

COVID-19's Impact on Substance Use and Well-Being of Younger Adult Cannabis Users in California: A Mixed Methods Inquiry

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Ekaterina V. Fedorova¹ , Carolyn F. Wong^{2,3,4},
Bridgid M. Conn^{2,3}, Janna Ataiants¹, Ellen Iverson^{2,3}, and
Stephen E. Lankenau¹

Abstract

Few qualitative studies have examined the impact of COVID-19 on cannabis and alcohol use, and overall well-being among cannabis users. Cannabis users (aged 26–32) were surveyed quantitatively (n=158) and interviewed qualitatively (n=29) in April 2020–May 2021 in Los Angeles. 63.3% of the quantitative sample reported increasing use of either cannabis (29.1%) or alcohol (15.2%) or both (19.0%) following the COVID-19 outbreak. Qualitative data revealed that increases in cannabis and alcohol use were largely attributed to changes in employment and staying at home resulting in fewer impediments and boredom. Themes of loneliness and utilization of various coping strategies were more pronounced among those who increased cannabis and/or alcohol use. For some, increases in cannabis/alcohol use were temporary until participants adjusted to “a new normal” or embraced more adaptive coping strategies. Results suggest monitoring cannabis/alcohol use trends and identifying coping strategies to reduce the pandemic’s impact on substance use and mental health.

Keywords

COVID-19, cannabis, alcohol, young adults, loneliness, social isolation, qualitative, mixed methods

¹Department of Community Health and Prevention, Dornsife School of Public Health, Drexel University, Philadelphia, PA, United States

²Department of Pediatrics, Keck School of Medicine, University of Southern California, Los Angeles, CA, United States

³Division of Adolescent Medicine, Children’s Hospital Los Angeles, Los Angeles, CA, United States

⁴Division of Research on Children, Youth, & Families, Children’s Hospital Los Angeles, Los Angeles, CA, United States

Corresponding Author:

Ekaterina V. Fedorova, Department of Community Health and Prevention, Dornsife School of Public Health, Drexel University, 3215 Market Street, Philadelphia, PA 19104, United States.

Email: evf26@drexel.edu

Introduction

The COVID-19 pandemic caused a total of 225 million cases and over 4 million deaths worldwide with over 41 million cases and 662,000 deaths in the U.S. alone as of late 2021 (CSSE, 2021). Safer-at-home orders and social isolation requirements were implemented in the U.S. in response to the COVID-19 pandemic with the goals of curbing the spread of the virus and reducing mortality rates starting in March 2020 (Moreland et al., 2020). This unprecedented move led to a number of unintended consequences, including heightened stressful experiences bordering on trauma (e.g., intense or incessant fear of contracting the virus or infecting others, uncertainty about the future) (Brooks et al., 2020; Dumas et al., 2020; Kwai & Peltier, 2021; Vidot et al., 2021) and increased daily stressors (e.g., unemployment, loss of structure, boredom, loneliness, and depression) (Bohicchio et al., 2021; Killgore et al., 2020; McKay & Asmundson, 2020; Rajkumar, 2020). In line with the self-medication hypothesis (Khantzian, 1997), increases in substance use to manage COVID-19-related stressors were expected (McKay & Asmundson, 2020). Previous research on major population-level disasters and crises, including the SARS outbreak in 2003, indicates that substances are frequently used to cope with elevated levels of stress months and even years after a traumatic event to deal with its lingering impact on mental health (Boscarino et al., 2011; Gonçalves et al., 2020; North et al., 2011; Vetter et al., 2008; Walsh et al., 2014).

In the context of the COVID-19 pandemic, cannabis use, smoking or vaping in particular, is of concern given increased vulnerability of contracting the virus and risk of more severe disease progression due to often compromised immune and respiratory systems (Wei & Shah, 2020). Thus far, several studies have investigated the impact of COVID-19 on cannabis and alcohol use within the general population (Vanderbruggen et al., 2020), adolescents (Dumas et al., 2020), adult cannabis users (Boehnke et al., 2020; Cousijn et al., 2021; van Laar et al., 2020; Vidot et al., 2021), alcohol users (Rodriguez et al., 2020), and young adult cannabis and alcohol users (Bartel et al., 2020; White et al., 2020), which have shown increases in frequency and quantity of cannabis and alcohol use. Only two studies were conducted among young adults (aged 18–25 years) (Bartel et al., 2020; White et al., 2020) who have the highest rates of cannabis and alcohol use compared to other age groups (SAMHSA, 2020). COVID-19-related factors contributing to increased cannabis and alcohol use included unemployment, boredom, reduced opportunities for leisure activities, COVID-19 anxiety, depression, loneliness, and younger age (Bartel et al., 2020; Boehnke et al., 2020; Cousijn et al., 2021; Dumas et al., 2020; van Laar et al., 2020; Vanderbruggen et al., 2020). Moreover, young adults aged 18–24 years were found to be particularly vulnerable to the effects of the pandemic, reporting the highest rates of mental health disorders, suicidal thoughts, and substance use to cope with pandemic-related stress (Czeisler et al., 2020). During the pandemic, transition into adult roles (e.g., self-actualization in career; building relationships and family) was interrupted for many young adults due to social isolation requirements, school closures, and rising unemployment rates while also increasing risk of substance use within this population (Arnett, 2000; Kwai & Peltier, 2021; Schulenberg et al., 2008). Easy access to alcohol and cannabis due to their legality across many locations within and outside of the U.S. (i.e., alcohol outlets and medical cannabis dispensaries were deemed essential businesses during lockdown) is an additional reason for these increases (Booker, 2020; Levin, 2020; McKay & Asmundson, 2020; NABCA, 2021). Furthermore, spikes in substance use may be even more pronounced among medical cannabis users (Boehnke et al., 2020; Vidot et al., 2021). Previous research reported that mental health problems (i.e., anxiety, depression) were the most common reasons for medical cannabis use (Lankenau et al., 2017a; Walsh et al., 2013). As a result, the COVID-19 pandemic may exacerbate these conditions which could lead to subsequent increases in cannabis, and, potentially, other substance use (Boehnke et al., 2020; Vidot et al., 2021).

Existing research on COVID-19's impact on cannabis and alcohol use has focused on the first months of the pandemic and implementation of social distancing guidelines compared to pre-pandemic levels (Barbosa et al., 2020; Bartel et al., 2020; Boehnke et al., 2020; Cousijn et al., 2021; Dumas et al., 2020; Rodriguez et al., 2020; van Laar et al., 2020; Vanderbruggen et al., 2020; Vidot et al., 2021; Wardell et al., 2020). However, research is needed to evaluate the longer-term impact of the COVID-19 pandemic and safer-at-home orders on these patterns of substance use (Cousijn et al., 2021; Rehm et al., 2020; Rodriguez et al., 2020; Wardell et al., 2020). Qualitative studies may be particularly useful for filling this gap by retrospectively exploring complex relationships between changes in the patterns of substance use, individual-level, and contextual factors early on in the COVID-19 pandemic and in more recent times (Cousijn et al., 2021; Teti et al., 2020). To our knowledge, only one qualitative study on cannabis and alcohol use within the context of the COVID-19 pandemic has been published which was conducted within a sample of adult sexual minority women, who found that cannabis and alcohol were used more by some respondents during the COVID-19 pandemic not only as a stress relief but also to deal with boredom and structure their day, while those, who used cannabis and alcohol mostly socially before the pandemic, actually decreased their use during COVID-19 (Bochicchio et al., 2021).

The present mixed methods study was undertaken to explore: (1) the extent to which patterns of cannabis and alcohol use and overall well-being changed after safer-at-home order went into effect in California and (2) reasons and contexts of changes in cannabis and alcohol use within a sample of medical and recreational younger adult cannabis users.

Methods

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

Sample

Data for this analysis were part of a larger longitudinal cohort *Cannabis, Health and Young Adults* (CHAYA) study. A baseline quantitative sample was recruited in 2014–2015 in Los Angeles, California, through targeted (e.g., college campuses and medical cannabis dispensaries) and chain-referral sampling strategies (Biernacki & Waldorf, 1981; Watters & Biernacki, 1989), and consisted of 18-to-26-year-old medical cannabis patients ($n = 210$) and non-patient cannabis users ($n = 156$) (see (Lankenau et al., 2017b) for more details). A baseline qualitative sample ($n = 62$) was derived from the baseline quantitative sample based on the presence/absence of a chronic health condition; frequency of cannabis use (median = 25 hits per day, range 2–101 hits per day; 52.9% of the baseline qualitative sample reported 25 hits per day or less); and Emotion Regulation Questionnaire's emotion suppression (median score = 3.25, range 1.24–6.25; 58.8% of the baseline qualitative sample scored 3.25 or less on emotion suppression subscale) and cognitive reappraisal (median score=4.83, range 1.67–7.00; 52.9% of the baseline qualitative sample scored 4.83 or less on cognitive reappraisal subscale) subscales scores (see (Fedorova et al., 2020) for more details; (Gross & John, 2003). Emotion regulation has been identified as an important construct in substance use research including cannabis use among young adults (Nichols et al., 2021; Wong et al., 2013).

Data Collection

In California, the safer-at-home order was in effect from March 19th through August 28th and was reinstated from November 21st through December 21st, 2020 (Mann and Philips, 2021).

COVID-19-related quantitative and qualitative data were collected between April 15th, 2020, and May 6th, 2021, and May 12th and October 24th, 2020, respectively. Participants were administered a quantitative survey and a qualitative semi-structured interview. Regarding the final analytical quantitative sample ($n = 158$), participants were excluded if they: (1) completed the survey without COVID-19 questions ($n = 54$); (2) lived outside of California for more than 2 months in the past 12 months ($n = 32$); or (3) did not use cannabis ($n = 25$). Regarding the final analytical qualitative sample ($n = 29$), participants were excluded if they lived outside of California at the time of interview ($n = 5$). Fifteen participants within the final analytical qualitative sample were not included in the final analytical quantitative analytical sample for the following reasons: (1) did not have COVID-19 quantitative data ($n = 11$); (2) did not use cannabis ($n = 3$); (3) lived outside of California for more than 2 months at the time of quantitative survey ($n = 1$). Quantitative surveys were administered online via Research Electronic Data Capture (REDCap) survey link. Qualitative interviews were conducted by two trained interviewers via Zoom and were digitally recorded. Each interview lasted 30–90 min. Participants received a \$50 incentive upon completion of the quantitative survey and a \$50 compensation for the qualitative interview.

Measures

Demographic information included age, sex at birth, and race/ethnicity. Medical cannabis patient status (i.e., possession of a current recommendation for medical cannabis), self-reported medical cannabis use (i.e., exclusively or primarily medical, or equally medical and recreational past-90-day cannabis use), past-90-day cannabis amount per week, hits per day, and days of cannabis and alcohol use in the past 90 days were assessed in the quantitative survey. Quantitative and qualitative instruments included questions about COVID-19's impact on health and well-being (e.g., COVID-19 testing, mental and physical health, daily activities, relationships with others, and employment), cannabis and other substance use. The quantitative survey included the following question assessing COVID-19-related changes across various domains: *Did you experience any of the following due to the COVID-19 outbreak (since March 1, 2020) [e.g., tested positive for COVID-19; lost a job; increased use of alcohol; depressed mood or sadness; increased communications with your family]? Changes in cannabis use were assessed with the following item: How has the COVID-19 outbreak impacted your cannabis practices (amount used) in the past 30 days compared to before the outbreak? (less, same, more, or not applicable).* Example questions from the qualitative interview guide are *Tell me about how the COVID-19 outbreak impacted your daily cannabis practices compared to before. Tell me about how the COVID-19 outbreak impacted your use of other drugs, for example, more, same, less [probes included alcohol use]. What impact has COVID-19 had on the way you feel (probe: anxiety, depression, loneliness, sleeplessness, restlessness, etc.)?*

Data Analyses

Descriptive statistics were used to characterize the larger quantitative sample by subgroups based on responses to questions on changes in cannabis and alcohol use, as well as how these subgroups varied across COVID-19-related health and well-being domains. Group differences were tested using multinomial logistic regression where outcome variable represented changes in cannabis and alcohol use. Quantitative analysis was performed using SAS (version 9.4).

Qualitative interviews were used to explain and contextualize trends observed quantitatively across cannabis and alcohol user subgroups. Qualitative interviews were transcribed verbatim. All transcripts were coded by the first author in consultation with co-authors, who has done coding extensively for related qualitative manuscripts, using Atlas.ti (version 9.0) software

(Fedorova et al., 2020; Lankenau et al., 2018; Reed et al., 2020). Thematic analysis was performed deductively, driven by research questions and interview guide probes (Braun & Clarke, 2012). Themes around COVID-19-related changes in cannabis and alcohol use, reasons behind these changes, along with changes in mental health status were identified. Additional themes (e.g., employment and returning to pre-pandemic levels of use) emerged inductively over the course of an iterative process of re-reading transcripts in their entirety several times and refining original themes. All participants within the qualitative sample were assigned pseudonyms.

Results

Quantitative

Participants in the quantitative sample were predominantly male, Hispanic/Latinx, and in their mid-to late 20s (range 26–32 years; Table 1). During the pandemic, according to participants' perceptions, 29.1% reported they increased only cannabis use, 15.2% reported they increased only alcohol use, and 19.0% reported they increased both cannabis and alcohol use compared to pre-pandemic period. Significantly greater days of cannabis use were reported by those who perceived an increase in cannabis (mean = 78.3 days, $p < 0.001$) or cannabis and alcohol (mean = 75.3 days, $p < 0.01$) use, compared to those who did not perceive an increase in cannabis or alcohol use (mean = 54.3 days). Additionally, those who perceived an increase in cannabis use reported significantly greater hits per day (mean = 29.4, $p < 0.05$) and a greater proportion reported using more than 1/8 of an ounce per week (88.6%, $p < 0.001$). Greater days of alcohol use were reported by those who perceived an increase in alcohol (mean = 39.3 days, $p < 0.01$) or both cannabis and alcohol (mean = 39.6 days, $p < 0.01$) use, compared to those who did not increase cannabis or alcohol use (mean = 12 days). Overall, while 52.1% self-reported medical cannabis use, only 4.4% were medical cannabis patients; no group differences were observed. Compared to other racial and ethnic groups, a significantly greater proportion of Black/African Americans were among those who reported an increase in cannabis use ($p < 0.05$). A greater proportion of Hispanic/Latinx and non-Hispanic Whites reported increased alcohol or both cannabis and alcohol use.

Overall, 3.2% tested positive for COVID-19, 8.2% felt sick but did not get tested, and 17.1% had a family member/partner/friend/co-worker who died due to complications from COVID-19. Regarding employment, 41.8% lost their jobs, whereas job loss was statistically higher among those who increased cannabis ($p < 0.05$), or cannabis and alcohol use ($p < 0.01$) (Table 2). A greater proportion of those who increased both cannabis and alcohol use during the pandemic reported negative impacts on mental health (i.e., feeling less motivated to connect with family/friends (60.0%, $p < 0.001$), anxiety (96.7%, $p < 0.001$), and depressed mood (76.7%, $p < 0.001$). Interestingly, positive impacts on overall well-being were more prevalent among those who increased alcohol (66.7% reported taking more walks/hikes/bike rides, $p < 0.01$), cannabis (54.3% reported spending more time with loved ones, $p < 0.01$) or both cannabis and alcohol (63.3% increased communication with family, $p < 0.05$; 56.7% reported spending more time with loved ones, $p < 0.01$) use.

Qualitative

The qualitative sample demographic characteristics were comparable to the quantitative sample: male (58.6%), self-identified as Hispanic/Latinx (48.3%; non-Hispanic White 24.1%, Black/African American 10.3%, Multi-Racial 6.9%, and Asian/Pacific Islander 6.9%), and aged 27.5 years old (range 24–32; data not shown). A majority reported increases in cannabis ($n = 12$, 41.4%) or alcohol ($n = 3$, 10.3%) use or both ($n = 3$, 10.3%). Compared to the quantitative sample, the qualitative sample had a greater proportion of those who increased cannabis use and smaller

Table 1. Demographic characteristics, cannabis use and perceived changes in cannabis and alcohol use in response to COVID-19 among younger adult cannabis users ($n = 158$).

	Total	Increased Cannabis Use	Increased Alcohol Use	Increased Cannabis and Alcohol Use	Did Not Increase Cannabis or Alcohol Use ¹
		%(<i>n</i>)	%(<i>n</i>)	%(<i>n</i>)	%(<i>n</i>)
	$n = 158$	29.1(46)	15.2(24)	19.0(30)	36.7(58)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Age ²	27.2 (2.4) %(<i>n</i>)	27.5 (2.6) %(<i>n</i>)	27.8 (2.2) %(<i>n</i>)	26.8 (2.3) %(<i>n</i>)	26.7 (2.3) %(<i>n</i>)
Sex at birth					
Male	64.6 (102)	67.4 (31)	75.0 (18)	63.3 (19)	58.6 (34)
Ethnicity					
Hispanic/Latinx	49.4 (78)	37.0 (17)	58.3 (14)	53.3 (16)	53.4 (31)
Non-Hispanic race					
White	25.3 (40)	13.0 (6)	29.2 (7)	36.7 (11)	27.6 (16)
Black/African American	16.5 (26)	32.6 (15)*	4.2 (1)	6.7 (2)	13.8 (8)
Multi-Racial	6.3 (10)	13.0 (6)	4.2 (1)	3.3 (1)	3.4 (2)
Asian/Pacific Islander	0.6 (1)	0.0 (0)	4.2 (1)	0.0 (0)	0.0 (0)
Medical Cannabis Patient	4.4 (7)	2.2 (1)	4.2 (1)	3.3 (1)	6.9 (4)
Self-reported medical cannabis use ³	52.1 (73)	50.0 (22)	52.6 (10)	53.6 (15)	53.1 (26)
More than 1/8 of an ounce of cannabis per week? ⁴	66.4 (97)	88.6 (39)***	45.5 (10)	67.9 (19)	55.8 (29)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Hits (pulls off a pipe, joint, bong, etc.) per day ⁵	19.2 (24.9)	29.4 (32.0)*	16.1 (23.8)	14.0 (19.2)	16.2 (20.8)
Days of cannabis use ⁶	64.1 (32.6)	78.3 (20.6)***	47.1 (34.4)	75.3 (27.1)**	54.3 (36.0)
Days of alcohol use ⁷	25.6 (23.8)	11.4 (9.5)	39.3 (23.3)**	39.6 (28.1)**	12.0 (9.7)

Note. ¹Reference group in a multinomial logistic regression; ²range 26-32; ³ $n = 140$; ⁴ $n = 146$; ⁵ $n = 138$, range 1-101; ⁶ $n = 152$, range 1-90; ⁷ $n = 60$, range 1-90; * $p < 0.05$, ** $p < 0.01$, *** $p > 0.001$.

proportion of those who increased both cannabis and alcohol use. Similar to the quantitative sample, 38.0% of the qualitative sample reported either no change ($n = 6$, 20.7%) or reducing cannabis ($n = 4$, 13.8%) or both cannabis and alcohol ($n = 1$, 3.5%) use compared to pre-pandemic levels. Among them, a majority were either social or already infrequent alcohol/cannabis users before the safer-at-home directive went into effect.

Several themes emerged during the qualitative analysis: *access to cannabis, modifications of cannabis practices, employment, mental health challenges, coping strategies, and reducing/returning to pre-pandemic levels of use.*

Table 2. COVID-19's impact on substance use, health and well-being among younger adult cannabis users ($n = 158$).

	Total	Increased Cannabis use	Increased Alcohol use	Increased Cannabis and Alcohol use	Did Not Increase Cannabis or Alcohol use ¹
	%(n)	%(n)	%(n)	%(n)	%(n)
	$n = 158$	29.1(46)	15.2(24)	19.0(30)	36.7(58)
<i>Tested positive for COVID-19</i>	3.2 (5)	2.2 (1)	4.2 (1)	0.0 (0)	5.2 (3)
<i>Felt sick but did not get tested</i>	8.2 (13)	4.3 (2)	12.5 (3)	13.3 (4)	6.9 (4)
<i>Family member/partner/friend/co-worker died due to complications from COVID-19</i>	17.1 (27)	26.1 (12)	16.7 (4)	13.3 (4)	12.1 (7)
<i>Lost a job</i>	41.8 (66)	50.0 (23)*	45.8 (11)	56.7 (17)**	25.9 (15)
<i>Negative impact on overall well-being</i>					
<i>Feeling less motivated or interested to connect with family/friends (e.g., through phone/text)</i>	30.4 (48)	23.9 (11)	29.2 (7)	60.0 (18)***	20.7 (12)
<i>Anxiety</i>	53.2 (84)	41.3 (19)	37.5 (9)	96.7 (29)***	46.6 (27)
<i>Depressed mood or sadness</i>	50.0 (79)	50.0 (23)	54.2 (13)	76.7 (23)***	34.5 (20)
<i>Positive impact on overall well-being</i>					
<i>Increased communication with your family</i>	48.7 (77)	45.7 (21)	58.3 (14)	63.3 (19)*	39.7 (23)
<i>Spending more quality time with loved ones</i>	43.7 (69)	54.3 (25)**	45.8 (11)	56.7 (17)**	27.6 (16)
<i>Taking more walks/hikes/bike rides</i>	38.0 (60)	37.0 (17)	66.7 (16)**	36.7 (11)	27.6 (16)

Note. ¹Reference group in a multinomial logistic regression; * $p < 0.05$, ** $p < 0.01$, *** $p > 0.001$.

Access to Cannabis

Among participants who reported increased cannabis and/or alcohol use, very few reported issues accessing cannabis through dispensaries. Victor's [Hispanic/Latinx; July 2020; cannabis use increase] preferred dispensary was not operational for 2 weeks after the Black Lives Matter protests in Los Angeles while other dispensaries were still operational. Alex [Hispanic/Latinx; June 2020; cannabis and alcohol use increase] noted that at first there were lines at the dispensaries due to limited hours of operation. However, he reported that cannabis prices were lower compared to pre-pandemic levels.

Two participants within the decreased/no change use group reported problems with accessing cannabis via dispensaries. For Alisha [Black/African American; June 2020; cannabis use decrease], price increases on cannabis products were a factor in reduced consumption. Lucas [Hispanic/Latinx; June 2020; no change in cannabis or alcohol use] noted that while some dispensaries were shut down, he was still able to purchase cannabis from authorized dispensary pop-up cannabis farmer's markets.

Modifications of Cannabis Practices

A fear of contracting COVID-19 or experiencing COVID-19-like symptoms compelled some participants to modify their cannabis practices (i.e., stopped sharing consumption devices; switched to non-combustible forms) during the pandemic. Melissa [Hispanic/Latinx; June 2020; cannabis use decrease] suspected that she contracted COVID-19 from her mother whose diagnosis was confirmed by testing. She had a fever, cough, and shortness of breath, but was advised by her boss not to go to a testing site since he suggested it would put herself at risk of contracting the virus if she did not have it. Melissa felt her lungs hurt when she was smoking cannabis, and, therefore, switched to cannabis tinctures and pills:

I do not know if it was COVID, but it hurt to breath like short breaths... Like I felt the crackling in my lungs. And I just had a fever and a cough... But I thought it was because I smoked a lot... But when I was sick, I do not know if I had COVID, I did not smoke during that time. I would take tinctures every day. And I would take pills because my lungs hurt.

Employment

Participants who were able to work remotely approved of not spending hours commuting to a workplace. However, changes in employment status, including job loss, and, less frequently, hours being cut, or working remotely, were key reasons for escalated cannabis and/or alcohol use. These changes were exacerbated by staying at home, having more time, fewer impediments to using cannabis or alcohol (e.g., not driving to work), and boredom:

I think I definitely drink, drink, drink – I have been drinking a lot more than I was prior to the pandemic. I am spending so much time at home. There is no consequence in terms of driving because I am not driving anywhere. So, I do not have an inhibition to stop drinking sometimes... [I have been drinking] maybe three times as much as I was before [David; White; June 2020; cannabis and alcohol use increase].

For others, working remotely and unemployment led to reduced cannabis and alcohol use due to limited financial resources, less or no work-related stress, and having more time for things they really enjoyed doing but had limited time for before the pandemic. Jenny [White; September 2020; cannabis and alcohol use decrease] was laid off from an entertainment industry job, which allowed her to substantially decrease cannabis and alcohol consumption since she was self-medicating a lot with these substances for work-related stress. Moreover, she had more time to connect with long-distance friends and relatives, and engage in other activities, such as cooking meals, exercising, doing yoga, meditation, and spending time with her husband:

I mean the job I had before this was really stressful, and I had a lot of anxiety. So, I definitely would come home and smoke [cannabis] a lot more after work. Nowadays, I really kind of just maybe mellow out in the evening, but I really have done it [cannabis] less. Just because I am home and I am not as stressed. I get to be home with my cat and husband all day... I kind of sometimes look at it as a blessing that I was let go, because I really was hating it [job]. I was probably having some kind of alcoholic beverage every other day. So, I definitely feel better now because I am not drinking so much. And yeah, [I] definitely have decreased.

Mental Health Challenges

Among those who reported increased cannabis and/or alcohol use during the pandemic, loneliness was the most common theme followed by feeling anxious (e.g., fear to get infected, uncertainty

about the future), and feeling depressed. Social isolation requirements were especially hard for those who were unable to go to work and regarded socializing with co-workers as their main source of social connections. Many lived alone or did not have a partner or loved one to fulfill the need for social interactions that could have lessened the feeling of loneliness and disconnectedness:

It [social isolation] sucks... cuz I like to go out, I like to meet new people. Especially right now, like, especially trying to date right now in this whole situation... And I never felt so alone. [Jose; Hispanic/Latinx; October 2020; cannabis use increase].

Increasing COVID-19 case counts and changes in response measures to the outbreak reported via news and social media was an ongoing source of anxiety and fear:

I have had a lot more anxiety because of it [COVID-19]. I think especially seeing on the news that cases are spiking and people are being dumb and not wearing masks and all that really frightens me [Clarissa; Hispanic/Latinx; June 2020; cannabis use increase].

Additionally, the pandemic was accompanied by other anxiety and depression-provoking stressors related to the broader socio-political climate and environmental disasters:

I think 2020 in general, between like um the election, the fires, COVID – it is just like – a super-hot mess... My boyfriend and I were talking about this the other day. We were talking about having a kind of like low-grade depression in the background [Megan; White; October 2020; cannabis use increase].

The theme of loneliness was not as pronounced among those who reported no change or decrease in cannabis and/or alcohol use since the majority were living with family members or partners or were communicating more with friends and family virtually. However, some still missed seeing friends in-person and making new friends. COVID-19-related anxiety—uncertainty about the future (e.g., employment) and fear of getting infected—was expressed by many participants within this group. Nadia [Black/African American; May 2020; no change in cannabis or alcohol use] lost her job, while her boyfriend still had to go to work as an essential worker, which was a source of anxiety due to fear of contracting COVID-19, along with uncertainty about validity of various news reports and limited opportunities for social support:

I feel very anxious because you do not really have all the information, and you do not know what is really going on... So you do not know what is right and what is false. So that was worrisome. And also, not being able to see your friends and other loved ones...

Coping Strategies

Coping with COVID-19-related stress through cannabis and/or alcohol use was explicitly articulated by a few participants. On the other hand, many participants who reported increased cannabis and/or alcohol use employed a wide array of more adaptive coping strategies to deal with stress and uneasy feelings ranging from physical activity (e.g., skating, hiking, and running), finding a new job (e.g., starting a new business) or hobbies (e.g., playing guitar, and cooking), getting professional help (i.e., starting therapy) or finding a relief through social support from friends and loved ones in-person or virtually. David, [White; June 2020; cannabis and alcohol use increase] experienced increased feelings of being depressed, with one day blending with another, and anxiety about future uncertainties, including being an undocumented immigrant and a

doctoral student with limited financial aid opportunities, and losing his job as a Lyft driver as the pandemic started. His alcohol use increased since there were no barriers to drinking anymore, such as driving. However, physical activity and spending more time outdoors helped him to relieve stress, while improved quality of relationship with his partner was a great source of support:

I feel like I have been coping okay. I have been trying to exercise as much as possible. I go on walks every day with my partner. I think me and my partner have a pretty healthy relationship, and we can communicate really openly. So, it has been, a big resource for me to have her there to kind of process what is happening...

Those who reported no change or decrease in cannabis and/or alcohol use employed fewer but similar alternative coping strategies, such as cleaning house, practicing yoga and meditation, taking long walks, and getting social support from friends and family to alleviate mental health challenges. Kevin [Asian/Pacific Islander; July 2020; cannabis use decrease], who used cannabis occasionally before and during the pandemic, reported difficulties working remotely in sales and uncertainty about work in the future where spending time with a partner helped him to deal with this work-related stress. Pre-existing mental health issues (i.e., anxiety, insomnia) were exacerbated by the pandemic for Lucas [Hispanic/Latinx; June 2020; no change in cannabis or alcohol use], but improved the quality of relationships with his family and prompted to identify other coping strategies:

I would say I have gotten a little closer like, since I kind of lost a lot of friends, like I just kind of cut off toxic friendships and stuff like that, so now it is just like my brother, my sister, and my mom. Sometimes my aunt who lives across the street, so we have been getting closer because we are stuck with each other every day... So, to keep sane, I guess, I have been listening to books on tape and that has been helping me a lot because, you are learning something when you are listening to books on tape, even if it is like fantasy, like "Lord of the Rings" and stuff but it is good to break up the cycle and it gives me something to do, so I am ok.

Reducing/Returning to Pre-Pandemic Levels of Use

One participant who reported increased cannabis use and all who increased both cannabis and alcohol use ultimately reported reducing or returning to pre-pandemic levels of use. They attributed it to "things getting better" (i.e., returning to work), or adjusting to "a new normal" and learning alternative coping strategies (i.e., seeing a therapist) and recreational activities (i.e., hiking) to relieve stress, boredom, and monotony. For Alex [Hispanic/Latinx; June 2020; cannabis and alcohol use increase], who was out of job as a photographer, the first two months of the pandemic were "a super stressful time" marked with depression and extreme anxiety with cannabis and alcohol serving as a coping mechanism to deal with these mental health states. However, his increase in use was temporary and was soon replaced with other activities (i.e., practicing yoga, walking, playing guitar, and being generally active):

At first, I would say March and April [2020], I was like, well, why not drink an entire, like, six-pack or a bottle of wine, and then it got really boring really quick. And I was like—this is not a good way to deal with this. And, so, I got back into yoga and back into playing guitar more regularly... I think I have drunk more during COVID than I did, like, the past three or four years... I would say it was a coping mechanism... Definitely noticed depression. I have felt, like, oh, shoot, I have not showered in a few days. I need to get some sun. That is why I started hiking a lot more because my usual routine involves a lot of fitness... and then anxiety, for sure, just because I am like, oh, my god, I am going to

die if I go to the grocery store. So, it has been very high anxiety. Lots of yoga... And breathing, I have had to take a lot of deep breaths, take a lot of warm showers, and take a lot of walks.

Discussion

This is the first mixed methods study exploring the impact of the COVID-19 pandemic on cannabis and alcohol use, and overall well-being of younger adult cannabis users during the immediate aftermath and several months later following the safer-at-home order in California. More than a half of the quantitative and qualitative samples in our study reported increased use of cannabis, alcohol or both during the pandemic with the greatest increase in cannabis use. The prevalence of participants who increased cannabis use was higher than it was reported in previous studies on COVID-19's impact on patterns of cannabis use among adult cannabis users (Boehnke et al., 2020; Vidot et al., 2021). Our findings could be explained by the fact that younger adults report higher levels of anxiety, depression, and initiation/increased substance use to deal with COVID-19-related stressors compared to older adults (Czeisler et al., 2020). In our qualitative sample, among those who did not report increases in cannabis and alcohol consumption, a majority of them either reported no change in use or decrease in cannabis use. Very few participants experienced difficulties with accessing cannabis via storefronts since cannabis businesses were deemed as essential during the pandemic (Booker, 2020). Additionally, some participants modified their cannabis practices by not sharing paraphernalia to reduce the risk of infection and by switching from smoking to using tinctures and pills, which do not compromise lung function. Such strategies were also reported by adult cannabis users in the U.S. (Vidot et al., 2021) and Netherlands (van Laar et al., 2020) within the context of the COVID-19 pandemic.

According to the quantitative survey results, 41.8% of the sample became unemployed, which was much higher than in U.S. (Vidot et al., 2021), European (Cousijn et al., 2021), and Canadian (Wardell et al., 2020) studies among adult cannabis or alcohol users. Greater COVID-19-related unemployment rates were observed among those who increased cannabis and/or alcohol use. Earlier studies of adult samples showed that while loss of a job was not associated with increased cannabis use, it predicted increases in alcohol use (Cousijn et al., 2021; Vanderbruggen et al., 2020). Our qualitative data demonstrated that loss of a job, hours being cut or working remotely, and, as a result, spending more time at home and experiencing boredom were key reasons for increases in cannabis and alcohol use (Bochicchio et al., 2021). Interestingly, all respondents in the qualitative sample, who were working remotely, perceived it as a positive change since it provided them with more free time, which was previously spent commuting to work. For some respondents, spending more time at home was an opportunity to invest this time in other activities (i.e., cooking, exercising, and spending time with loved ones).

Regarding negative impacts on mental health and overall well-being, quantitative data revealed that those who increased both cannabis and alcohol use also reported the greatest increases in feelings of disconnectedness, being anxious, or depressed related to COVID-19. Importantly, almost half of those who did not increase cannabis or alcohol use still experienced elevated levels of feeling anxious. These quantitative findings conformed with the results from the qualitative analysis. Within the qualitative sample, loneliness was the most frequent mental health theme among those who reported increases in cannabis and/or alcohol use, which was especially impactful for respondents who lived alone or were not in romantic relationships. Increases in cannabis or alcohol use due to loneliness were reported in earlier quantitative studies among adult (van Laar et al., 2020) and young adult (Bartel et al., 2020) cannabis users, and a general population sample (Vanderbruggen et al., 2020). Conversely, those who did not change, or decreased cannabis or alcohol use, reported greater social support through in-person or virtual communications with family members, loved ones, or friends. Nevertheless, COVID-19-related

anxiety, such as fear of infection or uncertainty about economic consequences of the pandemic, was a common theme among those who experienced increase, decrease, or no change in cannabis or alcohol use. In other studies, while COVID-19 anxiety was very prevalent (Boehnke et al., 2020; Vidot et al., 2021), it was not associated with elevated cannabis (Cousijn et al., 2021) or alcohol (Wardell et al., 2020) use.

Interestingly, the utilization of adaptive coping strategies to combat COVID-19's toll on mental health was more prevalent among those who increased use, especially among those who increased cannabis use (i.e., physical activity, meditation, hobbies) and those who increased both cannabis and alcohol use (i.e., seeking social support from family and loved ones), compared to those who did not increase cannabis or alcohol use. This quantitative finding was supported by our qualitative data, where those who increased cannabis and/or alcohol use were more actively seeking alternative ways of coping other than substance use to relieve boredom, loneliness, and COVID-19 related anxiety. Similar strategies (i.e., physical activity and getting social support) were utilized to cope with COVID-19 stress and loneliness within a sample of Canadian adolescents (Ellis et al., 2020).

The finding that participants were able to reduce use or return to pre-pandemic levels of use among those who increased cannabis and alcohol consumption during the pandemic through the use of various coping strategies is promising, and corroborated with findings of a qualitative study of adult sexual minority women in Chicago (Bochicchio et al., 2021). These findings suggest that many will find ways to adjust to new realities, especially given rising vaccination rates and lifting of COVID-19 restrictions, which would enable the visiting of family, friends, and returning to work and school (CDC, 2021; Creswell et al., 2021). However, some may still experience lingering effects of the COVID-19 pandemic on their mental health (i.e., persistent fear of direct contact with co-workers and friends), where learning to cope in adaptive ways would be key to alleviating their distress. For others, seeking professional help may be needed (Cava et al., 2005; Holmes et al., 2020).

Findings present several clinical implications for healthcare providers and mental health professionals. Providers should follow-up with younger adults within the context of the ongoing pandemic to increase the quality of relationships with significant others and encourage the identification of flexible, alternative methods of coping (e.g., journaling, hiking and meditation) as results suggest that these strategies may mitigate further risk for problematic cannabis and/or alcohol use. Further, healthcare for younger adults in the U.S. should include screening for increased cannabis and alcohol use, especially given increased psychosocial stressors associated with COVID-19, including social isolation, grief and loss, job/housing loss, and myriad life changes.

Future research should continue to monitor the longer-term effects of the pandemic on substance use and well-being of younger adults during a critical period of adult identity development, including self-actualization in profession, finding meaningful relationships, and creating families (Kwai & Peltier, 2021). Moreover, future directions should include examinations of these experiences from trauma and resilience frameworks (Polizzi et al., 2020; Suarez, 2016). Investigation of diverse coping strategies and facilitating factors in building resilience is needed to inform researchers, practitioners, and policy makers in preparation for future pandemics (Boehnke et al., 2020; Holmes et al., 2020; Vanderbruggen et al., 2020). These factors should also inform interventions and clinical practices that could mitigate potential negative long-term impact of the pandemic.

Our findings should be considered in light of some limitations. First, trends observed within the quantitative sample may not be representative of all younger adult cannabis users in Los Angeles or other U.S. regions since it was a convenience sample, and COVID-19 mitigation efforts varied considerably across nation. Second, our data could be subject to recall and social desirability bias,

since the survey and interview questions referred to past behaviors, including cannabis and alcohol use. Third, even though quantitative data showed that COVID-19's impact was more pronounced among those who increased alcohol or both cannabis and alcohol use, we were unable to describe contexts of these differences qualitatively due to a very small number of participants who reported increased alcohol or both cannabis and alcohol use within the qualitative sample. Therefore, future qualitative studies focusing on changes in alcohol use and co-use with other substances during the pandemic are warranted. Fourth, it is important to note that quantitative data represented a cumulative impact of the COVID-19 pandemic since the safer-at-home order first went into effect in California and did not examine fluctuations of this impact as the safer-at-home order was phased in and out. However, qualitative data were able to capture changes in the impact retrospectively (e.g., increasing and then decreasing use; initially heightened COVID-19-related stress later subsided through adaptive coping).

Conclusions

A majority of younger adult cannabis users in our sample reported increases in cannabis, alcohol or both cannabis and alcohol use during the COVID-19 pandemic and the safer-at-home order in Los Angeles, California. Changes in employment was a key factor in these increases. Many experienced negative mental health effects (i.e., loneliness and pandemic-related anxiety) from the pandemic but also reported utilization of various adaptive coping strategies resulting in greater well-being for some. A few participants were able to return to pre-pandemic levels of cannabis or alcohol use after initial increases in use. The present study reflects a crucial, initial exploration of the impact of the ongoing stress associated with the COVID-19 pandemic and highlights the importance of examining adaptive coping among vulnerable populations in future studies.

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ORCID iD

Ekaterina V. Fedorova  <https://orcid.org/0000-0002-8084-9703>

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Author Biographies

Ekaterina V. Fedorova is a Senior Research Scientist in the Department of Community Health and Prevention at Drexel University. She is a clinical psychologist and researcher investigating relationships between cannabis use and other substance use within a context of developmental changes, major life, policy changes, and other historic events.

Carolyn F. Wong is an Assistant 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, Keck School of Medicine at University of Southern California. She is a 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.

Ellen Iverson is an Assistant Research Professor at Children’s Hospital Los Angeles, Keck School of Medicine at University of Southern California. For over 25 years, Ms. Iverson has

designed and conducted mixed-method research focusing on multilevel factors that have an impact on health and healthcare utilization, especially among vulnerable populations.

Stephen E. Lankenau is a Professor and Associate Dean for Research 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.