


Recent Trends in Cannabis Use in Adults Ages 60 Years and Older

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Abstract: This narrative review highlights the growing population of older adults (OA) who use cannabis and health considerations of cannabis use especially relevant to aging. The majority of OA who endorse using cannabis also report choosing it for medical purposes, most commonly to target symptoms of pain, insomnia, anxiety, and depression. However, many OA who use cannabis also do not discuss their use with their medical providers, and additional controlled clinical trials are needed to delineate which symptoms cannabis can successfully alleviate and any conditions or circumstances for which it is contraindicated. Further, emerging research in younger populations has documented possible cardiovascular risks of heavy cannabis use, and this area has yet to be thoroughly investigated in aging adults despite risk for vascular and other forms of dementia. Preclinical models are beginning to offer insight into health effects of cannabis use with aging, including cognition and dementia risk. In particular, cannabis represents a possible treatment for cognitive decline and neurodegeneration in OA, but further research is needed to characterize effects of cannabis use in healthy aging versus dementia processes.

Keywords: marijuana, aging, mental health, cardiovascular health, pain, sleep

Overview

Older adults (OA) remain an understudied portion of the general population, and there are variable definitions as to when older adulthood begins. For example, 55 years is used as a common minimum (eg, “senior” discounts and enrollments; Rule of 55¹) in the United States (US), versus 60 years according to the World Health Organization (WHO²) or 65 years according to the US National Institutes of Health (NIH³). Based on the 2020 US census, the OA population grew from 5% to nearly 17% of the total population over the last 100 years, a growth rate five times that of the overall population, which has resulted in 55.8 million adults aged 65 years and older currently residing in the US.⁴ These numbers are expected to continue to grow exponentially over the coming decades, with recent estimates projecting over 80 million OA representing 22% of the total population by the year 2040.⁵ Given the importance of remaining independent as long as possible to reduce financial and caregiver burdens, supporting healthy aging through investigating factors that influence trajectories of quality of life or decline is critical.

As a research group, we adhere to the WHO definition of OA as 60 years and older, but given the variability in the literature, we note the age ranges for each human cannabis study discussed here as well as important contextual factors in [Supplemental Table 1](#). It should be noted that the majority of studies identified in the context of this review were conducted among US samples, followed by Canadian and European samples.

In this review, we discuss common patterns of use among OA as well as common reasons or motivations for use. As the aging population has increased at proportionally higher rates compared with their younger counterparts, so too has OA cannabis use. We then discuss current evidence on effects or efficacy of cannabis in current major topics of study, including the most common medical purposes for use (mental health, pain, and sleep), as well as cardiovascular health and dementia risk. There are many recognized possible therapeutic benefits of cannabis use through direct and indirect

pathways (eg, improving pain or sleep, which can then improve other aspects of daily functioning). However, cannabis still has an unclear risk profile for OA, who can experience greater sensitivity to medications due to changing metabolism and greater rates of polypharmacy, raising concern for pharmaceutical interactions. At minimum, shifts in preferences and acceptability regarding medical cannabis use signal a strong need for further research and training for healthcare providers working with OA.

More Older Adults are Choosing Cannabis

Past month cannabis use prevalence among a sample of US OA 65 years and older rose from 4.6% to 7.0% from just 2021 to 2023.⁶ This increase likely reflects both greater social acceptance of cannabis use as well as greater legal permissibility and accessibility of cannabis products. As of late 2025, 40 states allow cannabis use for medical purposes, and 24 states, three territories, and the District of Columbia allow cannabis for non-medical (ie, recreational) use by adults.⁷ A recent study found that cannabis use increased over 3% on average across the adult population in the 5 years following recreational cannabis legalization by state.⁸ Although that rate may initially appear low, cannabis is quickly becoming one of the most widely used substances in the US and may soon outpace tobacco.⁹

Patterns of Use

OA are often referred to as a singular sociocultural group despite increasing racial and ethnic diversity within the group,¹⁰ as well as diversity of daily experience¹¹ and cumulative lived experience.¹² Similarly, cannabis use is most often treated as a single binary variable, neglecting the diverse ways in which cannabis can be used. Importantly, patterns of cannabis use among OA are as diverse as the population itself. One study found three distinct groups of OA using cannabis, described as those using for the first time, those who have used consistently since their youth, and those who may have used in younger adulthood, abstained in their early middle adulthood, and reengaged in cannabis use in older age, referred to as stop-out use.¹³ A higher percentage of those who endorsed lifelong or stop-out use reported weekly or daily use, whereas a higher percentage of those new to cannabis use reported less than monthly use. Additionally, medical use was more common than recreational use in OA who were using cannabis for the first time, whereas use for both medical and recreational purposes was more common with stop-out and lifelong use. In a qualitative study of OA using cannabis for medical purposes, half of the participants reported no cannabis use prior to receiving their medical card.¹⁴ These patterns will remain important for investigating health impacts of cannabis and relevant changes over time (eg, higher potencies).¹⁵

Further, there appear to be differences in cannabis use patterns among various demographics within the aging population. For example, in a study conducted with data from the University of Michigan's National Poll on Health Aging, nearly 14% of adults ages 50 to 64 years reported past-year cannabis use, whereas this number was less than 10% in adults aged 65 to 80 years.¹⁶ Fernandez et al¹⁶ also found that cannabis use was more common in individuals who were White, unmarried, and unemployed. Another study found that OA who reported past-year cannabis use were more likely to have higher education and be male.¹⁷ Additionally, across adulthood, women are more likely to endorse primarily consuming edible products, whereas men are more likely to endorse primarily using cannabis via inhalation.¹⁸ Overall, however, OA are more likely than their younger counterparts to use cannabis in the form of edible products, drinks, and other non-flower means of administration (ie, not smoked).¹⁹ Compared with younger adults, OA are also more likely to use cannabis later in the day and use lower potency concentrations.²⁰ Variability in patterns of use across OA is notable when considering the differential impacts of product type, frequency and duration of use, and route of administration on the potential benefits and risks associated with cannabis use.

Reasons for Use

Understanding why OA elect to use cannabis is just as relevant as understanding how they use cannabis, particularly in concert with investigating the long-term impacts of use in a physically and cognitively changing population. Perceptions of cannabis have continued to change with the ever-evolving political landscape of cannabis legislation, particularly among OA who have witnessed decades of transformation in societal and individual attitudes towards cannabis. Stigma, such as the long-held belief that cannabis is a "gateway drug," has been associated with recreational use and may be

related to OA preferring to endorse medical reasons for use.²¹ In this same study, 60% of OA were strongly in favor of legalized medical cannabis, whereas less than 30% of OA felt similarly about recreational cannabis.²¹ OA also perceived recreational cannabis as more risky than medical cannabis.

These attitudes are commonly reflected in OA who choose to use cannabis. For example, in a sample of patients at a geriatric clinic, 74% endorsed only medical use, whereas 15% endorsed recreational use, and 11% reported using for both medical and recreational purposes.²² Approximately 35% of OA perceived negative stigma from their family members and friends because of their cannabis use.²³ Some OA have reportedly opted to either completely conceal or selectively disclose their cannabis use, citing fear of judgement or concern they would appear as negative role models (ie, that their cannabis use would encourage younger people to initiate recreational cannabis use).²⁴ As noted above, OA often choose consumption methods they deem more medically appropriate (eg, oils, topical creams, and edibles),¹⁹ as OA tend to associate smoking with recreational use.²⁴

In the most recent studies, OA appeared to view cannabis as a viable option for symptom management and treatment of mental health and physical conditions; however, perceptions differed by several factors, including cannabis use history and reasons for use.^{25,26} OA most commonly cite pain management, sleep difficulties (eg, insomnia), anxiety, and depression as medical motivations for use.^{24,27–30} However, compared with OA who endorsed current use, OA who previously used cannabis but no longer do so were less likely to view cannabis as an effective treatment for symptom management and were more likely to believe OA were at higher risk of side effects from cannabis.²⁵ In addition, compared with individuals endorsing solely recreational use, those who only used cannabis for medical purposes were more likely to believe cannabis was a reasonable alternative for treating intractable symptoms, and that it is effective in doing so. OA who used cannabis for both recreational and medical purposes also had higher odds of agreeing with statements about treatment efficacy.²⁵ Interestingly, these beliefs are apparent despite few clinical trials focused on medical cannabis for OA, which will be discussed below.

Although recreational use is less common than medical use among OA, especially when compared to younger adults, OA have endorsed alternative motivations for cannabis use such as for relaxation, to stimulate creativity or enhance other activities, or because they enjoy the feeling.³¹ However, descriptions of medical versus recreational use frequently vary across studies. Some researchers include checklists pertaining to possible medical and recreational motivations (eg, pain and social activity).¹⁷ Others have administered existing motivation measures,³² but no questionnaires regarding cannabis use motives have been validated specifically among OA.

Risks with Use

Data from a nationally representative sample indicate that a sharp decline in perceived risk of cannabis use between 2015 and 2019 has occurred among OA, especially among OA who endorsed high-risk behaviors (eg, tobacco and binge alcohol use) or were diagnosed with chronic diseases.³³ Overall, OA endorsing cannabis use are more likely to endorse co-occurring alcohol, tobacco, or other substance use (“co-use”).³⁴ Despite overall decreasing trends in tobacco use in most demographics,³⁵ OA have recently demonstrated increasing rates of tobacco and cannabis co-use.³⁶ Additionally, a recent survey of OA using cannabis found that nearly 72% also consumed alcohol, and those over age 65 reported more frequent alcohol use than those between ages 50 and 64 years.³⁷ Co-occurring substance use is particularly concerning in populations at greater risk for polypharmacy, such as OA. In contrast, research suggests that OA endorsing medical cannabis use report reduced opioid and benzodiazepine use,³⁸ which should be further investigated by controlled clinical trials.

Cannabis use disorder (CUD), defined by the DSM-5 as problematic use including uncontrolled use, associated risky behavior, negative impact on important roles and daily life, cravings, tolerance, and/or withdrawal symptoms within a 12-month period,³⁹ is also of concern in the OA population. Data from the National Surveys on Drug Use and Health showed that 7% of the general population reported symptoms consistent with DSM-5 criteria for CUD.⁴⁰ Those with CUD had rates of comorbid other substance use disorders (eg, alcohol use disorder) three to four times higher than individuals without CUD. Additionally, over 38% of individuals with CUD had comorbid moderate or severe mental illness and nearly 17% reported receiving substance use treatment. Similarly, findings from nine cross-sectional studies suggested that OA who endorse past-year cannabis use have higher self-reported prevalence of mental and substance use disorders than their peers who have never used or not used within the last year.⁴¹ Specifically, 65% of people over age 50

who had used cannabis within the last year reported past-year substance use disorder, and 82% reported lifetime substance use disorder. In comparison, those who had never used cannabis only reported 18% and 27% past-year and lifetime substance use disorder, respectively. However, people reported nicotine use disorder (58–62%) and alcohol use disorder (42%–48%) more frequently than CUD (7–18%).

Notably, prevalence of CUD may vary in different subpopulations of OA. For example, among OA veterans, within the 10% of participants overall who reported recent use, more than a third (36%) met criteria for CUD.⁴² Being male, aged 65–74 years (“young-old”), having anxiety, more frequent cannabis use, and co-use of any illicit substance were risk factors for CUD. Participants with CUD were more likely to use cannabis via inhalation as opposed to only edible use. In contrast, use for exclusively medical reasons was associated with lower rates of CUD.

Misinformation regarding cannabis use may lead OA to have problematic cannabis use or limit the therapeutic benefit of medicinal use. Most frequently, OA report learning about medical cannabis from their social networks (eg, family members, friends, and acquaintances) who have encouraged them to try cannabis to address health concerns.²⁸ Other sources of information regarding cannabis use in general include the media (eg, television news and the internet) and cannabis store employees.^{26,27,43} Notably, OA report difficulty navigating the cannabis market, including understanding the meaning of product names and specifications (ie, dose and ratio).¹⁴ Healthcare providers (HCPs) are rarely cited as sources of information regarding cannabis.^{26,27,30}

This disconnect in clinical communication between OA and HCPs is another point of concern, further emphasized by the sharp increase in cannabis-related emergency department (CRED) visits among OA Californians.⁴⁴ Between 2005 and 2019, CRED visits increased from 20.7 per 100,000 visits to 395.0 per 100,000 visits among OA. More specifically, higher CRED visits in 2019 were associated with being ages 65–74, male, and having more comorbidities. Although limited to California, these trends demonstrate an added risk for OA as cannabis accessibility continues to increase throughout the US. Moreover, population-level analyses suggest that individuals ($M_{age} = 55$ years) who receive emergency care related to cannabis use in some way (eg, harmful use, cannabis poisoning, and intoxication) are more likely than both the general population and others receiving any non-cannabis-related acute care to be diagnosed with a dementia in the next 5 to 10 years.⁴⁵

HCPs tend to be understandably concerned about the lack of data on cannabis effectiveness relative to the recognized risk of adverse effects among OA, which may hinder discussion between HCPs and their patients.²⁵ In one study, a majority (76%) of OA agreed that cannabis is a highly important treatment option broadly speaking (“used to treat the symptoms and diseases seen in older adults”).²⁶ Additionally, 80% of OA stated they felt comfortable discussing their cannabis use with their HCP partially due to factors like legalization or a desire to be truthful and open with their HCPs.^{26,27} On the other hand, fewer than half of OA who use cannabis (38%) felt their physician was supportive of their cannabis use⁴⁶ and others have expressed hesitation to disclose cannabis use to their HCPs due to stigma surrounding previous criminalization (eg, not wanting cannabis use on their medical chart), fear of judgement, and because they did not view their HCPs as experts regarding medical cannabis use.²⁷ For example, only 8% of a sample of OA in a state without legalized cannabis endorsed discussing cannabis use with their healthcare provider, relative to 46% of the sample having ever used.³⁰ Further, HCPs were less likely to inquire about cannabis use compared to other substances like alcohol and tobacco.^{26,47} As OA continue to pursue cannabis use for medical symptom management, both HCPs and their patients require additional information on the nuances of cannabis use and its role in healthy aging.

Shift in Scheduling

Cannabis interest among OA is clearly on the rise, accompanied by a broad range of use patterns predominantly motivated by medical reasons. Although cannabis is growing in accessibility through local markets and dispensaries, there is a disconnect with the medical profession regarding the appropriate use of this newly widely available treatment. With more traditional pharmaceutical interventions, OA would receive guidance to determine appropriate use, including frequency and dosages. Yet, research on optimal cannabis dosages for various symptom management and potential drug interactions is limited.

Since the enactment of the Controlled Substances Act in 1970, cannabis has been classified as a Schedule I substance (ie, having no currently accepted medical use), limiting research studies to primarily self-report, which is highly

susceptible to social desirability bias and lacks experimental control.⁴⁸ However, barriers to cannabis research associated with its Schedule I status continue to evolve. The Medical Marijuana and Cannabidiol Research Expansion Act of 2022 outlined specialized procedures to receive approval from the US Drug Enforcement Administration (DEA) for cannabis research. More recently, in December 2025, an executive order was issued to move cannabis from Schedule I to Schedule III, following a notice of proposed rulemaking by the US Department of Justice and the DEA initiated in May 2024, with the intent to increase medical cannabis research.⁴⁸

US federal government motivation to reschedule cannabis was partially due to the following factors: 1) the Food and Drug Administration (FDA) identified scientific evidence that supported the use of cannabis to treat pain, which is important as chronic pain affects nearly one in four US adults, more than one in three US OA, and six out of 10 people reportedly use medical cannabis to manage pain; 2) one in 10 OA reportedly used cannabis in the last year and evidence showed medical cannabis use improved some OA health-related quality of life and pain; and 3) the current lack of research and lack of FDA approval leaves doctors and patients without adequate clinical guidance regarding cannabis use, especially notable as “just over half” of OA using cannabis have discussed their cannabis use with their providers.⁴⁹ The potential clinical benefits and the need to enhance cannabis research opportunities were also echoed by members of the public, who submitted comments in response to the May 2024 notice of proposed rulemaking.⁵⁰ The clinical benefits cited in these comments included the treatment of chronic pain, insomnia, and post-traumatic stress disorder.

The impact on OA health was notably considered in discussion of rescheduling. With the anticipated shift in classification of cannabis to Schedule III, new opportunities will emerge for researchers to fill these gaps in the literature. In addition, growing accessibility to cannabis and cannabis research will likely continue generating interest among OA considering medical use.

Effects of Cannabis Use for OA

Understanding the underlying mechanisms of cannabinoid function helps frame our understanding of the effects of using cannabis on health. The two primarily researched cannabinoids, delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD), have been postulated to interact with cells primarily by binding to G Protein-Coupled Receptors CB1 and CB2.⁵¹ CB1 is mostly abundant in the brain and spinal cord, but also in low levels in the immune system.⁵² CB1 is most densely expressed in the prefrontal cortex, globus pallidus, substantia nigra, hippocampus, striatum, and molecular layer of the cerebellum, which leads to the behavioral and psychological effects of cannabinoids.⁵³ In comparison, CB2 is expressed more highly in the peripheral nervous system, immune cells, and the gastrointestinal tract, and in the brain at lower levels.^{54–56} Previous studies have suggested that THC has greater affinity for CB1, producing the “high,” while CBD has greater affinity for CB2 leading to greater peripheral and anti-inflammatory effects, but more recent work highlights that THC has stronger affinity for both CB1 and CB2 than CBD.⁵⁷ While numerous additional cannabinoids have been identified, most cannabis products are marketed according to amount of THC and/or CBD, and OA who are stop-out or new to using cannabis may be surprised at how potent current products can be relative to earlier strains (eg, 4% THC in the 1970s compared to 25%+ THC in current markets).⁵⁸ Beyond variability in product cannabinoid composition and potency complicating interpretation of study findings, common limitations that the field has yet to overcome include lack of randomized controlled trials, often due to legal limitations, and related reliance on self-reported effects; limited longitudinal data particularly among OA; and limited generalizability to the diverse OA population. Not surprisingly, preliminary observational studies among OA tend to report a range of health outcomes that could be difficult for a layperson to evaluate.

Common Medical Purposes

Across studies, patterns emerge of cannabis being used most often to treat mental health, pain, and sleep concerns. One study found that 7% (n = 591) out of 9003 adults in the US reported using cannabis for medical purposes, most commonly for anxiety (49%), insomnia (47%), chronic pain (42%), and depression (39%).⁵⁹ In this study, one-third of the sample endorsing medical cannabis use was represented by people age 50 and older (23% 50–64 years, 10% age 65 and older). Similar to this broader adult study, studies focused on OA most commonly cite pain management, insomnia, anxiety, and depression as medical motivations for use.^{24,27–29} The majority of OA who endorsed using cannabis for

medical purposes in one sample²² stated that they were using for pain/arthritis (73%), sleep problems (29%), anxiety (24%), and depression (17%). Relative to samples including younger adults, these findings suggest OA intend to treat pain and sleep at greater rates than mental health concerns. In addition, over three quarters of these OA reported that using cannabis was either “somewhat” or “extremely” helpful. It is worth noting that more than half of the OA in their sample were already over age 60 when they initiated use, and that only 41% reported that their healthcare provider was aware of their cannabis use.²²

Interestingly, that study was among few to investigate how helpful cannabis was in addressing symptoms according to self-report. A recent literature review on OA and benefits of cannabis did not find any evidence of controlled studies (ie, not self-report) that confirmed any benefits (or harm) of using cannabis for diminishing symptoms of insomnia, depression, non-cancer pain, or anxiety.⁶⁰ The authors noted that most studies did not separate OA from other ages, and that this should be a focus of future literature. In terms of acute adverse effects, several clinical trials have found that OA without prior serious mental illness tolerated short-term, low-dose medical cannabis generally well, although the possibility of mental and cognitive adverse effects was not systematically addressed.⁴¹

Instead, more frequent cannabis use does appear to be correlated with worse health. You et al⁶¹ found an association of daily cannabis use and worse mental and physical health in a nationwide sample of 55,108 individuals age 50 and older completing the Behavioral Risk Factor Surveillance System (BRFSS). To measure mental health, participants were asked to report the number of days out of the past 30 days that their mental health (ie, stress, depression, and problems with emotions) was “not good.” Participants were asked to report their physical health in the same way by indicating how many days in the last 30 days their physical health (ie, physical illness and injury) was “not good.” Cannabis use was measured by asking participants how many days they used marijuana or cannabis out of the past 30 days. Participants who used cannabis daily were 133% more likely to endorse frequent mental distress (ie, 14 or more days out of 30 of poor mental health) and 76% more likely to report more than 14 out of 30 days of poor physical health. However, directionality remains unclear, and it could be that people living with mental and physical health problems are trying cannabis as one part of their overall search for effective treatment. In one illustrative example, Drake et al⁶² examined associations between geographic availability of medical cannabis dispensaries and self-reported mental health of OA age 65 and older, using the same reporting structure from the BRFSS specific to New York state. The authors found a significant relationship between dispensary availability and lower endorsement of any poor mental health days (ie, binary) from 2011 to 2021 among OA. This effect was not observed for number of past-month worse mental health days (ie, continuous out of 30 days) or frequent mental distress, nor for any age cohort under 65 years. In other words, fewer OA were endorsing mental health concerns overall, rather than OA who endorsed having mental health concerns reporting experiencing fewer bad symptom days. Any number of confounding factors could be at play, and the authors suggest their findings may indicate spillover effects, in which someone within an OA’s social circle experiencing more direct improvement could then indirectly benefit the survey respondent.

Drake et al⁶² also concluded that their results supported that increasing availability of medical cannabis did not increase harm (ie, significantly increase reports of poor mental health, across any age group). However, due to limitations of the survey (eg, not including questions about cannabis use until 2018), they were not able to include cannabis use itself as a variable in their models. This type of problem (ie, data collection that is not comprehensive) is common across studies, and direct examinations through randomized controlled trials are needed to fully assess cost–benefit ratios.

Cardiovascular and Dementia Risk

Other than questions of efficacy for mental health, pain, and sleep, perhaps the biggest current research questions on cannabis use among OA are related to cardiovascular and cerebrovascular impacts, which overlap with risk for vascular and other dementias. Worse cardiovascular health is consistently predictive of cognitive decline and biomarkers of aging.^{63,64} Given the role of cardiovascular health in retaining quality of life with aging, an emerging area of research is how cannabis interacts with the cardiovascular system and how it impacts vascular health and aging more broadly. CB1 and CB2 receptors are found throughout the cardiovascular system, and cannabis consumption results in activation of cells in the myocardium, endothelium, and vascular smooth muscles.⁶⁵ Specifically, acute effects of cannabis use include increases in arterial stiffness, arterial pressure, and heart rate.⁶⁶ Cannabis may also impact blood pressure; however, it is

unclear whether cannabis use results in reduction in blood pressure, no effect, or an increase in blood pressure.^{66,67} Several studies have documented potential associations between cannabis use and higher risk of myocardial infarction and ischemic stroke even in otherwise healthy young individuals.⁶⁸ Despite further clarification being needed on the specific acute effects of cannabis use, it is clear that cannabis does interact with the cardiovascular system.

Studies examining long-term effects of cannabis use focus primarily on vascular function and adverse cardiovascular outcomes. Cannabis use has been linked to increases in blood pressure variability and arterial stiffness and reduced flow-mediated dilation of arteries.^{69–71} However, it is unclear if these results generalize to OA, as these studies focus on participants within the age ranges of 17–59, 19–45, and 18–50 years, respectively. Additionally, only one of these studies examined differences between consumption methods, and none offer detailed information regarding cannabis potency or longevity of cannabis use. Although uncertainties remain, these findings warrant consideration that cannabis use may have deleterious effects on the cardiovascular system. This view is supported by multiple recent studies showing an association between cannabis use and acute coronary syndrome, myocardial infarction, and stroke.^{72–76} The majority of these studies' populations maintained an average age from 26 to 31 years, and the only study that included OA had a disproportionate representation of older adults in the non-using group (about 15%, versus about 6% of groups endorsing cannabis use).⁷³ Although these studies suggest a strong association between cannabis use and negative cardiovascular outcomes, further research is needed to account for other lifestyle factors, method of consumption, dose, total lifetime use, and age-dependent effects. Indeed, one study found that OA with hypertension experienced a decrease in both systolic blood pressure (sBP) and diastolic blood pressure (DBP) following ongoing cannabis treatment.⁷⁷ This suggests that cannabis may serve a protective role against hypertension, at least among OA already experiencing cardiovascular changes.

Critically, nearly all the above studies, both systematic reviews and observational studies, lack any information regarding consumption methods. Consumption methods not only differ in bioavailability, but they may also have differential impacts on cells implicated from CB1 and CB2 activation.⁵¹ Indeed, one study⁷¹ compared vascular endothelial function among people who did not consume cannabis and who long-term either smoked or consumed edibles, all age-matched, healthy, and without history of tobacco use. Participants' flow-mediated dilation, a measure of how healthy arteries dilate in response to increased blood flow, was lower in both cannabis groups and negatively associated with weekly number of smoking sessions as well as edible THC ingested. Additionally, ex-vivo serum nitrous oxide production, an indicator of whether the endothelial cells are appropriately regulating dilation versus constriction, was significantly lower in smoking samples but not edible samples relative to non-using samples. In other words, there was evidence for lower endothelial function (ie, greater risk for future vascular disease) in both cannabis groups, but via differing mechanisms given the variable nitrous oxide release for either route of consumption.⁷¹ Similarly, differences in consumption methods may cause variations in the underlying physiological mechanisms that support tissue health and function, such as oxygen-carrying capacity in red blood cells.⁶⁵ However, it is important to note that many studies also contain disproportionately high numbers of males who use cannabis in group comparisons (eg, about two-thirds males to one-third females in the example above⁷¹), and it remains somewhat unclear if cannabis findings are the result of differing levels of cardiovascular risk by sex or an interaction between sex and cannabis use. The latter perspective seems to be supported by one study finding that current and heavy lifetime cannabis use was associated with greater arterial stiffness in males, but not females.⁷⁸

Understanding effects of cannabis on the cardiovascular system more broadly will be important for better understanding whether cannabis impacts both physical and psychological outcomes in OA. Cardiovascular health appears to play a significant role in the development of cerebral small vessel disease (CSVD).⁷⁹ Hypertension, blood pressure variability, and arterial stiffness are among many documented risk factors for developing CSVD, primarily through their association with development of white matter hyperintensities.^{80–82} Despite research connecting cannabis to all of these risk factors, there is no research that directly links cannabis use to CSVD.

Overall, cannabis use appears to impact the cardiovascular system in a multitude of ways, both positive and negative, and downstream effects are unclear. Studies showing cannabis use is associated with negative cardiovascular outcomes position cannabis use as a potential risk factor for developing CSVD. However, there is some evidence to suggest that cannabis may play a role in protecting against CSVD through its role in reducing blood pressure for some OA. This view is further supported

by research showing hypertension medication may reduce the progression of CSVD, particularly with larger reductions in sBP.⁸³ Perhaps most importantly, cannabis use has been linked to multiple cardiovascular outcomes that are associated with development of white matter hyperintensities and CSVD, which are implicated in dementia risk.

When it comes to typical cognitive aging (ie, OA who are not showing early signs of a dementia process), studies investigating underlying brain structure and connectivity as well as tests of cognitive function tend to present mixed findings on whether cannabis use is more beneficial or possibly harmful. This is one area where preclinical animal models are emerging, although maintaining an animal colony through aging (ie, up to 2 years for rodents) remains relatively rare. Animal models also tend to require inhalation exposure, which is less common among human OA who tend to favor non-inhaled formulations. A study⁸⁴ that exposed aging mice (N = 23; 17% male) to vaporized 10% THC, 10% CBD, or placebo for 30 minutes each day over 4 weeks found decreased midbrain volume and fractional anisotropy among the mice exposed to THC, with behavioral effects on pain (ie, tail-flick test) but not anxiety or cognition tests (ie, open field and novel object preference tests), although this effect did not persist after a washout period of two weeks. Mice exposed to CBD showed increased functional connectivity in the absence of changes to behavioral measures, and this effect persisted after washout. These findings suggest acute analgesic effects of THC for OA, with unclear behavioral effects of CBD. A complementary study administered oral CBD to mice for seven months and evaluated their behavior once aged 19 to 21 months (N = 14; 79% male), and found evidence for decreased inflammation in the hippocampus and medial prefrontal cortex along with improved spatial memory.⁸⁵ Alternatively, THC alone was shown to more efficiently improve spatial memory than a combination of CBD and THC.⁸⁶ In a study of aging rats, THC was found to have minimal to no effect on spatial memory, but improvement in terms of working memory.⁸⁷ Taken together, these studies suggest differential effects of THC versus CBD, but a compelling possibility for less cognitive decline with aging relative to placebo groups.

Studies among healthy OA who use cannabis have found mixed results in terms of underlying neuroimaging. Vered et al⁸⁸ utilized a sample of 19,932 OA participants from the UK Biobank with mean age 68 years ($SD = 5.00$, 48% male), of which 3,800 reported any lifetime use of cannabis. Any cannabis use was associated with lower total, white matter, and grey matter volumes. Further, within those endorsing lifetime cannabis use, longer duration of use was associated with lower total and grey matter volumes as well as increased white matter hyperintensities. However, no significant changes in neuroimaging measures were observed relative to cannabis use, suggesting that effects of cannabis use were present prior to older age for OA who endorsed former but not current use. In another neuroimaging study, OA aged 60+ ($M = 67.50$, $SD = 5.65$, 39.4% male) showed improved connectivity between the hippocampus and parahippocampal cortices relative to young adults,⁸⁹ although this finding was not connected to behavioral or cognitive functioning.

Studies focused on cognitive test performance with cannabis use tend to present more consistently negative findings. Greater recent cannabis use, in a healthy OA sample, had negative associations with working memory,⁹⁰ while THC was associated with worse inhibitory control⁹¹ and processing speed.⁹² Further, longer duration of use may be related to worse processing speed and executive functioning.⁹³ However, these findings may depend on age of first use and lifetime patterns of use for OA.^{92,93}

Compared to general healthy OA samples, some studies have focused on subjective cognitive decline (SCD), which may be a precursor to premorbid or early stages of dementia processes. Past month cannabis use, when compared to non-use, was associated with greater reports of SCD in one study,⁹⁴ while another study found that use in the past month was not correlated with SCD compared to non-use.⁹⁵ Instead, endorsement of cannabis use within the last year and greater frequency of use was associated with SCD, which likely captures a combination of confounds related to health status for past-year use. This likelihood is reflected in the same study finding that medical reasons as the primary motive for cannabis use were found to be more highly correlated with SCD complaints than recreational or mixed medical-recreational reasons for use.⁹⁵ At least one other study found a similar pattern of reduced odds of SCD for nonmedical use.⁹⁶ These findings were theorized to be rooted in medical use of cannabis likely being longer in duration, at a higher dosage, possibly used to relieve SCD symptoms, and as THC is more often used in recreational strains, that low doses of THC may improve cognitive symptoms.^{95,96}

By extension, cannabis is also being investigated as an intervention for those already experiencing dementia symptoms. In one randomized, double-blind, placebo-controlled, clinical trial of 60- to 80-year-old individuals with Alzheimer's related dementia, low-doses of THC-CBD performed better on a mental status exam than those who

received placebo.⁹⁷ Further, another study showed that 3% CBD drops were effective in alleviating behavioral and psychological symptoms of dementia in a sample of 20 people with varying etiologies.⁹⁸ In another study using Alzheimer's disease mouse models, CBD treatment improved learning and memory, and was shown to reduce neuroinflammation through targeting of specific neuroinflammatory pathways.⁹⁹ These studies indicate that research into cannabis as a treatment for dementia and Alzheimer's disease is relatively new, and primary in animal models. However, the findings seem to be positive, indicating that more research is needed to determine efficacy for individuals with dementia including Alzheimer's disease.

Future Research

Accumulating research suggests that cannabinoids influence the cardiovascular system, but it remains to be seen how cannabis use interacts with cardiovascular health of OA whether they are generally healthy or experiencing existing disease. Common limitations of existing research include underrepresentation of women and ethnic/racial and socio-cultural diversity, reliance on self-report data, and challenges documenting cannabis potency and other descriptors. Variable effects could be presumed based on method of consumption (eg, smoking), duration of use, and level of exercise, among many other possible factors, but cannabis use being linked to myocardial infarction and stroke in young adults certainly raises concern for OA who are using cannabis regularly. Cardiovascular health has direct implications for dementia risk, although it likewise remains unclear how cannabis use interacts with OA cognitive function at different stages of cognitive aging. Overall, there are potential moderating effects of cannabis type and dosage, as well as age of first use and other aspects of lifetime history, motivations for use, and current frequency of use, all of which could contribute to variable findings in the literature. More research needs to be undertaken to elucidate the specific relationships between cannabis and cognition, as well better understand both the positive and negative effects that may be found as a result of cannabis on OA cognition and risk for dementia.

Conclusion

More OA are choosing to use cannabis, especially as treatment for prevalent physical and mental health concerns with aging, and yet a thorough profile of possible harms and benefits has not been established. OA may hesitate to initiate discussion about cannabis use with their medical providers due to lingering stigma, or it may be the case that healthcare providers are not proactive in screening for cannabis use in the same way they are trained to screen for alcohol and tobacco use and mental health concerns. Given our lack of clarity at a population level for health effects of cannabis use for OA, it is even more critical for individuals and providers working with OA to be comfortable reviewing how cannabis use fits into their overall health and risk profile. Currently, self-report data suggest that cannabis can be generally helpful for improving pain and sleep, and that occasional and non-heavy use does not appear to be risky. However, more randomized controlled trials are needed in terms of physical and mental health effects, including cardiovascular effects and dementia risk.

Disclosure

The author(s) report no conflicts of interest in this work.

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