




# Substance Use Disorders in the Geriatric Population: a Review and Synthesis of the Literature of a Growing Problem in a Growing Population

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## Abstract

*Purpose of review* Substance use disorders are becoming increasingly prevalent in the geriatric population, necessitating an updated understanding of the existing literature. This review aims to describe the epidemiology, special considerations, and management of substance use disorders in older adults.

*Recent findings* PubMed, Ovid MEDLINE, and PsychINFO databases were searched from their inception through June 2022 using the following keywords: “substance use disorder,” “substance abuse,” “abuse,” “illicit substances,” “illicit drugs,” “addiction,” “geriatric,” “elderly,” “older adults,” “alcohol,” “marijuana,” “cannabis,” “cocaine,” “heroin,” “opioid,”

and “benzodiazepine.” Our findings suggest an increasing trend in substance use in older adults despite medical and psychiatric consequences when using such substances. The majority of older patients admitted to substance abuse treatment programs were not referred by healthcare providers, suggesting room for improvement in the screening and discussion of substance use disorders. Our review also suggests that there should be careful consideration of COVID-19 and racial disparities when screening, diagnosing, and treating substance use disorders in the older population.

*Summary* This review provides updated information on epidemiology, special considerations, and management of substance use disorders in older adults. As substance use disorders become more prevalent in older adults, primary care physicians must be prepared to recognize and diagnose substance use disorders as well as collaborate with and refer patients to geriatric medicine, geriatric psychiatry, and addiction medicine.

## Introduction

In the United States, the proportion of older adults has been increasing as advances in healthcare, particularly preventative medicine, have fueled longevity. This increase is primarily driven by the baby boomer generation, those born between 1946 and 1965, who have had higher rates of substance use at each stage of life compared to previous generations [1]. These increased rates are due to shifting attitudes toward substance use during their upbringing and increased life expectancy [1]. It is estimated that the number of geriatric persons, adults aged 65 or older, in the United States will be approximately 72.1 million by 2030 [2]. As larger cohorts of adults continue to age, increasing concern regarding the unique healthcare needs of the geriatric population must be addressed. Substance use disorders (SUDs) among the geriatric population are one of the fastest growing public health concerns in the United States [1].

The prevalence rates of SUDs in the geriatric population have increased over the years, especially considering that more recent cohorts have had higher rates of earlier life substance use and might continue their substance use as they age [3]. Data from the Treatment Episode Data Set-Admissions (TEDS-A), a national data set on annual admissions to substance use treatment facilities, show that between 2008 and 2018, the proportion of admissions attributed to adults aged 55 or over increased, from 9.04% to 15.64%, relative to younger adults [4]. The number of older adults' admissions increased 190% [4]. During this

period, the percentage of first admissions for alcohol only decreased while the proportion of admissions attributed to drugs only increased in older adults [4]. First-time admissions due to illicit drug only surpassed those due to alcohol only and a combination of alcohol and illicit drug use by 2018 [4]. During this same period, older adults mentioned the following substances more than 1% of the time at admission: alcohol (66.7%), cocaine (14.8%), cannabis (14.1%), heroin (14.0%), other opioids (8.6%), methamphetamine (5.8%), benzodiazepines (2.4%), and other (2.7%) [4]. 42% of older adults entering substance use treatment were self-referred and only 11% of older adults entering substance use treatment were referred by a healthcare provider [4].

The body of epidemiological research on SUDs has shed light on demographic predispositions specific to older adults. The risk factors related to substance use problems in older adults are primarily physical, psychiatric, or social in nature [5]. As this becomes a growing problem in the geriatric population, it is important to gain further insight on the complexities of substance use and SUDs in older adults. We provide a review of SUDs in the geriatric population to better understand the epidemiology of substance use and special considerations in older adults, including medical and psychiatric consequences and comorbidities of SUDs. We focus specifically on the substances that have become more prevalent in the geriatric population: alcohol, cannabis, cocaine, opioids,

and benzodiazepines. We also discuss the challenges in screening, diagnosis, and treatment of SUDs and briefly review the impact of COVID-19 and racial and socioeconomic disparities on SUDs in older adults.

## Methods

### Literature search

We searched PubMed, Ovid MEDLINE, and PsycINFO databases from their inception through June 2022 using various combinations of the following keywords: "substance use disorder," "substance abuse," "abuse," "illicit substances," "illicit drugs," "addiction," "geriatric," "elderly," "older adults," "alcohol," "marijuana," "cannabis," "cocaine," "opioid," and "benzodiazepine." Other relevant articles were identified by checking reference lists of the identified studies. There were no publication date or article type restrictions on the search strategy, although the authors aimed to include more recent studies. Older studies were included if they addressed topics that were unlikely to change during this timeframe. We reviewed abstracts and reviewed and included full text of each article if it addressed substance use disorders in older adults. Inclusion criteria included: 1) published in English language, 2) "older" adult population, and 3) identified substance use or misuse.

## Results

### Screening and diagnosis

As substance use among older adults continues to rise, effective screening and diagnosis will become increasingly critical. The benefits of early detection and treatment of SUDs can have dramatic implications for overall physical and mental wellbeing in older adults. When examining SUD treatment admissions, patients were mostly referred by an individual (patient or other non-provider) or the criminal justice system. Healthcare providers accounted for only 12.8% of referrals for older adults to substance abuse treatment programs, perhaps suggesting that there is room for improvement in the screening and discussion of SUDs in older adults [6]. While office assessment through history taking might elicit discussion of substance use, this is limited by patient discomfort with reporting stigmatized behavior; however, barriers to more formal screening include lack of time and challenges integrating screening into clinic workflow [7].

While the bulk of screening modalities have been formulated for the general population, there are important considerations regarding their use in older adults. Based on extensive literature review, Kuerbis et al. compiled a comprehensive list of potential indicators of substance misuse and abuse among older adults, organized indicators into four categories: physical symptoms (ex: falls, poor hygiene, poor nutrition, incontinence), cognitive symptoms (ex: disorientation, memory loss), psychiatric symptoms (ex: sleep

disturbance, excessive mood swings), and social symptoms (ex: family, financial, or legal problems, social isolation, running out of medication early) [5]. These indicators can be observed in a wide range of medical and psychiatric problems, highlighting the clinical complexity particular to older patients (Table 1).

There exist numerous screening and diagnostic tools for alcohol and substance use in the general population; however, these tools must be validated in the geriatric population due to the unique social characteristics of older adults. Several screening tools have been adapted or validated for use in older adults, particularly for alcohol use disorder (AUD). The U.S. Preventative Services Task Force (USPSTF) recommends screening older adults for alcohol misuse [8]. However, the screening and diagnosis of AUD remains difficult. Several screening tools have been adapted or validated for use in older adults, particularly for AUD, and are described in Table 2. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) single-item screener is a single

**Table 1. Lifetime, past year, and past month prevalence of substance use in adults aged 65 years and older in the United States from 2016–2020 based on published data from the National Survey on Drug Use and Health (NSDUH)**

	Illicit drugs (%)	Cannabis (%)	Cocaine (%)	Crack (%)	Opioids (mis-use <sup>1</sup> ) (%)	Benzodiazepines (any use <sup>2</sup> ) (%)	Benzodiazepines (mis-use) (%)
Lifetime use							
2016	26.5 <sup>a</sup>	23.4 <sup>a</sup>	6.4	1.2	NR	NR	NR
2017	31.2	28.0	6.8	1.3			
2018	32.5	29.6	7.7 <sup>b</sup>	1.0			
2019	34.5	31.5	9.3	1.4			
2020	39.0	35.5	9.4	2.1			
Past year use							
2016	5.3	3.3	0.2	0.1	1.2	NR	NR
2017	5.7	3.7	0.3 <sup>c</sup>	0.1	1.6	13.6	0.7
2018	5.7 <sup>b</sup>	4.1	0.1	0.0	1.3	13.0	0.4
2019	7.1	5.1	0.2	0.1	1.9	12.6	0.5
2020	7.9	6.0	0.3	0.2	2.0	10.7	0.3
Past month use							
2016	2.9	2.3	0.1	0.1	0.4	NR	NR
2017	3.0	2.4	0.2	0.0	0.5		
2018	3.2 <sup>b</sup>	2.5 <sup>b</sup>	0.0	0.0	0.4		
2019	4.2	3.5	0.1	0.0	0.5		
2020	4.7	3.7	0.0	0.0	0.6		

<sup>1</sup>Misuse of prescription psychotherapeutics is defined as use in any way not directed by a doctor, including use without a prescription of one's own; use in greater amounts, more often, or longer than told; or use in any other way not directed by a doctor. <sup>2</sup>Any use of prescription psychotherapeutics is defined as (a) the use of one's own prescription medication as directed by a doctor or (b) misuse of prescription psychotherapeutics. <sup>3</sup>The difference between this estimate and the 2017 estimate is statistically significant at the 0.01 level. <sup>b</sup>The difference between this estimate and the 2019 estimate is statistically significant at the 0.06 level. <sup>c</sup>The difference between this estimate and the 2018 estimate is statistically significant at the 0.05 level.

Table 2. Screening tools for problematic alcohol and substance use validated in older adults

Tool	Description	Comment	Link
Alcohol use AUDIT-C	3-item screening tool modified from the 10 question AUDIT tool used to identify at-risk drinkers who may not be alcohol-dependent. Cutoff $\geq 5$ in men and $\geq 4$ in women	Shown to be superior to the Cut Down, Annoyed, Guilty, and Eye-Opener (CAGE) questionnaire [4, 9]	<a href="https://www.mdcalc.com/calc/2021/audit-c-alcohol-use">https://www.mdcalc.com/calc/2021/audit-c-alcohol-use</a>
CAGE	4-item screening tool for excessive drinking and alcoholism. Cutoff $\geq 2$ although the Consensus Panel recommends that primary care clinicians lower the threshold to one positive answer to cast a wider net and identify more patients who may have substance abuse disorders		<a href="https://www.mdcalc.com/calc/1729/cage-questions-alcohol-use">https://www.mdcalc.com/calc/1729/cage-questions-alcohol-use</a>
CARET	An updated and revised version of the Alcohol-Related Problems Survey (ARPS) to identify alcohol-related problems in older adults. It considers comorbidities, high-risk behaviors, and concomitant medication use that are more common in older adults	Takes into consideration comorbidities, high-risk behaviors, and concomitant medication use that can be placed on older alcohol users at elevated risk [10]	<a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2896609/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2896609/</a>

Table 2. (continued)

Tool	Description	Comment	Link
MAST-G	<p>24-items screening tool for detecting potential alcohol problem and suggests need for further assessment. Differs from MAST in that questions highlight the special employment and social situations of someone who is retired and how that can relate to alcohol use. Cutoff <math>\geq 5</math></p>	<p>Focuses on life stressors and behaviors specific to older population [11]</p>	<p><a href="https://docs.clinicaltools.com/pdf/sbirt/MAST-G.pdf">https://docs.clinicaltools.com/pdf/sbirt/MAST-G.pdf</a></p>
<p>Drug use ASSIST</p>	<p>8-item screening tool developed by the World Health Organization to screen for the following substances: tobacco products, alcohol, cannabis, cocaine, amphetamine-type stimulants, sedatives and sleeping pills (benzodiazepines), hallucinogens, inhalants, opioids, other drugs. It determines a risk score for each substance which is used to start a discussion with clients about their substance use. It can identify acute intoxication, regular use, dependent or 'high risk' use and injecting behavior</p>		<p><a href="https://www.who.int/publications/i/item/978924159938-2">https://www.who.int/publications/i/item/978924159938-2</a></p>

Table 2. (continued)

Tool	Description	Comment	Link
CAGE-AID	4-item screening tool adapted from the CAGE Questionnaire for the purpose of combining screening for alcohol and drug problems. Cutoff $\geq 1$	<i>AUDIT-C</i> Alcohol use disorders identification test-consumption; <i>CAGE</i> Cut down, annoyed, guilty, and eye-opener; <i>CARET</i> Comorbidity alcohol risk evaluation tool; <i>MAST-G</i> Michigan alcoholism screening test-geriatric version; <i>ASSIST</i> Alcohol, smoking and substance involvement screening test; <i>CAGE-AID</i> Cut down, annoyed, guilty, eye-opener – adapted to include drugs	<a href="https://www.hiv.uw.edu/page/substance-use/cage-aid">https://www.hiv.uw.edu/page/substance-use/cage-aid</a>

question used to screen for unhealthy alcohol use that has been validated in the primary care setting. It asks patients how many times in the past year they have had five (for men) or four (for women) or more drinks in a day [12]. However, it is important to note that the NIAAA also recommends that adults age 65 or older limit their alcohol consumption to 1 standard drink per day or 7 standard drinks per week with no more than 3 drinks per occasion [13].

There are specific biologic and social factors in older adults that make it difficult to diagnose SUDs using Diagnostic and Statistical Manual of Mental Disorders (DSM)-5 criteria. Many criteria are not relevant to older adults because of changing social norms in older adults [7]. Symptoms of tolerance and withdrawal might manifest differently in older adults because of biological changes [7]. These changes in older adults are important to consider; for example, the endorsement of certain DSM-5 criteria for AUD changes with increasing age in individuals with persistent AUD, suggesting that there could be room for weighing specific criterion items differently based on age [14]. The identification of SUDs in older adults is difficult as some signs and symptoms of substance use may be mistaken for symptoms of other chronic diseases or the natural course of aging [7]. Ultimately, the validation of screening tools in older adults and careful assessment of these patients are necessary to aid further discussion on substance use and diagnosis.

## Alcohol

### *Epidemiology*

Alcohol is the most commonly used substance by older adults. The 2019 National Survey on Drug Use and Health reported an estimated 10.7% of adults aged 65 years and older engaged in past-month binge alcohol use (defined as over 5 drinks on an occasion) and 2.8% engaged in past-month heavy alcohol use (defined as bingeing in at least 5 of the past 30 days) [3]. The overall number of older adults reporting binge and heavy drinking was likely grossly underestimated when considering that the binge threshold for older adults is typically considered to be 3 drinks per day for men and 2 drinks per day for women. A study utilizing data from the 2014–2019 National Health Interview Surveys reported that the estimated prevalence of past-month binge drinking among men 65 years or older significantly increased from 12.8% in 2015 to 15.7% [15]. The estimated prevalence of lifetime, past year, and past month substance use in adults aged 65 and older is described in Table 1.

### *Special considerations in older adults*

Compared to their younger counterparts, older adults are more vulnerable to the impacts of alcohol. The etiology is multifactorial, likely related to changes in neurocircuitry, neurovasculature, hepatic function, and adiposity that occur as a function of normal aging [5]. For example, increased permeability of the blood brain barrier, decreased liver metabolism, and increased body fat predispose older adults to alcohol toxicity [16, 17]. As adults age, there are



changes in body composition that lead to decreased lean muscle mass and decreased total volume of body water available for alcohol to distribute [17, 18]. As a result, a given amount of alcohol results in a higher blood alcohol level in older adults and ultimately puts older adults at risk for intoxication and harm at a lower intake of alcohol [16].

Problematic drinking can lead to a host of medical consequences in this population. However, there are different types of problematic drinking, of which binge drinking is the most concerning in older adults. As mentioned before, prevalence of binge drinking has increased in older adults, specifically in males. Binge drinking is associated with injuries and can negatively affect comorbid conditions in older adults by worsening disease and complicating disease management, thus lowering quality of life [19].

Older adults who drink are also more likely to take alcohol-interactive prescription medications than younger adults, increasing the risk for adverse alcohol-medication interactions [20]. Overall, studies have suggested that moderate alcohol consumption can have some protective cardiovascular factors, while heavier consumption drinking has been associated with exacerbation of hypertension and increased incidence of heart failure [21]. Studies have also shown that excessive alcohol consumption in older adults is associated with increased risk of cognitive dysfunction and dementia, although light or moderate alcohol consumption have shown protective effects [22, 23]. However Andrews et al. found that the protective effect of alcohol dependence could potentially be due to survivor bias [24]. Importantly, even a history of alcohol dependence in the absence of heavy current alcohol use was associated with lasting negative consequences for neurocognitive function irrespective of age [25].

Choi et al. found that heavy alcohol use was positively associated with mental health problems, poorer health, and increased need for mental health treatment in adults aged 50–64 as well as adults aged 65 and over [26]. In both groups of older adults, lifetime abstainers had significantly lower likelihood of using mental health treatment. AUD elevates suicide risk in older adults and is likely related to other factors that are more common in older adults such as depressive symptoms, medical illness, negatively perceived health status, and low social support [27].

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## *Treatment*

In general, pharmacologic and psychotherapeutic treatments developed for SUDs in the general population have been shown to be safe and effective in older adults, with psychotherapeutic interventions being of particular use. In the treatment of AUD, naltrexone has consistently been shown to be highly effective for older adults, often superior to its effectiveness in younger populations [28]. On the other hand, disulfiram should generally be avoided in older adults due to its contraindications with cerebrovascular disease, peripheral neuropathy, etc., that are more common in older adults [29]. Aside from pharmacologic treatments, AUD is often treated with interventions such as twelve-step facilitation (TSF); in fact, there is high quality evidence that TSF

interventions are more effective than cognitive behavioral therapy (CBT) for increasing abstinence in those with AUD [30].

## Cannabis

### *Epidemiology*

Although it has become increasingly legalized in the U.S., cannabis remains a federally illegal drug and is classified as illicit in substance use literature. As such, it is considered the most prevalent form of illicit substance use by older adults in the U.S.<sup>4</sup> Over recent years, cannabis has become less stigmatized and more accepted by the general public. Among older adults, the perceived risk of regular cannabis use has significantly decreased from 52.0% to 42.7% from 2015 to 2019 [31]. The demographic subgroups with the largest reductions in perceived risk were those never married, men, and those who lived in states where medical cannabis was legal [31]. Importantly, those with chronic disease and high-risk behaviors, including tobacco and binge alcohol use, also had significant decreases in perceived risk [31]. Older adults with high-risk behaviors are already at particular risk for harm, and the changing perceptions of cannabis use in this group can potentially lead to more consequences [31].

The prevalence of past-year cannabis use among adults 65 years and older increased significantly, from 3.3% to 6.0%, between 2016 and 2020 [3]. Han et al. evaluated which demographic characteristics were associated with significant relative increase in cannabis use from 2015 to 2018 and found that the characteristics associated with significant relative change included women (93.3% change), individuals of white and nonwhite races/ethnicities (42.9% and 336.4%, respectively), individuals with a college education (113.8%), those with total family incomes of \$20,000 to \$49,000 and \$75,000 or greater (138.5% and 129.2%, respectively), and married individuals (100%) [32]. Individuals who received mental health treatment in the past year had a 157.1% relative increase in cannabis use during this time [32]. Interestingly enough, the increase in cannabis use appeared to be driven largely by older adults who did not have multiple chronic medical conditions [32]. In addition to this, there was a 117.2% relative increase in cannabis use among older adults who use alcohol [32]. One qualitative study showed that older adults mainly used cannabis for medicinal reasons, but none received cannabis prescriptions from their family physicians and the main sources of information regarding cannabis use were from friends, cannabis store staff, and the media [33].

It is also important to note the difference between pharmacologic preparations of cannabis and medicinal cannabis. Pharmacologic preparations are approved by the Food and Drug Administration (FDA) for specific indications such as seizures or anorexia [34]. The FDA currently has approved one cannabis-derived and three cannabis-related drug products; these include cannabidiol, nabilone, and two brands of dronabinol [34]. Medicinal cannabis, however, is part of an unregulated industry with no medical or government oversight and thus largely operates under

the Herbal and Dietary Supplements Industry. It is thus regulated as a natural product, but the term “medical” has been used to make it more marketable to the medically untrained public [35]. This highlights the importance of screening, proper education, and medicine reconciliation in older adults.

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### *Special considerations in older adults*

Despite the common perception that cannabis is relatively benign, it is known to pose unique risks to older adults [31]. Studies have shown that chronic cannabis use in older adults is associated with higher fall risk compared to younger adults, predisposing older adults to falling [36, 37]. This is particularly concerning given the increase in cannabis use among older adults who use alcohol, as well as a decrease in perceived risk among older adults who binge drink or use tobacco [31]. Use of cannabis with other substances can lead to higher risk of impairment and complications than use of either alone [38]. In addition to this, data suggest that cannabis use is associated with cardiovascular adverse events, such as worse mortality rate after myocardial infarction, arrhythmias, stress cardiomyopathy, and arteritis [39]. Studies have also shown possible association between cannabis use and stroke, although the relationship is complex and must be further explored [40, 41]. Older adults are more vulnerable to cardiovascular events and cannabis should be used with caution in this population.

Cannabis use has also been associated with psychiatric comorbidities. Choi et al. found that, among older adults, cannabis-only users had a higher likelihood of developing lifetime and past year major depressive disorder when compared to non-users and the odds of developing lifetime and past-year major depressive disorder further increased when cannabis was used alongside other illicit drugs [42]. Similarly, Diep et al. found that cannabis use in the past 30 days was associated with suicidal ideation in the past 2 weeks and depression in adults [43]. However, it is difficult to determine causation in these studies.

Studies have shown some benefits for cannabis use in the general population, although the presence of side effects may limit its benefits in older adults. AminiLari et al. found that while medical cannabis and cannabinoids might improve impaired sleep in those with chronic pain, the magnitude of change is likely small [44]. Grimison et al. found that adding oral tetrahydrocannabinol:cannabidiol to standard antiemetics was associated with less nausea and vomiting in those with refractor chemotherapy-induced nausea and vomiting. Both studies, however, found significant increase in risk of dizziness as well as other side effects [44, 45]. Unfortunately, the majority of studies evaluating the benefits of cannabis are done on patients aged < 60 years old and evidence for its efficacy in the treatment of pain, sleep disturbances, mood disorders, and neurological symptoms in older adults is limited [46]. While there could be benefits of cannabis use, the reported side effects, particularly dizziness, can pose great risk in older adults.

### *Treatment*

The treatment of cannabis use disorder in older adults is similar to that of the general population. Cannabis use disorder treatment is primarily done through CBT, motivational enhancement therapy (MET), and contingency management (CM) with a combination of the three modalities producing the best outcomes [47].

## Cocaine

### *Epidemiology*

Cocaine use among older adults has been steadily increasing. Data from the National Survey on Drug Use and Health (NSDUH) reports that in adults 65 years and older, 0.2% had used cocaine in the past year in 2019, and 0.3% in 2020 [3]. However, studies investigating the prevalence of cocaine use in older adults have detected rates as high as 2.3% among hospitalized patients, several-fold higher than estimates being reported in the NSDUH, suggesting that surveys are underreporting the prevalence of cocaine use in older adults [48]. Between 2000 and 2017, older adults showed greater increases in proportions admitted for cocaine/crack relative to younger adults [49]. Gangu et al. found that there has been an uptrend in hospital admissions in the U.S. with a primary diagnosis of cocaine abuse, dependence, poisoning, or unspecified cocaine use from 2016 to 2018, with patients over 50 years old comprising only 21.2% of admissions in 2006 compared to 43.27% in 2018 [50]. Further research must be done to better understand trends in order to address appropriate screening, diagnosis, and treatment of older patients.

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### *Special considerations in older adults*

The adverse effects of cocaine use have been well documented in the general population, and while there are limited data on the adverse effects specifically seen in older adults, the assumption can be made that adverse effects are likely the same or even more devastating in older adults. Cocaine use has been associated with cardiovascular (left ventricular hypertrophy, ischemic heart disease, aortic or cerebrovascular atherosclerosis, arrhythmias, and vasospasm), pulmonary, gastrointestinal, cerebrovascular (stroke, subarachnoid and intracerebral hemorrhage, aneurysm rupture, and cerebral ischemia), hematologic (prothrombotic properties), and psychiatric complications [1]. A recent study by Soder et al. found that cocaine use disorder could further increase inflammatory burden in older adults [51]. Older adults are likely at an increased risk of adverse effects of cocaine use, and cocaine should be avoided in this population, especially considering that there are no cited medical benefits for cocaine use outside of surgical procedures.

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## Treatment

The treatments of choice for cocaine use disorder in older adults are CBT and CM programs, similar to that of the general population [52]. A systematic review and meta-analysis of treatments for cocaine use in the general population found that CM programs were consistently associated with decreased cocaine use, measured with urinalysis, while other treatment options such as psychotherapy, placebo, opioids, psychostimulants, anticonvulsants, dopamine agonists, antidepressants, and antipsychotics were not associated with decreased use [53].

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## Opioids

### Epidemiology

The prevalence of opioid prescriptions in older adults continues to increase [54]. As the population ages, there are increasing indications—whether appropriate or not—for opioids in older adults. Older adults have higher rates of chronic pain, and opioid prescription fill rates were disproportionately higher among adults aged 65 years or older from 2008–2018 [55]. Han et al. found that, among adults 65 years and older, an estimated 1.2% reported past-year prescription opioid misuse in 2015–2016 [56].

The number of adults 55 years and older in the U.S. who entered treatment for opioid use disorder with heroin tripled between 2007 and 2017 [57]. Lynch et al. found that, among adult heroin users 65 years and older, 69% began using heroin before the age of 30 (typical onset) while 31% began using heroin after the age 30 (late onset) [57]. Those with late-onset heroin use were more likely to use heroin more frequently and less likely to receive medication for opioid use disorder or residential treatment [57]. There has also been an increasing death rate among older adults due to opioid overdose [58]. In 1999, the annual death rate due to opioid overdose per 100,000 persons 55 years or older was 0.90 compared to 10.70 in 2019 [58]. The fatality rate was highest among non-Hispanic Black men 55 years or older, with a rate of 40.03 per 100,000 persons [58].

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### Special considerations in older adults

The prescribing of opioids to older adults should be done with caution. Older adults have impairments in drug metabolism and elimination, causing opioids to be more potent and have longer duration of action than predicted in older adults compared to younger adults [59]. In fact, a recent study demonstrated that baby boomers have an increased risk of death from prescription opioid and heroin overdose compared to younger cohorts, suggesting more dramatic consequences of opioid misuse in older adults [60]. In older adults who were prescribed opioids after a medical hospitalization, there was a 7.0%

rate of adverse drug events occurring within 30 days of hospital discharge; the most notable risk factors for adverse drug events included dementia, delirium, red flags for opioid misuse, musculoskeletal and nervous system, and prescription of long-acting [61]. Adverse drug events included slowed colonic motility, delirium, nausea/vomiting, fall/fracture, urinary retention, and opioid-related adverse effects [61].

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### *Treatment*

Opioid use disorder has discrete pharmacologic treatments such as methadone, buprenorphine, and naltrexone. Methadone has been shown to be safe and effective in the treatment of opioid use disorder in older adults [62]. There is less known about the safety of buprenorphine in older adults compared to methadone although it may be preferable because it is less likely to cause withdrawal symptoms, erectile dysfunction, constipation, or respiratory depression [63]. Buprenorphine can also be prescribed by primary care physicians whereas methadone must be administered at qualified opioid treatment centers.

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## **Benzodiazepines**

### *Epidemiology*

Similar to opioid use, benzodiazepine use has also increased in the past few years, with estimates among older adults being as high as 30%, and, between 2003 and 2015, the number of primary care visits associated with prescribing benzodiazepines nearly doubled (3.8% to 7.4%) [64]. Many factors could account for the increased prevalence of benzodiazepine use in older adults, such as overprescription, misdiagnosis, and polypharmacy. Benzodiazepines have been used to treat insomnia, anxiety disorders, and behavioral disturbances in dementia in older adults; the high prevalence of these disorders in older adults makes older adults particularly vulnerable to benzodiazepine misuse [65, 66]. A review of studies evaluating the treatment of these diagnoses found inappropriate over-prescribing of benzodiazepines in older adults [67].

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### *Special considerations in older adults*

Benzodiazepines should be carefully monitored in older adults. Studies have shown conflicting results on whether benzodiazepines are associated with cognitive decline or dementia [68, 69], and if so, whether there is a dose-dependent response pattern [70]. Conflicting results are likely due to large heterogeneity in demographics across and within different studies. More research must be conducted to clarify the relationship between benzodiazepine use and cognitive function in older adults; although this relationship remains unclear, there are many other well studied reasons to avoid

benzodiazepine use in older adults, including sedation, drowsiness, ataxia, and dizziness [71]. In addition to this, long-term benzodiazepine use is well known to be associated with dependence and withdrawal-induced delirium, seizures, and death [72].

Another special consideration in older adults is that past-year misuse of opioids or benzodiazepines in adults 50 years or older has been significantly associated with past-year suicidal ideation, with 25.4% of older adults who misused both opioids and benzodiazepines reporting past-year suicidal ideation compared to only 2.2% of adults not engaged in either medication class misuse [73]. Thus, physicians should screen for suicidality in older adults who are either at-risk for or engaged in misusing opioids and/or benzodiazepines.

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## Treatment

CBT has been shown to aid in discontinuing benzodiazepines; randomized controlled trials showed that the proportion of discontinuing benzodiazepines was significantly higher when patients participated in CBT plus gradual tapering than in gradual tapering alone both in the short and long term [74]. More research should be done to evaluate the efficacy of such therapeutic modalities specifically in older adults.

## The impact of the COVID-19 pandemic

According to the Centers for Disease Control and Prevention (CDC), 13% of Americans reported increasing or starting substance use to cope with the COVID-19 pandemic in June 2020 [75]. The existing literature suggests that there was an overall trend towards increased alcohol consumption and a clear trend towards increased use of other substances in the general population during COVID-19 [76]. While the COVID-19 pandemic has caused psychosocial stressors and economic strain for all adults with SUDs, older adults are disproportionately affected, as they are already at increased risk for social isolation, which can be detrimental when patients rely on interactions with both formal and informal supports to maintain sobriety [77]. To counteract this, there has been a dramatic increase in telehealth availability, particularly in the treatment of SUDs [78]. Studies have shown virtual outpatient care for the treatment of SUD to be a feasible alternative to in-person-only programming [79]. However, access to these virtual programs can be limited by advanced age as older adults might have limited computer literacy, limited access to internet and technology, or hearing loss. Older adults also might prefer in-person visits, as suggested in a qualitative study of older adults in treatment for AUD during COVID-19, where they considered face-to-face provision to be essential [80]. As the popularity of telehealth continues to increase, it will be of utmost importance to address the structural barriers for accessing telehealth treatment for older adults and to adapt such services to increase engagement in older people, their caregivers, and healthcare providers.

## Racial and socioeconomic disparities

Racial and socioeconomic disparities persist through age, and older age likely complicates such disparities further. Age trends in SUDs across ages 18–90 showed that disparities by race/ethnicity varied with age; for example, SUDs were more prevalent in Black adults at older ages and more prevalent in White adults at younger ages [81]. In addition to this, while telehealth is becoming more common in the post-COVID-19 era, satisfaction with telehealth among older adults showed lower satisfaction among those with lower socioeconomic status and among certain minorities including Black, Hispanic, and Native Americans [82]. These findings suggest an interplay between older age, race, and socioeconomic status that must be further explored to provide the most appropriate care for the geriatric population.

While only 18% of substance abuse treatment programs were specifically designed for the geriatric population, the general availability of SUD treatment facilities is limited for those of lower socioeconomic status, making it even more difficult for these patients to seek proper care for their SUDs. There is limited availability of SUD treatment facilities that accept Medicaid, with only about 60% of US counties having at least 1 outpatient SUD facility that accepts Medicaid [83]. Further exacerbating this issue is the fact that counties with a higher percentage of Black, rural, and/or uninsured residents were less likely to have an SUD facility that accepts Medicaid [83].

There also exist disparities in completion of substance use treatment programs. Suntai et al. found that, among older adults, Black older adults were 37% less likely to complete a substance use treatment program than Whites, while Hispanic older adults were 26% more likely to complete a substance use treatment than Whites [84]. These results are similar to the results shown in studies of younger adults, suggesting that racial disparities must be addressed in substance use treatment across ages. Healthcare professionals must acknowledge cultural barriers in order to increase completion of substance use treatment programs in older adults.

## Barriers to treatment in the older population

Despite increasing rates of substance use in older adults, the number of referrals made by healthcare providers for substance use treatment has been declining [6]. In addition to this, only 18% of substance abuse treatment programs are specifically designed for the geriatric population. Older adults face unique barriers to treatment such as social isolation, limited mobility, financial problems, transportation issues, and shame regarding substance use [5]. Choi et al. found that lack of readiness and cost/limited insurance were the most frequently mentioned barriers to treatment among older adults [85]. The abundance of missed opportunities for screening and treating older adults with substance use problems will have devastating consequences if they are not appropriately addressed moving forward.



## Conclusion

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Substance use in older adults is an underestimated and growing concern in the U.S. Older adults are more susceptible to the effects of alcohol, and problematic drinking can cause more severe consequences in this population. While cannabis has become less stigmatized and limited benefits have been suggested, its side effects should be carefully considered in older adults. Prescription medications such as opioids and benzodiazepines are being overprescribed in older adults. Use of drugs such as cocaine and heroin are increasing in older adults and can be associated with dangerous consequences. Ultimately, relatively low rates of detection and treatment in healthcare settings have a significant impact on the morbidity and mortality of our rapidly aging population. We must carefully consider the biologic and social factors that make it difficult to recognize SUDs in older adults. There are many special considerations in the screening, diagnosis, treatment, and consequences of SUDs in older adults. Further research into the prevalence and predisposition of SUDs in older adults will be critical, and research should carefully consider the post-COVID-19 era as well as racial and socioeconomic disparities to best improve our ability to address this concern in an aging population.

## Author contributions

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Dimitry Francois contributed to the study conception and design. Material preparation, data collection, and analysis were performed by Jenny Lin. The first draft of the manuscript was written by Mitchell Arno-vitz and Jenny Lin. All authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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### Human and Animal Rights and Informed Consent

This article does not contain any studies with human or animal subjects performed by any of the authors.

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