

# COVID-19 Vaccine Uptake and Attitudes Within Two Cohorts of Younger Adult Cannabis Users

Journal of Drug Issues  
2023, Vol. 53(3) 422–430  
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DOI: 10.1177/00220426221131488  
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## Abstract

It is crucial to understand COVID-19 vaccine uptake and attitudes among young adult cannabis users given the lowest vaccination rates among young adults and negative association between cannabis use and willingness to get vaccinated. 18–21-year-old and 26–33-year-old cohorts of cannabis users, recruited in California, were surveyed about the COVID-19 vaccine uptake/attitudes between March–August 2021. Cannabis use/demographic differences were investigated by vaccination status. Vaccine attitudes data were categorized and presented descriptively. 44.4% of the older and 71.8% of the younger cohorts were vaccinated. Non-Hispanic Black/African American race/ethnicity, lack of health insurance, and medicinal orientation towards cannabis use were negatively associated with vaccine receipt within the older cohort. For both cohorts, top reasons for vaccine hesitancy and rejection were concerns about speed of development, potential side effects, natural immunity, and lack of trust of vaccines. Our results highlight greater vaccine hesitance/rejection and need for targeted interventions among mid-20's-early-30's cannabis users.

## Keywords

COVID-19 vaccine, vaccine hesitancy, young adults, medical cannabis use

## Introduction

In the U.S., vaccinations against COVID-19 began on December 14, 2020, when the Food and Drug Administration granted emergency authorization to Pfizer-BioNTech COVID-19 vaccine,

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though vaccine allocation was initially limited to high-risk groups (i.e., health care and essential workers, geriatric populations, adolescents and adults with high-risk medical conditions, including smoking) (Dooling et al., 2021; Money & Shalby, 2021; U.S. Department of Health & Human Services, 2021). Californians aged 16 and older became eligible for the COVID-19 vaccine starting April 15, 2021 (Money & Shalby, 2021). As of September 2022, over 263 million had received at least one dose of the COVID-19 vaccine and over 224 million were fully vaccinated in the U.S. (Center for Disease Control and Prevention, 2022).

Young adults aged 18–29 years account for the most COVID-19 cases, the lowest COVID-19 vaccination coverage, and rank highest among unvaccinated persons who “probably or definitely will not get vaccinated” relative to other age groups (Center for Disease Control and Prevention, 2022; Hamel et al., 2021b). Several demographic factors have been found to be associated with vaccine uptake within a general population. More specifically, a smaller proportion of non-Hispanic Black individuals, those without health insurance, and those with less than bachelor’s degree received at least one dose of the vaccine (Bhuyan et al., 2021; Center for Disease Control and Prevention, 2022; Hamel et al., 2021b). However, little is known about what demographic factors impact vaccine uptake among young adults.

Emerging research indicates increased rates of cannabis use during the COVID-19 pandemic among adult (Boehnke et al., 2020; Cousijn et al., 2021; van Laar et al., 2020; Vidot et al., 2021) and young adult (Bartel et al., 2020; Clendennen et al., 2021) cannabis users partially related to coping with mental health problems (e.g., stress, anxiety, and depression). Additionally, existing evidence suggests the possibility of a more severe COVID-19 disease progression among cannabis smokers (Wei & Shah, 2020) due to THC-related immunosuppression (Cabral & Jamerson, 2014) and higher risk of COPD (Tan et al., 2009) within this group. However, a recent study concluded that higher lifetime cannabis use was negatively associated with willingness to get a COVID-19 vaccine (Spechler et al., 2021). Despite increases in cannabis use during the COVID-19 pandemic and lower vaccination rates among young adults which potentially heightens vulnerability to severe complications of COVID-19 among cannabis smokers, no study to date has examined vaccine uptake in relation to specific cannabis practices (i.e., frequency, amount, reasons for use) and barriers to vaccination among younger adult cannabis users.

This study presents preliminary data on a COVID-19 vaccine uptake and associated demographic and cannabis use factors, as well as attitudes towards a COVID-19 vaccine among two cohorts of younger adult cannabis users in California. Results of this study may inform policy makers and public health professionals as to whether additional interventions are needed to increase vaccine uptake among young adult cannabis users through addressing barriers to vaccination to better reduce the spread and severity of COVID-19.

## Methods

Two longitudinal cohorts of younger adult cannabis users were surveyed quantitatively about COVID-19 vaccination status and attitudes towards a COVID-19 vaccine between March 2nd and August 10th, 2021. Participants in an older cohort, recruited in Los Angeles, California, in 2014–2015, were 26–33 years old at the time of data collection (Lankenau et al., 2017). Participants in a younger cohort, recruited in Los Angeles, California, in 2019–2020, were 18–21 years old at the time of data collection. Both cohorts were recruited via targeted (e.g., medical and recreational cannabis dispensaries, college campuses, parks, Craigslist) and chain referral sampling strategies (Biernacki & Waldorf, 1981; Watters & Biernacki, 1989). Eligibility criteria for both cohorts were having a current valid medical cannabis recommendation, which was visually inspected by interviewers at the time of the baseline survey, or never having a medical cannabis

recommendation; reporting using cannabis at least 4 times within 30 days prior to enrollment; residing in Los Angeles metro area; being able to read and speak English; being 18–26 years old for the older cohort or 18–20 years old for the younger cohort at the time of enrollment. All participants provided informed consent to participate in the study. Participants completed annual surveys and short surveys distributed every 3 months in between annual surveys. Within the younger cohort, baseline data was collected face-to-face up until March 2020, and via Zoom or WebEx from March 2020. All other surveys were completed via Research Electronic Data Capture (REDCap) online survey link. COVID-19 vaccine data was derived from the most recent data point available for each participant and resulted in two sets on analyses: one focused on vaccination status and a second centered on attitudes towards a COVID-19 vaccination.

During annual and short surveys, participants were asked whether they received a COVID-19 vaccine (yes/no). Each cohort was divided into two groups (Vaccinated/Not Vaccinated) based upon vaccination status (see Table 1). Chi-square or Kruskal–Wallis tests examined differences in demographic (i.e., gender, race/ethnicity, education, employment, health insurance) and cannabis

**Table 1.** Demographic Characteristics, Cannabis Use, and COVID-19 Vaccination Status.

	Older cohort			Younger cohort		
	% (n)	% (n)	% (n)	% (n)	% (n)	% (n)
	Total	Vaccinated	Not vaccinated	Total	Vaccinated	Not vaccinated
	<i>n</i> = 169	44.4 (75)	55.6 (94)	<i>n</i> = 71	71.8 (51)	28.2 (20)
Male	58.0 (98)	58.7 (44)	57.4 (54)	39.4 (28)	31.4 (16)*	60.0 (12)
Ethnicity						
Hispanic/Latinx	46.1 (77)	43.2 (32)	48.4 (45)	43.7 (31)	45.1 (23)	40.0 (8)
Non-Hispanic race						
White	30.5 (51)	39.2 (29)*	23.7 (22)	29.6 (21)	31.4 (16)	25.0 (5)
Black/African American	12.0 (20)	5.4 (4)*	17.2 (16)	8.5 (6)	0.0 (0)	30.0 (6)
Multi-racial	7.2 (12)	6.8 (5)	7.5 (7)	5.6 (4)	5.9 (3)	5.0 (1)
Asian/Pacific Islander	4.2 (7)	5.4 (4)	3.2 (3)	12.7 (9)	17.6 (9)	0.0 (0)
Some college or above	84.3 (140)	95.9 (71)	75.0 (69)	73.2 (52)	74.5 (38)	70.0 (14)
Currently at school	20.7 (35)	16.0 (12)	24.5 (23)	88.7 (63)	94.1 (48)*	75.0 (15)
Employed	65.3 (109)	71.2 (52)	60.6 (57)	57.1 (40)	60.0 (30)	50.0 (10)
Health insurance	74.1 (120)	84.7 (61)**	65.6 (59)	95.7 (67)	96.1 (49)	94.7 (18)
Medicinal orientation towards cannabis use	52.9 (74)	41.8 (28)*	63.0 (46)	40.8 (29)	39.2 (20)	45.0 (9)
Cannabis days, mean (SD)	53.5 (36.9)	50.4 (36.6)	56.0 (37.1)	62.4 (28.8)	63.9 (28.1)	58.6 (31.2)
More than 1/8 of an ounce of cannabis per week	60.6 (86)	54.7 (35)	65.4 (51)	63.6 (66)	60.9 (28)	70.0 (14)
Past 90-day reasons for cannabis use						
To relieve physical pain	43.2 (73)	41.3 (31)	44.7 (42)	40.8 (29)	41.2 (21)	40.0 (8)
To relieve feeling uptight or anxious	44.4 (75)	45.3 (34)	43.6 (41)	71.8 (51)	76.5 (39)	60.0 (12)
To help sleep	58.6 (99)	53.3 (40)	62.8 (59)	66.2 (47)	68.6 (35)	60.0 (12)

\**p* < .05, \*\**p* < .01.

use (i.e., days, amount, medicinal orientation towards use (Fedorova et al., 2019) including reasons for use) variables based on vaccination status. Medicinal orientation towards cannabis use was derived from the following question: *How would you characterize your use of cannabis over the past 90 days?* Recreational use was defined as “to socialize with others, to increase creativity, or to make experiences more pleasurable, interesting, or exciting”) while medical use was defined as “to treat or help cope with any physical ailments, such as pain or discomfort, or psychological conditions, such as feeling anxious or sad, insomnia.” Those who selected “exclusively medical,” “primarily medical,” or “equally medical and recreational” were categorized as having medicinal orientation towards cannabis use.

In addition to the COVID-19 vaccination question, unvaccinated participants were asked whether they were planning, unsure, or not planning to get vaccinated. In a text box, all participants were asked to describe reasons behind behaviors and attitudes towards a COVID-19 vaccine (i.e., being vaccinated, planning to get vaccinated, being unsure about getting vaccinated and not planning to get vaccinated). Data derived from open-ended responses were analyzed inductively and generated a preliminary set of categories describing attitudes towards a COVID-19 vaccination. The first author coded all responses and developed the initial set of categories which were then discussed, refined, and finalized with other co-authors to ensure that the emerging set of attitudes towards the COVID-19 vaccination reliably matched open-ended responses. For instance, response “*Because I believe in science and I want to mitigate my chances of getting covid, having a severe case, or spreading covid*” was assigned to *Protect myself & others* category; response “*I want to wait it out*” was assigned to *Too soon* category. Responses from the same participant could be assigned to multiple categories (i.e., response “*I do not trust the vaccine and it’s not a sure form of protection*” was assigned to *No trust* and *Ineffective* categories). These categories were finalized and translated into two lists of attitudes towards the COVID-19 vaccination—“Vaccinated/Planning to Get Vaccinated” and “Unvaccinated (Unsure/Don’t Plan). Ultimately, the frequency of these attitudes towards the COVID-19 vaccination—originally reported as text—were tabulated across the two cohorts (see Table 2).

All study procedures were approved by the Institutional Review Boards at Children’s Hospital Los Angeles and Drexel University.

## Results

Among the older cohort, 44.4% ( $n = 75$ ) reported receiving at least one shot of a COVID-19 vaccine and 8.3% ( $n = 14$ ) reported planning to get vaccinated, while 47.3% were either unsure about getting the COVID-19 vaccine ( $n = 27$ ) or did not plan to get vaccinated ( $n = 53$ ). Among the younger cohort, 71.8% ( $n = 51$ ) reported receiving at least one shot of the COVID-19 vaccine and 11.3% ( $n = 8$ ) reported planning to get vaccinated, while 16.9% were either unsure about getting the COVID-19 vaccine ( $n = 4$ ) or did not plan to get vaccinated ( $n = 8$ ).

Both cohorts were primarily Hispanic/Latinx (46.1% older vs. 43.7% younger), were currently employed (65.3% older vs. 57.1% younger), had health insurance (74.1% older vs. 95.7% younger), and had some college education or above (84.3% older vs. 73.2% younger) (Table 1). Within the older cohort, medicinal orientation towards cannabis use ( $p < .05$ ), being non-Hispanic Black/African American ( $p < .05$ ), and lack of health insurance ( $p < .01$ ) were negatively associated with vaccine receipt. Within the younger cohort, female gender ( $p < .05$ ) and being currently at school ( $p < .05$ ) were positively associated with vaccine receipt. Within both cohorts, cannabis use frequency (i.e., days of use) or amount, and reasons for cannabis use (i.e., for pain, anxiety, or sleep) were not associated with vaccine receipt.

Within the older cohort (Table 2), the top reasons for being vaccinated or planning to get vaccinated were: *To protect myself & others* (70.8%), *Work requirement* (13.5%), and *Get back to*

**Table 2.** Attitudes Towards COVID-19 Vaccination.

Reasons	Vaccinated/Planning to get vaccinated		Unvaccinated (Unsure/Don't plan)		
	Older cohort	Younger cohort	Reasons	Older cohort	Younger cohort
	% (n)	% (n)		% (n)	% (n)
	52.7 (89)	83.1 (59)		47.3 (80)	16.9 (12)
To protect myself & others	70.8 (63)	66.1 (39)	Too soon	30.0 (24)	25.0 (3)
Work requirement	13.5 (12)	10.2 (6)	Unsafe/side effects	18.8 (15)	8.3 (1)
School requirement	–	8.5 (5)	No trust in vaccines	15.0 (12)	8.3 (1)
Get back to normal life	12.4 (11)	15.3 (9)	No need/natural immunity	13.8 (11)	16.7 (2)
Vaccine availability	6.7 (6)	1.7 (1)	I don't know	8.8 (7)	8.3 (1)
Being able to travel	6.7 (6)	5.1 (3)	Perceived ineffectiveness	6.3 (5)	8.3 (1)
I don't know	2.3 (2)	–	I don't want to	6.3 (5)	8.3 (1)
Social pressure	1.1 (1)	–	Conspiracy	5.0 (4)	–
Conformity	1.1 (1)	–	Medical reasons	3.8 (3)	–
Doctor recommended	1.1 (1)	–	Perceived unavailability	3.8 (3)	–
			Scared	1.3 (1)	–
			Forced choice	1.3 (1)	–

*normal life* (12.4%). Similarly, within the younger cohort, top reasons for being vaccinated or planning to get vaccinated were: *To protect myself & others* (66.1%), *Get back to normal life* (15.3%), and *Work* (10.2%) or *School* (8.5%) *requirements*. While the older cohort reported a greater variety of reasons for being unsure about getting vaccinated or not planning to get vaccinated, both cohorts had the same top reason—*Too soon* (30.0% older vs. 25.0% younger)—followed by *Unsafe/side effects* (18.8% older vs. 8.3% younger), *No need/natural immunity* (13.8% older vs. 16.7% younger), and *No trust in vaccines* (15.0% older vs. 8.3% younger).

## Discussion

Over 80% of our younger cohort (18–21-year-olds) had already received a COVID-19 vaccine or planned to get vaccinated as of August 2021. This finding is corroborated by national data where over 80% of 18–25-year-old adults were either vaccinated or planned to get vaccinated (Adams et al., 2021), while over 90% of a sample of undergraduates (mean age 21.8 years) intended to get vaccinated (Graupensperger et al., 2021). Therefore, our data suggests that cannabis use was not a factor in vaccination uptake or intent to get vaccinated within the younger cohort. In contrast, only slightly over a half of our older cohort (26–33-year-olds) reported either being vaccinated or planning to get vaccinated which was lower than vaccination uptake among 18–29-year-olds within a general population sample (Hamel et al., 2021b). Similarly, only 49.1% of adult cannabis and/or tobacco smokers were willing to get vaccinated (Yang et al., 2021). Greater acceptance of the COVID-19 vaccine by the younger cohort in our study could be due to the fact that a majority (88.7%) were students and educational institutions often require all on-campus students to be

vaccinated (Johnson, 2022). Moreover, being currently at school was positively associated with being vaccinated within the younger cohort.

Being Black/African American and not having health insurance was negatively associated with receiving a COVID-19 vaccine within the older cohort. Similar demographic characteristics associated with vaccine uptake and willingness to get vaccinated were reported in previous studies in both the general population (Bhuyan et al., 2021) and cannabis and/or tobacco smokers (Yang et al., 2021). Therefore, despite increasing vaccination uptake among Black/African Americans within the general population (Hamel et al., 2021a), our study demonstrated that racial disparities existed within a population of younger adult cannabis users at the time of data collection, which could be explained by structural barriers limiting access to a COVID-19 vaccinations among Black participants (Njoku et al., 2021) as well as a historic mistrust of government-developed medicine and vaccines in general compared to natural remedies, including cannabis (Dreher, 2002; Freimuth et al., 2017; Quinn et al., 2016). Racial disparities in vaccination rates are particularly concerning given the disproportionately higher rates of COVID-19 infection among Black/African Americans (Zelner et al., 2021).

Notably, cannabis amount, frequency, or reasons for use were not associated with vaccine uptake. However, a medicinal orientation towards cannabis use was negatively associated with a COVID-19 vaccine receipt within the older cohort, which may reflect longer exposure to a medical cannabis program resulting in a mistrust of pharmaceutical companies and belief in a greater effectiveness and safety of natural remedies, such as cannabis (Lucas et al., 2019).

The top reasons for receiving a COVID-19 vaccine or planning to get vaccinated in our sample were: *To protect myself & others*, *Work/school requirements*, and *Get back to normal life*. *Too soon* was the key reason for vaccine hesitancy and rejection in both cohorts. *Unsafe/side effects* and *No trust in vaccines* reasons were frequently reported by the older cohort. Accordingly, this “wait and see” attitude due to novelty of the vaccine and concerns about unknown side effects were the most cited barriers to a COVID-19 vaccination among other young adult, general population, and adult cannabis and/or tobacco smokers samples (Adams et al., 2021; Graupensperger et al., 2021; Hamel et al., 2021b; Yang et al., 2021).

Future intervention efforts should focus on cannabis users in their mid-20’s-early-30’s to address concerns around safety of a COVID-19 vaccine by providing and explaining the latest data on vaccine safety testing. Heightened vulnerability to a more severe COVID-19 disease progression due to cannabis smoking should be highlighted in targeted education campaigns through venues frequented by younger adult cannabis users, such as cannabis dispensaries or pertinent social media outlets.

A few limitations should be noted. First, our findings should be interpreted with caution given that analysis is based on convenience samples of younger adult cannabis users in Los Angeles, California, and may not be representative of all young adult cannabis users across the U.S. Second, data utilized in this analysis did not assess whether participants were fully vaccinated or whether they received a booster shot—only if they had received at least one shot of a COVID-19 vaccine. Third, a relatively small sample size within the younger cohort could limit our power to identify other statistically significant correlates of vaccination uptake, which will be explored once more data is aggregated.

## Conclusions

Greater vaccine hesitance and rejection was observed within a cohort of mid-20’s-early-30’s cannabis users, especially among uninsured, Black/African Americans, and those who reported using cannabis medicinally. Unsupportive attitudes towards vaccination were primarily driven by concerns related to the recency and safety of a COVID-19 vaccine. Further investigation of factors

that can reduce vaccine hesitancy and rejection among mid-20's-early-30's cannabis users is warranted.

### Acknowledgments

The authors would like to acknowledge the National Institute on Drug Abuse (DA034067) for funding this research study, project's Community Advisory Board and the following individuals who supported the development of this manuscript: Meagan Suen, Alisha Osornio, Susie Lee, and Maral Shahinian.

### Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

### Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This work was supported by the National Institute on Drug Abuse under Grant DA034067.

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**Carolyn F. Wong** is an Associate Professor at Children’s Hospital Los Angeles, Keck School of Medicine at University of Southern California. Dr. Wong’s research focuses on better understanding the impact of psychosocial risk and resilient factors of young adults at high risk for mental health problems and substance use/misuse.

**Bridgid M. Conn** is an Assistant Professor of Clinical Pediatrics at Children’s Hospital Los Angeles and Keck School of Medicine at the University of Southern California. She is a board-certified clinical psychologist whose research focuses on substance use and other health behaviors among historically marginalized and minoritized communities of adolescents and young adults.

**Janna Ataiants** is a Senior Research Scientist in the Department of Community Health and Prevention at Drexel University. Dr. Ataiants’ research examines health and behaviors of people who use psychoactive substances, with particular focus on cannabis and opioid use.

**Stephen E. Lankenau** is a Professor at the Dornsife School of Public Health, Drexel University. Dr. Lankenau is a sociologist who combines public health concerns and mixed methods to the study of substance use and health outcomes associated with use, including homelessness and overdose.