabis consumption, particularly in the emerging adult population. The present study examined cannabis use and willingness to participate in cannabis-related research in emerging adults. Undergraduates enrolled in a psychology course (N = 262) reported frequency of use and willingness to participate in hypothetical research studies on cannabis that varied in type and compensation. Logistic regression analyses revealed that women were more likely to participate in a survey for a prize, and both women and non-cannabis users were less likely to participate in a lab study for science. In addition, those who used cannabis less frequently were less willing to participate in an ingestion study for science and an ingestion study for pay. These findings reveal important trends exist in potential participation for cannabis-related research in the emerging adult population, specifically around gender and cannabis use. The results suggest cautious interpretation for the generalizability of studies on cannabis in undergraduate students. Most work might be free of bias but the results of laboratory administration of cannabis might prove difficult to generalize to women and infrequent users of cannabis.

Key words: cannabis, participation bias, emerging adults, gender differences, research participation

Representative samples are essential to generalizable research, but recruitment practices, perception of risk, and incentives might create participation bias. Biased participation patterns generate concern for several sensitive research areas, including substance use. Due to the illicit nature of many substances, coupled with the social taboo around use and addiction, several barriers might inhibit individuals from volunteering for research. Numerous factors impact participation in substance use studies, including current user status, history of use,

study location site, perceived risk, race, age, informed consent, psychopathology, and gender (Bandyopadhyay, Desantis, Korte, & Brady, 2011; Brown & Topcu, 2003; Carter & Hall, 2013; Mariani, Haney, Hart, Vosburg, & Levin, 2009; Orsi, Chapman, & Edwards, 2010; Potter et al., 2011; Ray et al., 2011; Rojas, Sherrit, Harris, & Knight, 2008; Strickland & Stoops, 2015).

Motivation to participate in sensitive psychological research might vary across potential participants, which can contribute to sample characteristics and generalizability.

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Studies likely entice individuals who find the research insightful and useful (Fry & Dwyer, 2001; Hasking, Tatnell, & Martin, 2015). The compensation for participation can also motivate individuals to partake in research, particularly if the study tasks are burdensome or highly sensitive (Frankel & Sharp, 1981; Holland, Ritchie, & Du Bois, 2015; Ulrich, Wallen, Feister, & Grady, 2005). While providing monetary incentives for substance-using individuals has inspired heated debate, these incentives are often necessary to attract, retain, and fairly compensate participants (Pollastri, Pokrywa, Walsh, Kranzler, & Gelernter, 2005; Slomka, McCurdy, Ratliff, Timpson, & Williams, 2007; Van Horn et al., 2011; Wilcox, Bogenschutz, Nakazawa, & Woody, 2012). Perceptions of research burden, risks, benefits, and the drug of interest can influence participation rates and variability (Strickland & Stoops, 2015).

Additionally, participation might vary with procedures. Potential disclosure of sensitive personal information alters volunteering among college students (Rosenbaum, Rabenhorst, Reddy, Fleming, & Howells, 2006). The perception of risk associated with data collection might also influence an individual's decision (Coors & Raymond, 2009; Ray et al., 2011). Surveys are common in psychological research. They can provide anonymity to a large sample; however, concerns around consent and representativeness remain (Buchanan & Hvizdak, 2009; Groves, Cialdini, & Couper, 1992). In contrast, clinical research might require more risk and engagement. Those who seek treatment are more likely to engage in intervention studies, depending upon the drug of interest (Souleymanov et al., 2016; Strickland & Stoops, 2015; Thrul, Stemmler, Goecke, & Bühler, 2015; Uhlmann et al., 2015).

Bias likely stems from sampling procedures that systematically target some people but not others. The historical lack of racial, socioeconomic, and geographic representation in psychological research remains troublesome (George, Duran, & Norris, 2014; Hussain-Gambles, Atkin, & Leese, 2004; Miranda, Nakamura, & Bernal, 2003). The exclusion of certain individuals leaves researchers, and the public, poorly informed on the prevalence of clinical problems and efficacy of treatments. Limited range of research sites coupled with the

ease of convenience sampling has led many researchers to draw from undergraduate populations in a university setting. This practice has facilitated a surge of findings, particularly for a population considered to be vulnerable to drug problems (Arnett, 2008; Hanel & Vione, 2016; Knight et al., 2002; O'Malley & Johnston, 2002). Nevertheless, few studies examine patterns of participation in emerging adults, particularly in the cannabis literature. The objective of this study was to examine willingness to participate in hypothetical research studies on cannabis, differing in methodology and incentive. Clinical intuitions and previous work generated exploratory hypotheses that gender, cannabis use, and the demands of the study would contribute to willingness to participate in research on the plant.

METHOD

Participants

Students in an undergraduate-level psychology course at a public university in the Northeast ($N = 262$) provided data by anonymously opting-in to a brief web-based survey. Preliminary analyses provided demographic information on the participating sample (Median = 18-22 years old, 71.4% Female).

Survey Administration

Questions appeared on Kahoot!™, an online platform that allows users to create custom quizzes. Each quiz has a unique sign-in code where invited participants may use a personal electronic device, such as a smartphone, tablet, or laptop, to enter the code once they have accessed the online site. Participants may provide a temporary non-identifying username in the quiz, and following each question, responses are aggregated. For this survey, all questions had up to four multiple choice options, and each question was timed for one minute, at which point responses for the question were closed. All procedures were in accordance with and approved by the local Institutional Review Board.

Cannabis Use

Participants reported cannabis use with three items: lifetime use (“How many days in your life have you used cannabis?”), past year use (“How often in the last 365 days have you used cannabis?”), and weekly use (“How many days per week did you use cannabis in the last year?”). Response options for lifetime use were: 0, less than 10, 11-50 and over 50 for lifetime use; for past year use: once a week, 2-3 times per month, about once a month, and less than once a month; and for weekly use: 1-2, 3-4, 5-6, and every day. For yearly and weekly use, participants learned to leave the response blank to indicate “no use.”

Potential Research Participation Measures

Participants viewed six unique hypothetical research opportunities, varying in type (online survey, laboratory experiment, or THC ingestion), and compensation (a prize, pay, or no compensation/simply for helping science), and provided a binary choice as to whether they would be willing to participate in such a study or not (“yes” or “no”) (Table 1).

Table 1. *Potential Research Participation Measures.*

Would you complete a 30 min online survey about cannabis for a chance at a prize?
Would you complete a 30 min online survey about cannabis simply to help science?
Would you come to a lab to spend 1 hour on a cannabis lab experiment to help science (no THC)?
Would you come to a lab to spend 1 hour on a cannabis lab experiment for pay (no THC)?
Would you ingest THC in a lab experiment to help science?
Would you ingest THC in a lab experiment to for pay?

Data Analysis

Descriptive analyses revealed details on demographics, and cannabis use measures. Cannabis use items were consolidated into a

single use variable (no use, less than once a month, 1-2 times a week, 3-4 times a week, 5-6 times a week, and everyday use). We regressed willingness to participate in each type of research on gender and cannabis measures. Due to the low sample size for one subpopulation of the model for willingness to come into the lab for pay, we performed a chi-square analysis to examine the association of participation with gender and cannabis use.

RESULTS

Demographics

Participants could report age through one of four items (“younger than 18 years old,” “18-22 years old,” “23 years and older,” or “rather not say.”) In this sample, ($N = 262$), over 90% participants reported an age between 18-22, followed by around 7% reporting 23 or older, less than 1% under 18, with the remaining sample not disclosing; the majority of sample participants identified as female (Median = 18-22 years old, 71.4% Female).

Cannabis Use

We found that 29.7% of participants reported using cannabis 1-2 times a week, followed by 20.3% reporting everyday use, 14.4% reporting less than once a month use, 13.4% reporting 3-4 times a week, and 7.9% reporting 5-6 times a week, while the remaining participants reported no use in their lifetime (14.4%). Among women, the modal response for use was 1-2 times a week (35.6%), while the modal response for men was daily use (30.2%) (Table 2).

Table 2. *Cannabis Use in Male and Female Undergraduates (Percentage).*

Cannabis Use	Male	Female
0	15.1	27.8
Less than once a month	7.5	16.8
1-2/week	13.2	35.6
3-4/week	15.1	12.8
5-6/week	18.9	4.0
Daily	30.2	16.8

Table 3. Logistic Regression Analysis of Cannabis Use from Gender.

	< 1/week			1-2/week			3-4/week			5-6/week			Daily		
	β	SE	OR [CI]	β	SE	OR [CI]	β	SE	OR [CI]	β	SE	OR [CI]	β	SE	OR [CI]
Constant	-.69	.61		-.13	.52		.00	.50		.22	.47		-.69	.43	
Gender	-.87	.68	2.38 [.63-9.03]	1.06	.58	2.88 [.93-8.96]	-.10	.59	.91 [.28-2.89]	-1.48	.66	.23 [.06-.84]*	.52	.53	.60 [.21-1.66]

Note. Reference category=no use. Gender coded as -1 for female, and 1 for male. β = unstandardized regression coefficient, SE = standard errors of regression coefficients, OR = odds ratio, CI = confidence interval for odds ratios, * $p < .05$.

A logistical regression analysis was performed to examine gender and cannabis use. Overall, use was predicted by gender ($\chi^2 (5, N= 202) = 23.023, p < .001$). Females were only .60 times as likely to report use 5-6 times a week. Nagelkerke's R^2 of .111, and Cox and Snell's R^2 of .108 indicated a small relationship between gender and use. The full set of analyses appears in Table 3.

Potential Research Participation

Logistic regressions addressed the role of cannabis use and gender in predicting research participation.

Survey for prize. A test of the model for willingness to complete a survey for a prize was significant ($\chi^2 (6, N = 201)=13.880 p < .05$). Willingness to participate in a survey for a prize was significantly predicted by gender, with women 4.19 times more likely to participate ($\chi^2 (1, N= 201) = 7.330, p < .01$). Nagelkerke's R^2 of .137, and Cox and Snell's R^2 of .067 indicated a small relation between the predictor and willingness to participate, and overall classification accuracy at 89.6%.

Lab for science. A test of the model for willingness to come into the lab for science was significant ($\chi^2 (6, N= 201) = 21.731 p < .01$). Both gender ($\chi^2 (1, N= 201) = 5.884 p < .05$) and use ($\chi^2 (5, N= 201) = 11.345 p < .05$) were predictive of willingness to participate in a lab study to contribute for science, with women only .42 times as likely to participate. Daily users were 3.53 times more likely to participate in this kind of study, as were those who used cannabis 3-4 times a week and 5-6 times a week (3.94 and 4.55 times more likely, respectively). Nagelkerke's R^2 of .137, and Cox and Snell's R^2 of .102 indicated a small

relation between predictors and willingness to participate, and overall classification accuracy at 65.2%.

Ingest for science. A test of the model for willingness to ingest cannabis for science was significant ($\chi^2 (6, N = 202) = 71.965, p < .001$). Cannabis use was a significant predictor ($\chi^2 (5, N = 202) = 65.969 p < .001$), with all users more likely to participate, including daily users who were 76.57 times more likely to participate in such a study. Nagelkerke's R^2 of .426, and Cox and Snell's R^2 of .300 indicated a moderate relation between the predictor and willingness to participate, and overall classification accuracy at 80.2%.

Ingest for pay. A test of the model for willingness to ingest cannabis for pay was significant ($\chi^2 (6, N = 198) = 51.497, p < .001$). Cannabis use was a significant predictor ($\chi^2 (5, N = 198) = 61.389, p < .001$), with daily users 53.05 times more willing to ingest cannabis for pay. Individuals using cannabis 1-2 times a week, 3-4 times a week and 5-6 times a week were also all more likely to participate in this study (11.67, 34.86, 18.54 times more likely, respectively). Nagelkerke's R^2 of .367, and Cox and Snell's R^2 of .229 indicated a moderate relation between the predictor and willingness to participate, and overall classification accuracy at 82.8%.

Lab for pay. Due to the low cell size, the model was unable to compute betas for specific levels of each predictor. A chi square test for independence revealed a significant relation between cannabis use and willingness to ingest cannabis for pay, ($\chi^2 (5, N= 198) = 54.234 p < .001, Cramer's V = .523$). Neither gender nor use altered willingness to participate in a survey for science, with none of

the predictors reaching statistical significance.

The full set of analyses appear in Table 4.

Table 4. *Logistic Regression Analysis of Willingness to Participate in Research from Cannabis Use and Gender*

	Survey for Prize			Lab for Science		
	β	<i>SE</i>	<i>OR</i> [CI]	β	<i>SE</i>	<i>OR</i> [CI]
Constant	.93	.62		-.37	.48	
Cannabis Use						
< 1 month	-.75	.75	.47 [.11 – 2.04]	0.30	.59	1.35 [.43 – 4.30]
1-2/week	.56	.78	1.76 [.38 – 8.02]	.68	.51	1.97 [.73 – 5.33]
3-4/week	-.03	.79	.97 [.21 – 4.59]	1.37	.58	3.94 [1.26 – 12.33]
5-6/week	1.43	1.20	4.18 [.40 – 43.56]	1.51	.70	4.55 [1.16 – 17.85]
Daily	1.40	.93	4.05 [.66 – 24.90]	1.26	.53	3.53 [1.24 – 10.01]**
Gender	1.43	.53	4.19 [1.50 – 11.75]**	-.86	.36	.42 [.21 – .85]*
	Ingest for Science			Ingest for Pay		
	β	<i>SE</i>	<i>OR</i> [CI]	β	<i>SE</i>	<i>OR</i> [CI]
Constant	-.74			-.42	1.09	
Cannabis Use						
< 1 month	1.31	.61	3.69 [1.11 – 12.30]*	.47	.54	1.60 [.56 – 4.61]
1-2/week	2.56	.58	12.99 [4.21 – 40.06]***	2.46	.58	11.67 [3.74 – 36.43]***
3-4/week	3.96	.88	52.56 [9.36 – 295.07]***	3.55	1.09	34.86 [4.13, 294.53]**
5-6/week	3.87	1.14	47.99 [5.15 – 447.35]**	2.92	1.13	18.54 [2.04 – 168.57]*
Daily	4.34	.87	76.57 [13.97 – 419.61]	3.97	1.09	53.05 [6.33 – 444.85]***
Gender	-.90	.54	.41 [.14 – 1.17]	.18	.530	1.20 [.42, 3.40]

Note. Reference category=no use. Gender coded as -1 for female, and 1 for male. β = unstandardized regression coefficient, *SE* = standard errors of regression coefficients, *OR* = odds ratio, *CI* = confidence interval for odds ratios, * $p < .05$, ** $p < .01$, *** $p < .001$

DISCUSSION

In an effort to identify if volunteer bias contributes to the generalizability of cannabis research on young adults, we looked at links among gender, cannabis use, and willingness to participate in varied studies and experiments. Gender and frequency of cannabis use covaried. Women were less likely to report using cannabis 5-6 times a week. In addition, women were more likely to participate in a survey study for a prize, though less likely to participate in a lab study for science. Cannabis use was predictive of willingness to participate in an ingestion study both for science and for pay. Specifically, those who used cannabis more frequently were more likely to participate in these studies.

These results are consistent with previous literature on participation trends in substance use research. High risk users are more likely to participate in substance-use-related research more generally, and these new data extend the

idea to cannabis research in particular (Thrul et al., 2015; Uhlmann et al., 2015). While other work has focused on monetary incentives as motivation for participation, the findings reported here suggest that users are just as willing to take part in risky research for scientific contribution rather than pay (Fry & Dwyer, 2001; Pollastri et al., 2005; Slomka et al., 2007; Van Horn et al., 2011; Wilcox et al., 2012). Future studies might benefit by emphasizing the altruistic and empowering aspects of drug research, which might mitigate ethical issues associated with monetary compensation (Daley, 2015). Substance users might also recognize the potential benefits of participating in research, contributing to willingness to participate without monetary compensation. Such benefits include reduction of use, increased knowledge, higher self-esteem, validation, and other positive gains (Daley, 2015; DeSantis, Bandyopadhyay, Back, & Brady, 2009; Tross et al., 2018). Recruiting undergraduate samples might stem from convenience, but the

practice can potentially neglect higher risk individuals (Billett, 2012). Generalizing from student samples does not always yield an accurate representation of the wider public; the current work highlights the importance of understanding the emerging adult population as a distinct group of users (Hanel & Vione, 2016). In addition, those emerging adults who are willing to participate in cannabis research likely differ from those who are not. Nevertheless, those who appear willing to volunteer appear more involved with cannabis. Perhaps they are the population we are most interested in generalizing to.

This study revealed important findings about potential gender differences in research participation. Women are more likely to participate in survey-based research, but men are more likely to come into the lab. Several possible factors might contribute to these results. Participation in a lab study might appear riskier than survey work, and men are more likely to engage in risky behaviors (Byrnes, Miller, & Schafer, 1999; Harris, Jenkins, & Glaser, 2006; Langhinrichsen-Rohling, Arata, O'Brien, Bowers, & Klibert, 2006). Additionally, women might be more hesitant to disclose substance use in a more public setting because of marginalization, existing social norms around substance use, or gender-related pathologizing (Salmon, Browne, & Pederson, 2010). Recruitment of female participants may be more successful if discomfort can be reduced by targeting safe and known environments (Cooper & Tempalski, 2014). In this sample, female users had a higher prevalence of cannabis use 1-2 times a week compared to men, who endorsed daily use more often. This suggests that while both men and women do use cannabis, they differ in frequency. Future studies should develop recruitment methods to accurately capture both male and female users, particularly if studies may be perceived as risky, in order to obtain a more representative sample.

The present study had several limitations. Given the nature of the survey tool, response options were limited to four multiple choice answers. While this tool was useful for quickly gathering data in this population anonymously, future survey work should provide participants with more nuanced choices, and the opportunity to elaborate on responses. The sample was drawn from an undergraduate course on addictive behaviors, which might attract individuals who

are more likely to be users and who are more partial to drug research compared to a general psychology course. Additionally, this study focused on willingness to participate in research, but did not examine the motivation behind participation interest or lack thereof. Follow up studies should investigate attitudes and perceptions around research that might influence willingness to participate. Finally, the current study presented participants with a survey of hypothetical scenarios; future work should utilize a diverse range of methods to examine participation trends in substance use research. Despite these limitations, the findings of this study suggest further work on potential volunteer bias appears warranted.

This present work provides important context for substance use research in the emerging adult population. Researchers can continue to focus on the young adult population but should remain mindful of potential biases in participation related to incentives and methodology. Furthermore, information about participation trends enables researchers to recruit samples that are more equitable, thus promoting work that is more generalizable to populations typically underrepresented in substance use research.

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