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Trends in past-month cannabis use among US adults across a range of disabilities and health conditions, 2015–2019

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Abstract

Introduction: While there is increasing interest in the use of cannabis to manage a range of health-related symptoms, little is known about trends in recent cannabis use with respect to various health conditions.

Methods: We examined data from a US representative sample of noninstitutionalized adults age ≥ 18 from the 2015–2019 National Survey on Drug Use and Health (N = 214,505). We estimated the pooled prevalences followed by linear time trends, overall, and by disability (i.e., difficulty hearing, seeing, thinking, walking, dressing, doing errands) and lifetime (i.e., bronchitis, cancer, diabetes, hepatitis, kidney disease) and current (i. e., asthma, depression, heart disease, hypertension) health condition status using logistic regression. Models with year-by-condition status interaction terms were used to assess differential time trends, adjusting for demographic characteristics.

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Kevin H. Yang: Conceptualization, Methodology, Investigation, Writing – original draft, Writing – review & editing, Visualization. **Rowena M. Tam:** Writing – original draft, Writing – review & editing, Visualization. **Nora Satybaldiyeva:** Writing – original draft, Writing – review & editing, Visualization. **Wayne Kepner:** Writing – original draft, Writing – review & editing, Visualization. **Benjamin H. Han:** Conceptualization, Writing – review & editing, Funding acquisition. **Alison A. Moore:** Conceptualization, Writing – review & editing, Funding acquisition. **Joseph J. Palamar:** Conceptualization, Methodology, Formal analysis, Investigation, Resources, Writing – review & editing, Visualization, Supervision, Funding acquisition.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ypmed.2023.107768.

Results: From 2015 to 2019, cannabis use increased significantly among adults with and without each disability and health condition examined. However, the increase was more rapid among those with (versus without) difficulty hearing (89.8% increase [4.9% to 9.3%] vs. 37.9% increase [8.7% to 12.0%], $p = 0.015$), difficulty walking (84.1% increase [6.3% to 11.6%] vs. 36.8% increase [8.7% to 11.9%], $p < 0.001$), 2–3 impairments (75.3% increase [9.3% to 16.3%] vs. 36.6% increase [8.2% to 11.2%], $p = 0.041$), and kidney disease (135.3% increase [3.4% to 8.0%] vs. 38.4% increase [8.6% to 11.9%], $p = 0.045$).

Conclusion: Given the potential adverse effects of cannabis, prevention and harm reduction efforts should focus on groups at increasingly higher risk for use, including those with disabilities and kidney disease.

Keywords

Cannabis; Marijuana; Health conditions; Disability; Functional impairment; Trends

1. Introduction

Cannabis use has increased significantly in the United States (US) over the past two decades (Hasin and Walsh, 2021; Compton et al., 2016; Han and Palamar, 2020). This may be, in part, due to state cannabis laws becoming increasingly permissive along with decreasing perceived risks associated with use (Han et al., 2021a; Pacek et al., 2015; Martins et al., 2016). In parallel with these changes, there has been increasing interest in the use of cannabis to treat a variety of disabilities and chronic health conditions (Matson et al., 2021; Park and Wu, 2017; Yang et al., 2021; Kosiba et al., 2019) given its potential efficacy in managing a number of symptoms including neuropathic pain, insomnia, nausea, and spasticity related to multiple sclerosis (National Academies of Sciences, Engineering, and Medicine, Health and Medicine Division, Board on Population Health and Public Health Practice, Committee on the Health Effects of Marijuana, 2017; Allan et al., 2018; Hill, 2015; Haffajee and Mauri, 2021). Indeed, numerous studies have suggested that cannabis use is more prevalent among persons with disabilities (Gimm et al., 2023; Hinson-Enslin et al., 2022; Anderson et al., 2018; Han et al., 2021b) and chronic health conditions (Dai and Richter, 2019; Browne et al., 2022; Han and Palamar, 2018). In addition to cannabis' possible role in management of these symptoms, research has shown that medical cannabis may improve the level of functioning and quality of life for individuals with certain disabilities and health conditions (Stetten et al., 2020).

While disability and chronic disease are distinct concepts, they often coexist and are inextricably linked (Iezzoni, 2010). More than one in four (26%) adults in the US reports having a disability (CDC. Disability and Health Overview | CDC, 2020), which the World Health Organization describes as an umbrella term to include bodily impairments, activity limitations, or participation restrictions that relate to a health condition (e.g., difficulty walking or hearing) (Krahn et al., 2015). As a result, disability is the interaction between people living with impairments and barriers in the physical and social environment. Additionally, adults with disabilities are more likely to have chronic health conditions including cardiovascular disease, asthma, and diabetes (Pharr and Bungum, 2012). As of 2018, 51.8% (129 million) of US adults had been diagnosed with at least one chronic

health condition (Boersma, 2020). These chronic diseases frequently contribute to disability (e.g., osteoarthritis or multiple sclerosis impairing ambulation), and disability, in turn, can precipitate secondary conditions (e.g., immobility contributing to pressure ulcers). Furthermore, the American Community Survey six-item set on disability, one of the most commonly used item sets in a survey to measure disability, has been shown to perform poorly in capturing respondents with chronic health conditions (Hall et al., 2022). There is thus much to explore regarding the complex associations between disabilities, health conditions, and their comorbid symptoms, for which cannabis may be increasingly used for symptomatic management.

Few studies have evaluated trends in cannabis use with respect to disabilities and chronic health conditions. For instance, Glazier and Kling, 2013 estimated that the prevalence of past-month cannabis use among individuals living with a disability increased by 46.7% from 2002 to 2010 (4.5% to 6.6%). Other studies have detected increases in cannabis use among those with cardiovascular disease (56.0% past-month increase from 2015 to 2019 [5.0% to 7.8%]) (Kim et al., 2022), diabetes (241.2% past-month increase from 2005 to 2018 (1.7% to 5.8%) (Sexton and Alshaarawy, 2020), and depression (41.8% past-month increase from 2005/06 to 2015/16 (12.2% to 17.3%) (Gorfinkel et al., 2020). Whether these trends have continued in recent years and among those with other health conditions remain unassessed.

Furthermore, despite cannabis' potential health benefits in easing disability- and health-related symptoms, cannabis use may be associated with harmful outcomes, including adverse cognitive changes (e.g., memory, attention), motor vehicle fatalities, and increased risk of medical (e.g., stroke, respiratory disease, overdose) and mental (e.g., anxiety, psychosis) disorders (Volkow et al., 2014; Campeny et al., 2020; Broyd et al., 2016). These outcomes may place those already experiencing an impairment or medical comorbidity at further risk of harm and lead to increased healthcare utilization (Han et al., 2023). Understanding the complex relationships between cannabis use, disabilities, and chronic conditions may help identify early screening and targeted interventions for those adversely and disproportionally impacted by continued and/or increased cannabis use. Our study aimed to address this gap in the literature by using nationally representative data to estimate trends in the prevalence of past-month cannabis use by disability and health condition status.

2. Methods

2.1. Study sample

We examined cross-sectional data from a US representative sample of noninstitutionalized adults age ≥ 18 from the 2015–2019 National Survey on Drug Use and Health (NSDUH) (N = 214,505). The survey is based on a multi-stage area probability sample and administered through computer-assisted interviewing conducted by an interviewer and audio computer-assisted self-interviewing.

2.2. Measures

The survey asked participants about past-month cannabis (marijuana/hashish) use in addition to demographic characteristics including age, sex, race/ethnicity, education attainment, family income, and marital status.

Regarding disabilities, the NSDUH uses standardized disability questions as recommended by the US Department of Health and Human Services (Krahn et al., 2015). Participants were asked if they have serious difficulty: 1) hearing ("Are you deaf or do you have serious difficulty hearing?"); 2) seeing ("Are you blind or do you have serious difficulty seeing, even when wearing eyeglasses?"); 3) thinking ("Because of a physical, mental or emotional condition, do you have serious difficulty concentration, remembering, or making decisions?"); 4) walking or climbing stairs ("Do you have serious difficulty walking or climbing stairs?"); 5) dressing or bathing ("Do you have difficulty dressing or bathing?"); and 6) doing errands alone ("Because of a physical, mental, or emotional condition, do you have difficulty doing errands alone such as visiting a doctor's office or shopping?"). We created an "any disability" variable to represent individuals with any of the aforementioned disabilities. We also categorized respondents by the number of self-reported disabilities (i.e., 0 impairments, 1 impairment, 2–3 impairments, 4–6 impairments).

Regarding health conditions, participants were asked if a doctor ever diagnosed them with asthma, bronchitis, cancer, diabetes, heart disease, hepatitis, hypertension, and kidney disease. These medical conditions are commonly considered chronic health conditions and are included in either the validated Katz chronic disease comorbidity questionnaire (Katz et al., 1996) or the Hierarchical Condition Category system (Pope et al., 2004). This methodology for assessing chronic disease and/or multimorbidity status has been performed in numerous studies using NSDUH data (Han and Palamar, 2018; Swartz and Jantz, 2014; Stanton et al., 2016; Han et al., 2018a; Han et al., 2021c). Among the aforementioned chronic health conditions, the NSDUH further queried current medical condition status for asthma, heart disease, and hypertension with the following questions: "do you still have asthma?"; "did you have any kind of heart condition or heart disease in the past 12 months?"; and "are you currently taking prescription medicine for your high blood pressure?", respectively. We choose to use these three variables rather than their respective lifetime diagnosis variable given the possibility that these lifetime diagnoses may not be truly representative of a chronic or ongoing condition (e.g., asthma present only in childhood, preeclampsia in pregnant females). Past-year major depressive episode (MDE) was coded by NSDUH as positive when participants reported experiencing at least five of the nine MDE *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* criteria nearly every day in the same two-week period, with at least one of the symptoms being depressed mood or loss of interest or pleasure in daily activities (American Psychiatric Association, 1994). We created an "any health condition" variable to represent individuals with any of the aforementioned health conditions.

2.3. Statistical analysis

First, we computed descriptive statistics to describe the sample characteristics of the pooled 2015–2019 NSDUH dataset overall, and by any health condition and any disability status.

We compared sample characteristic differences for those with (versus without) any health condition and any disability using the Rao-Scott chi-square test. Next, we compared the combined prevalence of past-month cannabis use according to presence or absence of each self-reported disability and health condition using chi-squares. We then estimated linear time trends in the prevalence of past-month cannabis use overall and stratified by disability and health condition status using logistic regression. Finally, models with year-by-condition status interaction terms were used to assess differential time trends, adjusting for demographic characteristics including age, race/ethnicity, sex, education, income, and marital status. For disabilities and health conditions, responses with “don't know” were coded as not having the condition (the range of “don't know” values in all variables was between 0.1%–0.4%). Responses with “bad data,” “blank,” or “refused” were treated as missing (the range of missing values in all variables was between 0.8%–1.5%). NSDUH suppression rules were followed in accordance with the Methodological Summary and Definitions guidelines (Substance Abuse and Mental Health Services Administration, 2020). Stata SE 17 (StataCorp, TX) was used for all analyses, and weights were used to account for the complex survey design, non-response, selection probability, and population distribution. This secondary analysis was exempt from review at the New York University Langone Medical Center's Institutional Review Board.

3. Results

Sample characteristics are presented in Table 1. The majority of the sample was female (51.7%), Non-Hispanic White (63.9%), and married (51.7%), and the plurality were aged 18–34 (29.9%), had a college degree or higher (31.6%), and had an income ≥$75,000 (38.3%). A tenth (9.9%) of individuals used marijuana in the past month. Compared to those without a health condition, those with any health condition were more likely to be older, female, Non-Hispanic White, have lower income, and be divorced or widowed, and less likely to have a college degree or use cannabis in the past month (all ps < 0.001). Similar comparisons were observed between those with and without any disability with the exception of those with any disability being more likely to have used cannabis in the past month (all ps < 0.001).

Difficulty walking was the most prevalent disability (8.9%), followed by difficulty thinking (7.5%), difficulty hearing (5.4%), difficulty doing errands (5.3%), difficulty seeing (4.4%), and difficulty dressing (2.6%). About a fifth (20.2%) of individuals experienced at least one of the aforementioned disabilities. Furthermore, 79.8% of individuals had no impairments, 12.2% had 1 impairment, 6.5% had 2–3 impairments, and 1.6% had 4–6 impairments. Regarding health conditions, hypertension was the most prevalent (16.3%), followed by diabetes (10.6%), depression (7.1%), cancer (6.3%), asthma (6.3%), heart disease (5.6%), bronchitis (4.3%), kidney disease (2.0%), and hepatitis (1.3%). About 39.2% of individuals was diagnosed with at least one of the aforementioned health conditions.

Overall prevalence comparisons of past-month cannabis use by disability status are presented in Table 2. Compared to those without each respective disability, the prevalences of past-month cannabis use was higher among those with difficulty seeing (11.4% vs 9.9%), difficulty thinking (17.6% vs. 9.3%), difficulty dressing (11.1% vs. 9.9%), difficulty

doing errands (13.6% vs. 9.7%), and multiple impairments (1 impairment [11.4%], 2–3 impairments [11.9%], and 4–6 impairments [11.4%] vs 9.5%) (all *p*s < 0.05), while the prevalences of past-month cannabis use was lower among those with difficulty hearing (7.1% vs. 10.1%) and difficulty walking (8.0% vs. 10.1%) (all *p*s < 0.001).

Overall prevalence comparisons of past-month cannabis use by health condition status are presented in Table 3. Compared to those without each respective health condition, the prevalences of past-month cannabis use was higher among those with asthma (11.3% vs. 9.8%), depression (20.8% vs. 9.1%), and hepatitis (18.1% vs. 9.8%), while the prevalences of past-month cannabis use was lower among those with cancer (5.5% vs. 10.2%), diabetes (5.0% vs. 10.5%), heart disease (6.2% vs. 10.2%), hypertension (4.7% vs. 10.9%), and kidney disease (5.7% vs. 10.0%) (all *p*s < 0.001). No differences in prevalence of past-month cannabis use was observed among those with versus without bronchitis (10.0% vs. 9.9%, $p = 0.87$).

From 2015 to 2019, the prevalence of past-month cannabis use increased significantly among all individuals from 8.5% (95% confidence interval [CI]: 8.0–8.9) to 11.9% (95% CI: 11.5–12.3), a 40.0% increase ($p < 0.001$). When stratified by disability status, cannabis use increased significantly over time among adults with and without each disability examined (all *p*s < 0.01) (Table 4 and Supplemental Fig. 1). When stratified by health condition status, cannabis use increased significantly over time among adults with and without each health condition examined (all *p*s < 0.05) (Table 5 and Supplemental Fig. 2). After adjusting for demographic characteristics, the rate of increase in the prevalence of cannabis use was significantly more rapid among those with (versus without) difficulty hearing (89.8% increase [4.9% to 9.3%] vs. 37.9% increase [8.7% to 12.0%], $p = 0.015$), difficulty walking (84.1% increase [6.3% to 11.6%] vs. 36.8% increase [8.7% to 11.9%], $p < 0.001$), 2–3 impairments (75.3% increase [9.3% to 16.3%] vs. 36.6% increase [8.2% to 11.2%], $p = 0.041$), and kidney disease (135.3% increase [3.4% to 8.0%] vs. 38.4% increase [8.6% to 11.9%], $p = 0.045$) (Fig. 1). Significant differential trends were not detected for any other disability or health condition after adjusting for demographic characteristics.

4. Discussion

Based on nationally representative US data, we estimated that the prevalence of past-month cannabis use increased over time between 2015 and 2019 among those with and without all the disabilities and health conditions examined. However, the rate of increase was more rapid among those with difficulty hearing, difficulty walking, 2–3 impairments, and kidney disease. We also found that certain disabilities and health conditions consistently had disproportionately elevated rates of cannabis use. These estimates indicate that increased monitoring and screening for cannabis use and cannabis-related harms may be warranted for individuals living with certain disabilities and/or health conditions.

The current study findings are consistent with prior studies that found an increasing prevalence of cannabis use for medical purposes and increasing use among those with various health conditions, including disabilities, cardiovascular disease, diabetes, and depression (Glazier and Kling, 2013; Kim et al., 2022; Sexton and Alshaarawy, 2020;

Gorfinkel et al., 2020; Han et al., 2018b). Our study adds to the literature by providing more recent trends in cannabis use prevalence and examining a greater number of health conditions. We also detected differential trends in cannabis use, notably among those with select disabilities and kidney disease. To our knowledge, these differential trend findings have not been previously reported.

We detected rapidly increasing trends in cannabis use among those with difficulty hearing, difficulty walking, and 2–3 impairments. To our knowledge, only two other studies have evaluated trends in cannabis use among individuals with disabilities, both of which noted widening gaps in prevalence of cannabis use among those with disabilities (Gimm et al., 2023; Glazier and Kling, 2013). For instance, Gimm et al., 2023 found that the prevalence of cannabis use increased 40.8% (14.2% to 20.0%) among those with disabilities compared to a 37.2% increase (9.4% to 12.9%) among those without disabilities using 2015–2019 NSDUH data. While these authors used the same dataset as ours, their sample was restricted to working-age adults (aged 18–64) and did not further stratify disability into its specific components. Through the inclusion of all adults age ≥ 18, our study provides additional context to the findings of Gimm et al., 2023 by showing that the widening gaps in cannabis use over time are specifically among those with difficulty hearing, difficulty walking, and 2–3 disabilities. This suggests that there may be shifting trends in cannabis use among those within different disability domains. As such, continued surveillance of these trends is necessary to monitor the rising prevalence of cannabis use among those having certain disabilities and allows us to understand the broader implications of these evolving patterns on public health and healthcare resources.

Multifactorial pathways may explain the rapidly increasing rates of cannabis use among those with various disabilities. First, the increasing rates may be due to self-medication of symptoms (e.g., pain, depression, anxiety, insomnia) commonly experienced by individuals living with functional limitations (Kinne et al., 2004). Individuals with disabilities often also have overlap with chronic health conditions, for which self-medication aligns with the broader context of medicinal cannabis use given many of the same symptoms described above (Yang et al., 2021; Kosiba et al., 2019). Second, increasing cannabis use might contribute to disabilities such as hearing loss and cognitive and motor functioning deficits (Broyd et al., 2016; Phulka et al., 2021). For instance, a scoping review of 48 otolaryngology-related studies concluded that cannabis use was associated with hearing loss, unintended tinnitus, and vertigo (Phulka et al., 2021). Other research found verbal learning, memory, attention, and psychomotor function impairments during both acute and chronic exposure to cannabis use, with some evidence for persistence even after cessation of use (Broyd et al., 2016). Cannabis use is also associated with increased risk of injury including motor vehicle collision, intimate partner violence, and suicidal behavior that may contribute to disability (Volkow et al., 2014; Campeny et al., 2020). Third, indirect associations such as co-occurring loneliness, isolation, poor physical and mental health, low quality of life, and inability to participate in activities of daily living among individuals with disabilities may be potential drivers for cannabis use (Kinne et al., 2004; Brach and VanSwearingen, 2002; Backe et al., 2018; Ciorba et al., 2012). More research about reasons for use and the risks and benefits among this population is therefore warranted.

We also detected differential trends based on number of self-reported impairments. Specifically, while there were significant increases in cannabis use regardless of number of impairments, those with 2–3 impairments had faster rates of increase. Reasons for the rapidly increasing cannabis use among those with 2–3 impairments are unclear, though it's possible there may be compounding effects of impairments on substance use. For instance, Marlow et al., 2022 detected increasing strength of associations between the number of impairments and suicidal ideation, planning, and attempt, with the largest association observed for those with ≥5 impairments. Thus, it may be possible that those with higher number of impairments may be at increased risk for cannabis use given worse mental health, autonomy, loneliness, or other factors. Lastly, our study did not detect differential increases among those with 4–6 impairments, despite those individuals having a 94.9% increase over the 2015–2019 period. This may partially be due to low sample sizes among this group as evidenced from the large confidence intervals. Future research should further investigate whether and how the number of impairments affect cannabis usage.

With regard to health conditions, we found rapidly increasing rates of cannabis use among those with kidney disease, which may be due to increasing use for symptomatic management associated with kidney disease such as pain, nausea, anorexia, and pruritus (Rein, 2020). On the other hand, investigations have also found cannabis use to be associated with kidney disease progression. For instance, the cannabinoid receptors, CB_1 and CB_2, play a role in regulating renal vasculature and blood flow regulation, which may contribute to pathophysiological outcomes (Rein, 2020; Park et al., 2017). Future research is needed to further examine the potential biological and causal mechanisms for these associations. Moreover, reasons to explain why cannabis use did not increase more rapidly for individuals with other conditions such as diabetes or cancer are unclear and warrant further investigation.

Finally, while the main objective of this paper was to estimate trends in cannabis use across a range of disabilities and health conditions, we found that many conditions, regardless of whether there were differential increases, consistently demonstrated disproportionate rates of cannabis use. For instance, although cannabis use among both those with difficulty hearing and difficulty walking increased more rapidly than those without, the overall 2015–2019 pooled prevalence remained less for those with versus without difficulty hearing and difficulty walking (7.1% vs. 10.1% and 8.0% vs. 10.1%, respectively). Reasons for these findings are unknown, though it may be possible that certain limitations, such as difficulty walking, may affect one's ability in obtaining cannabis. On the other hand, there may not be differential rates of change in cannabis use for people with and without depression (56.0% increase vs. 35.4% increase), yet the overall prevalence of cannabis use among those with depression is over twice that of those without depression (20.8% vs. 9.1%). Thus, the disparity might not be increasing or decreasing for many of the examined disabilities and health conditions, but a disparity in cannabis prevalence exists and is persistent between those with and without certain conditions throughout the 2015–2019 time period. These findings indicate that attention and prevention efforts should not only be aimed towards those conditions with faster increases in use, but also among those with disproportionately elevated rates of cannabis use. Future studies should also attempt to understand how the evolving legal landscape surrounding cannabis and environmental factors such as the

COVID-19 pandemic might influence not only cannabis use but also the use and co-use of other substances, such as alcohol and tobacco. For instance, prior studies using NSDUH 2015–2019 data have found increases in cannabis use yet no significant increases in heavy episodic drinking among adults stratified by sex and sexual identity (Dyar et al., 2023), binge drinking among middle-aged and older adults (Kepner et al., 2023), nor alcohol or tobacco use among those with cardiovascular disease (Kim et al., 2022). Whether such trends in alcohol and tobacco persist in the context of increasing cannabis use remains an area to be explored. Continued surveillance of other legal drug use may also help to understand if current cannabis trends may be attributed to the legal landscape of cannabis versus other factors.

4.1. Limitations

Study limitations include reliance on self-report measures of cannabis use and health status which are subject to social desirability and recall bias. Second, the cross-sectional nature of the NSDUH precludes drawing causal or temporal inferences. Third, institutionalized individuals such as jail inmates and people experiencing homelessness not living in a shelter were excluded and thus findings may not be generalizable to those populations. Fourth, neither information on quantity or frequency of cannabis use nor the current status, severity, duration, or prior treatment history of health conditions were queried. Future longitudinal studies incorporating these variables may help to better understand the associations we observed. Fifth, there is a possibility that some health condition variables may not reflect an ongoing or chronic condition. For instance, kidney disease may potentially refer to individuals who suffered an acute kidney injury in the past or a nephrotic syndrome that self-resolved. However, this same variable has been used in other NSDUH studies to represent chronic kidney disease (Han et al., 2021a; Wilk et al., 2022). Sixth, some health conditions queried in NSDUH such as cirrhosis could not be incorporated given small sample sizes. Finally, we could not include 2020 or 2021 data as different survey methodologies were employed due to COVID-19, and the Substance Abuse and Mental Health Services Administration warns that these estimates should not be compared to previous years. Redesign changes in 2015 regarding multiple variables also precluded the use of data prior to 2015.

5. Conclusions

Our findings provide new evidence suggesting that the prevalence of past-month cannabis use is disproportionately elevated among US individuals with certain disabilities and health conditions and that use is increasing more rapidly among those with difficulty hearing, difficulty walking, 2–3 impairments, and kidney disease. These increasing trends may be linked to efforts by individuals to alleviate common symptoms associated with these conditions such as pain, insomnia, anorexia, nausea, and pruritus, or from cannabis contributing to such outcomes due to various biological and social factors. Targeted interventions such as education programs that are tailored to individuals with these health conditions can help explain both the potential benefits and the risks associated with cannabis use. Additionally, the incorporation of a cannabis curriculum into medical school education and continuing education credits on cannabis for health professionals may

increase providers' confidence in screening for and facilitating discussions on cannabis use (Ware and Ziemianski, 2015; Evanoff et al., 2017). Finally, ongoing monitoring among at-risk populations are warranted in addition to evaluating the impact of state-level cannabis laws on both medical and recreational cannabis usage over time.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Data availability

Data will be made available on request.

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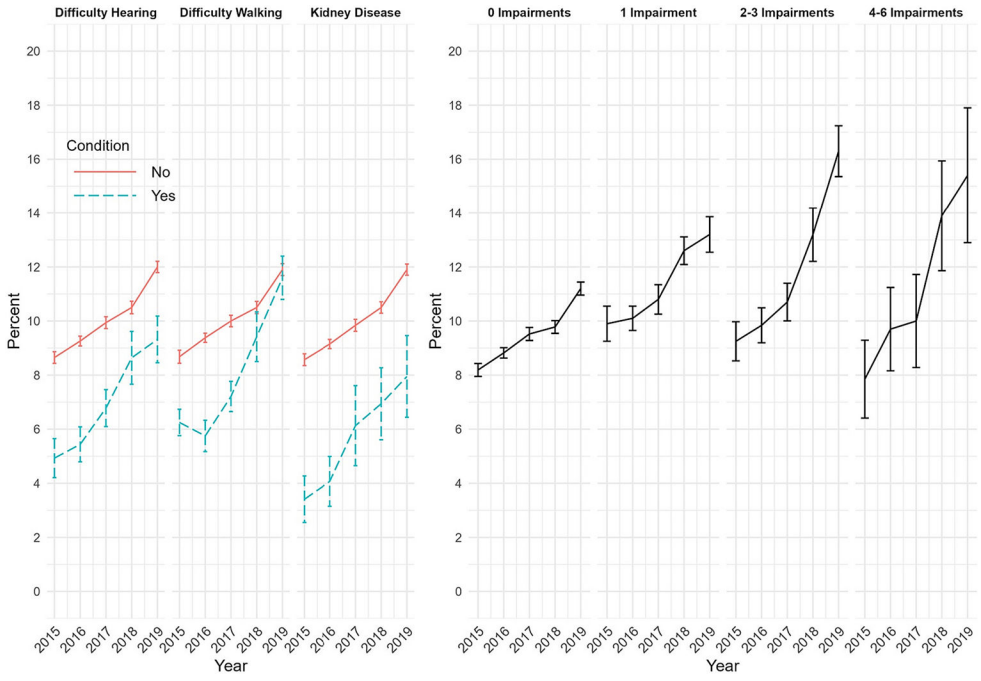

Fig. 1.

Trends in prevalence of past-month cannabis use among US adults from the 2015–2019 NSDUH by selected disability and health condition status with more rapid increases in use among those with difficulty hearing, difficulty walking, 2–3 impairments, and kidney disease.

Table 1

Sample characteristics of US adults from the 2015–2019 NSDUH overall and by health condition and disability status.

Variable	Full sample	Any health condition		Any disability	
	Weighted % (95% CI)	Without weighted % (95% CI)	With weighted % (95% CI)	Without weighted % (95% CI)	With weighted % (95% CI)
Marijuana use (past-month)	9.9 (9.8–10.1)	10.6 (10.5–10.8)	8.8 (8.6–9.0)	9.5 (9.3–9.7)	11.5 (11.1–12.0)
Age					
18–34	29.9 (29.5–30.3)	38.7 (38.2–39.2)	16.1 (15.8–16.4)	32.1 (31.7–32.5)	21.1 (20.6–21.7)
35–49	24.7 (24.4–25.0)	28.9 (28.5–29.2)	18.2 (17.8–18.6)	26.9 (26.6–27.2)	15.9 (15.4–16.3)
50–64	25.3 (24.9–25.7)	21.6 (21.1–22.1)	31.0 (30.5–31.5)	24.8 (24.4–25.2)	27.3 (26.6–28.0)
65+	20.2 (19.8–20.5)	10.8 (10.5–11.1)	34.7 (34.2–35.3)	16.2 (15.9–16.6)	35.7 (34.9–36.5)
Sex					
Male	48.3 (47.9–48.6)	51.2 (50.7–51.6)	43.7 (43.1–44.3)	49.3 (48.9–49.6)	44.1 (43.4–44.8)
Female	51.7 (51.4–52.1)	48.8 (48.4–49.3)	56.3 (55.7–56.9)	50.7 (50.4–51.1)	55.9 (55.2–56.6)
Race/ethnicity					
NH White	63.9 (63.3–64.4)	60.2 (59.6–60.8)	69.5 (68.9–70.2)	62.9 (62.4–63.4)	68.1 (67.1–69.0)
NH Black	11.9 (11.5–12.2)	11.8 (11.4–12.2)	12.0 (11.5–12.5)	11.9 (11.6–12.3)	11.5 (10.9–12.1)
Hispanic	16.0 (15.6–16.4)	18.8 (18.3–19.3)	11.8 (11.4–12.3)	16.4 (16.0–16.9)	14.3 (13.7–15.0)
NH Asian or other race	8.2 (8.0–8.5)	9.3 (8.9–9.6)	6.6 (6.3–6.9)	8.8 (8.5–9.0)	6.1 (5.8–6.5)
Education					
Less than high school	12.7 (12.4–13.0)	12.8 (12.5–13.1)	12.6 (12.1–13.0)	11.0 (10.7–11.2)	19.4 (18.8–20.1)
High school	24.8 (24.5–25.1)	24.5 (24.2–24.9)	25.3 (24.8–25.8)	23.2 (22.9–23.6)	31.1 (30.3–31.8)
Some college	30.8 (30.5–31.2)	30.0 (29.6–30.4)	32.2 (31.6–32.7)	30.8 (30.5–31.2)	31.0 (30.2–31.8)
College degree or higher	31.6 (31.1–32.1)	32.7 (32.1–33.2)	29.9 (29.3–30.6)	35.0 (34.5–35.5)	18.5 (17.9–19.1)
Income					
Less than $20,000	16.3 (16.0–16.6)	15.4 (15.1–15.7)	17.7 (17.2–18.1)	13.5 (13.2–13.8)	27.1 (26.4–27.8)
$20,000–$49,999	29.5 (29.1–29.9)	28.5 (28.1–29.0)	30.9 (30.3–31.5)	27.8 (27.4–28.3)	35.9 (35.2–36.5)
$50,000–$74,999	16.0 (15.7–16.2)	15.9 (15.6–16.2)	16.2 (15.8–16.6)	16.5 (16.2–16.8)	13.9 (13.4–14.5)
$75,000 or greater	38.3 (37.7–38.8)	40.2 (39.6–40.9)	35.2 (34.5–36.0)	42.2 (41.6–42.7)	23.1 (22.3–23.9)
Marital status					
Married	51.7 (51.3–52.2)	50.5 (50.0–51.1)	53.6 (53.0–54.3)	53.9 (53.4–54.3)	43.6 (42.6–44.6)
Widowed	5.9 (5.7–6.1)	3.4 (3.2–3.5)	9.9 (9.5–10.3)	4.2 (4.0–4.4)	12.5 (11.9–13.0)

Variable	Full sample	Any health condition		Any disability	
	Weighted % (95% CI)	Without weighted % (95% CI)	With weighted % (95% CI)	Without weighted % (95% CI)	With weighted % (95% CI)
Divorced	13.8 (13.6–14.1)	12.0 (11.7–12.3)	16.7 (16.2–17.1)	12.6 (12.4–12.9)	18.6 (18.0–19.2)
Never married	28.5 (28.2–28.9)	34.1 (33.7–34.6)	19.8 (19.5–20.2)	29.3 (28.9–29.6)	25.4 (24.8–26.0)

Note: Data from 2015 to 2019 are pooled. CI = confidence interval. NH = Non-Hispanic.

All *p*s < 0.001.

Table 2

Overall prevalence of past-month cannabis use among US adults from the 2015–2019 NSDUH by disability status.

Characteristic	Weighted % (95% CI)	*p*
Difficulty hearing		**<0.001**
With	7.1 (6.5–7.7)	
Without	10.1 (9.9–10.2)	
Difficulty seeing		**<0.001**
With	11.4 (10.7–12.3)	
Without	9.9 (9.7–10.0)	
Difficulty thinking		**<0.001**
With	17.6 (16.8–18.3)	
Without	9.3 (9.1–9.5)	
Difficulty walking		**<0.001**
With	8.0 (7.4–8.7)	
Without	10.1 (10.0–10.3)	
Difficulty dressing		**0.040**
With	11.1 (9.9–12.4)	
Without	9.9 (9.7–10.0)	
Difficulty doing errands		**<0.001**
With	13.6 (12.7–14.5)	
Without	9.7 (9.6–9.9)	
Multiple impairments		**<0.001**
0 impairments	9.5 (9.3–9.7)	
1 impairment	11.4 (10.9–11.9)	
2–3 impairments	11.9 (11.3–12.5)	
4–6 impairments	11.4 (9.9–13.1)	

Note: Data from 2015 to 2019 are pooled. Boldface indicates statistical significance ($p < 0.05$). CI = confidence interval.

Table 3

Overall prevalence of past-month cannabis use among US adults from the 2015–2019 NSDUH by health condition status.

Characteristic	Weighted % (95% CI)	*p*
Asthma (past-year)		**<0.001**
With	11.3 (10.8–11.9)	
Without	9.8 (9.7–10.0)	
Bronchitis		0.87
With	10.0 (9.1–11.0)	
Without	9.9 (9.8–10.1)	
Cancer		**<0.001**
With	5.5 (4.9–6.2)	
Without	10.2 (10.1–10.4)	
Depression (past-year)		**<0.001**
With	20.8 (20.1–21.4)	
Without	9.1 (8.9–9.2)	
Diabetes		**<0.001**
With	5.0 (4.6–5.4)	
Without	10.5 (10.3–10.7)	
Heart disease (past-year)		**<0.001**
With	6.2 (5.5–6.9)	
Without	10.2 (10.0–10.3)	
Hepatitis		**<0.001**
With	18.1 (15.7–20.8)	
Without	9.8 (9.7–10.0)	
Hypertension (meds)		**<0.001**
With	4.7 (4.3–5.2)	
Without	10.9 (10.8–11.1)	
Kidney disease		**<0.001**
With	5.7 (4.8–6.8)	
Without	10.0 (9.9–10.2)	

Note: Data from 2015 to 2019 are pooled. Boldface indicates statistical significance ($p < 0.05$). CI = confidence interval.

Table 4

Trends in prevalence of past-month cannabis use among US adults from the 2015–2019 NSDUH by disability status.

Characteristic	Weighted % (95% CI)					Change from 2015 to 2019			Interactions *p*-value
	2015	2016	2017	2018	2019	% relative change	aOR (95% CI)	Linear trend *p*-value	
Difficulty hearing									**0.015**
With	4.9 (3.7–6.6)	5.4 (4.3–6.9)	6.8 (5.5–8.3)	8.6 (6.9–10.8)	9.3 (7.7–11.2)	89.8	1.23 (1.14–1.34)	**<0.001**	
Without	8.7 (8.2–9.1)	9.3 (8.9–9.6)	9.9 (9.5–10.4)	10.5 (10.1–11.0)	12.0 (11.6–12.4)	37.9	1.11 (1.09–1.12)	**<0.001**	
Difficulty seeing									0.70
With	9.0 (7.4–11.0)	10.5 (8.6–12.7)	11.4 (9.1–14.2)	13.0 (11.0–15.3)	13.2 (11.6–14.9)	46.7	1.10 (1.03–1.17)	**<0.01**	
Without	8.4 (8.0–8.9)	9.0 (8.6–9.3)	9.7 (9.3–10.1)	10.3 (9.9–10.7)	11.8 (11.4–12.2)	40.5	1.11 (1.09–1.13)	**<0.001**	
Difficulty thinking									0.50
With	15.1 (13.3–17.1)	16.1 (14.7–17.6)	16.2 (14.8–17.7)	19.6 (17.8–21.5)	20.4 (18.8–22.0)	35.1	1.10 (1.06–1.14)	**<0.001**	
Without	8.0 (7.5–8.4)	8.5 (8.2–8.9)	9.2 (8.8–9.7)	9.7 (9.3–10.1)	11.1 (10.6–11.5)	38.8	1.11 (1.09–1.13)	**<0.001**	
Difficulty walking									**<0.001**
With	6.3 (5.3–7.3)	5.8 (4.7–7.0)	7.2 (6.2–8.4)	9.4 (7.7–11.4)	11.6 (10.1–13.3)	84.1	1.25 (1.19–1.32)	**<0.001**	
Without	8.7 (8.2–9.2)	9.4 (9.1–9.7)	10.0 (9.6–10.4)	10.5 (10.1–11.0)	11.9 (11.4–12.3)	36.8	1.10 (1.08–1.12)	**<0.001**	
Difficulty dressing									0.14
With	9.3 (6.8–12.6)	9.2 (7.0–11.9)	8.7 (6.4–11.6)	12.0 (9.1–15.6)	16.4 (13.0–20.4)	76.3	1.21 (1.09–1.35)	**0.001**	
Without	8.4 (8.0–8.9)	9.1 (8.7–9.4)	9.8 (9.4–10.2)	10.4 (10.0–10.8)	11.7 (11.3–12.2)	39.3	1.11 (1.09–1.13)	**<0.001**	
Difficulty doing errands									0.22
With	10.7 (9.2–12.5)	11.8 (10.1–13.8)	11.8 (10.3–13.4)	15.1 (12.9–17.5)	18.1 (16.1–20.4)	69.2	1.15 (1.09–1.22)	**<0.001**	
Without	8.3 (7.9–8.8)	8.9 (8.6–9.2)	9.7 (9.2–10.1)	10.2 (9.8–10.6)	11.5 (11.1–11.9)	38.6	1.11 (1.09–1.12)	**<0.001**	
Multiple impairments									
0 impairments	8.2 (7.7–8.7)	8.8 (8.4–9.2)	9.5 (9.1–10.0)	9.8 (9.3–10.3)	11.2 (10.7–11.7)	36.6	1.10 (1.08–1.12)	**<0.001**	
1 impairment	9.9 (8.7–11.3)	10.1 (9.3–11.1)	10.8 (9.7–11.9)	12.6 (11.6–13.7)	13.2 (11.9–14.5)	33.3	1.09 (1.05–1.14)	**<0.001**	0.80
2–3 impairments	9.3 (7.9–10.8)	9.8 (8.6–11.2)	10.7 (9.4–12.2)	13.2 (11.3–15.3)	16.3 (14.5–18.3)	75.3	1.17 (1.11–1.23)	**<0.001**	**0.041**
4–6 impairments	7.9 (5.4–11.3)	9.7 (7.0–13.3)	10.0 (7.1–14.0)	13.9 (10.2–18.5)	15.4 (11.0–21.1)	94.9	1.24 (1.08–1.43)	**<0.01**	0.15

Note: Boldface indicates statistical significance ($p < 0.05$). aOR = adjusted odds ratio. CI = confidence interval. Analyses adjusted for age, race/ethnicity, sex, education, income, and marital status.

Table 5

Trends in prevalence of past-month cannabis use among US adults from the 2015–2019 NSDUH by health condition status.

Characteristic	Weighted % (95% CI)					Change from 2015 to 2019			Interactions *p*-value
	2015	2016	2017	2018	2019	% relative change	aOR (95% CI)	Linear trend *p*-value	
Asthma (past-year)									0.13
With	9.7 (8.4–11.1)	9.4 (8.1–10.9)	10.7 (9.6–11.9)	12.6 (11.3–14.1)	14.2 (12.8–15.7)	46.4	1.16 (1.10–1.22)	**<0.001**	
Without	8.4 (8.0–8.9)	9.0 (8.7–9.4)	9.7 (9.3–10.2)	10.3 (9.9–10.8)	11.7 (11.3–12.2)	39.3	1.11 (1.09–1.13)	**<0.001**	
Bronchitis									0.34
With	8.6 (7.0–10.4)	8.3 (6.8–10.2)	9.7 (7.9–11.7)	10.5 (8.8–12.4)	13.1 (10.6–16.0)	52.3	1.16 (1.08–1.26)	**0.001**	
Without	8.5 (8.0–8.9)	9.1 (8.8–9.4)	9.8 (9.4–10.2)	10.5 (10.0–10.9)	11.8 (11.4–12.2)	38.8	1.11 (1.09–1.13)	**<0.001**	
Cancer									0.96
With	4.2 (2.9–5.9)	5.1 (3.9–6.6)	6.1 (4.8–7.8)	5.6 (4.5–6.9)	6.4 (5.0–8.3)	52.4	1.11 (1.00–1.24)	**0.042**	
Without	8.7 (8.3–9.2)	9.3 (9.0–9.6)	10.0 (9.6–10.5)	10.8 (10.4–11.2)	12.2 (11.8–12.7)	40.2	1.11 (1.09–1.13)	**<0.001**	
Depression (past-year)									0.20
With	15.9 (14.4–17.4)	18.6 (16.5–20.9)	20.1 (18.4–22.0)	23.5 (21.8–25.2)	24.8 (23.3–26.5)	56.0	1.14 (1.09–1.19)	**<0.001**	
Without	7.9 (7.5–8.4)	8.3 (8.1–8.6)	9.0 (8.5–9.4)	9.4 (9.0–9.8)	10.7 (10.3–11.2)	35.4	1.10 (1.08–1.22)	**<0.001**	
Diabetes									0.076
With	3.6 (2.9–4.6)	4.1 (3.3–5.1)	4.8 (3.8–6.0)	5.7 (4.7–7.1)	6.7 (5.6–8.0)	86.1	1.21 (1.11–1.32)	**<0.001**	
Without	9.0 (8.6–9.5)	9.6 (9.3–10.0)	10.3 (9.9–10.8)	11.0 (10.6–11.5)	12.5 (12.0–13.0)	38.9	1.11 (1.09–1.12)	**<0.001**	
Heart disease (past-year)									0.79
With	5.0 (3.7–6.6)	6.0 (4.7–7.8)	5.5 (4.2–7.2)	6.3 (4.9–8.1)	7.8 (6.1–9.9)	56.0	1.13 (1.02–1.24)	**0.019**	
Without	8.7 (8.2–9.1)	9.2 (8.9–9.6)	10.0 (9.6–10.5)	10.7 (10.3–11.2)	12.1 (11.7–12.6)	39.1	1.11 (1.09–1.13)	**<0.001**	
Hepatitis									0.17
With	14.7 (11.1–19.3)	15.9 (11.3–21.9)	19.0 (15.0–23.7)	14.3 (10.3–19.6)	27.9 (21.1–36.0)	89.8	1.20 (1.08–1.34)	**0.001**	
Without	8.4 (8.0–8.8)	8.9 (8.6–9.3)	9.7 (9.3–10.1)	10.4 (10.0–10.8)	11.7 (11.3–12.1)	39.3	1.11 (1.09–1.13)	**<0.001**	
Hypertension (meds)									0.33
With	3.7 (3.0–4.5)	4.0 (3.3–4.9)	4.8 (4.1–5.6)	5.2 (4.3–6.3)	5.9 (5.0–6.9)	59.5	1.15 (1.08–1.22)	**<0.001**	
Without	9.4 (8.9–9.9)	10.1 (9.7–10.4)	10.7 (10.3–11.2)	11.5 (11.0–11.9)	13.0 (12.5–13.5)	38.3	1.11 (1.09–1.13)	**<0.001**	
Kidney disease									**0.045**
With	3.4 (2.0–5.6)	4.1 (2.6–6.4)	6.1 (3.8–9.9)	6.9 (4.7–10.1)	8.0 (5.4–11.6)	135.3	1.31 (1.12–1.53)	**0.001**	

Characteristic	Weighted % (95% CI)					Change from 2015 to 2019			Interactions *p*-value
	2015	2016	2017	2018	2019	% relative change	aOR (95% CI)	Linear trend *p*-value	
Without	8.6 (8.1–9.0)	9.2 (8.8–9.5)	9.8 (9.4–10.3)	10.5 (10.1–10.9)	11.9 (11.5–12.4)	38.4	1.11 (1.09–1.13)	**<0.001**	

Note: Boldface indicates statistical significance ($p < 0.05$). aOR = adjusted odds ratio. CI = confidence interval. Analyses adjusted for age, race/ethnicity, sex, education, income, and marital status.