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Brief Communications

Cannabis use among cancer survivors before and during the COVID-19 pandemic, 2019-2021

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Abstract

We estimated the prevalence of past 30-day cannabis use, evaluated reasons for use, and identified individual-level factors associated with cannabis use among cancer survivors before (2019) and during (2020 and 2021) the COVID-19 pandemic. Cancer survivors, aged 18 years and older, were identified from the 2019 (n = 8185), 2020 (n = 11 084), and 2021 (n = 12 248) Behavioral Risk Factor Surveillance System. Prevalence of past 30-day cannabis use among survivors held steady through the pandemic (8.7%, 7.4%, and 8.4% in 2019, 2020 and 2021, respectively). Of those who used cannabis, 48.7% used it for medical reasons in 2019, 54.5% in 2020, and 43.5% in 2021. Survivors were more likely to report past 30-day cannabis use if they were younger, male, current or former tobacco smokers, and binge alcohol consumers and if they experienced poor mental health in the past 30-days. Our study identified subpopulations of cancer survivors that need to be targeted for evidence-informed discussions about cannabis use.

In the United States, 18 million individuals report cancer history (1). Because of aging of the population and advances in cancer diagnosis and treatment, the number of cancer survivors is expected to reach 22.2 million by 2030 (1,2). Unfortunately, a vast majority of them, up to 93%, experience ongoing symptom burden (3-6). Many cancer survivors often turn to cannabis to manage high symptom burden, perform daily living activities, and cope with the oncology care disruptions caused by the pandemic (7-9). As many states have legalized cannabis for either medicinal or recreational purposes, the access to and use of cannabis are increasing in the United States. Currently, 55 million (16.9%) adults report cannabis use (10,11). Medical cannabis is legal in 37 states, and the vast majority include cancer as a qualifying condition. Yet, scientific evidence on cannabis use's effectiveness for cancer survivors is insufficient (12-15). Even though cannabis use is increasing, no studies have assessed cannabis use before and during the COVID-19 pandemic in cancer survivors using nationally representative data. Thus, this study estimated the prevalence of past 30-day cannabis use, evaluated reasons for use, and identified individual-level factors associated with cannabis use among cancer survivors before (2019) and during (2020 and 2021) the pandemic.

We used population-based, nationally representative, cross-sectional data on cancer survivors (aged 18 years and older) from 2019 (n = 8185), 2020 (n = 11 084), and 2021 (n = 12 248) Behavioral Risk Factor Surveillance System, Marijuana Use module (Supplementary Table 1, available online). Participants who responded "yes" to the question, "Has a doctor, nurse, or other health professional ever told you that you had any other (than skin cancer) types of cancer?" were defined as cancer survivors. Outcome was past 30-day cannabis use—those who reported 1 or more days of cannabis use in the past 30-days. Self-reported covariates included age, sex, race and ethnicity, education, marital status, employment, residency, insurance statuses, tobacco use, binge drinking, general health status, comorbid conditions, and past 30-day mental health. We applied sampling weights to account for the complex survey design to generate population estimates and conducted descriptive statistics and logistic regression models using STATA version 17. Analyses were 2-sided, and a *P* value of no more than .05 indicated statistical significance.

Of 9.6 million adult cancer survivors 290 251, 234 244, and 261 415 reported past 30-day cannabis use in 2019, 2020, and 2021, respectively. National prevalence of cannabis use among cancer survivors were 8.7% (95% confidence interval [CI] = 7.4% to 10.2%) in 2019, 7.4% (95% CI = 6.5% to 8.3%) in 2020, and 8.4% (95% CI = 7.0% to 10.1%) in 2021. Of those reporting cannabis use, 48.7% (95% CI = 41.0% to 56.5%), 54.5% (95% CI = 48.6% to 60.2%), and 43.6% (95% CI = 34.0% to 53.6%) used cannabis for medical reasons in 2019, 2020, and 2021, respectively (Table 1). During the first year of the pandemic (2020), survivors who self-reported as Black had 2.23 (95% CI = 1.36 to 3.164; *P* = .001) times higher the odds of reporting cannabis use compared with White individuals. Older age was associated with lower odds of cannabis use. The odds of cannabis use were greater among survivors who reported

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Table 1. Individual-level sociodemographic, clinical, and behavioral characteristics of cancer survivors and prevalence of cannabis use, BRFSS 2019-2021[a]

Characteristics	2019[b]		2020[c]		2021[d]	
	Unweighted sample (n = 8185)	Weighted % (95% CI) (n = 3 333 312)	Unweighted sample (n = 11 084)	Weighted % (95% CI) (n = 3 183 781)	Unweighted sample (n = 12 248)	Weighted % (95% CI) (n = 3 119 886)
Age, y						
18-49	730	14.8 (13.1 to 16.8)	973	13.6 (12.3 to 15.0)	1061	13.4 (12.1 to 14.8)
50-64	1990	30.6 (28.4 to 32.9)	2760	29.9 (28.0 to 31.8)	2980	30.1 (28.2 to 32.1)
65-74	2759	27.2 (25.3 to 29.2)	3876	31 (29.4 to 32.6)	6059	42.9 (40.9 to 44.9)
75 and older	2706	27.4 (25.3 to 29.6)	3475	25.6 (24.2 to 27.1)	2148	13.6 (12.5 to 14.9)
Sex						
Female	4920	61.4 (59.1 to 63.7)	6805	60.1 (58.3 to 61.9)	7223	56.8 (54.7 to 58.9)
Male	3265	38.6 (36.3 to 40.9)	4279	39.9 (38.2 to 41.8)	5025	43.2 (41.2 to 45.3)
Race and ethnicity						
Non-Hispanic Black	478	8.0 (6.8 to 9.4)	598	8.9 (7.8 to 10.2)	497	7.8 (6.3 to 9.6)
Hispanic	217	9.8 (8.2 to 11.7)	197	3.1 (1.8 to 5.3)	241	4.1 (2.9 to 5.7)
Non-Hispanic White	7205	75.3 (72.8 to 77.7)	9687	84.0 (82.0 to 85.9)	10 797	83.5 (81.4 to 85.5)
Other[e]	285	6.8 (5.2 to 8.9)	602	4.0 (3.4 to 4.6)	713	4.6 (3.9 to 5.3)
Marital status						
Never married	603	9.4 (8.0 to 11.0)	823	8.2 (7.2 to 9.3)	965	9.1 (7.8 to 10.5)
Married	4571	59.8 (57.5 to 62.1)	6143	59.6 (57.8 to 61.3)	6959	60.7 (58.7 to 62.7)
Divorced or separated	1365	15.9 (14.3 to 17.6)	1868	15.6 (14.5 to 16.9)	1999	14.7 (13.4 to 16.2)
Widowed	1646	14.9 (13.4 to 16.6)	2250	16.6 (15.4 to 17.9)	2325	15.5 (14.2 to 16.9)
Education						
High school or less	2414	34.9 (32.6 to 37.4)	3511	39.7 (37.7 to 41.6)	3281	36.0 (34.0 to 38.1)
Attended college	2371	34.9 (32.5 to 37.3)	3196	31.8 (30.1 to 33.4)	3615	34.1 (32.1 to 36.3)
Graduated college	3400	30.2 (28.3 to 32.2)	4377	28.6 (27.2 to 30.1)	5352	29.9 (28.4 to 31.5)
Employment						
Not in a workforce	1269	20.4 (18.4 to 22.6)	1794	19.8 (18.4 to 21.2)	1696	17.9 (16.3 to 19.7)
Employed	2327	33.5 (31.2 to 35.8)	2988	30.4 (28.8 to 32.1)	3533	31.0 (29.2 to 32.7)
Retired	4589	46.1 (43.7 to 48.5)	6302	49.8 (47.9 to 51.7)	7019	51.1 (49.1 to 53.1)
Residency						
Rural	1267	6.9 (6.1 to 7.8)	2064	10.7 (9.8 to 11.74)	2222	10.1 (9.1 to 11.1)
Urban	6918	93.1 (92.2 to 93.9)	9020	89.3 (88.3 to 90.2)	10 026	89.9 (88.9 to 90.9)
Health insurance						
No	238	4.1 (3.2 to 5.2)	298	3.3 (2.7 to 4.1)	139	1.4 (1.1 to 1.7)
Yes	7947	95.9 (94.8 to 96.8)	10 786	96.7 (95.9 to 97.3)	12 109	98.6 (98.3 to 98.9)
General health status						
Fair/poor	2457	3.0 (30.7 to 35.3)	3155	30.6 (29.0 to 32.3)	3319	30.0 (28.0 to 32)
Good	2741	33.0 (30.7 to 35.3)	3821	34.6 (32.7 to 36.6)	4290	35.9 (33.9 to 37.9)
Excellent/very good	2987	34.1 (31.8 to 36.4)	4108	34.8 (33.1 to 36.6)	4639	34.2 (32.4 to 36)
Mental distress, d[f]						
0	5580	63.7 (61.2 to 66.1)	7428	64.6 (62.6 to 66.5)	8147	63.1 (60.9 to 65.1)
1-13	1609	22.0 (19.9 to 24.2)	2199	20.5 (18.7 to 22.4)	2590	22.8 (20.8 to 24.9)
≥14	996	14.3 (12.5 to 16.4)	1457	14.9 (13.7 to 16.3)	1511	14.2 (12.9 to 15.5)
Comorbid conditions[g]						
0	1954	25.6 (23.5 to 27.8)	2566	23.0 (21.6 to 24.6)	2852	24.5 (22.8 to 26.3)
1	2583	32.3 (30.0 to 34.7)	3399	30.3 (28.4 to 32.3)	3952	31.3 (29.5 to 33.3)
2	1946	22 (20.1 to 24.0)	2709	24.2 (22.7 to 25.8)	2871	22.3 (20.6 to 24.0)
≥3	1702	20.1 (18.3 to 22.1)	2410	22.4 (21.0 to 23.9)	2573	21.9 (20.1 to 23.7)
Smoking status						
Never smokers	4244	50.1 (47.7 to 52.5)	5580	48.1 (46.2 to 49.9)	6347	49.5 (47.4 to 51.5)
Former smokers	3067	39.1 (36.8 to 41.5)	4124	36.0 (34.3 to 37.8)	4586	37.7 (35.6 to 39.8)
Current smokers	874	10.8 (9.6 to 12.2)	1380	15.9 (14.7 to 17.3)	1315	12.9 (11.7 to 14.1)
Binge drinking[h]						
No	7640	93.0 (91.8 to 94)	10 408	92.9 (92.0 to 93.8)	11 455	92.8 (91.8 to 93.7)
Yes	545	7.0 (6.0 to 8.2)	676	7.1 (6.2 to 8.0)	793	7.2 (6.3 to 8.2)
Past 30-day cannabis use[i]						
No	7722	91.3 (89.8 to 92.6)	10 325	92.6 (91.7 to 93.5)	11 401	91.6 (90.0 to 93.0)
Yes	463	8.7 (7.4 to 10.2)	759	7.4 (6.5 to 8.3)	847	8.4 (7.0 to 10.1)
Reasons for cannabis use[j]						
Medical	240	48.7 (41.0 to 56.5)	411	54.5 (48.6 to 60.2)	387	43.6 (34.0 to 53.6)
Nonmedical	104	23.2 (16.4 to 31.7)	126	18.5 (15.1 to 22.5)	172	15.9 (12 to 20.7)
Both medical and nonmedical	114	28.1 (21.8 to 35.4)	219	27.0 (21.9 to 32.9)	283	40.6 (32.0 to 49.8)

[a] Supplementary Table 1 (available online) presents unweighted frequencies and weighted percentages of each state. To reflect the complex sampling design of BRFSS, we used STATA's survey procedures using "svy" command for all weighted analysis. We used publicly available data and, therefore, did not require institutional review board approval. BRFSS = Behavioral Risk Factor Surveillance System; CI = confidence interval.

[b] 2019 data came from 12 US states that administered marijuana use module (California, Idaho, Illinois, Maryland, Minnesota, New Hampshire, North Dakota, South Carolina, Tennessee, Utah, West Virginia, Wyoming).

[c] 2020 data came from 20 US states that administered marijuana use module (Alaska, Delaware, Hawaii, Idaho, Illinois, Indiana, Kentucky, Maine, Maryland, Minnesota, Mississippi, New Hampshire, North Dakota, Ohio, Rhode Island, South Carolina, Tennessee, Utah, West Virginia, Wyoming).

[d] 2021 data came from 20 US states that administered marijuana use module (Alaska, Connecticut, Delaware, Hawaii, Idaho, Illinois, Indiana, Kentucky, Maine, Maryland, Minnesota, Montana, Nevada, New Hampshire, North Dakota, Ohio, Rhode Island, Utah, Vermont, Wyoming).

[e] Other category includes non-Hispanic Asian, non-Hispanic American Indian and Alaskan, non-Hispanic native Hawaiian and Other Pacific Islander, non-Hispanic multiracial, non-Hispanic Other race.

[f] Mental distress was measured by the following question: Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good? We categorized as 0 = zero days when mental health not good, 1 = 1-13 days when mental health not good, and 14-30 days when mental health not good.

[g] Comorbid conditions included history of asthma, arthritis, kidney disease, diabetes, heart disease, stroke, skin cancer, and chronic obstructive pulmonary disease, emphysema, or chronic bronchitis.

[h] Binge drinking is defined as males having 5 or more drinks on 1 occasion and females having 4 or more drinks on 1 occasion during the past 30 days.

[i] Participants were asked the following question: During the past 30 days, on how many days did you use marijuana or cannabis? Those who reported at least 1 day of cannabis use were classified as past 30-day cannabis users.

[j] The reasons for cannabis use were measured by the following question: When you used marijuana or cannabis during the past 30 days, was it usually for medical reasons, for nonmedical reasons, or for both medical and nonmedical reasons?

Table 2. Individual-level characteristics associated with past 30-day cannabis use among cancer survivors, BRFSS 2019-2021

	2019[a]		2020[b]		2021[c]	
Characteristics	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
Age, y						
18-49	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
50-64	0.81 (0.50 to 1.29)	.370	0.56 (0.40 to 0.80)	.001	0.46 (0.30 to 0.71)	<.001
65-74	0.45 (0.24 to 0.85)	.014	0.50 (0.31 to 0.79)	.003	0.16 (1.00 to 0.26)	<.001
75 and older	0.10 (0.05 to 0.22)	<.001	0.16 (0.08 to 0.36)	<.001	0.09 (0.03 to 0.29)	<.001
Sex						
Female	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Male	1.11 (0.74 to 1.69)	.605	1.66 (1.23 to 2.23)	.001	2.00 (1.40 to 2.84)	<.001
Race and ethnicity						
Non-Hispanic Black	0.95 (0.47 to 1.93)	.893	2.23 (1.36 to 3.65)	.001	1.21 (0.57 to 2.58)	.624
Hispanic	0.53 (0.23 to 1.25)	.149	1.18 (0.52 to 2.70)	.693	1.03 (0.35 to 3.00)	.959
Non-Hispanic White	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Other	1.01 (0.49 to 2.11)	.962	1.20 (0.72 to 2.00)	.491	1.49 (0.86 to 2.58)	.153
Marital status						
Never married	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Married	0.69 (0.39 to 1.24)	.214	0.64 (0.42 to 0.98)	.039	0.47 (0.28 to 0.81)	.007
Divorced or separated	0.67 (0.37 to 1.23)	.195	0.81 (0.51 to 1.29)	.370	0.74 (0.40 to 1.36)	.330
Widowed	0.50 (0.24 to 1.06)	.069	0.85 (0.51 to 1.43)	.550	0.51 (0.22 to 1.22)	.131
Education						
High school or less	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Attended some college	0.98 (0.59 to 1.64)	.953	1.50 (1.08 to 2.08)	.016	0.88 (0.55 to 1.39)	.579
Graduated college	1.11 (0.64 to 1.91)	.720	1.52 (1.07 to 2.16)	.018	0.70 (0.48 to 1.03)	.070
Employment						
Not in a workforce	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Employed	0.76 (0.47 to 1.24)	.269	0.50 (0.33 to 0.75)	.001	0.30 (0.20 to 0.45)	<.001
Retired	0.77 (0.44 to 1.34)	.351	0.57 (0.37 to 0.87)	.010	0.51 (0.33 to 0.79)	.003
Residency						
Rural	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Urban	1.01(0.53 to 1.94)	.977	0.87 (0.56 to 1.36)	.542	1.74 (0.94 to 3.22)	.079
Health insurance						
No	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Yes	0.83 (0.40 to 1.70)	.603	0.56 (0.32 to 0.96)	.036	0.49 (0.25 to 0.98)	.043
General health status						
Fair or poor	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Good	1.22 (0.73 to 2.04)	.454	0.92 (0.67 to 1.28)	.638	1.36 (0.83 to 2.22)	.240
Excellent or very good	1.59 (0.92 to 2.78)	.101	0.76 (0.50 to 1.14)	.188	1.36 (0.82 to 2.26)	.222
Mental health, d						
0	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
1-13	1.49 (0.95 to 2.34)	.085	1.76 (1.24 to 2.51)	.002	1.21 (0.73 to 2.01)	.450
≥14	1.40 (0.82 to 2.37)	.213	2.05 (1.39 to 3.03)	<.001	1.73(1.09 to 2.75)	.021
Comorbid conditions						
0	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
1	1.37 (0.82 to 2.29)	.227	0.97 (0.64 to 1.49)	.904	1.24 (0.80 to 1.90)	.334
2	1.23 (0.73 to 2.11)	.432	0.99 (0.62 to 1.56)	.952	1.49 (0.91 to 2.44)	.113
≥3	1.85 (0.99 to 3.47)	.054	0.87 (0.55 to 1.39)	.558	1.16 (0.65 to 2.06)	.622
Smoking status						
Never smokers	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Former smokers	2.15 (1.35 to 3.41)	.001	2.53 (1.77 to 3.62)	<.001	3.65 (2.43 to 5.50)	<.001
Current smokers	4.12 (2.50 to 6.81)	<.001	4.06 (2.77 to 5.94)	<.001	4.05 (2.68 to 6.11)	<.001
Binge drinking						
No	1.00 (Referent)		1.00 (Referent)		1.00 (Referent)	
Yes	2.29 (1.36 to 3.87)	.002	3.13 (2.18 to 4.51)	<.001	2.37 (1.46 to 3.84)	<.001

[a] Regression models are controlled for states as well. 2019: 12 US states (California, Idaho, Illinois, Maryland, Minnesota, New Hampshire, North Dakota, South Carolina, Tennessee, Utah, West Virginia, Wyoming) were included in the regression model. BRFSS = Behavioral Risk Factor Surveillance System; CI = confidence interval; OR = odds ratio.
[b] 2020: 20 US states (Alaska, Delaware, Hawaii, Idaho, Illinois, Indiana, Kentucky, Maine, Maryland, Minnesota, Mississippi, New Hampshire, North Dakota, Ohio, Rhode Island, South Carolina, Tennessee, Utah, West Virginia, Wyoming) were included in the regression model.
[c] 2021: 20 US states (Alaska, Connecticut, Delaware, Hawaii, Idaho, Illinois, Indiana, Kentucky, Maine, Maryland, Minnesota, Montana, Nevada, New Hampshire, North Dakota, Ohio, Rhode Island, Utah, Vermont, Wyoming) were included in the regression model.

binge drinking and being current and former smokers. Moreover, survivors who reported that their mental health was not good for 14 or more days during the past month reported increased odds of cannabis use during the pandemic (2020 and 2021) but not before the pandemic (2019) (Table 2).

Our study findings suggest that the past 30-day cannabis use remained stable in 2019, 2020, and 2021 among cancer survivors. However, reasons for cannabis use evolved during this period. Specifically, during the first year of the pandemic, a higher proportion (54.5%) of survivors used cannabis for medical reasons compared with 48.7% who used it for medical reasons before the pandemic and 43.5% during the second year of the pandemic. Such findings may suggest that cancer survivors were coping with the major disruptions to their medical care caused by

COVID-19 and were attempting to manage their symptom burden independently, as the pandemic has triggered added stress and anxiety among survivors who had high rates of anxiety even before the pandemic. A recent study found that cancer survivors were more likely to report feeling nervous, anxious, depressed, lonely, and hopeless during the pandemic compared with adults without cancer (16). Other studies reported that cancer survivors were using cannabis during the pandemic to manage physical and mental symptoms including sleep difficulties, anxiety, pain, and nausea (16-18). This may explain the reason of increased cannabis use among survivors for medicinal reasons during the first year of the pandemic. Yet, current scientific evidence is insufficient regarding the benefits of cannabis use, as reported by multiple recent meta-analyses and systematic reviews (12-15). Thus, future trials are needed to understand the therapeutic effects of cannabis use on symptom management among cancer survivors. Our findings suggest racial differences in cannabis use as Black individuals were more likely to use cannabis than White individuals in 2020. Such differences might be because of pandemic-exacerbated care access that minority individuals experienced. Future studies should investigate the pandemic's disproportionately adverse impact on minority population. Cancer survivors who reported current tobacco use and binge drinking were more likely to report cannabis use. Evidence suggests co-occurring relationships among substance use including tobacco, alcohol, and cannabis use. For example, 90% of cannabis users are also tobacco users, and cannabis users are more likely to have nicotine dependence (19-27). Alcohol use disorder in adults is much higher among past-year cannabis users than non-cannabis users (56% vs 12%) (28,29). Such findings suggest multifaceted intervention for cancer survivors with substance use.

This study is not without limitations. We were able to examine the associations and not the causal relationships because of the data's cross-sectional nature. Findings may not be generalizable to all cancer survivors living in the United States as not all states administered the Marijuana Use module. We did not have information about cancer type, time since cancer diagnosis, stage, symptoms, and whether survivors were still receiving or have completed treatment, and such variables may further explain cannabis use. Cannabis use was self-reported, and participants may have over- or under-reported it. Despite limitations, our study is strengthened by its large population-based, nationally representative sample of cancer survivors. Leveraging existing big data to provide evidence for guiding effective survivorship care is one of the research priorities for cancer survivorship care identified by the National Cancer Institute (30). Our study also identified subpopulations of cancer survivors that need to be targeted for evidence-informed discussions about cannabis use.

Data availability

The Behavioral Risk Factor Surveillance System (BRFSS) data that support the findings of this study are openly available in https://www.cdc.gov/brfss/index.html.

Author contributions

Sayantani Sarkar, PhD, BSc (Conceptualization; Formal analysis; Methodology; Writing—review & editing); Ilana M. Braun, MD (Writing—review & editing); Manan Nayak, PhD (Writing—review & editing); Angela D. Bryan, PhD, MA (Writing—review & editing); and Hermine Poghosyan, PhD, MPH (Conceptualization; Formal analysis; Methodology; Writing—original draft; Writing—review & editing).

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Conflicts of interest

The authors have no conflict of interest to disclose.

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