Canadian Centre on Substance Use and Addiction

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SUBSTANCE USE IN CANADA

Improving Quality of Life: **Substance Use and Aging**

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Improving Quality of Life: **Substance Use and Aging**

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Foreword

Canada is getting older.

According to Statistics Canada, the share of our population made up of older adults will grow from just under 15% in 2010 to more than 25% in 2036. As this subgroup grows larger, there will be a significant impact on many aspects of our society, including a greater burden placed on our healthcare system. And that burden will be much heavier if the increasingly prevalent issue of substance use by older adults is not addressed.

The issue is, however, difficult to comprehend fully. When most people think of someone with a substance use disorder, an older adult does not immediately come to mind. When an older adult suffers a fall or experiences declining physical or mental health, we are quick to assume it's the result of "getting older" and might not consider the possibility of substance use as a contributing factor.

To find a path forward that recognizes the needs of this growing population and responds effectively, we need to set our assumptions aside and look to the evidence. We need to build a more thorough understanding of what's happening to people during this stage of life and why they might be more susceptible to experiencing harms associated with substance use (both licit and illicit substances) and problematic substance use.

In that sense, there are interesting parallels between this topic and the one featured in our previous report in this series, which explored cannabis use during adolescence. Much like youth, older adults experience significant physiological, psychological and social change. It's a period of rapid, dynamic and difficult transitions. Taking a closer look at the unique elements of later life and how they relate to substance use, as we do in this report, is key to developing new and more tailored strategies for reducing the harms of alcohol and drugs on older adults.

Since 2005, the series now known as *Substance Use in Canada* has highlighted alcohol- and drug-related issues that are in need of greater attention. For this seventh edition, we began with two questions: **How can we help people age in a healthy way?** and **How can we ensure they have the supports they need to sustain a good quality of life in their later years?**

Getting the answers to those questions begins by having a dialogue about substance use by older Canadians. It is with that in mind that this report calls for greater awareness and understanding of the issue among healthcare providers and caregivers — and facilitates that understanding through an in-depth exploration of the latest evidence on "successful aging," the prevalence of substance use among older Canadians, the consequences of substance use in this vulnerable population, and other critical topics. It also emphasizes the need for a complete continuum of age-specific care, including substance use guidelines and treatment services tailored to the specific needs of this demographic, backed by improved training and education on how to detect and assess problematic substance use in older adults.

Through the evidence presented in this report, we are hoping to jumpstart a national conversation about substance use by older adults. And as with any conversation, the words we use are critically important. For this reason, we changed the title of this series to *Substance Use in Canada* from the previous *Substance Abuse in Canada*, reflecting a similar change we made to the name of our organization. The intent is to take every opportunity to move the language used away from stigma and toward greater sensitivity to all those affected by substance use disorders, including older adults. Understanding and language matter — especially if they help lead to better policies, practices and programs for older Canadians.

Acknowledgements

I want to thank all the researchers and clinical experts who took time from their busy schedules to apply their thought and expertise to the chapters of this report. Special thanks also go out to Dr. Amy Porath, CCSA's Director of Research and Policy, who played a key role in this initiative, and to the members of CCSA's Scientific Advisory Council for their expert advice and guidance. My sincere thanks to co-editors Dr. Franco Vaccarino, Dr. Alastair Flint and Dr. Zul Merali, and to chapter author Dr. Tony George. I must also thank Dr. Zachary Patterson, Dr. Robyn McQuaid and Dr. Sarah Wallingford, for their ongoing and significant contributions to this report. Finally, thank you to CCSA's design and production team.

Rita Notarandrea
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Foreword

Canadians have several misperceptions when it comes to substance use among older adults. Some don't think it's an issue at all. Others believe it's too late to improve the quality of life of someone who uses substances in older age. Why try to get somebody to quit smoking after 50 years? Isn't the damage already done?

Nothing could be further from the truth.

We know that older adults do use substances: prescription and non-prescription, legal and illegal. Problematic substance use can develop gradually, becoming noticeable only later in life. And although prevalence of substance use is much lower among older adults than other age groups, they are at elevated risk for experiencing harms associated with non-prescription substance use.

Most importantly, we know quality of life can be improved significantly by addressing problematic substance use, regardless of a person's age. Older adults can indeed live long, healthy and productive lives while in recovery.

Unfortunately, addressing the issue of substance use in older adults has proven to be difficult for a number of reasons. Too often, the symptoms of impairment are dismissed by clinicians as the symptoms of old age. The social isolation experienced by many older adults results in fewer opportunities for monitoring by friends and family. As their social networks continue to grow smaller, many older adults are hesitant to even broach the topic of substance use with family or caregivers, not wanting to bring conflict into their few remaining relationships.

From a research perspective, we are also challenged by the lack of evidence specific to Canada. We still need to learn more about how substance use affects healthy aging. We also need to look more closely at the effectiveness of age-specific screening and treatment options.

That's where this report comes into play. It pulls together the evidence that currently exists, and sheds light on areas that need more research. It identifies the current gaps in Canada's healthcare system, as well as potential tools or resources to help fill them.

At the Canadian Institutes of Health Research Institute of Neurosciences, Mental Health and Addiction, an important part of our mandate is to focus on research into substance use. While typically this has centred around younger populations, we now know that substance use is far more common among older adults than previously thought. We also know that the issue **can** be addressed and we can't afford to wait. As Canada's population continues to age, the time for action is now.

We need to put in place, as soon as possible, systems and strategies to promote healthy aging. To do so, we must improve our understanding of older adults' unique needs with respect to substance use. We have to reduce the stigma that surrounds substance use so that older adults engage in the conversation and seek support. And, finally, we have to follow through and ensure older adults, their families and caregivers know how to access the services and supports they need.

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Introduction

About Substance Use in Canada

Since 2005, *Substance Use in Canada* (formerly *Substance Abuse in Canada*) has shone a spotlight on key contemporary issues related to substance use and identified specific areas for action in both policy and practice. Each report in the series is intended for a broad audience that includes policy makers, program development personnel, researchers, educators and health professionals. Health journalists are also an important audience as they can help raise the public profile of the issues discussed and help create the impetus for change.

This seventh *Substance Use in Canada* report explores alcohol and drug use in older adulthood (age 65 and older). Specifically, it:

- Considers the impact of the aging population and increasing problematic substance use among older adults on health outcomes and the Canadian healthcare system;
- Identifies gaps in knowledge about the harms associated with substance use and their impacts on healthy aging; and
- Summarizes the best available evidence on effective ways to prevent, detect, assess and treat problematic substance use in the older adult population.

As the older adult population continues to grow so will the total number of older adults who use alcohol and other drugs, making it increasingly important to understand the needs of older adults and how the Canadian healthcare system can adapt to meet them.

This report is not a systematic review. Instead, it provides a broad, high-level overview of this important health issue, drawing on neuroscience and an understanding of the behavioural and social context that shapes older adults' substance use. It aims to give decision makers, policy makers, nurses, geriatricians, researchers and others working with older adults the opportunity to consider the evidence as they develop and employ more effective prevention and intervention programs to address substance use among older adults.

The Series to Now

Current Challenges and Choices examined a variety of topics, including the prevention of alcohol problems, alternative sanctions for cannabis use and possession, drug-impaired driving, and the abuse and diversion of prescription medication.

Focus on Youth looked at the prevalence of substance use and its associated harms among young people, exploring the underlying neurobiology of substance use in adolescence and identifying existing gaps in youth-centric services.

Concurrent Disorders focused on the co-occurrence of mental health and substance use problems, examining the interconnections between addiction and mental illness, the costs of concurrent disorders for the healthcare system, and why treating these complex cases requires new and innovative approaches.

Licit and Illicit Drug Use during Pregnancy addressed the medical and obstetrical consequences of problematic drug use and dependency in pregnant women, as well as the short- and long-term effects that prenatal exposure to drugs can have on a child's development.

Childhood and Adolescent Pathways to Substance Use Disorders explored influences during childhood and adolescence that can affect problematic substance use later in life, as well as the implications an understanding of those influences has for prevention and treatment.

The Effects of Cannabis Use during Adolescence reviewed the effects of youth cannabis use, looking specifically at the drug's impact on health and brain development, as well as the interventions currently available for treating cannabis use disorder.

Chapter-by-Chapter Summary

Chapter 1: Substance Use and Successful Aging: Key Issues and Considerations

The global population is aging dramatically, with older adults representing the fastest-growing segment of society. In Canada, the number of older adults increased from 2.7 million in 1986 to 4.8 million in 2010. By 2036, approximately 25% of Canada's population will be 65 years of age and older.

This chapter explores the concept of "successful aging," highlighting the importance of specific lifestyle and psychological factors that help people adapt to the physical, cognitive and emotional changes associated with older adulthood. Maintaining social contacts, pursuing stimulating activities and cultivating a sense of purpose in life are all key to successful aging. The absence of these factors appears to increase the risk of problematic substance use: social isolation, sudden lifestyle changes (such as retirement) and declining physical health are some of the main reasons why older adults use alcohol, prescription drugs and other substances.

Strategies and interventions designed to promote successful aging could hold the key to reducing problematic substance use among older adults, with patients, caregivers and healthcare providers all having important roles to play in ensuring positive aging outcomes.

Chapter 2: Epidemiology of Psychoactive Substance Use among Older Adults

This chapter summarizes the most recent epidemiologic data on substance use among Canadians aged 55 and older, looking at their prevalence of use for five categories of psychoactive substances: tobacco, alcohol, prescription drugs (pain relievers, sedatives and stimulants), cannabis and other illicit drugs.

While older Canadians generally use these substances less frequently than younger Canadians, patterns of daily use are more common among older adults for prescription drugs and especially alcohol, with daily drinking and drinking that exceeds low-risk drinking guidelines both peaking in the 55 and older age group. In addition, the health-related problems associated with substance use are experienced more severely among older adults. For example, older Canadians are more often nicotine-dependent than the general population.

For cannabis and other illicit drugs, the data suggest a cohort effect. As younger generations of Canadians are more likely to use and be exposed to these substances, there will likely be an increase in their use (and related health issues) in the decades to come as the younger cohort enters older adulthood.

Chapter 3: The Aging Brain and Substance Use

As the population ages, a deeper knowledge of how the aging process changes the brain will be critical to better understanding the impact of substance use on older adults' health.

After discussing how the brain's function, structure and compensatory processes change with age, this chapter presents a detailed examination of the impact of aging on pharmacodynamics: the actions drugs have on the body. It explores the age-related changes that affect several neurotransmitter systems as well as the neuroendocrine and homeostatic systems. It also reviews the impact of aging on pharmacokinetics (the actions of the body on drugs), looking at how drug absorption, distribution, metabolism, and excretion and elimination processes change in older adulthood.

In some cases, pharmacodynamic and pharmacokinetic changes associated directly with aging can increase the likelihood of harmful drug–drug interactions or toxicity. In addition, problematic drug use places additional stress on the body's systems (which are already more vulnerable with age) and reduces individuals' ability to deal with the consequences of the aging process.

Chapter 4: Consequences of Alcohol and Drug Use in Older Adults

Age-related physiological changes to the nervous, gastrointestinal, respiratory and renal systems all result in diminished function, making older adults more vulnerable to the effects of substance use. This heightened level of vulnerability also significantly increases the risk of adverse outcomes that place a greater burden on Canada's healthcare system and social services.

This chapter provides an overview of some of the harmful consequences of substance use among the aging population, including hospitalization, falls, vehicular accidents, cognitive impairment, depression, substance withdrawal and death, including by suicide. Mortality rates are much higher among older adults who have substance use disorders.

Because the use of alcohol and medication, whether prescribed or misused, causes greater harm in older adults than illicit drugs, this chapter focuses on how the use of alcohol, opioids, benzodiazepines and cannabis can result in adverse health outcomes. Alcohol's accessibility and prevalence of use make it the substance of greatest risk, with the widest range of harms, for older adults. More older adults in Canada are hospitalized each year for alcohol-related issues than for heart attacks.

The chapter concludes with a discussion of the social consequences of substance use, which include elder abuse, homelessness, family breakdown, crime and social isolation.

Chapter 5: Considerations for Co-occurring Health Conditions

Many older adults with psychiatric disorders use illicit drugs or misuse prescription drugs, which can ultimately worsen the severity of and prognosis for their mental illness. Certain physical health problems in older adults can also be worsened by problematic substance use. When older adults have co-occurring psychiatric disorders and medical problems, they are at much greater risk of developing a substance use disorder (SUD) or experiencing harmful interactions between prescription and non-prescription medications.

This chapter presents evidence on the prevalence of and contributing factors behind some of the psychiatric disorders that commonly co-occur with SUDs, including schizophrenia, mood and anxiety disorders, post-traumatic stress disorder, and Alzheimer's and Parkinson's diseases. It also looks at how SUDs (and their lack of treatment) can worsen physical health issues such as coronary heart disease, diabetes, insomnia and chronic pain.

As demand grows for integrated physical health, mental health and addictions services for older adults, there is need for more research focused on older adults with substance use disorders and co-occurring physical or mental illnesses.

Chapter 6: Detection, Screening and Assessment

Most people who misuse substances never receive the treatment they need for a number of reasons, the most notable being a lack of detection. Some symptoms of substance use can be masked by other physical ailments, making it difficult for clinicians to identify them. At the same time, friends, family and caregivers might attribute an older adult's symptoms simply to getting older and therefore not seek treatment.

Several substance use screening tools and approaches are reviewed in this chapter, looking at their ease of use and ability to accurately detect problematic substance use in older adults. Ultimately, the best approaches are those that are tailored to reflect the unique sensitivities of older adults. Also discussed are the importance of conducting more comprehensive assessments of older adults, the challenges inherent to diagnosing SUDs in older adults, and the atypical presentations of substance use in older adults that clinicians must consider when making a diagnosis.

The chapter concludes by highlighting the need for better training of healthcare professionals and students on the prevention and detection of SUDs in older adults, with a brief discussion of some of the more innovative programs and curricula in this field.

Chapter 7: Substance Use Treatment for Older Adults

When age-specific treatment services are available, older adults are more likely than younger adults to complete treatment programs — with comparable or better treatment outcomes, including reduced (or eliminated) substance use as well as improvements to overall health and quality of life.

This chapter explores some of the pharmacological options available to clinicians for treating acute intoxication and withdrawal among older adults, providing guidelines and best practices for addressing symptoms related to alcohol, opioid, benzodiazepine, nicotine and cannabis disorders and dependence. It also offers advice on the use of inpatient residential treatment (to prevent continual access to alcohol and drugs) and outpatient treatment (to connect patients with resources in their community).

Also addressed are the many behavioural treatment options available to build social support, improve self-esteem and develop ways to cope with substance use, including brief interventions, motivational interviewing, case and care management, and contingency management. Addiction treatment in primary care settings is also covered in this chapter, emphasizing the importance of offering a continuum of care that includes linkages to community resources.

Chapter 8: A Call to Action

Summarizing the key findings presented in the previous chapters, this final section of the report outlines the immediate actions that can be taken to address the issue of under-diagnosis and under-reporting of SUDs in older adults, which, in turn, will improve treatment outcomes and reduce the harms associated with substance use in older adults.

This chapter calls for greater awareness of the growing issues associated with substance use by older adults, noting that more research and policy focused specifically on this population is required to shift ageist societal attitudes on substance use. Increasing awareness also means delivering more training and education to healthcare professionals and students, helping them improve the skills and capacity for detecting and diagnosing SUDs in older adults.

Finally, the report advocates developing clinical guidelines and recommendations for the diagnosis and treatment of SUDs that are tailored to the unique needs of older adults, which will require more precise understanding of the stages of development within older adulthood. There is a need to improve the availability and accessibility of age-specific treatments and care — and to effectively communicate information about those services to the general public, healthcare professionals, decision makers and older adults.

Terminology Notes

Several of the terms used throughout this report have clinical definitions, which are provided below. The Canadian Centre on Substance Use and Addiction no longer uses the term "substance abuse," as it is generally accepted that this term is stigmatizing and does not reflect the current consensus on the subject. However, some of the sources cited in the report do use "substance abuse" and variations on the term as clinical indicators and outcomes. Whenever the sources use these terms, they are reflected in the text of the report by being included in quotation marks to indicate they come from another source. These terms are left intact to preserve the integrity of the original research being cited.

Addiction:[1] A health condition characterized by compulsive drug use, despite harmful consequences. Someone suffering from addiction is unable to consistently abstain from substance use, even when it causes physical, psychological, social or economic harms. Other symptoms include craving for the substance and diminished recognition of problems with one's behaviour and relationships.

Substance dependence:[2] A physiological dependence on a psychoactive substance developed after prolonged use, where an individual experiences withdrawal symptoms when the substance is abruptly discontinued. Dependence can occur without the psychological and behavioural symptoms associated with addiction, such as compulsive use and craving.

Substance misuse:[3] The use of a psychoactive substance in a way that increases the risk of harmful consequences for the person misusing the substance. Substance misuse can be defined specifically as the use of a prescription medication by someone other than the person to whom the medication is prescribed or in a manner or for a purpose contrary to what is medically intended.

Substance use: "Substance" includes all legal and illegal drugs or psychoactive substances, including alcohol and tobacco. Because of this breadth of application, the term is often modified.

Substance use disorder:[4] A cluster of cognitive, behavioural and physiological symptoms related to the use of a psychoactive substance and experienced by an individual who continues to use the substance despite the symptoms. A substance use disorder is characterized by a maladaptive pattern of use that continues despite harms to the individual's physical or mental health, or the welfare of others. A disorder can also result in adverse social consequences related to substance use, such as failure to meet work, family or school obligations, interpersonal conflicts or legal problems.

[1] American Society of Addiction Medicine. (2011). *Public policy statement: definition of addiction*. Retrieved from www.asam.org/advocacy/find-a-policy-statement/view-policy-statement/public-policy-statements/2011/12/15/the-definition-of-addiction

[2] National Institute on Drug Abuse. (2014). *Media guide*. Retrieved from www.drugabuse.gov/publications/media-guide/dear-journalist

[3] World Health Organization. (2015). *Lexicon of alcohol and drug terms*. Retrieved from www.who.int/substance_abuse/terminology/who_lexicon/en/

[4] American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*, (5th ed.). Washington, D.C.: American Psychiatric Publishing.

01

CHAPTER

Substance Use and Successful Aging: Key Issues and Considerations

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CHAPTER AT A GLANCE

- Older adults represent the fastest growing segment of society. In Canada, the aging population is expected to grow faster than in most other developed countries.
- Rates of substance use and substance use disorders among older adults are projected to increase over the next few decades.
- Risk factors for substance use among older adults stem from difficulties adjusting to the lifestyle changes and challenges experienced during aging, including the loss of meaningful work-related activities (e.g., retirement), social isolation and the presence of chronic medical conditions.
- Not all older adults follow the same trajectory in normal aging declines, with some individuals displaying what is known as “successful aging.”
- Older adults who age successfully appear to possess positive psychological traits and lifestyles, such as optimism, adaptability and social engagement, that make them more resilient to the challenges of older adulthood.
- By incorporating successful aging strategies into their lives and work, patients, caregivers and healthcare providers might be able to help prevent problematic substance use among older adults.

1.1 Introduction

The global population is aging dramatically, with older adults now the fastest growing segment of society. People face a number of challenges as they age, from social isolation to an increase in chronic medical conditions. Difficulties adjusting to these challenges place older adults at heightened risk of problematic substance use (Arndt & Schultz, 2015).

Given these realities, the number of older adults with problematic substance use is projected to increase over the next few decades (Jeste et al., 1999; Patterson & Jeste, 1999). This increase is concerning because problematic substance use among older adults is associated with negative physical, cognitive and emotional health outcomes, all of which can lead to higher healthcare costs (Koh, Gorney, Badre, & Jeste, 2016).

Research on "successful aging" has highlighted the importance of specific lifestyle and psychological factors in helping people adapt to the challenges of older adulthood (Harmell, Jeste, & Depp, 2014). These factors might also hold the key to reducing rates of substance use among older adults.

1.2 Demographic Trends in Aging

The aging population represents an unprecedented demographic trend: there are now more older adults and a greater proportion of older adults relative to the total population than at any time in history (Bloom, Canning, & Fink, 2010). Worldwide, the number of individuals over the age of 60 increased from 200 million in 1950 to approximately 760 million in 2011, with the percentage of older adults increasing from 8% to 11% of the overall population (Beard et al., 2012).

The aging trend is likely to continue for the next several decades. Current estimates project that the number of individuals over the age of 60 worldwide will reach two billion by 2050, representing 22% of the overall population (Beard et al., 2012). The world's population is expected to increase 3.7 times from 1950 to 2050; during that same period, the population of individuals age 60 and older will increase by a factor of 10 (Bloom, Boersch-Supan, McGee, & Seike, 2011).

Canada has not been excluded from this growth in the number of older adults. Between 1986 and 2010, the number of older adults rose from 2.7 million to 4.8 million, increasing the proportion of older adults to the general population from 10% to 14% (Canadian Institute for Health Information, 2011). As of 2011, 14.4% of the Canadian population was 65 years and older — making the percentage of older adults in Canada slightly higher than the worldwide average (Statistics Canada, 2011).

By 2036, approximately 25% of Canada's population will be 65 years of age and older (Statistics Canada, 2007). In fact, Canada's aging population is expected to grow faster than most other developed countries, with current projections stating it will take just 33 years for the number of people age 65 and older to increase by 10%. In comparison, the United States is expected to take nearly 50 years to realize this same percentage increase (Canadian Institute for Health Information, 2011).

1.2.1 Causes and Consequences of the Global Aging Trend

There appear to be three main reasons for the disproportionate growth of the aging population (Canadian Institute for Health Information, 2011):

- Life expectancy has increased substantially over the past century, largely due to economic and healthcare advances. Worldwide, the average life expectancy has risen from 48 years in 1950 to 68 years in 2010 — and is predicted to reach 76 years by 2050.
- Fertility rates have declined, resulting in a decrease in the proportion of younger individuals relative to the overall population. In 1950, the fertility rate was five children per woman; it has since fallen to approximately 2.5 children per woman. The fertility rate is expected to further decline over the coming decades, decreasing to 2.2 children per woman by 2050.
- The large cohorts of children born after World War II (the "baby boomers") are shifting population structures as they age.

Given that older adults are frequent users of healthcare services, it is unsurprising that these aging trends have contributed to rising healthcare costs. Between 1998 and 2008, healthcare expenditures increased by 7.4% in Canada, with the aging of the population accounting for 11% of this increase. Projecting into the future, the Organisation for Economic Co-operation and Development (OECD) estimates the share of Canada's gross domestic product (GDP) directed toward aging-related health and long-term care will rise by 1.9% from 2010 to 2025 (Canadian Institute for Health Information, 2011). In absolute terms, this is equivalent to a $30.9-billion increase in healthcare expenditures, or $905 per Canadian.

As older adults represent a fast-growing, economically significant population, determining strategies for promoting successful aging will be essential to ensuring positive aging outcomes and controlling healthcare costs (see Chapter 2 for more discussion on that topic). Before reviewing the research on successful aging, it is first necessary to describe how the typical aging process unfolds.

1.3 How the Typical Aging Process Affects Health

Aging into older adulthood is associated with changes across multiple health domains, especially those related to physical, cognitive and emotional health.

1.3.1 Physical Health

Non-communicable and chronic diseases are highly prevalent among older adults. Arthritis and rheumatism are the most common chronic conditions, affecting 44% of the older adult population in Canada. Cardiovascular disease is also highly prevalent; in 2009, 23% of Canadian older adults reported some form of heart disease and 56% reported a diagnosis of high blood pressure. A significant percentage of older Canadian women also suffer from osteoporosis (29%). In addition, older Canadian adults make up a disproportionate number of new cases of cancer, with 39% of all new cases in 2006 diagnosed among Canadians age 65–79 and another 17% diagnosed among Canadians 80 years and older. Finally, many older Canadians report conditions affecting their hearing and vision, such as cataracts and glaucoma (Public Health Agency of Canada, 2010).

1.3.2 Cognitive Health

Subtle declines in cognitive abilities occur as a person advances into older adulthood, with numerous studies exploring the specificity of these deficits across distinct cognitive processes and domains. Crystallized intelligence, which involves knowledge that is overlearned and familiar (e.g., vocabulary, general knowledge), remains largely stable through the sixth (age 50–60) and seventh (age 60–69) decades of life. In contrast, fluid intelligence — that is, the ability to process and learn new information, reason and solve problems, and attend to and manipulate the environment — declines gradually over the course of adulthood (Salthouse, 2012).

Most prominent among the changes seen in fluid intelligence are declines in the speed with which cognitive activities and motor responses are performed (termed processing speed). Processing speed typically peaks between the ages of 20 and 29, then gradually declines throughout the rest of adulthood and into older adulthood (Salthouse, 2010). Declines in processing speed can affect other cognitive domains, including memory (Luszcz & Bryan, 1999).

Declines in complex attention (e.g., dividing attention between multiple tasks) and executive functioning (e.g., self-monitoring, planning, organizing, reasoning, problem solving) are also prominent among older adults, with these abilities typically beginning to subside during the seventh decade (Salthouse, 2010; Salthouse, Fristoe, Lineweaver, & Coon, 1995). The neurological basis of these cognitive changes is complex, primarily involving reductions in grey and white matter volume as well as reduced white matter tract integrity (Harada, Natelson Love, & Triebel, 2013).

1.3.3 Emotional Health

In contrast to physical and cognitive health, subjective well-being and psychological health might improve in older adulthood. Several studies have reported that mental health follows a U-shaped curve over the course of development, with declines in mental health occurring in early adulthood and into middle adulthood followed by subsequent improvement in later adulthood (Blanchflower & Oswald, 2008; Jeste & Oswald, 2014; Stone, Schwartz, Broderick, & Deaton, 2010). Similarly, large-scale epidemiological studies have reported lower levels of mental illnesses in older adults (de Graaf, ten Have, van Gool, & van Dorsselaer, 2012; Hasin, Goodwin, Stinson, & Grant, 2005).

Other research has looked more specifically at emotional domains. The findings suggest that happiness, enjoyment and the inverse of sadness all exhibit U-shaped patterns over development. Stress and anger decline linearly with age, while worry remains elevated into middle age and then declines in older adulthood (Stone et al., 2010; Goncalves & Byrne, 2013).

Spotlight: Successful Aging Evaluation study

The Successful Aging Evaluation (SAGE), a community-based study of dementia-free adults in San Diego County, California, examined the physical, cognitive and mental health of individuals between the ages of 20 and 100. Participants were selected by random digit dialing, with oversampling of individuals older than 75 years. After controlling for relevant demographic factors (gender, education, marital status), analyses revealed that both cognitive and physical health declined while mental health improved in older age groups relative to younger groups. Specifically, physical and cognitive health exhibited non-linear worsening, with accelerated declines beginning around age 70. Mental health, on the other hand, improved linearly with age. This pattern represents a paradoxical trend in aging: despite worsening physical and cognitive health, older adults report superior mental health relative to younger cohorts (Thomas et al., 2016).

1.4 What Is Successful Aging?

While most individuals age in accordance with the physical, cognitive and emotional health trends described above, a minority of older adults exhibits a more favourable progression in some, if not all, of these three domains. In their seminal review, Rowe and Kahn (1987) argued that many of the declines observed in typical aging are due not to the aging process but rather result from exogenous factors such as lifestyle choices. They also suggested that the aging process could be improved by focusing on individuals who exhibit superior aging. Consistent with this proposal, twin studies suggest that longevity and functioning in older adulthood are only 20–30% heritable, suggesting a key role for exogenous factors (Gurland, Page, & Plassman, 2004). The concept of successful aging was proposed to identify individuals who have demonstrated favourable aging outcomes, and to highlight the relevant behaviours and strategies they used to promote such outcomes (Fiocco & Yaffe, 2010).

1.4.1 Defining Successful Aging

The term "successful aging" was introduced into biomedical literature in the 1970s and 1980s. Rowe and Kahn (1987) articulated the most influential early model of successful aging, which had three components: freedom from disease and disability; high cognitive and physical functioning; and social and productive engagement. This model was then incorporated into the MacArthur Foundation Research Network on Successful Aging study, which followed 1,000 older adults and was the first large-scale longitudinal study of successful aging.

Despite the influence of Rowe and Kahn's definition, there is currently no consensus on how to define successful aging. Depp and Jeste (2006) reviewed 28 studies on successful aging and identified 29 distinct definitions. Consistent with Rowe and Kahn's definition, most of the conceptualizations of successful aging identified by Depp and Jeste were multidimensional. The most common dimensions identified were, in order of frequency, disability/physical functioning (26/29 definitions), cognitive functioning (13/29), life satisfaction/well-being (9/29), social/productive engagement (8/29), presence of illness (6/29), longevity (4/29), self-rated health (3/29), personality (2/29), environment/finances (2/29) and self-rated successful aging (2/29).

A more recent review identified 105 operational definitions of successful aging across 84 studies (Cosco, Prina, Perales, Stephan, & Brayne, 2014). These definitions were categorized into five broad constructs:

- Physiological (physical function/disability, cognitive function, illness/disease presence, health status, longevity, mental health);
- Well-being (affective status, life satisfaction/well-being);
- Engagement (active life/social engagement, support system);
- Personal resources (personal resources, independence/autonomy); and
- Extrinsic factors (environment/finances).

The authors of this review also found that the majority of definitions were multidimensional, with the average definition incorporating 2.2 of these broad constructs. Physiological constructs were the most frequently included,

appearing in 91% of definitions of successful aging, followed by engagement (51%), well-being (49%), personal resources (25%) and extrinsic factors (6%). This research suggests successful aging is a complex, multidimensional construct that involves more than simply the absence of disability or disease.

Due to the lack of consensus on a definition, the prevalence of successful aging has been difficult to estimate precisely. Depp and Jeste (2006) reported a mean proportion of successful aging of 35.8%, but noted that prevalence depended substantially on the operational definition used. Inclusion of a disability/physical function dimension had the largest impact on prevalence: studies that included this dimension reported a mean prevalence of 27.2% whereas those that excluded it reported a mean prevalence of 63.8%. Similarly, Cosco and colleagues (2014) reported a wide range of prevalence estimates, noting that the number of constructs included in the operational definition of successful aging affected prevalence estimates substantially. Operational definitions including only a single construct reported a mean prevalence of 32.5% whereas those including four constructs yielded a prevalence of 23.3%.

1.4.2 A Qualitative Perspective on Successful Aging

An alternative approach to defining successful aging has focused on the perspectives of older adults themselves. These studies have consistently found that older adults emphasize the importance of psychological well-being over physical and cognitive functioning in describing successful aging. For instance, von Faber and colleagues (2001) reported that while older adults acknowledge the impact of physical and cognitive limitations, they perceive their ability to adapt to and make the best of these changes as more crucial.

Maintaining social contacts was also seen as a key component of successful aging. Knight and Ricciardelli (2003), for example, found that older adults highlighted the ability to adjust to losses and limitations as central to successful aging. Again, older adults noted that while health-related issues could pose challenges to continuing previously enjoyed activities, learning to adjust to these challenges and finding activities better suited to their current capabilities was more central to success in aging.

Reichstadt and colleagues (2010) conducted qualitative interviews with older adults to determine their conceptions of successful aging. They found older adults describe successful aging as a balance between two seemingly opposing tendencies: self-acceptance/self-contentment and self-growth/engagement. Self-acceptance was described as having a realistic self-appraisal and comfort with one's past experiences and current circumstances, while self-growth involved an active engagement in life, including pursuing novel activities, maintaining social relationships, fostering a positive attitude and contributing to others' well-being. Taken together, studies exploring the subjective experience of older adults highlight important psychological and behavioural components of successful aging that are often not captured by objective definitions.

1.4.3 Success Factors

Given their differing definitions, it is not surprising that objective and subjective prevalence estimates of successful aging differ widely. For instance, Strawbridge and colleagues (2002) compared Rowe and Kahn's criteria directly to self-rated successful aging in a sample of 867 older adults aged 65–99 years. While Rowe and Kahn's criteria yielded a successful aging prevalence of 18.8%, self-rated successful aging was much higher at 50.3%. Presence of disease and disability emerged as the most prominent rate-limiting factor of objectively defined successful aging.

In contrast, many older adults considered themselves to be successful agers despite having chronic medical conditions. A similar pattern was documented by Vahia and colleagues (2010) in a study of 1,979 women over age 60. Respondents were asked to rate themselves on a scale from 1 (not successfully aging) to 10 (successfully aging). Nearly 90% of older women rated themselves with a score of 7 or higher despite only 15% of the sample reporting absence of disease and only 38% reporting freedom from disability (see also Montross et al., 2006; von Faber et al., 2001).

These findings suggest successfully aging older adults might possess positive psychological traits that render them resilient to the challenges of aging. Across two longitudinal studies, older adults with a more positive self-perception of aging exhibited superior functional health and survival over time (Levy, Slade, & Kasl, 2002; Levy, Slade, Kunkel, & Kasl, 2002). Giltay and colleagues (2004) found that dispositional optimism, defined as the "general expectation that good things rather than bad things are likely to happen in the future," was predictive of decreased all-cause mortality, with optimism being particularly protective against cardiovascular mortality among men. Having a purpose in life is also important for older adults: those with a stronger sense of "meaning" exhibited better physical health, leading to lower levels of mortality over a period of five years (Krause, 2009).

Consistent with these findings, older adults themselves tend to emphasize psychosocial factors as central to aging successfully. Reichstadt and colleagues (2007) conducted focus group interviews with 72 older adults between the ages of 60 and 99. Participants identified 33 factors relevant to successful aging, which could be grouped into four broad categories:

1. The importance of one's attitude and ability to adapt to change;
2. A sense of security and stability in life, often related to issues involving one's living environment, social supports and financial resources;
3. Engagement in life, including pursuing stimulating activities, contributing to others' well-being and cultivating a sense of purpose; and
4. Physical health and wellness, although it should be noted that participants conveyed mixed opinions on their necessity for successful aging.

Additional correlates of successful aging outside of positive psychological traits have also included factors related to age and physical health. In their review, Depp and Jeste (2006) reported that age (closer to age 60), freedom from arthritis or diabetes, absence of hearing problems, better activities of daily living and being a non-smoker were the most predictive factors of successful aging. Moderate support was also found for exercise/physical activity, better self-rated health, lower systolic blood pressure, fewer medical conditions and the absence of depression, while limited support was found for higher income, greater education, current marriage and white ethnicity.

CLINICAL VIGNETTE

PATRICE

At age 60, Patrice was involved in a car accident that significantly impaired his mobility and resulted in chronic back pain, forcing him to retire early from his job at an automotive manufacturing plant. As many of Patrice's closest friends were his co-workers, he felt isolated and lonely after retiring. While he had drunk alcohol in modest amounts throughout his life, he started drinking more frequently after retirement — both to cope with the pain and to assuage his feelings of boredom and loneliness. At first, Patrice drank only a beer or two per day; over time, that increased to five or six beers per day.

Concerned over Patrice's alcohol intake and thinking he may be depressed, his wife encouraged him to see a doctor; however, Patrice refused. When Patrice's wife passed away when he was 64 he became even more withdrawn, often going days without showering. Worried about his well-being, Patrice's two sons insisted he see a doctor, to which he eventually agreed.

During the appointment, the doctor discussed a plan to reduce Patrice's substance use and improve his mood. When Patrice mentioned that most of his former co-workers had now retired, he was encouraged to reconnect with them. Patrice's oldest son also asked Patrice to move in with him, saying he was struggling to find daycare for his daughter and could use the help. Finally, the doctor recommended Patrice see a therapist to discuss his sadness, monitor his alcohol use and develop behavioural strategies to cope with his chronic pain.

Six months later, Patrice is living with his son. He enjoys caring for his granddaughter, saying it makes him feel useful again. He reconnected with several former co-workers and served as an important support when the wife of his best friend passed away. And while Patrice remains skeptical about therapy, he enjoys having somebody to talk to about his wife. Today, Patrice drinks only a beer or two per occasion and only in social contexts. Although he's still frustrated by his functional limitations, he knows there are many positive things in his life and he shouldn't focus so much on the bad things outside his control.

1.5 Why Older Adults Use Alcohol, Prescription Drugs and Other Substance

Prevalence of substance use among older adults can be difficult to estimate because current diagnostic criteria might not be appropriate for this population (Arndt & Schultz, 2015). Older adults most frequently report problematic use of alcohol, nicotine and prescription medications, although rates of cannabis use have increased in recent years (Simoni-Wastila & Yang, 2006).

While older adults do not report high levels of problematic psychoactive drug use, nearly one in four reports having used a psychoactive medication with an abuse potential (Simoni-Wastila & Yang, 2006). The baby boomer generation, particularly individuals between the ages of 50 and 64, report using more illicit and non-medical drugs than older cohorts. Taking these two trends together, current projections estimate that the number of older adults with substance use disorders will rise considerably in the future (Wu & Blazer, 2011). In the U.S., the number of older adults with a substance use disorder is projected to double between 2002–2006 and 2020 (Han, Gfroerer, Colliver, & Penne, 2009). There is no corresponding estimate for the increase of older adults with a substance use disorder in Canada.

1.5.1 Lifestyle Changes

Numerous lifestyle changes and challenges specific to older adulthood could contribute to substance use. Retirement is a near-universal phenomenon among older adults that brings significant changes to one's life, including the loss of meaningful work-related activity, a reduction in social contacts and an increase in leisure time. Among some older adults, these changes can increase depression and reduce well-being, especially when retirement is abrupt or perceived as happening too early (Szinovacz & Davey, 2004). While some studies have reported unemployment as being associated with increased substance use among older adults (Bryant & Kim, 2012), others have not found this association (Lin et al., 2011). It is likely that there is not a direct relationship between retirement and substance use; rather, one's social network might play a key role in the association between retirement and substance use. Individuals with limited social networks independent of work could exhibit higher rates of post-employment substance use (Kuerbis & Sacco, 2012).

1.5.2 Physical Health

Physical health among older adults might also affect substance use. Several studies have reported that healthier older adults are more likely to use alcohol problematically (Bryant & Kim, 2012; Merrick et al., 2008; Platt, Sloan, & Costanzo, 2010). Others have found the opposite pattern, with less healthy individuals more likely to report problematic alcohol use (St. John, Montgomery, & Tyas, 2009). Overall, there appears to be a subset of healthy older adults who drink excessively; however, once their health declines they may limit their alcohol use (Arndt & Schultz, 2015). The one notable exception to this trend is among older adults with medical conditions causing chronic pain. They might rely on alcohol to reduce pain, leading to more alcohol use problems (Moos, Brennan, Schutte, & Moos, 2010).

The association between physical health and non-medical prescription drug use is clearer. Research has consistently identified poor general medical condition and having chronic or multiple physical illnesses as risk factors for the non-medical use of prescription drugs (Sarkar, Parmar, & Chatterjee, 2015). Medical illnesses such as chronic pain, insomnia and anxiety increase the likelihood of exposure to prescription drugs with abuse potential, especially benzodiazepines, opiate analgesics and skeletal muscle relaxants (Culberson & Ziska, 2008). In the majority of cases, non-medical use of prescription drugs is unintentional among older adults (Sarkar et al., 2015).

1.5.3 Social Isolation

Finally, social isolation is a known risk factor for substance use. Social isolation can be divided into two types: objective social isolation, in which an individual possesses few social contacts; or perceived social isolation, in which the individual might have a typical level of social contact but has less social contact than they desire. Perceived social isolation is also known colloquially as "loneliness."

Rates of clinically significant loneliness rise substantially in older adulthood, with estimates reaching as high as 40% (Pinquart & Sorensen, 2001; Weeks, 1994). Importantly, loneliness is associated with a greater propensity to abuse alcohol and can serve as both an initiating and maintaining factor in alcohol abuse (Akerlind & Hornquist, 1992). On the other hand, objective social isolation, especially due to living at home alone, appears to contribute to a greater likelihood of non-medical use of prescription drugs among older adults (Jinks & Raschko, 1990; Sarkar et al., 2015). Mechanisms underlying this association are currently unclear and deserve further examination.

Marriages can also undergo substantial changes in older adulthood that can lead to social isolation, with widowhood being the most significant. Research has consistently demonstrated an association between marital status and substance use. Compared to those who are married, single older adults are more likely to use alcohol (Blazer & Wu, 2009; Lin et al., 2011; Merrick et al., 2008; Moore et al., 2009), cannabis (Blazer & Wu, 2009) and nicotine (Blazer & Wu, 2012).

1.6 How Patients, Caregivers and Providers Can Promote Successful Aging

Risk factors for problematic substance use overlap considerably with the processes relevant to successful aging. Older adults see successful aging as the ability to accept and adapt to the medical and social challenges of older adulthood (Knight & Ricciardelli, 2003; Reichstadt et al., 2010; von Faber et al., 2001). Maintaining social contacts, pursuing stimulating activities and cultivating a sense of purpose in life are also seen as important components of successful aging (Reichstadt et al., 2010; von Faber et al., 2001). The flip side of each of these factors appears to increase risk of problematic substance use. More specifically, limited social contact and limited social networks (Akerlind & Hornquist, 1992; Jinks & Raschko, 1990; Kuerbis & Sacco, 2012; Sarkar et al., 2015), reductions in meaningful activity (Bryant & Kim, 2012; Kuerbis & Sacco, 2012), and the presence of and difficulties adjusting to chronic medical conditions (Sarkar et al., 2015; St John et al., 2009), especially chronic pain (Culberson & Ziska, 2008; Moos et al., 2010), contribute to problematic substance use among older adults. This correlation suggests that interventions designed to promote successful aging could also reduce problematic substance use — with patients, caregivers and healthcare providers each having an important role to play in cultivating the elements of successful aging.

1.6.1 Patients

As there are several modifiable lifestyle factors that contribute to both successful aging and substance use among older adults, a multifactorial approach is warranted. Such an approach should focus on three goals: reducing physical illness; increasing social engagement; and improving psychological well-being.

There is a wealth of research demonstrating that physical activity reduces the risk of cardiovascular disease, metabolic disease and osteoarthritis during aging (Harmell et al., 2014). Increased physical activity also appears to improve cognitive function and reduce the risk of cognitive decline among older adults (Brown, Peiffer, & Martins, 2013). To achieve these health benefits, the American College of Sports Medicine recommends at least 150 minutes of moderate weekly physical activity (i.e., 30 minutes per day, five days per week) (Chodzko-Zajko et al., 2009).

As mentioned earlier, social withdrawal and loneliness increase in older adulthood, largely due to physical decline and retirement (Pinquart & Sorensen, 2001; Weeks, 1994). Limited social engagement has been shown to affect self-reported health, cognitive functioning and depression, as well as alcohol and prescription drug abuse among older adults (Akerlind & Hornquist, 1992; Jinks & Raschko, 1990; Sarkar et al., 2015). Interventions to reduce social isolation among older adults should focus on improving social skills, enhancing social supports, increasing opportunities for social contact and restructuring maladaptive social cognition (Masi, Chen, Hawkley, & Cacioppo, 2011).

Increasing positive psychological traits is also a promising strategy to promote successful aging and reduce substance use among older adults. Resilience, optimism and adaptability appear to be especially important psychological contributors to successful aging (Engberg et al., 2013; Jeste et al., 2013). Although no structured interventions have been conducted to promote these positive psychological traits, it has been suggested that increasing levels of social support, enhancing self-efficacy and structuring tasks to an individual's ability level might enhance these traits (Southwick & Charney, 2012).

1.6.2 Caregivers

Caregivers can play a key role in promoting successful aging and reducing substance use by encouraging social engagement and promoting healthy lifestyle behaviours. To increase social engagement, caregivers should provide activities that are deemed meaningful and enjoyable by their loved one. These activities should be consistent with the individual's level of ability or, if beyond their level (e.g., because of physical disability), structured in a way that allows the individual to successfully engage in them. Older adults often report social activities (particularly those involving family and friends) and opportunites to contribute to the well-being of others as especially important to successful aging (Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010).

Caregivers can also help promote an active lifestyle. Moderate exercise or even a simple walking program can help improve cardiovascular fitness and cognitive functioning (Erickson et al., 2011). Engaging in activities that stimulate cognition, such as board games, card games and crossword puzzles, might also help reduce the risk of cognitive decline (Hughes, Chang, Vander Bilt, & Ganguli, 2010).

1.6.3 Healthcare Providers

Healthcare providers can play a crucial role in monitoring successful aging and substance use among their patients. They should promote and monitor programs intended to increase physical activity, social engagement and psychological well-being. This task will require discussion with both patients and their caregivers to determine the appropriateness of successful aging strategies, the effectiveness of these strategies and the need for potential modification. Providers should also make sure to inquire beyond physical health when speaking with patients and caregivers, as psychological factors appear to be just as important (if not more important) than physical health in positive aging and substance use outcomes.

At the same time, providers must be aware of potential limitations in the decision-making capacity of older adults with physical dependence on substances. Many individuals with a physical dependence exhibit impairments on decision-making tasks, typically characterized by a preference for actions associated with short-term gains with reduced consideration for long-term losses and a greater likelihood of selecting risky actions (Bechara & Damasio, 2002; Lane & Cherek, 2000). These decision-making deficits can be further exacerbated in older adults because of declines in cognition associated with aging (Harada et al., 2013).

As there is considerable heterogeneity in decision-making capacity among individuals with a physical substance dependence, conclusions about decisional capacity should not be drawn strictly from an individual's diagnosis (Jeste & Saks, 2006). When questions about capacity to consent to treatment arise, providers are advised to consider use of a structured instrument to assess treatment-related decision-making capacity, such as the MacArthur Competence Assessment Tool — Treatment (Grisso, Appelbaum, & Hill-Fotouhi, 1997) or the Hopkins Competency Assessment Tool (Janofsky, McCarthy, & Folstein, 1992).

1.7 Conclusion

Many risk factors for substance use among older adults stem from difficulties adjusting to socio-environmental challenges specific to older adulthood including retirement, social withdrawal, widowhood and chronic medical conditions. Research among successful agers has revealed numerous strategies for coping with these challenges — and these strategies for successful aging might also provide a robust preventative approach to substance use among older adults.

With the increasing use of psychoactive drugs and the aging of the baby boomer generation, problematic substance use is projected to increase over the coming years (Han et al., 2009). To develop more effective interventions, policy makers, clinicians and allied healthcare workers will need a more thorough understanding of the prevalence of specific psychoactive substances, as well as the risk and protective factors for problematic substance use among older adults.

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02

CHAPTER

Epidemiology of Psychoactive Substance Use Among Older Adults

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CHAPTER AT A GLANCE

Tobacco

- Males are more likely than females to smoke tobacco; however, this gender difference is smaller in the 55 and older age group than in younger age groups.
- While older Canadians smoke tobacco at a lower frequency than younger Canadians, those who do are smoking larger quantities of cigarettes and are more often dependent on nicotine.

Alcohol

- The frequency of daily or almost daily alcohol use peaks in the 65–74 age group, where it is almost three times as high as in the 15–54 age group.
- More than 13% of Canadians age 55 and older report a pattern of problematic binge drinking.

Prescription Drugs

- While the frequency of prescription opiate use is lower in the 55 and older age group compared to younger age groups, a pattern of daily use is seen more frequently among older adults.

Cannabis

- As age increases, cannabis use and dependence tend to decrease. This pattern is consistent with a cohort effect, meaning cannabis use among older adults could increase in future generations as the current cannabis-using cohort ages.
- The frequency of cannabis use for medical purposes is lower among older adults despite an increase in the indicators for such use (e.g., chronic pain).

Other Drugs

- The frequency of illicit drug use is lower in the 55 and older age group compared to younger age groups.
- The pattern of lifetime illicit drug use suggests a possible cohort effect, raising concerns that illicit drug use could increase in future generations of older Canadians.

2.1 Introduction

This chapter summarizes recent epidemiologic data on substance use among older Canadians, with an emphasis on providing the best available evidence about the prevalence of psychoactive substance use within the 55 and older age group.

The estimates reported in this chapter come from two Statistics Canada surveys: the 2012 Canadian Community Health Survey — Mental Health (CCHS-MH) and the 2015 Canadian Tobacco, Alcohol and Drugs Survey (CTADS).

- The CCHS-MH was the first national survey to include a diagnostic measure for assessing substance use disorders (Statistics Canada, 2012). A total of 25,113 Canadians aged 15 years and older were surveyed in 2012, with face-to-face interviews used whenever possible. The survey used a Canadian adaptation of the Composite International Diagnostic Interview, a fully structured psychiatric diagnostic tool.
- The CTADS is a biennial survey of smoking, alcohol and drug use trends (Statistics Canada, 2016). Throughout 2015, computer-assisted telephone interviewing was used to collect data from 15,154 Canadians aged 15 years and older. Starting from a random sample of telephone numbers, one or two respondents from each number were then selected based on household composition. An equal number of respondents were chosen from each province.

Additional information about both surveys can be found at www.statcan.gc.ca.

2.1.1 How Prevalence Is Reported

There are several types of prevalence. The most common is point **prevalence**: the proportion of a population having an attribute (e.g., cannabis use) at a point in time. However, some estimates provided in this chapter use **period prevalence**: the proportion of a population with an attribute at any time during a specified interval (e.g., one week, one month, one year).

In addition to overall prevalence estimates for the general Canadian population, sex- and age-specific estimates are also provided. While the focus of this report is on the older adult population (defined here as 55 years and older), prevalence estimates for younger age groups are often presented for context.

Two types of estimates of psychoactive substance use are reported in most of the analyses that follow. First, the frequency of use of each specific substance is described. Second, estimates of relevant clinically defined entities (problematic use, dependence and other clinical syndromes characterized by a pathological pattern of use) are also reported. The prevalence of substance use and substance use disorders are reported here as percentages along with their associated 95% confidence intervals (CI). That is, it is 95% certain that the true prevalence falls somewhere within lower and upper confidence limits provided for each estimate.

Spotlight: Challenges in data collection and analysis

Data collected by Statistics Canada are usually available in two formats: public-use micro-data files (PUMFs) and master files. PUMFs include safeguards to protect the confidentiality of survey respondents; master files retain a higher level of detail but can be accessed only by approved personnel in a secured environment and only when analyses cannot be carried out using PUMFs. For this reason, all of the estimates reported in this chapter are derived from PUMFs.

As the CCHS-MH and CTADS are national surveys, data collection by simple random samples is not feasible. Instead, geographical areas are selected first, then households, then individuals in those households. This method produces two complications for statistical analysis. First, people living in the same geographical region are somewhat similar to one another, meaning the amount of variability in the population could be underestimated. Second, if only one person is selected from a household, that means members of larger households have a lower probability of being selected than those of smaller households. Such factors must all be accounted for in the analysis. In addition, to ensure estimates can be made for smaller provinces, Statistics Canada must deliberately oversample those provinces, requiring further adjustments to be made in the analysis.

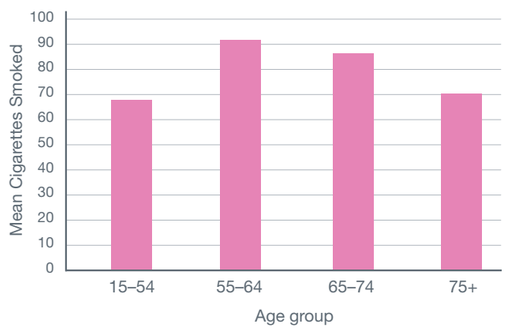
2.2 Tobacco

According to the most recent CTADS results, 12.9% of Canadians are smokers (9.3% are daily smokers and 3.7% are occasional smokers). Within the general population, smoking occurs at a higher frequency in males (15.6%) than females (10.4%). This trend is observed in most age groups as well.

Among males between the ages of 15 and 54, the prevalence of smoking is 17.6% (95% CI 15.4–19.7) versus 10.9% (95% CI 9.0–12.8) for females in the same age range. In the 55 and older age group, 11.8% (95% CI 8.9–14.7) of males are smokers, similar to the female prevalence of 9.3% (95% CI 7.0–11.6). The widely held belief that smoking is far more prevalent in males than females appears not to apply to older adults. It might also be that any protective effect against smoking associated with being female becomes smaller as people grow older.

Overall, 10.5% (95% CI 8.7–12.3) of Canadians in the 55 and older age group are smokers, compared to 14.3% (95% CI 12.9–15.6) of those under the age of 55. Yet while the overall frequency of smoking is lower in older Canadians, there is evidence to suggest the health-related challenges facing older adults who smoke are more severe. For example, older Canadians are smoking more cigarettes than younger Canadians. The CTADS records the number of cigarettes smoked in the week prior to the survey. As shown in Figure 1, the mean number of cigarettes smoked in the 15–54 age group was 67; among those aged 55–64, it was 91. The estimates for the 65–74 and 75 and older age groups are also higher than for the 15–54 age group.

Figure 1. Mean number of cigarettes smoked in the preceding week, by age group



Older Canadians are also more likely to be nicotine-dependent (i.e., having a physical dependence to nicotine after prolonged use and experiencing withdrawal symptoms when use is discontinued) than younger Canadians. This fact is an important indicator because different approaches to smoking cessation are needed for people with physical dependence. For example, they likely need more intensive treatments (such as evidence-based counselling or nicotine-replacement therapy) than non-dependent smokers. A good indicator of physical dependence to nicotine is the time to one's first cigarette after waking up. Among older adults, 20.4% (95% CI 12.8–27.9) can go more than 60 minutes before having their first cigarette of the day. In comparison, nearly one-third (28.9%; 95% CI 22.6–35.2) of those in the 15–54 age group are able to delay smoking by more than 60 minutes.

2.2.1 Interprovincial Differences in Smoking Prevalence

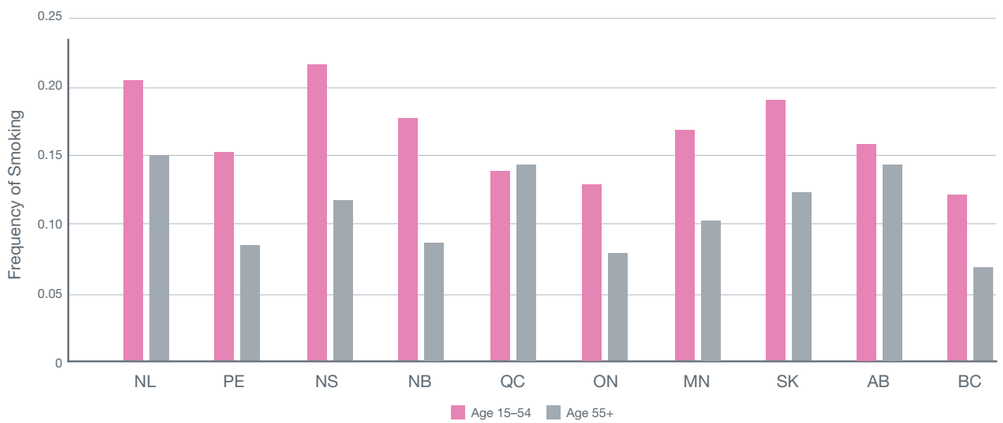
Figure 2 presents province-specific estimates stratified by age group. As expected, smoking rates are generally lower among older Canadians when compared to the 15–54 age group. The provinces with the lowest frequencies of smoking in the 55 and older age group tend to have a larger gap in prevalence between the two age groups, while those with the highest frequencies of smoking among older adults (Newfoundland and Labrador, Quebec, Alberta) tend to have smaller differences. This finding could suggest that some provinces are more effective than others at helping people quit smoking.

There are many possible explanations for these interprovincial differences in smoking prevalence, including different policies for the age at which tobacco products can be legally purchased. Four provinces allow 18-year-olds to purchase tobacco products: Quebec, Manitoba, Saskatchewan and Alberta. Not surprisingly, these provinces have a higher frequency of smoking in the 15–54 age group: a combined 15.2% (95% CI 12.7–17.7) versus 13.6% (95% CI 11.7–15.5) in the other provinces (although the overlapping confidence intervals means the difference might not be statistically distinct). What is more surprising is that the same trend is seen in the older age groups, where the prevalence of tobacco use in the provinces that allow purchase at age 18 is 14.0% (95% CI 10.7–17.3) compared to 8.2% (95% CI 6.2–10.2) in the others. Here, the non-overlapping confidence intervals indicate a statistically distinct difference. To assess the robustness of this finding, the same estimates were calculated using the 2013 CTADS dataset, which showed effects in the same direction.

2.3 Alcohol

The CTADS asks all respondents how often they drank alcoholic beverages during the past 12 months. Compared to younger Canadians, those in the 55 and older age group are more likely to not drink at all: 28.8% (95% CI 26.3–31.3) versus 20.1% (95% CI 18.5–21.7) of those under the age of 55. However, the responses regarding daily or almost daily drinking represent a reversal of this pattern, with 11.0% (95% CI 9.1–12.9) of respondents aged 55 and older drinking every day compared to just 4.0% (95% CI 3.2–4.8) of those between the ages of 15 and 54. The frequency of daily or almost daily alcohol use peaks in the 65–74 age group, where it is almost three times as high as in the 15–54 age group.

Figure 2. Frequency of smoking, by province and age group



What's in a drink?

The CTADS methodology is built upon the definition of a "standard drink," which is equal to one 341 millilitre (mL) serving of beer or cider, one 142 mL glass of wine, or one straight or mixed drink containing 43 mL of liquor or spirit.

This pattern of daily drinking is a concern given that *Canada's Low-Risk Alcohol Drinking Guidelines* recommend non-drinking days every week to diminish the habit-forming effects of alcohol (Canadian Centre on Substance Use and Addiction, 2017). Similar to the pattern seen for smoking, while the frequency of alcohol consumption is slightly lower in older adults than in the general population, the problems associated with its use occur more frequently and are more severe.

2.3.1 Binge Drinking

Another drinking pattern associated with health risks is binge drinking, which is defined as five or more drinks on any one occasion for males and four or more drinks on any one occasion for females. In the CTADS, all respondents who report past-year drinking are asked how often they had five or more drinks in a single occasion during the past 12 months. (The frequencies reported here represent the frequency of past-year binge drinking only among those who report any drinking in the past year.)

The estimated overall prevalence of past-year binge drinking in the Canadian population is 44.7%, with prevalence higher in males (52.0%) than females (37.7%). The frequency of binge drinking among older adults is lower than that of the 15–54 age group; among respondents aged 55 and older, 27.5% (95% CI 25.1–30.0) report past-year binge drinking compared to 54.0% (95% CI 51.8–56.2) in the younger age group.

Because binge drinking includes a heterogeneous pattern of alcohol consumption, it cannot be fully captured by past-year frequency. The CTADS therefore collects complementary information on the frequency of binge drinking. A pattern of binge drinking that occurs at a monthly frequency (or more) is considered especially problematic. Among older Canadians, the estimated prevalence of monthly (or more frequent) binge drinking is 13.2% (95% CI 11.3–15.0), which is lower than that of the 15–54 age group but still quite high.

A facsimile of the low-risk drinking guidelines was created for this analysis by using past-week drinking data and combining the overall maximum weekly consumption (10 drinks for females and 15 for males) with a requirement that more than two drinks for females and more than three for males not occur on four of seven days of the week. Based on this model, the prevalence of "risky" drinking among older adults is 10.2% (95% CI 8.4–12.0).

Rates of binge drinking across all age groups have increased over time, with a recent time-series analysis finding that the increase has occurred at a similar rate among older Canadians (both male and female) as for any other age group (Bulloch, Williams, Lavorato, & Patten, 2016).

2.3.2 Problematic Alcohol Use

Binge drinking is a major health issue for Canadians aged 55 and older. Not only is this pattern of drinking in itself associated with harmful effects (such as an increased risk of falls), it is more strongly associated with alcohol use disorders in older adults.

In the general Canadian population, across all ages, both alcohol abuse and alcohol dependence are more prevalent in males than females.[1] The overall prevalence of past-year alcohol abuse is 2.2% (95% CI 1.7–2.7), with a prevalence of 3.4% (95% CI 2.6–4.2) in males and 1.1% (95% CI

[1] The CCHS-MH was conducted in 2012 and therefore uses definitions from the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders*, or DSM-IV (American Psychiatric Association, 2000), rather than DSM-5 (American Psychiatric Association, 2013). The DSM-IV terminology includes "alcohol abuse" and "alcohol dependence" whereas DSM-5 includes mild, moderate and severe "substance use disorders." While the less-stigmatizing term "problematic alcohol use" is used elsewhere in this report, this chapter uses "alcohol abuse" because it was a specific clinical diagnosis at the time the data were collected. The DSM-5 definition of "mild substance use disorder" roughly aligns with the DSM-IV definition of "alcohol abuse."

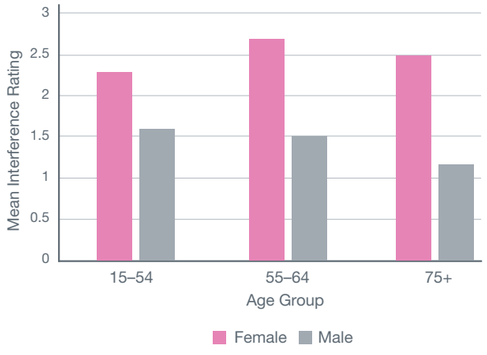
0.6–1.6)[M] in females.[2] The overall prevalence of past-year alcohol dependence is 0.9% (95% CI 0.6–1.4)[M].

Due to the similarity of the age- and sex-specific patterns, the two categories (abuse and dependence) are presented here under a single label: alcohol use disorders.

Alcohol-related Interference in Daily Life

The CCHS-MH asks respondents whether they have encountered problems due to their drinking in their home responsibilities, school attendance, ability to work at a job, and ability to form and maintain close relationships and social life. As shown in Figure 3, Statistics Canada derived an "interference rating" representing the average value of the relevant ratings for each respondent.

Figure 3. Mean interference ratings, by sex and age group



Although the interference ratings do not show the same age or sex differences evident in the prevalence data, it is notable that females report higher alcohol-related interference in their daily lives than males. Also, the mean level of interference does not decline very much with increasing age. This finding reinforces a theme repeatedly seen in these data sources: while the prevalence of problematic patterns of substance use tends to be lower in older adults (and particularly in females), the severity or impact of such use is not necessarily lower when compared to the younger age groups.

Relationship Between Binge Drinking and Alcohol Use Disorder

While the CCHS-MH also assesses binge drinking, its definition of the term is simply five or more drinks on any one occasion (i.e., the lower threshold of four or more drinks for females is not applied as it is in the CTADS). By this definition, the frequency of binge drinking across all age groups in Canada is 20.9%, slightly lower than the 22.1% reported by the CTADS. The inclusion of binge drinking in the CCHS-MH allows for an examination of the relationship of binge drinking to alcohol use disorders in different age groups. This distinction is important because, by definition, alcohol use disorders refer to pathological patterns of alcohol use (e.g., loss of control over use) associated with substantial distress, dysfunction or danger to health (American Psychiatric Association, 2013).

Questions often arise concerning the extent to which binge drinking is indicative of psychopathology. For example, while occasional binge drinking is associated with certain risks (e.g., violence, accidents), it does not always indicate the occurrence of substance use disorder. Consistent with this idea, only 7.6% (95% CI 6.3–8.9) of the total CCHS-MH sample reporting at least one episode of past year binge-drinking qualifies for an alcohol use disorder. Among older adults, this frequency is even lower at 4.7% (95% CI 2.0–7.2)[M].

Still, the association of binge drinking with alcohol use disorders is strong irrespective of age. In the 15–24 age group, the weighted odds ratio for the association of alcohol use disorders with at least monthly binge drinking is 19.6, meaning that the odds of an alcohol use disorder being present are nearly 20 times higher than that of non-binge drinkers. This association gets even stronger with age. In the 55–64 age group, the odds ratio is 24.3 and in the 65 and older age group it is 64.3. While binge drinking declines with age, the seriousness of its associated problems does not.

[2] Because the CCHS-MH and CTADS are conducted using random samples, it is possible that repeating the survey with another random sample would lead to different results. While the degree of such random variation is small, it can increase when estimates are made for subgroups of the population, such as the 55 and older age group, meaning some precision might be lost. Statistics Canada provides measures of variability (called "coefficients of variation") that can be used to quantify an estimate's vulnerability to random error. Estimates presented here with a superscript "M" indicate the need for caution in their interpretation due to their coefficients of variation.

2.4 Prescription Drugs

The CTADS addresses three categories of prescription drug use: pain relievers, stimulants and sedatives. The pain reliever category focuses on opiates, the type of drug of main concern. However, as some opiates (e.g., heroin) are not available by prescription in Canada, these are discussed in the subsequent section on "other illicit drugs." For similar reasons, some stimulants (e.g., cocaine) are also discussed in that section.

2.4.1 Pain Relievers

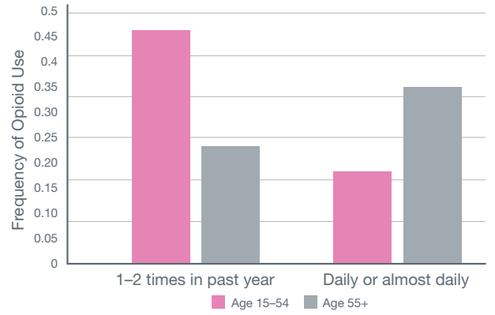
When the CTADS asks about prescription use of pain relievers, it specifically refers to products that contain opioids such as codeine, morphine or related drugs (i.e., not regular Tylenol®, Advil®, aspirin, etc.). While most of these products require a prescription, some codeine products are available over the counter. Among all respondents, the weighted frequency of those who have ever used such pain relievers is 42.6% (95% CI 40.7–44.5). Among those in the 55 and older age group, 43.9% (95% CI 40.8–47.0) have used pain relievers, similar to the 41.8% (95% CI 39.8–43.8) reported in the 15–54 age group. The frequency of use is not appreciably higher in males (43.1%) than females (42.1%).

In the context of the current opioid epidemic and its related regulatory changes, it is important to assess the lifetime exposure to preparations containing oxycodone. Consequently, the CTADS asks about past-year use of these preparations. Among the overall population, the frequency of reported use of oxycodone-containing preparations is 2.3% (95% CI 1.7–2.9). The frequency of use is nearly identical for the 15–54 year range (2.4%; 95% CI 1.7–3.0) as it is for the 55 and older age range (2.1%; 95% CI 1.2–2.9)[M] and also when comparing males (2.4%) and females (2.2%).

In examining the frequency of opiate use among people who use them, a bimodal distribution pattern emerges (as illustrated in Figure 4), with peaks at either end of the frequency scale: minimal use (i.e., one to two times in past year) and daily or almost daily use. Interestingly, the modal (most frequent) value differed by age group. While minimal use of opiates is the modal pattern in the 15–54 age group, daily or near-daily use is the most frequent pattern in the 55 and older age group — even with post-surgical use of opiates excluded from the analysis.

To provide context for the very high frequency of daily or near daily use (35.7%; 95% CI 25.1–46.4)[M] among older adults reporting opiate use, it is helpful to consider that the overall prevalence of daily or nearly daily opiate use in the entire older adult population is only 1.1% (95% CI 0.6–1.5)[M].

Figure 4. Frequency of opiate use (among those reporting use), by age group



Note: Intermediate categories (e.g., monthly) are included in the denominators of the reported proportions but are not reported separately due to large coefficients of variation.

2.4.2 Sedatives

Although the term "sedative" has referred traditionally to benzodiazepines and related "z-drugs" such as zopiclone, it now encompasses many different medications that have sedative effects, including those designed to help people sleep, calm down or relax their muscles. The CTADS asks about the use of various sedatives or anti-anxiety medications, specifically mentioning products that can be obtained from a doctor such as diazepam, lorazepam, alprazolam and clonazepam.

The pattern of past-year use of these substances in the general population differs from other drug classes: prevalence of use is higher in females (13.5%; 95% CI 11.9–15.1) than males (7.3%; 95% CI 6.0–8.6), and higher in older adults (14.6%; 95% CI 12.5–16.6) than younger adults (8.3%; 95% CI 7.1–9.5). The prevalence of use in older females is especially high at 18.7% (95% CI 15.6–21.8), approximately twice that of older males (10.0%; 95% CI 7.2–12.8)[M]. About half of the older adults taking sedatives do so on a daily or almost daily basis, amounting to 7.7% of the older adult population (95% CI 6.1–9.2).

2.4.3 Stimulants

The CTADS also collects data on stimulant use, asking respondents about their use of products such as Ritalin®, Concerta®, Adderal® and Dexedrine® that are prescribed by doctors to help with attention or concentration problems.

Approximately 1.1% (95% CI 0.7–1.4)[M] of the Canadian population has used stimulants in the past year. The frequency of use is much higher in younger age groups, with the highest frequency occurring in the 15–24 age range (4.5%; 95% CI 2.7–6.3)[M]. The frequency of stimulant use in older adults is very small: about 0.2% but ultimately too low to support an adequately precise estimation.

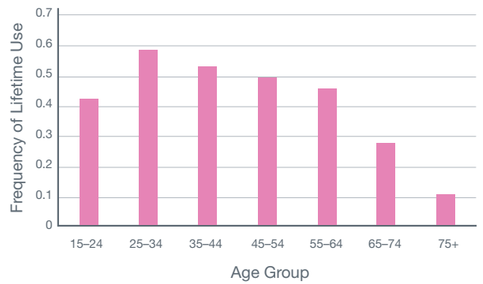
2.5 Cannabis

Epidemiological information about cannabis use is available from both the CCHS-MH, which assesses cannabis use disorders (subdivided into the categories of abuse and dependence), and the CTADS, which measures the frequency and quantity of cannabis use.

In the CTADS, respondents are asked about lifetime use of marijuana (specifically, marijuana, hashish, hash oil or any other preparation of the cannabis plant), as well as use on more than one occasion and use within the past 12 months. Despite the commonly held opinion that cannabis use is everywhere, only 44.5% (95% CI 42.9–46.1) of respondents have used cannabis at some point during their lives. Among males, a slight majority report lifetime use (52.0%; 95% CI 49.4–54.5) compared to 37.2% (95% CI 34.9–39.5) for females. Approximately one-third of older adults (32.6%; 95% CI 29.7–35.5) have used cannabis while more than half of those in the 15–54 age range (50.9%; 95% CI 48.8–53.0) report using it.

As shown in Figure 5, this pattern of lifetime cannabis use is suggestive of a cohort effect, with younger generations of Canadians having a higher probability of exposure to cannabis. If there was no cohort effect (i.e., if the probability of using cannabis remained stable over time), older respondents would likely report similar rates of lifetime exposure to those in the younger ager groups. However, it appears that respondents born before 1980 were less likely to be exposed to cannabis than those born later. This cohort effect could predict an increase in cannabis-related issues among older Canadians as the more recent birth cohorts enter the 55 and older age group.

Figure 5. Lifetime cannabis use, by age group



Note: The estimate for the 75 and older age group should be interpreted with caution due to a marginal coefficient of variation.

Among respondents reporting lifetime use, 84.1% have used cannabis multiple times, with similar frequencies found in males (86.4%) and females (81.1%), as well as in the 15–54 (85.8%) and 55 and older (79.3%) age groups. About one-third (33.5%) of those who have ever used cannabis did so within the past year, which translates to 12.1% (95% CI 10.9–13.3) of the general population. Overall, 14.7% of males and 9.6% of females have used cannabis within the past year. The frequency of past-year use is higher among 15–54 year olds (16.8%; 95% CI 15.2–18.4) than in the older adult age group (3.5%; 95% CI 2.4–4.6).

In the CTADS, respondents who report the use of cannabis are asked whether they consider their use to be medicinal. Despite having more issues for which medical cannabis is likely to be used (e.g., chronic pain), the frequency of self-reported medical cannabis use is not higher among older adults. Overall, only 7.7% (95% CI 5.8–9.6) of respondents use cannabis for medical purposes. The frequency of medical cannabis use is nearly twice as high in the 15–54 age group (8.6%; 95% CI 6.8–10.3) than in the 55 and older age group (4.95%; 95% CI 2.5–7.4)[M].

2.5.1 Cannabis Use Disorders

In addition to using cannabis less frequently, older Canadians have a lower prevalence of cannabis use disorders. In the overall population, the lifetime prevalence of cannabis use disorders (as assessed by the CCHS-MH) is 6.8% (95% CI 6.0–7.6), with higher lifetime prevalence found in males (9.9%) than in females (3.9%). When looking across age groups, lifetime prevalence is higher in the 15–54 age range (8.9%; 95% CI 7.8–10.0) than in the 55 and older age group (2.6%; 95% CI 1.6–3.5)[M].

As these estimates are for lifetime prevalence, the apparent effect of age could again represent a cohort effect. It does not necessarily mean that these problems decline with age, but rather that those currently afflicted with a cannabis use disorder tend to have been born more recently. As these individuals age, the prevalence of cannabis use disorders in older adults is likely to increase. Although it was not possible to estimate the prevalence of past-year cannabis use disorder in the older adult age group, among the overall population, past-year prevalence is 1.3% (95% CI 0.9–1.7), which is decidedly lower than the lifetime prevalence of 6.8% — suggesting that a large proportion of people recover from their disorder.

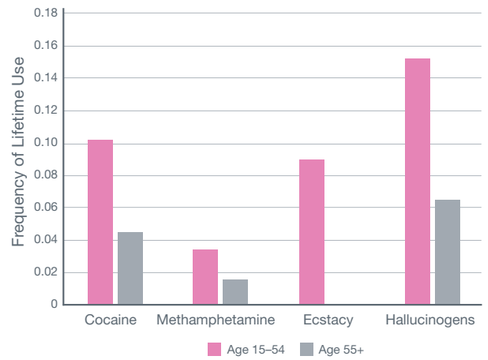
Another possible explanation for declining lifetime prevalence with age is recall bias. If people forget or for other reasons do not report cannabis use from earlier in their life as they get older, declining lifetime prevalence estimates could occur. As a way of exploring this issue, lifetime prevalence of alcohol dependence was assessed to see if the same appearance of a cohort effect was evident. In this analysis, the lifetime prevalence of alcohol dependence was higher in the 15–54 age group (3.4%; 95% CI 2.6–4.2) than in the 55 and older age group (2.2%; 95% CI 1.3–3.1), suggesting possible recall bias. However, the observed difference does not occur to the same extent as is seen with cannabis.

2.6 Other Illicit Drugs

Because respondents might be unwilling to disclose information about illegal activities, it can be difficult for surveys like the CTADS and CCHS-MH to collect accurate data on the use of illicit substances such as cocaine, ecstasy and methamphetamine.

In most cases, the frequencies of recent use (i.e., past 12 months) reported by the CTADS are too low to produce age-stratified estimates; however, it is possible to estimate lifetime use of several drugs and groups of drugs. As shown in Figure 6, the frequency of use of many illicit drugs is lower in older adults relative to younger adults. The pattern of higher frequency of exposure in the younger age group suggests a possible cohort effect, indicating a potential increase in illicit drug use in future generations of older Canadians.

Figure 6. Lifetime use of selected drugs, by age group



Note: The methamphetamine estimate for the 55 and older age group should be interpreted with caution due to a marginal coefficient of variation. The ecstasy estimate for the 55 and older age group cannot be reported due to the very high coefficient of variation.

The CCHS-MH provides estimates of the prevalence of drug abuse and dependence for drugs other than alcohol and cannabis. Defined in this way, the lifetime prevalence of drug abuse or dependence is 4.0% (95% CI 3.3–4.7) in the overall Canadian population. As expected, prevalence is higher in males (5.1%) than females (3.0%). Lifetime prevalence is also higher in the 15–54 age group (4.9%; 95% CI 4.0–5.8) than in the 55 and older age group (2.1%; 95% CI 1.3–2.9), a pattern consistent with a cohort effect but for which recall bias is another possible explanation.

2.7 Limitations of the Analysis

As mentioned earlier, this analysis is based on data from Statistics Canada PUMFs. Determination of the standard errors associated with estimates arising from these files is difficult, requiring the use of approximate coefficients of variation. More accurate variance estimation would be possible using master file data. Access to the master files would also support more elaborate analyses, such as the ability to make statistical adjustments using multivariable analysis.

This analysis is also limited by its reliance on a small number of cross-sectional data sources, collected within a few years of each other. Pooling estimates from many

different surveys would allow for an assessment of trends over time. For example, while the lower rates of lifetime exposure reported in older adults suggest a possible cohort effect, serial cross-sectional estimates would be needed to differentiate between age and cohort effects (Keyes, Utz, Robinson, & Li, 2010). Longitudinal data with repeated measures would also help address the potential issue of recall bias among older adults.

The available data sources also have inherent limitations. For example, the CTADS asks about "sedatives," which is a much broader and non-specific class of medications than just benzodiazepines. It might also include over-the-counter preparations such as antihistamines that are marketed for their sleep-inducing properties, for example. For many years, the frequency of use of benzodiazepines (and related z-drugs) in the general Canadian population was about 3% (Kassam & Patten, 2006). While this frequency of use appears to have decreased in recent years (Patten et al., 2016), any diminishment of benzodiazepine use may have been offset by an increase in the use of sedating, second-generation antipsychotics during this same period. Unfortunately, it was not possible to delve deeper into this issue using the available data sources.

Finally, it is difficult to compare these data to international data because available reports use different age classifications. A recent report summarizing findings from the 2015 U.S. National Survey on Drug Use and Health (Bose et al., 2016) used 26 and older as its oldest age group. Similarly, estimates for older adults are inconspicuous in the 2016 European Drug Report (European Monitoring Centre for Drugs and Drug Addiction, 2016). More than anything else, this illustrates that older adults have sometimes been neglected in surveillance activities.

2.8 Conclusion

Substance use is an important issue for older Canadians. While the prevalence of substance use is generally lower in older adults than in the 15–54 age group, it is still quite high. More notably, patterns of substance use are often more pronounced and problematic in older adults. For example, indicators of nicotine dependence are more prominent among older adults who smoke. Also, daily drinking or drinking that exceeds the low-risk drinking guidelines both peak in the 55 and older age group. These findings have important implications for understanding the effects of alcohol on the aging brain (explored in Chapter 3) and the consequences of substance use in older adults (explored in Chapter 4).

Even though self-reported use of other substances (such as cannabis and cocaine) tends to be lower in the 55 and older age category, this pattern could be indicative of a cohort effect, where younger Canadians have had greater exposure to some of these drugs — meaning increasing prevalence of use in older adults will likely be seen in the decades to come as the younger cohort ages.

The possibility of a cohort effect is particularly important as it relates to the legalization of cannabis. While the current data suggest a possible cohort effect, a period effect might also occur. A period effect occurs when an event (in this case, cannabis legalization) affects people of all ages when it occurs; in contrast, a cohort effect affects just one particular generation, with the effect moving from one age group to the next as that generation grows older.

Canada is fortunate to routinely conduct surveys like the CTADS and CCHS-MS that contributed data to this analysis. However, these surveys are designed for surveillance, using only a brief telephone or face-to-face interview for data collection. They also do not specifically focus on older adults. The ongoing Canadian Longitudinal Study on Aging will be a valuable source of information for more deeply exploring the causes and consequences of substance use in older adults.

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03

CHAPTER

The Aging Brain and Substance Use

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CHAPTER AT A GLANCE

- Aging is associated with cognitive and functional changes that can make the brain more vulnerable to the effects of drugs.
- With aging, the brain experiences changes that force it to compensate for functional declines or disease states. Substance use can jeopardize these compensatory changes, making the brain more vulnerable to declines or disease.
- Many neurotransmitter systems change with age, which can alter how a drug acts on the brain — and reduce the ability of older adults to adapt to the physiological effects of drugs.
- Age-related changes can affect drug absorption, distribution, metabolism and excretion. Declining kidney function and reduced liver performance among older adults have the greatest impact on the ability to eliminate drugs from one's body.
- Older adults tend to have more physical illnesses and be prescribed more medications. Exposed to more drug combinations and with less capacity to avoid the adverse effects of substance use, older adults are at increased risk for potentially harmful drug–drug interactions.
- Substance use among older adults puts additional stress on vulnerable body systems and reduces the ability to deal with the consequences of the aging process.

Case examples of drug interactions in older adults

Example 1: If an individual takes stimulants (whether prescribed or illicit) or the opiate methadone, and is also prescribed citalopram for depression or anxiety disorder, they will be exposed to two drugs that prolong QT interval (a measure of the heart's electrical cycle), which is associated with increased risk of cardiac arrhythmias. Because the metabolic activity of the liver enzyme CYP2C19 declines with age, it will lead to a progressively greater plasma concentration of citalopram for any given dose. It is plausible that there could be an additional pharmacokinetic component to this pharmacodynamic interaction.

Example 2: The antiemetic agent Gravol® (dimenhydrinate), which is prone to problematic use due to its deliriant effects, has anticholinergic properties because it is an antagonist of muscarinic cholinergic receptors. It therefore has the potential to have a negative impact on cognition in tandem with the natural loss of anticholinergic function that comes with aging — especially if an individual is taking other drugs that also have anticholinergic effects. These include many drugs commonly taken by older adults such as drugs for incontinence (e.g., tolterodine), several antipsychotic medications (e.g., olanzapine) and some older antidepressants (e.g., imipramine, amitriptyline, paroxetine).

Example 3: Older adults who are taking drugs associated with postural hypotension, such as alpha-adrenergic blockers (e.g., prazosin) and tricyclic antidepressants, may be at increased risk of experiencing side effects due to the age-related weakening of the baroreceptor reflex as well as a progressive failure of a homeostatic mechanism. Use of opiates such as morphine can worsen this problem because some of these drugs are also associated with postural hypotension.

3.1 Introduction

With more than 600 million people around the world currently aged 65 or older — and more than twice this number of older adults expected by 2050 (He, Goodkind, & Kowal, 2016) — a deeper knowledge of how the aging process changes the brain is critical to building a better understanding of the impact external factors such as substance use can have on the health of older adults.

3.2 Impact of Aging on the Brain

3.2.1 Age-related Changes in Brain Function

Cognitive Function

As healthy adults grow older, some cognitive functions gradually decline while others remain stable or improve over time. Vocabulary and verbal skills, for example, tend to remain stable into the eighth decade of life (Hedden & Gabrieli, 2004; Wisdom, Mignogna, & Collins, 2012) and, in some studies, have even been shown to improve with age (Park & Reuter-Lorenz, 2009; Singh-Manoux et al., 2012). Substance use can affect these functions: studies assessing the impact of drugs on language found that alcohol and stimulants improve verbal flow (Higgins & Stitzer, 1988, 1989), while other drugs, such as ketamine, impair language and can cause a disordered thought process (Adler, Goldberg, Malholtra, Pickar, & Breier, 1998; Adler et al., 1999).

In contrast to vocabulary and verbal skills, perceptual speed, reasoning and memory all tend to decline as a person grows older, beginning as early as 20 years old (Hedden & Gabrieli, 2004; Wisdom et al., 2012; Salthouse, 2010). Such declines can have significant implications on the impact of drugs on processing speed, which is a fundamental cognitive process that affects performance in almost all other domains. Cannabis use, for example, is associated with impaired processing speed, though not during the acute intake phase (Kelleher, Stough, Sergejew, & Rolfe, 2004).

Attention and Memory

Complex attention processes such as selective and divided attention also decline with age (Carlson, Hasher, Connelly, & Zacks, 1995; Salthouse, Fristoe, Lineweaver, & Coon, 1995). Selective attention is critical to a person's ability to focus on a task in the presence of noise or other distractors; divided attention allows a person to multitask. Drugs such as amphetamine, cocaine and nicotine have been shown to enhance attention in the short term (Mattay et al., 1996; Del Olmo, Higuera-Matas, Miguens, Garcia-Lecumberri, & Ambrosio, 2007; Kenney & Gould, 2008). This acute improvement in attention raises the question as to whether the aging process makes older adults more susceptible to becoming physically dependent on these drugs due to their enhanced effects on cognitive function. Not all drugs provide such improvement, however; chronic exposure to alcohol, amphetamine and cannabis tends to be associated with deficits in complex forms of attention (Moriyama, Muramatsu, Kato, Mimura, & Kashima, 2006; Dalley et al., 2005; Pope, Gruber, & Yurgelun-Todd, 2001).

Another cognitive function that declines with age is working memory (Salthouse, Mitchell, Skovronek, & Babcock, 1989), which is the ability to store and manipulate information in the short term (Baddeley, 1996). There is also evidence to suggest that working memory is negatively affected by chronic exposure to alcohol (Moriyama et al., 2006) and nicotine (Kenney & Gould, 2008).

Declarative memory (i.e., the conscious ability to recall specific facts or events) can be subdivided into two categories:

- Episodic memory, which is the ability to recall specific events experienced over the course of one's life; and
- Semantic memory, which is the ability to recall facts and knowledge obtained over the course of one's life.

While older adults experience a gradual decline in both episodic and semantic memory, the decline in semantic memory occurs much later in life (Ronnlund, Nyberg, Backman, & Nilsson, 2005). The decline of both episodic and semantic memories can be exacerbated by any drug that impairs declarative memory (Blagrove et al., 2011). Cocaine and ecstasy, for example, impair declarative memory by interfering with the ability to store and recall memories (Tronson & Taylor, 2013).

In contrast to the declines seen in declarative memory, procedural memory tends to remain stable as adults age. Procedural memory refers to the memory of performing certain tasks (e.g., riding a bicycle, buttoning up a shirt) that do not require conscious recollection but are instead recalled and carried out subconsciously. Despite these memories remaining stable over time, there is evidence to suggest drugs such as cocaine and ecstasy negatively affect procedural memories (van Gorp et al., 1999; Blagrove et al., 2011). Chronic use of such drugs could deprive older adults of the stability of procedural memory in later life.

Executive Function

Aging is also associated with declines in executive functions, which include abilities for abstract thinking, planning, shifting tasks, reasoning, impulse control and problem solving (Fuster, 2009). Declines in executive function cause older adults to become more cognitively rigid (Oosterman et al., 2010) and also contribute to a deficit in inductive reasoning (Singh-Manoux et al., 2012). Several drugs have been shown to have a negative impact on executive functions, including cannabis, cocaine and opioids (Pope et al., 2001; Kelley, Yeager, Pepper, & Beversdorf, 2005; Lyvers & Yakimoff, 2003). The effects of these drugs could exacerbate age-related declines in executive functions.

3.2.2 Age-related Changes in Brain Structure

In parallel with the changes made to the brain's functions, the aging process is also associated with structural changes in the brain that are thought to mediate the functional changes observed in the later stages of life.

Grey Matter

One of the most apparent age-related structural changes is the decline of grey matter in the older adult brain. While neuronal death could contribute to reductions in grey matter, these reductions are likely the result of reductions in synaptic densities (Terry & Katzman, 2001; Uttara, Singh, Zamboni, & Mahajan, 2009). In the healthy aging brain, reductions in grey matter are observed early on in the prefrontal cortex (West, 1996); in contrast, people with Alzheimer's disease show early reductions in grey matter in the entorhinal cortex (Raz, 2000; Terry, 2000; Resnick, Pham, Kraut, Zonderman, & Davatzikos, 2003; Raz, Rodrigue, Head, Kennedy, & Acker, 2004).

What are grey and white matter?

Grey matter is a major component of the central nervous system. It is composed of neuronal cell bodies and synapses. Grey matter has a very light grey colour, which comes from capillary blood vessels and neuronal cell bodies.

The other major component of the central nervous system, white matter is composed mostly of myelinated axons. White matter is named for its light appearance, the result of the fatty myelin sheathe that insulates the electrical communication between neurons.

The susceptibility of the prefrontal cortex to age-related structural changes results in changes in the frontostriatal system, which includes a decrease in dopaminergic,

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noradrenergic and serotonergic neurotransmission (Raz, 2000; Volkow et al., 2000). These three neurochemical systems are central to the mechanisms of action of several substances, both medicinal and recreational. Substance use in older adults can modify these neurotransmitter systems, exacerbating the structural changes that occur as a consequence of aging. For example, chronic cannabis use has been associated with reductions in bilateral orbitofrontal gyri volumes (i.e., a symmetrical size reduction in the orbitofrontal cortex; Filbey et al., 2014). In another study, decreases in grey matter volumes were observed in women who were previously dependent on stimulants (cocaine, amphetamines or methamphetamine) even after being abstinent for an average of more than one year (Regner et al., 2015).

White Matter

Aging is associated not only with decreases in grey matter volume but also with changes in white matter integrity and connectivity. While white matter disruption in the aging brain occurs in nearly every cortical region, it is most prominent in the prefrontal cortex and corpus callosum (Head et al., 2004). Some of the changes in white matter integrity and connectivity have been associated with age-related declines in executive function (O'Sullivan et al., 2001). For example, decreases in white matter integrity have been observed in the brain structures related to memory formation, such as the para-hippocampal region, with such decreases associated with a decline in memory (Rogalski et al., 2012). Other studies have observed disruptions in white matter integrity in individuals who use drugs such as alcohol, cannabis and heroin (Jacobus et al. 2013; Liu et al., 2008). These disruptions occur in the frontolimbic system of the brain, the same system that is susceptible to aging.

3.2.3 Age-related Changes to Compensatory Processes

Although the brain experiences a number of declines as it ages, evidence has shown that the prefrontal cortex plays a compensatory role in response to age-related memory declines (Gutchess et al., 2005; Davis, Dennis, Daselaar, Fleck, & Cabeza, 2008; Rosano et al., 2012). In a healthy adult, the frontal lobes are part of the frontostriatal axis that is affected by the typical aging process; in contrast, it is the temporoparietal axis that is affected in disease states such as Alzheimer's disease (Buckner, 2004; Head, Snyder, Girton, Morris, & Buckner, 2005; Fjell et al., 2014). Patients with mild cognitive impairment — a clinical state that typically precedes Alzheimer's disease — who have high prefrontal cortical function continue to perform well on measures of episodic memory. Their strong performance is associated with prefrontal cortical thickness rather than temporal lobe thickness (Chang et al., 2010), suggesting that the frontostriatal axis has beneficial effects on memory-related tasks. Furthermore, prefrontal cortical function in patients with mild cognitive impairment is a predictor of their progression to Alzheimer's disease (Gomar et al., 2011). Patients with Alzheimer's disease have cerebral blood-flow deficits in the temporal and parietal lobes during the early stages of the disease; these deficits are seen only in the frontal lobes during the later stages of the disease (Jagust, Budinger, & Reed, 1987; Rapoport, 1991; Brown et al., 1996; Jagust, Eberling, Reed, Mathis, & Budinger, 1997).

There is also evidence for the engagement of the prefrontal cortex to compensate for the effects of cognitive aging. Among healthy older adults, the prefrontal cortex shows overactivation on one side of the brain (i.e., a loss of symmetrical activity) in response to a cognitive task (Cabeza, 2002; Reuter-Lorenz & Cappell, 2008; Cappell, Gmeindl, & Reuter-Lorenz, 2010; Schneider-Garces et al., 2010; Tyler et al., 2010). Cognitive training in older adults can result in structural changes in the frontal lobes, increasing their potential to compensate for cognitive decline (Anguera et al., 2013). The ability of the frontal lobe to change and adapt has also been demonstrated in a study where the frontal cortices of older adults were electrically stimulated through artificial means and the stimulation normalized the pattern of brain activity to what is typically observed among younger adults (Meinzer, Lindenberg, Antonenko, Flaisch, & Floel, 2013). Finally, the ability of the frontal cortices to compensate is supported by the fact that with aging there is mostly dendritic (but not neuronal) loss in the frontal lobes (Bennett et al., 2006).

The prefrontal cortex's ability to compensate, along with other mechanisms of compensation, could delay the manifestation of Alzheimer's disease among highly educated individuals, despite the high levels of neurodegeneration taking place within their brains (Stern, 2002; Brickman et al., 2008; Rentz et al., 2010; Jagust & Mormino, 2011; Brickman et al., 2012; Stern 2012). If substance use exacerbates declines in prefrontal cortical function, it is likely that substance use will accelerate cognitive decline in older adults and advance progression to Alzheimer's disease among high-risk individuals.

3.3 Impact of Aging on Pharmacodynamics

Aging is directly associated with changes in pharmacodynamics (the actions drugs have on the body) and pharmacokinetics (the actions of the body on drugs). However, much of the complexity in determining the consequences of substance use in older adults comes from two further consequences of advancing age.

First, older adults might have less capacity to deal with change beyond the expected age-related pharmacodynamic and pharmacokinetic changes, which involve multiple organs and bodily systems (Klotz, 2009). This loss of capacity to deal with change is in part because of the aging process and partly due to the greater likelihood of illness and disease. Second, older adults are, in general, prescribed more medications than their younger counterparts, increasing the risk of harmful drug–drug interactions (Davies, Eayrs, Pratt, & Lennard, 2004; Kennerfalk, Ruigómez, Wallander, Wilhelmsen, & Johansson, 2002; Pizzuti, Caffari, Binkin, & Gruppo Argento, 2006). In the United States, for example, persons over the age of 65 account for 13% of the population but receive approximately one-third of all drug prescriptions (Avorn, 1995).

3.3.1 Age-related Changes to Neurotransmitter Systems

Pharmacodynamic changes influence the relationship between the concentration of drugs circulating in the body and the behavioural responses caused by those drugs (Bowie & Slattum, 2007). Drug pharmacodynamics can be altered through age-related changes in the function of neurotransmitter systems, such as the number of available receptors and the receptors' affinity to neurotransmitters (Singh & Bajorek, 2015; Bowie & Slattum, 2007). Age-related pharmacodynamic changes can also be mediated by allied hormonal systems and homeostatic mechanisms. These age-related changes affect many neurotransmitter systems, including monoamine (e.g., dopamine, noradrenaline, serotonin) neurotransmitters and the cholinergic system (Rehman & Massoon, 2001).

Monoamine Neurotransmitters
The dopaminergic system shows pronounced changes with aging, most notably in the tuberoinfundibular pathway, which is one of the four major dopamine pathways in the brain. Age-related declines in dopamine D2 receptors have also been reported in other brain regions, including the caudate, putamen, substantia nigra and globus pallidus (Morgan, May, & Finch, 1987). Because dopamine neurotransmission in these regions controls physical movement, the age-related declines in dopamine receptors might explain the increased sensitivity of older adults to drug-induced movement disorders. Such disorders are common with conventional antipsychotic agents that act specifically on the dopamine system.

Important age-related changes have also been observed in the noradrenaline system, with evidence showing age-related reduction of neuronal density in the locus coeruleus, the principal site for norepinephrine synthesis in the brain (De Kosky & Palmer, 1987).

Finally, several imaging studies have reported small age-related reductions in the availability of serotonin receptors, which help regulate mood and anxiety. These reductions were shown in the 5-HT1A receptors (Moller, Jakobsen, & Gjedde, 2007) and 5-HT2 receptors (Adams et al., 2004), although the ramifications of these age-related changes are not clear.

Cholinergic System
Aging is associated with decreased acetylcholine levels as well as a decreased number of acetylcholine receptors in the caudate, putamen, hippocampus and frontal cortex (Rinne, 1987). These changes cause older adults to become more sensitive to anticholinergic drugs (e.g., Benadryl®). As a result, drugs with anticholinergic activity are more likely to cause obvious deficits, such as cognitive impairment, in the older adult population.

GABA System
Many anxiolytic (anti-anxiety) and hypnotic drugs act on the gamma-aminobutyric acid (GABA) system by binding to the GABA-benzodiazepine receptor. (GABA is the primary inhibitory neurotransmitter in the brain and works to reduce neuronal excitability throughout the nervous system.) Traditional benzodiazepines, such as diazepam, alprazolam, lorazepam and clonazepam, produce their anxiolytic effects by activating the GABA system. The 1990s saw the introduction of a newer class of "z-drugs" (e.g., zopiclone, zaleplon, zolpidem) that produce a hypnotic effect through the activation of the GABA system. There are also some non-benzodiazepine anxiolytic drugs, such as pregabalin, buspirone and hydroxyzine, which work through non-GABA related systems to treat anxiety. Similarly, there are non-benzodiazepine drugs used to promote sleep, such as antihistamines and trazodone, which do not exert their effect through the GABA system.

The use of benzodiazepines can be risky for older adults. For example, older adults who take benzodiazepines are approximately 50% more likely to fracture a hip than those who do not (Cumming & Le Couteur, 2003). Alcohol, like benzodiazepines, acts primarily on the GABA system but has additional effects on other systems such as the dopamine system and N-methyl-D-aspartate (NMDA) receptors. The common mechanism of action between alcohol and benzodiazepines is important when considering drug–drug interactions and the synergistic effects of drugs that converge on the GABA system. Many of the harms associated with benzodiazepine use are worsened in the presence of alcohol because both drugs target the same receptors and neurotransmitter systems.

Many studies have shown that increased sensitivity to a specific drug (such as benzodiazepines) can be explained by pharmacokinetics. For example, Greenblatt and colleagues (1991) reported that increased sedation and impairment on psychomotor performance and memory were related to triazolam plasma concentrations, which are greater in older adults. However, a minority of studies have suggested that benzodiazepine sensitivity might be increased independently of pharmacokinetic factors. A study using alprazolam showed that the drug was maintained at a similar concentration in both young and older participants (Bertz et al., 1997), with this effect possibly explained by changes in GABA-benzodiazepine receptor density rather than alterations in the binding affinity of the GABA-benzodiazepine receptor.

Opioid System
The majority of pain relievers prone to problematic use act on the opioid system. Although there is little information in the literature on age-related changes in the functioning of the opioid system, such as alterations in receptor sensitivity or density, the pharmacodynamic effects in older adults are important. Older adults often receive prescription opioids to mediate pain. While pain relief is mediated through the activation of mu-opioid receptors in the central nervous system, opioid use inevitably activates mu-opioid receptors in the periphery. Activation of peripheral mu-opioid receptors, such as those in the gastro-intestinal system, leads to the commonly observed problem of constipation among older adults, with those aged 80 and older particularly vulnerable to this side effect (Chokhavatia, John, Bridgeman, & Dixit, 2016).

Cannabinoid System
Tetrahydrocannabinol, the main psychoactive component of cannabis, acts on a specific receptor system that has affinity for naturally occurring endocannabinoids. Evidence on the age-related pharmacodynamic changes occurring in the endocannabinoid system — and the potential risks of cannabis use in older adults — is sparse and further study is required. However, one area that has received attention is the effects of cannabis on memory impairment in younger populations (Ranganathan & D'Souza, 2006). These findings can be extrapolated to older adults with greater vulnerability to cognitive decline, suggesting that this population could be at a relatively greater risk of memory problems when using cannabis regularly.

Adenosine System
Caffeine, the primary stimulant in coffee, exerts its effects by antagonizing the adenosine receptor, leading to the release of monoamines and acetylcholine. There is limited evidence to suggest differences in the pharmacodynamic effects of caffeine between younger and older adults. However, differences such as a greater caffeine-induced rise in blood pressure and a greater impact on calcium metabolism have been noted in older adults (Massey, 1998).

3.3.2 Age-related Changes to the Neuroendocrine System

Many neuroendocrine changes have been described in older adults, including decreased levels of testosterone, aldosterone, growth hormone, thyroid stimulating hormone, oxytocin and melatonin (Rehman & Massoon, 2001). In contrast, reports suggest that luteinizing hormone, follicle-stimulating hormone and antidiuretic hormone show increased blood concentrations in older adults (Deslypere & Vermeulen, 1984).

3.3.3 Age-related Changes to Homeostatic Mechanisms

Important pharmacodynamic changes in older adults are linked to declines in homeostatic systems, which help control water balance, posture, circulatory responses and thermoregulation (Bigos, Bies, & Pollock, 2013). Changes to these systems might interfere with the ability to adapt to the physiological effects of medication. For example, aging is associated with a decrease in baroreceptor responsivity, meaning orthostatic hypotension (i.e., a drop in blood pressure when moving from sitting to standing) is more likely to occur when using medications such as prazosin and tricyclic antidepressants. The co-prescription of diuretics might also worsen orthostatic hypotension through a reduction of fluid volume.

Other examples of impairments in homeostatic mechanisms include a reduction in peripheral parasympathetic nervous system responses (e.g., the "rest-and-digest" response), which are dependent on acetylcholine and muscarinic cholinergic receptors; and an increased risk of syndrome of inappropriate antidiuretic hormone secretion when prescribed antidepressants.

In general, the failure of homeostatic mechanisms creates vulnerabilities that might be worsened by standard drug treatment as well as problematic substance use. For example, the increased risk of falls in older adults is multifactorial in origin, with some of the contributing factors including poor control of posture and orthostatic responses. There are associations with the use of prescribed medications, including most psychotropic drugs, that might be worsened by problematic use of substances such as benzodiazepines and alcohol.

3.4 Impact of Aging on Pharmacokinetics

In contrast to pharmacodynamics, pharmacokinetics describes the actions of the body on drugs. Once a drug gains access to the blood stream (the absorption process), it must travel to the intended site of action and elsewhere (the distribution process) and then be removed from the body (the elimination and excretion process). A minority of drugs are excreted directly by the renal system without being changed or modified. However, most drugs are first converted to more polar compounds (the metabolism process) before they can eventually be excreted in the form of metabolites.

3.4.1 Absorption Process

Aging is associated with a variety of pharmacokinetic changes. Some principally affect the absorption process, either by enhancing or limiting it. For example, the reduction in gastric motility and decrease in the available luminal surface that occurs with aging tends to reduce levels of drug absorption (Singh & Bajorek, 2015).

Some drugs, such as codeine, ionize in an acidic environment and will normally be present in the stomach in the ionized state. Age-related reductions in gastric acid secretion are associated with reduced codeine ionization, making the molecule more lipid-soluble and improving its absorption in the stomach. Furthermore, reduced first-pass metabolism — the process by which orally administered drugs get broken down in the liver before having any opportunity to influence other organs — means that some drugs, such as morphine, have greater bioavailability in older adults. At the same time, several studies have found that in healthy individuals the absorption of many drugs (such as lorazepam) is unchanged with age (Greenblatt et al., 1991).

3.4.2 Distribution Process

An increase in body fat often seen among older adults increases the volume of distribution and might increase the half-life of fat-soluble drugs (Klotz, Avant, Hoyumpa, Schenker, & Wilkinson, 1975). Furthermore, reductions in body water associated with aging increase the serum concentration of drugs such as ethanol and morphine. Other age-related changes include a reduction in serum albumin (the most common protein in human blood plasma), which increases the amount of highly protein-bound drugs.

3.4.3 Metabolism Process

The vast majority of prescription and non-prescription drugs require metabolic transformations before they can be excreted or eliminated. Metabolism consists of two phases: the alteration of functional groups, which most commonly occurs in the liver where cytochrome P450 (CYP) enzymes catalyze transformations such as oxidation or reduction; followed by the addition of functional groups (e.g., conjugation with sulphate or glucuronic acid). The first phase of metabolism is more susceptible to age-related changes than the second phase. For example, the first phase is reduced in the presence of liver disease or reductions in hepatic volume, which is observed in healthy aging, leading to greater plasma concentrations of drugs such as diazepam and alprazolam.

Many studies have reported that the activity of specific liver enzymes, such as CYP3A4 and CYP2D6, is largely unaffected by healthy aging. However, the rate of CYP3A4-mediated metabolism is dependent on hepatic blood flow, so reports that benzodiazepines metabolized by this enzyme are cleared more slowly in older adults could be attributable to the progressive decline in liver perfusion due to aging. The CYP2C19 enzyme, which is important in the metabolism of citalopram and escitalopram, appears to be susceptible to an age-related decline in functioning (Jin et al., 2010), with advancing age being associated with a reduced ability to metabolize both drugs.

What is cytochrome P450?

Cytochrome P450 (CYP) refers to a family of many distinct enzymes present in the liver and other sites (e.g., gut, brain) that are important in the metabolism of most drugs. CYP enzymes most commonly involved in drug metabolism include CYP2D6, CYP3A4, CYP1A2, CYP2C19, CYP2C9, CYP2B6 and CYP2E1.

Many pharmacokinetic drug interactions occur when one or more CYP enzymes is less able to metabolize drugs due to being inhibited (either through the presence of a drug competing for metabolism or a drug that shuts down enzyme activity), or metabolizes drugs more extensively than usual (through the presence of a drug that induces the activity of the enzyme).

For further details, refer to Davies & Nutt, 2007.

Overall, the effect of age-related changes on CYP-mediated metabolism is much smaller than that of co-prescribed medications, which can have profound effects on inhibiting the activity of a specific enzyme, or of known genetic polymorphisms, such as the impact of being a “poor” CYP2D6 metabolizer (Kirchheiner & Seeringer, 2010). Individuals with a poor metabolizer genotype with respect to CYP2D6 might have elevated plasma concentrations of drugs metabolized by this enzyme unless alternative metabolic pathways are available.

3.4.4 Excretion and Elimination Process

Regarding excretion, it is likely that the liver and kidneys will function sub-optimally with advancing age. In other words, aging is associated with hepatic or renal impairment, slowing the metabolism and excretion of drugs. (It should also be noted that a reduction in cardiac output, such as occurs in heart failure, will reduce blood flow to both the liver and the kidneys, slowing the elimination of drugs through both routes.)

Declining renal function is the most consistent finding of all pharmacokinetic changes directly associated with aging. A reduction in glomerular filtration rate, which is considered the best test to measure kidney function and determine stages of kidney disease, occurs each year over the age of 40 (Wildiers, Highley, de Bruijn, & van Oosterom, 2003). However, approximately one-third of older adults show no change in renal function up to age 89 (Lindeman, Tobin, & Shock, 1985). Reduced renal function is an especially important issue for drugs that are exclusively excreted renally, such as lithium, gabapentin and pregabalin. Depending on the extent of the renal impairment, consumption of these drugs requires adjustments to dosing.

Codeine and its active metabolite, morphine, rely substantially on renal excretion for elimination, making their use in patients with renal impairment problematic. Long-term use of morphine should not occur in people with moderate or severe renal failure due to the potential for metabolites to accumulate. While less than 20% of oxycodone is excreted renally, dose reductions can still be required in cases of renal impairment.

3.5 Impact of Pharmacokinetic Changes in the Metabolism of Drugs Prone to Problematic Use

3.5.1 Opioids

Several commonly prescribed antidepressants are inhibitors of liver enzymes that play a key role in the metabolism of drugs prone to problematic use. The selective serotonin reuptake inhibitors (SSRIs) paroxetine and fluoxetine, the selective norepinephrine reuptake inhibitor (SNRI) duloxetine and the dopaminergic antidepressant bupropion are all relatively strong inhibitors of the CYP2D6 liver enzyme, which metabolizes methadone and hydrocodone (Flockhart, 2016). When methadone or hydrocodone are used at the same time as SSRIs, SNRIs or dopaminergic antidepressants, their metabolism will likely be slowed, resulting in higher concentrations of the drug than expected. This deficit in metabolism is associated with increased potential for toxicity and adverse effects. Begre and colleagues (2002) described an interaction between methadone and paroxetine where the antidepressant caused an increase in the concentration of methadone plasma.

For some opioids, such as codeine and tramadol, metabolism by CYP2D6 to active analgesics (e.g., codeine to methadone and tramadol to o-desmethyltramadol) is essential for the intended therapeutic effects. A recent study reported that rates of falls within 28 days after initiating codeine or tramadol in people concurrently prescribed a CYP2D6 inhibitor occurred less frequently than in those who were not (Möller, Laflamme, & Söderberg Löfdal, 2015). In other words, the presence of a CYP2D6 inhibitor in these circumstances prevented the formation of the active analgesic and reduced the incidence of the associated side effects.

Several antidepressant drugs inhibit the CYP3A4 liver enzyme. Examples include fluoxetine (through its long-lasting active metabolite, norfluoxetine) and fluvoxamine (Nemeroff, DeVane, & Pollock, 1996). CYP3A4 is involved in the metabolism of more prescribed drugs than any other enzyme. Fentanyl, methadone, some of the benzodiazepines (including alprazolam, diazepam and triazolam), and the z-drugs zaleplon and zolpidem are all metabolized by CYP3A4. Higher blood concentrations of any of the above drugs can be expected when they are co-prescribed with a CYP3A4-inhibiting antidepressant, increasing the risk for adverse effects.

The case of the analgesic agent tramadol is of particular interest (Brown & Davies, 2016). Tramadol is a "pro-drug" in that its analgesic effect depends on it being converted by CYP2D6 to an active metabolite, O-desmethyltramadol. In the presence of a CYP2D6 inhibitor (such as paroxetine, fluoxetine or duloxetine) or in a person whose genetics determine they are a poor metabolizer of this enzyme, conversion can be blocked so that little or none of the metabolite is produced and little analgesic effect is achieved. In this circumstance, tramadol metabolism must rely on other pathways, including one dependent on CYP3A4.

Sometimes these pathways are also blocked — for example, a person taking the antibiotic erythromycin would have inhibition of the CYP3A4 enzyme — meaning the tramadol itself would be present at higher concentrations for longer periods. However, tramadol has some pro-serotonergic activity. When taken in combination with a serotonergic antidepressant, such as paroxetine or fluoxetine, there have been several reports of serotonin syndrome: a dangerous condition characterized by autonomic instability, tachycardia, diaphoresis and agitation that carries a risk of death.

3.5.2 Tobacco

Tobacco smoking is associated with a risk of drug interactions because it induces the CYP1A2 liver enzyme. That is, it causes an increased rate of metabolic activity through the production of greater quantities of the enzyme. While the impact of substances that inhibit specific liver enzymes on other substances can be limited, if the latter can be metabolized by an alternative enzyme, the effect of inducers can be more profound in that a sudden increase in metabolizing capacity can result in a marked reduction of co-prescribed drug concentration.

It is thought that CYP1A2 induction arises not from nicotine (Hukkanen, Jacob, Peng Dempsey, & Benowitz, 2012), but rather from the polyaromatic hydrocarbons released by smoking. Because several important drugs are metabolized by CYP1A2 (notably the antipsychotic drug clozapine), the onset of smoking is associated with increased metabolism and thereby a reduction in exposure to clozapine, potentially compromising the therapeutic effect. Conversely, if an individual who smokes cigarettes and takes clozapine is made to stop (e.g., on admission to a hospital where smoking is not permitted), the lost induction effect can be associated with an increase in clozapine plasma concentration and increased potential for side effects and toxicity.

Because caffeine is partially metabolized through CYP1A2, smoking cessation can, by the same mechanism, result in increased exposure to caffeine and increased likelihood of toxicity.

3.5.3 Cannabis

The enzymes CYP3A4 and CYP2C9 metabolize tetrahydrocannabinols (Watanabe, Yamaori, Funahashi, Kimura, & Yamamoto, 2008). Because the activity of CYP3A4 can be induced by several psychotropic drugs, including carbamazepine and St John's wort (Flockhart, 2016), it is possible that individuals using these drugs might have less response from a specific exposure to cannabis than would be expected in the absence of the inducer. However, the literature relating to clinical observations of CYP-based interactions with cannabis is not well developed.

3.5.4 Alcohol

CYP enzymes play only a minor role in the metabolism of some substances prone to problematic use. Alcohol dehydrogenase is the most important enzyme in the metabolism of ethanol, for example, with the CYP2E1 enzyme playing a role only if a large amount of alcohol has been consumed. Although it is not clear whether the activity of both enzymes declines with age in the absence of other changes, the usual age-related factors of reduced hepatic perfusion and reduced liver size apply to reduce the clearance of alcohol. A further issue is that alcohol dehydrogenase is known to be present in the gastric mucosa, where it effects a first-pass metabolism that reduces the exposure to alcohol of other organs. With aging, the alcohol dehydrogenase in the gastric mucosa is known to reduce markedly so that the extent of the protective first-pass metabolism is reduced (Meier & Seitz, 2008).

3.6 Conclusion

Aging is associated with changes in organ function and the failure of compensatory mechanisms, both at the level of the brain and its peripheral systems. In some cases, pharmacodynamic and pharmacokinetic changes associated directly with aging can increase the likelihood of harmful drug–drug interactions or toxicity. However, in many cases, these changes are of secondary importance compared to the increased burdens of physical illness and exposure to multiple prescribed medications, both of which are increasingly common in older adults.

Problematic drug use places additional stress on vulnerable systems and reduces the ability to deal with the consequences of the aging process. This increased stress and reduced ability can result in an increased risk of harms and consequences associated with substance use among older adults, which is discussed in the next chapter.

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Substance Use In Canada—Improving Quality of Life: Substance Use and Aging

04

CHAPTER

Consequences of Alcohol and Drug Use in Older Adults

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CHAPTER AT A GLANCE

- Changing physiology makes older adults more vulnerable to the physical effects of substances, resulting in significantly increased risk of adverse outcomes.
- The use of alcohol and medication, whether prescribed or misused, causes greater harm in older adults than illicit substances. Alcohol represents the greatest risk and range of harms among older adults.
- There is a strong association between substance use and falls, accidents, cognitive impairment, depression and suicide among older adults.
- Older adults are often hospitalized as a result of adverse events related to the use of opioids, alcohol and other substances. Mortality rates are significantly higher in older adults with substance use disorders.
- Older adults may experience social consequences of substance use, such as abuse, homelessness, family breakdown, crime and social isolation.

4.1 Introduction

Older adults represent a highly vulnerable population because of their high rates of frailty, comorbidities and diminished physiological reserves (Davies & O'Mahony, 2015). With substance use among older adults on the rise, Canada will likely see an increase in morbidity, including substance-related emergency department visits and hospitalizations — resulting in a significant burden on the country's healthcare system and social services. Some of the harmful consequences of substance use among the aging population include hospitalization, death, falls, accidents, acute and chronic cognitive impairment, depression, suicide and substance withdrawal. There are also the social consequences of substance use that need to be considered.

As an individual grows older, every major organ system undergoes physiologic change. As discussed in the previous chapter, the pharmacodynamic and pharmacokinetic changes to the nervous system, gastrointestinal system (especially the liver), respiratory system and renal system all result in diminished function, making older adults more vulnerable physiologically to the effects of substance use.

Aging is also associated with a high prevalence of physical and psychiatric comorbidities. A large study of primary care patients reported multimorbidity in 81.5% of those over age 85 (Barnett et al., 2012), with a Scottish study finding the most common conditions in multimorbid primary care patients over age 75 to be hypertension (61.9%), ischemic heart disease (31.2%) and pain (23.6%) (McLean et al., 2014). Other conditions reported included chronic renal disease, depression, diabetes, constipation, stroke, thyroid disease and hearing loss. Violan and colleagues (2014) carried out a systematic review of rates of multimorbidity in 39 primary care studies, all of which found a significant positive association between multimorbidity and age along with additional associations with lower socioeconomic status, female gender and mental disorders.

4.2 Hospitalization and Death

A recent study from Sweden examined "drug abuse"-associated mortality, finding that the mortality hazard ratio (i.e., the comparative risk of death) is 11.3 times higher for drug abusers than for those without a history of drug abuse — and substantially higher for non-medical than medical causes (Kendler et al., 2017). Concomitant smoking and alcohol use explains only a small proportion of the excess mortality associated with the specific drugs that were studied. The mortality hazard ratio is highest for individuals who use opiates, followed by individuals who use sedatives, cocaine/stimulants and cannabis. The authors note that excess mortality stems from both indirect and direct causes, with direct effects being strongest in middle to middle-late adult life. Another study by Kendler and colleagues (2016) focused on alcohol use disorder (AUD), finding a mortality hazard ratio of 5.83 and also noting the direct effect of AUD becomes progressively more important later in life and with longer duration of the disorder.

While the subsequent sections of this chapter focus on harms described broadly under the term "substance use," there are select substance-specific findings that stand out. Although these intersect with the harms categorized later in this report, it is a useful preface to highlight unique and prominent harms among older adults, especially in the context of hospitalization and mortality rates.

4.2.1 Alcohol

Given its accessibility and prevalence of use, alcohol represents the greatest risk and range of harms among older adults. An Australian report on alcohol- and drug-related harms in adults aged 65–74 identified liver cirrhosis and hemorrhagic stroke as the major causes of death among this age group (Chikritzhs & Pascal, 2005). Falls, supraventricular cardiac dysrhythmias and alcohol dependence are significant alcohol-related causes of hospitalization. A recent Canadian Institute for Health Information (2017) report found that peak rates of hospitalization caused entirely by alcohol are highest for men between the ages of 55 and 69 and for women between the ages of 45 and 59. According to the report, in 2015–2016, alcohol-caused hospitalizations exceeded hospitalizations caused by heart attacks in Canada.

Excessive drinking puts older adults at increased risk of coronary heart disease, hypertension and stroke (Substance Abuse and Mental Health Services Administration, 1998). There is also evidence of a causal association between alcohol consumption and a number of gastrointestinal cancers (including liver cancer) as well as breast cancer (Boffetta & Hashibe, 2006).

Older adults who chronically use alcohol problematically are more vulnerable to the development of alcoholic liver disease (ALD). Symptoms and signs of ALD and its complications in older adults are similar to those seen in patients of all ages (Seitz & Stickel, 2007). However, up to 79% of individuals with ALD who are 60 years and older suffer complications such as cirrhosis (Kim, Kisseleva, & Brenner, 2015). Of the older adults with alcoholic cirrhosis, 40% develop hepatitis, which has a related mortality rate of 15 to 25%. Additional consequences of cirrhosis include portal hypertension, ascites and esophageal varices, with or without upper gastrointestinal bleeding. As a result, half of older adult patients with cirrhosis die within one year of their diagnosis (Smith, 1995).

That said, in a 2013 study of the global burden of alcoholic liver disease, Rehm and colleagues (2013) reported that the overall impact of alcoholic liver cirrhosis is actually the greatest in the middle-aged group: 62.1% of all deaths from alcohol-attributable liver cirrhosis occurred among people aged 35–64 versus 33.0% among those 65 and older.

In the United Kingdom, an analysis of hospital admissions and deaths found that while older adults are less likely to exceed the recommended drinking guidelines, those who meet the definition of "moderate" drinking (weekly intake of 21 units for men and 14 for women) are more likely than younger adults to be admitted to hospital for an alcohol-related condition (Wadd & Papodopoulos, 2014). During that study's timespan (2002 to 2010), alcohol-related hospital admission rates increased the most among those between the ages of 55 and 74.

Although the National Institute on Alcohol Abuse and Alcoholism in the United States recommends that healthy people older than 65 consume no more than one drink per day, limits appropriate to age have not been established for older adults in most countries (National Institute on Alcohol Abuse and Alcoholism, n.d.). Such limits should be lower than those for younger people because of age-related changes in metabolism, advancing ill health and increased sensitivity to the effects of alcohol.

4.2.2 Opioids

In a study of older adults, opioids accounted for 9.2% of emergency department visits and hospitalizations related to adverse drug events, ranking third behind anti-coagulants and anti-neoplastic agents. More than 20% of these presentations resulted in hospitalizations (Bayoumi, Dolovich, Hutchison, & Holbrook, 2014).

In Canada, adults 65 and older had the highest opioid-related hospitalization rates in 2014–2015 (Canadian Institute for Health Information, 2016), with accidental poisonings, especially during therapeutic use, accounting for the highest proportion of hospitalizations (55%) in this population. Older adults accounted for nearly a quarter of all hospitalizations for opioid poisoning during this period, even though this age group represents only 16% of the Canadian population. A previous Canadian report noted a 142% increase between 2006 and 2011 in the number of days spent in the hospital due to opioid use disorders among older adults (Young & Jesseman, 2014).

Hospitalization and mortality related to opioid therapeutic use has been associated with increased comorbidity and age. Vision and memory problems can develop with age, increasing the risk of overconsumption of prescribed medications, especially for patients with complex medical regimens. Problematic opioid use — specifically, opioid use disorder (OUD) — can worsen outcomes in people with pre-existing medical conditions. A 2000–2011 study of older adults in the United States explored the impact of opioid use on older adult medical conditions with respect to mortality. During this period, adults aged 50 and older with OUD were more likely to die from any cause than younger adults with OUD. Furthermore, HIV- and liver-related deaths were higher among older people with OUD compared to same-age peers without OUD (Larney et al., 2015).

4.2.3 Benzodiazepines and Sedative-Hypnotics

Among older adults, the use of benzodiazepines and sedative-hypnotics poses a serious risk of adverse effects, including impaired cognitive functioning (Zhang, Zhou, Meranus, Wang, & Kukull, 2016), reduced driving skills (Meuleners et al., 2011) and increased risks of falls (Diem et al., 2014). Specifically, the risks of falls is greater when using benzodiazepines with a longer half-life (Woolcott et al., 2009). Long-acting benzodiazepines can pose particular risks in older adults because of age-related changes in pharmacokinetics and pharmacodynamics (Madhusoodanan & Bogunovic, 2004).

In both French and British outcome studies, benzodiazepines appear to be associated with an increased risk of death, with a mortality rate for those exposed to these drugs 1.2 to 3.7 times higher than those who have not been exposed (Palmaro, Dupouy, & Lapeyre-Mestre, 2015). However, it is unclear if this association is causal or whether these drugs are prescribed more frequently to people who are already at higher risk of dying (Markota, Rummans, Bostwick, & Lapid, 2016).

A large U.S. population-based cohort study suggested no increase in risk (or a minor increase, at most) of all-cause mortality associated with benzodiazepine initiation (Patorno, Glynn, Levin, Lee, & Huybrechts, 2017). Also, a Finnish retrospective cohort study of mortality associated with the use of benzodiazepines and related drugs among people aged 65 years and older initially reported an increased mortality hazard. However, after adjusting for age, sex, antipsychotic drug use and diagnostic confounders, the use of these drugs was found not to be associated with excess mortality (Gisev, Hartikainen, Chen, Korhonen, & Bell, 2011).

4.2.4 Cannabis

Compared with other drugs, the disease burden related to cannabis appears to be relatively small (Degenhardt & Hall, 2012). Fischer and colleagues (2015) attempted to calculate cannabis-attributable mortality and morbidity in Canada, based on epidemiological data, using a comparative risk assessment. Focusing on motor vehicle accidents, cannabis use disorders, mental health (in particular, psychosis) and lung cancer, they found motor vehicle accidents and cannabis use disorders far outweigh the others in terms of morbidity (number of cases). They also reported that motor vehicle accidents and lung cancer are the only domains where cannabis-attributable mortality is estimated to occur. However, there does not appear to be any data specific to older adults.

A four-year Danish study of individuals entering treatment for cannabis use disorders found that the standardized mortality ratios are highest for accidents (8.2) and suicide (5.3), followed by homicide/violence and natural causes (Arendt, Munk-Jørgensen, Sher, & Jensen, 2013).

4.3 Falls

Approximately 20 to 30% of community-dwelling older Canadians experience at least one fall each year (Public Health Agency of Canada, 2014). Most falls are the result of multiple factors that combine and overwhelm an older adult's ability to maintain or regain balance. Attention to the interplay of these factors as it pertains to alcohol and drug use might allow researchers to better isolate these risks for study and prevention. In a Taiwanese study of adults aged 65 years and older who were hospitalized for trauma following a fall, it was found that older adults have more severe injuries, worse outcomes and a higher mortality rate compared to younger adults (Rau et al., 2014).

The relationship between alcohol and falls has been widely studied but the literature is somewhat inconsistent as it relates to older adults (Choi et al., 2014). For example, Tait and colleagues (2013) reported an increased risk of falls in "abstainers" with depression, diabetes and, for women, musculoskeletal conditions. However, a cross-sectional and longitudinal study of older adults in four U.S. communities found that consumption of 14 or more drinks per week is associated with an increased risk of falls (Mukamal et al., 2004). The authors suggest that cross-sectional studies might fail to identify this risk of heavier drinking because older adults at risk for falls decrease their alcohol use over time, or because heavier drinkers at risk for falls tend not to enroll in cohort studies. Also, people who consume large amounts of alcohol and those who use opioids (especially when suffering with pain) are less likely to be moving around, which could reduce the incidence of falls. In a Swedish study, heavy alcohol consumption and use of sedatives or hypnotics was significantly associated with serious falls among women over the age of 60 (Stenbacka, Jansson, Leifman, & Romelsjö, 2002).

The risk of falls and fractures among older adults has been linked to the use of opioids for pain-related conditions (Papaleontiou et al., 2010; Rolita, Spegman, Tang, & Cronstein, 2013), primarily with a focus on early initiation and short-term use. A study in Quebec (Buckeridge et al., 2010) found that, after adjusting for concurrent drug use and baseline risk factors, low- and intermediate-potency opioids were associated with a risk of injury. The use of codeine combinations was associated with the highest risk of injury, with a 127% greater risk per one adult dose increase.

Woolcott and colleagues (2009) conducted a meta-analysis of the impact of nine medication classes on falls in older adults, noting an increased risk of falling associated with use of benzodiazepines, antipsychotics, antidepressants, sedative-hypnotics and nonsteroidal anti-inflammatory medication. Similarly, an Irish study of middle-aged and older adults found an association between benzodiazepine use and an increased risk of falls — along with an association between **injurious** falls and benzodiazepines when coupled with the concurrent use of multiple medications (Richardson, Bennett, & Kenny, 2015). A prospective study examining age-adjusted risk of falls also found an association between non-benzodiazepine sedative-hypnotics and an increased risk of any falls as well as recurrent falls. The same study also associated benzodiazepine use with a similar increase in age-adjusted risk of falling (Diem et al., 2014).

In a 2014 study assessing the risk of falls in people with dementia, while the prevalence of falls was significant (17%), problematic substance use significantly enhanced the risk of falls with an odds ratio of 1.68 (Eshkoor et al., 2014).

4.4 Vehicular Accidents

While falls are the leading cause of injury among older adults in Canada, motor vehicle collisions are the leading cause of accidental deaths in the 65–74 age group (Public Health Agency of Canada, 2015). Falls and vehicular collisions together account for approximately 91% of all injury-related hospital admissions among older adults.

It has long been established that driving under the influence of alcohol increases the risk of accident involvement (Borkenstein, 1964). In one study from the Fatality Analysis Reporting System in the United States, overall drug and alcohol use was determined to be considerably less common among fatally injured older adult drivers compared to middle-aged drivers (Zhu & Rudisill, 2014). Older drivers tested positive for medications more often than illicit drugs, with narcotics such as hydrocodone and sedatives often detected separately or in combination with medication.

A recent study by Choi, DiNitto and Marti (2014) examined risk factors for older adults driving under the influence of alcohol or drugs. Of past-year users, 14.5% of those aged 50–64 and 6.2% of those in the 65+ age group self-reported impaired driving. In both groups, the likelihood of driving under the influence significantly increased in the presence of higher frequency alcohol use, binge drinking, marijuana use and a major depressive episode.

In a systematic review of medication use and collision risk, 15 medications (of a larger group of 53 medications investigated) were associated with an increased risk of vehicular collision, including 13 opioid and sedative-hypnotic medications, some of which are commonly used by older adults (Rudisill, Zhu, Kelley, Pilkerton, & Rudisill, 2016).

Distinguishing the risk from ongoing use versus first-time use of medication could be useful in establishing harm in older adults. An analysis of sedative-hypnotic vehicle crash data (including benzodiazepines and the related "z-drugs" temazepam and zolpidem) showed that individuals newly using sedatives were at an increased risk of collision compared to non-users (Hansen, Boudreau, Ebel, Grossman, & Sullivan, 2015). These studies emphasize the need for additional approaches to preventing older adults from driving while under the influence, including the challenging issue of when to invoke mandatory reporting to the authorities, as is already required in some jurisdictions.

4.5 Cognitive Impairment

Substance use and cognitive impairment have a complicated relationship in later life. Because cognitive decline is frequent in older adults as well as people who use substances, the extent to which substances lower the threshold or accelerate cognitive changes is of particular interest and relevance. An Australian study of 99 individuals between the ages of 50 and 71 attending drug and alcohol services reported that 40% of clients met the cut-off scores for more severe cognitive impairment (Lintzeris et al., 2016). The most frequently used substances among this group were alcohol (46%), benzodiazepines (40%) and cannabis (38%).

Chapter 3 of this report contains a detailed account of aging-related declines in brain function, structure and compensatory processes, as well as changes to neurotransmitter systems, neuroendocrine function and homeostatic mechanisms.

4.5.1 Acute Cognitive Changes

Acute cognitive changes can be precipitated by many substances, including a variety of prescribed medications, illicit drugs and alcohol. These changes can range from subtle to profound, as in cases of acute delirium, which can be precipitated by toxicity or substance withdrawal. Drugs with significant anticholinergic effects (e.g., psychotropic medications, antihistamines) are known to either precipitate delirium or the risk factors of delirium, especially in older adults (Tune, 2000).

A systematic review found that delirium risk appears to be increased by benzodiazepines, opioids, dihydropyridines (calcium channel blockers) and possibly antihistamines (Clegg & Young, 2010). It is therefore recommended that people at risk of delirium avoid new prescriptions of benzodiazepines, or consider reducing or discontinuing their use of these medications when possible. The review also recommends opioids should be prescribed with caution for people at risk of delirium, tempered by the observation that untreated severe pain can itself trigger delirium.

In a study on the acute effects of alcohol use, alcohol was associated with poorer working memory performance in older adults (aged 55–70), but not in younger adults (Boissoneault, Sklar, Prather, & Nixon, 2014). Alcohol was also associated with poorer performance on a set-shifting task (Trail Making Test – Part B) in older subjects. Cannabis can acutely affect short-term memory, attention and executive function (Lundqvist, 2010). Acute and chronic effects of substances can also affect driving ability especially among older adults, raising a critical public safety issue.

4.5.2 Cognitive Changes Associated with Long-term Substance Use

Alcohol

Excessive long-term use of alcohol can lead to damage to the structure and function of the brain (Harper, 2009), with a history of AUDs increasing the odds of developing severe memory impairment later in life (Kuźma et al., 2014). However, because alcohol-related dementia (ARD) does not have a distinct pathophysiological profile, it has received limited recognition as a distinct entity (Bowden, 2010). There remains considerable debate about the neurotoxicity from alcohol versus neurotoxicity from an associated cause (such as thiamine deficiency) or multiple causes. Confounding factors include common comorbidities such as psychiatric disorders, the use of other substances, head injury and increased vascular risk factors. Compared to people with Alzheimer's disease, those with ARD tend to perform better on semantic tasks, but worse on visual-spatial tasks (Ridley, Draper, & Withall, 2013).

To stimulate research on ARD and improve the recognition of alcohol-related problems among older adults, Oslin and Cary (2003) developed diagnostic criteria for ARD, then studied 192 nursing home residents in an attempt to validate their criteria. (Table 1 below summarizes the criteria for classifying probable ARD.) Eighty-two percent of the study participants were diagnosed with some form of dementia, with 10% receiving a diagnosis of ARD. Those with ARD were less cognitively impaired, more often unmarried, and demonstrated a stabilization of both cognition and functional status. In contrast, those with Alzheimer's disease and vascular dementia showed a general decline in both cognitive and functional status. Neuroimaging and neuropathological evidence of individuals diagnosed with ARD demonstrate prominent white matter loss and neuronal loss in the superior frontal association cortex, hypothalamus and cerebellum (Ridley et al., 2013).

There is evidence that the frontal lobes of individuals with ARD appear particularly susceptible to damage. It is also possible that thiamine deficiency plays a significant role in the development of ARD. Individuals with AUDs have a very high risk of thiamine deficiency because of poor dietary nutrition and also because alcohol directly compromises thiamine metabolism. Thiamine deficiency can cause Wernicke's encephalopathy, which is an acute neurological disorder characterized by ocular motor abnormalities, cerebellar dysfunction and altered mental state. Korsakoff syndrome, which is a syndrome of profound memory impairment, can also develop and appears to be related to additional damage to diencephalic and hippocampal circuitry.

Dementia and cognitive decline are linked to cardiovascular risk factors and there is some evidence to suggest alcohol might be protective in terms of reducing the risk of coronary artery disease and ischemic stroke. This protective effect could be related to alcohol's inhibitory effect on platelet aggregation and a reduction of inflammatory markers, as well as by an alteration of the serum lipid profile (Hulse, Lautenschlager, Tait, & Almeida, 2005).

Table 1. Classification of probable alcohol-related dementia

Criteria for the clinical diagnosis of probable ARD include the following:
• A clinical diagnosis of dementia at least 60 days after the last exposure to alcohol; and • Significant alcohol use, as defined by a minimum average of 35 standard drinks per week for men and 28 for women, for a period greater than five years. The period of significant alcohol use must occur within three years of the initial onset of cognitive deficits.
The diagnosis of ARD is supported by the presence of any of the following:
• Alcohol-related hepatic, pancreatic, gastrointestinal, cardiovascular or renal disease (i.e., other end-organ damage); • Ataxia or peripheral sensory polyneuropathy (not attributable to other specific causes); • Stabilization or improvement of cognitive impairment after 60 days of abstinence; • Neuroimaging evidence of improvement in ventricular or sulcal dilatation after 60 days of abstinence; or • Neuroimaging evidence of cerebellar atrophy, especially of the vermis.
The following clinical features cast doubt upon the diagnosis of ARD:
• Presence of language impairment, especially dysnomia or anomia; • Presence of focal neurologic signs or symptoms (except ataxia or peripheral sensory polyneuropathy); • Neuroimaging evidence of cortical or subcortical infarction, subdural hematoma or other focal brain pathology; and • Elevated score on the Hachinski Ischemia Scale.
Clinical features that are neither supportive nor cast doubt upon the diagnosis of ARD include:
• Neuroimaging evidence of cortical atrophy; • Presence of periventricular or deep white-matter lesions on neuroimaging, in the absence of focal infarcts; and • Presence of the apolipoprotein e4 allele.

Source: Oslin & Cary, 2003.

A systematic review and meta-analysis by Peters and colleagues (2008) suggested that small amounts of alcohol may be protective against dementia, noting a risk ratio of 0.63. (The reduced risk was specifically for Alzheimer's disease, not for vascular dementia or general cognitive decline, but because of the heterogeneity of the data, these findings should be interpreted with caution.) Anstey and colleagues (2009) also carried out a meta-analysis of 15 prospective studies. The pooled relative risks of Alzheimer's disease, vascular dementia and any dementia for light to moderate drinkers compared to non-drinkers were all in the range of 0.72 to 0.75. These results suggest this group of alcohol drinkers had a reduced risk of dementia later in life compared to abstainers. However, it is unclear whether this reflects selection effects in cohort studies commencing in late life, a protective effect of alcohol consumption throughout adulthood or a specific benefit of alcohol in late life.

Cannabis

Very little research on the effects of cannabis has been carried out among adults over the age of 50, highlighting the urgent need to evaluate the impact of cannabis use on this population.

In a systematic review of the effects of cannabinoids on human cognition, Broyd and colleagues (2016) found that verbal learning, memory and attention are most consistently impaired by both acute and chronic exposure to cannabis. They suggest that psychomotor function is most affected during acute intoxication, with some evidence for persistence in individuals who use cannabis chronically and after cessation of use. They also note that impaired verbal, memory, attention and some executive functions may persist even after prolonged abstinence.

Conversely, a recent report from the Canadian Centre on Substance Use and Addiction (CCSA) provides evidence to suggest continued chronic cannabis use does not produce severe or debilitating impairment of memory, attention, psychomotor and other cognitive functioning (McInnis & Porath-Waller, 2015). The report's authors suggest the effects on these cognitive abilities are generally subtle. However, despite a large number of studies examining the impact of cannabis on various aspects of cognitive functioning, it is uncertain whether the effects of cannabis on cognition are reversible following cessation of the drug. The authors do note that there is emerging evidence that chronic cannabis use can affect brain development and functioning in areas that are important for cognitive and emotional processes, prompting concern about cannabis use in adolescents and young adults. Given the aging of the baby boomer generation, it is important to ask about early use of cannabis during clinical evaluation of this population.

Interestingly, it has been suggested that cannabinoids could have a positive impact on neurodegeneration. The cannabinoid system is emerging as an important factor in determining a neuron's fate by providing protection to neurons through the activation of pro-survival pathways and the control of neurogenesis (Gowran, Noonan, & Campbell, 2011). While neurodegenerative illnesses are associated with toxicity of neurons due to their over-activation, oxidative stress and neuroinflammation, certain cannabinoid molecules have been demonstrated to inhibit these events. However, there has not been any clinical research to support this concept.

Benzodiazepines

In a meta-analysis on the association between benzodiazepine use and dementia, Zhong and colleagues (2015) found that the risk of dementia is increased by approximately 50% in individuals who chronically use benzodiazepines compared to those who have never used these medications. Similarly, a systematic review of observational studies found that individuals who use benzodiazepines long-term have up to a two-fold increased risk of developing dementia compared to those who do not (Billioti de Gage et al., 2015).

However, the observed association between benzodiazepine use and dementia may be due to confounding factors such as indication for use and reverse causation. For example, the prodromal symptoms of dementia (e.g., sleep disturbance, anxiety, depression) can occur for up to 10 years before a clinical diagnosis of dementia and may significantly contribute to the increased use of benzodiazepines. There are a number of different mechanisms that could underlie the potential influence of benzodiazepines on the development of dementia. As an example, due to neural compensation and cognitive reserve concepts, some people can cope with initial neurodegenerative lesions by using or developing alternative networks (Pariente, de Gage, Moore, & Bégaud, 2016). Lowering brain activation levels through benzodiazepine use could limit this capacity.

Opioids

Although there has been limited research on the potential for opioids to increase the risk of dementia, it has been suggested that opioids modulate the behaviour of microglia (a form of active immune defence of the central nervous system) — specifically, by promoting the initiation of programmed cell death — which might contribute to the development of neurodegenerative diseases (Hu, Sheng, Lokensgard, & Peterson, 2002). In a study of older adults who were not suffering from dementia, Dublin and colleagues (2015) concluded that people with the heaviest opioid or non-steroidal anti-inflammatory drug use have a slightly higher risk for dementia than those with little or no use. However, as these results could reflect a direct effect of chronic pain on cognition, there is little evidence of long-term cognitive harm associated with opioids.

4.6 Mood and Related Disorders

4.6.1 Alcohol

Older adults suffering from depression are three to four times more likely than non-depressed older adults to have an AUD, with AUDs prevalent in 15 to 30% of patients with late-life major depression (Devanand, 2002). At the same time, a high percentage of older adults with a diagnosed AUD have a history of depression.

There are several possible causal relationships in the association between AUDs and major depression. An AUD might cause depression. Major depression might cause an AUD (via self-medication). There can also be a reciprocal causal relationship, where each disorder increases the risk of the other disorder simultaneously. Possible explanations for the factors and processes giving rise to these causal links include:

- Alcohol misuse often leads to disruptions in family and social life, as well as physical health problems. While it can be argued that these difficulties are the source of the linkage between AUD and depression, studies that have tried to account for these factors found that the links persist even after controlling for social and environmental factors (Boden & Ferguson, 2011).
- The disorders could be linked by genetic factors related to neurotransmitter functioning.
- Alcohol could cause metabolic changes (e.g., reduced folate levels, alterations to circadian rhythms) that increase the risk of depression.
- Many older adults drink alcohol in response to psychosocial triggers such as loneliness and depressed mood.

In their examination of the literature on the association between AUDs and depression, Boden and Ferguson (2011) found that the presence of either disorder doubles the risk of the second disorder. They suggest the most plausible causal association is one in which the AUD increases the risk of major depression rather than vice versa. A systematic review by Sullivan and colleagues (2005) revealed a median prevalence of current or lifetime alcohol problems in people with depression of 16% and 30%, respectively. (In contrast, the general population has a prevalence of 7% and 16 to 24%, respectively.) There is evidence that alcohol problems are associated with worse outcomes over the course of depression, with negative impacts on suicide and death risk, social functioning and healthcare use. There is also evidence that antidepressants can improve depression outcomes in people with alcohol dependence.

4.6.2 Opioids

A recent study of individuals with chronic pain who were treated with prescription opioids, medical cannabis or both found that patients who were prescribed opioids were significantly more likely to screen positive for depression and anxiety (Feingold, Goor-Aryeh, Bril, Delayahu, & Lev-

Ran, 2017). Individuals in the group receiving both opioids and medical cannabis were also more prone to depression than those in the cannabis-only group. Similarly, newly emerging epidemiologic evidence suggests the incidence of depression following initiation of prescription opioid analgesics is high (Fischer, Murphy, Kurdyak, & Goldner, 2016). In a study of two large patient cohorts, patients with remitted depression who were exposed to opioid analgesics were 77 to 117% more likely to experience a recurrence of depression than those who remained opioid-free (Scherrer et al., 2016). There is also evidence of an association between major depression and non-medical use of prescription opioids (Fink et al., 2015).

4.6.3 Benzodiazepines

Although benzodiazepines are widely believed to cause depression, there is a lack of evidence to substantiate this claim (Patten, 2008). However, in a study of the determinants of treatment-resistant depression, Parker and Graham (2015) reported that benzodiazepine use was significantly more frequent in the highest treatment-resistant group.

4.6.4 Cannabis

Various reviews and meta-analyses have found an association between heavy or problematic cannabis use and depression (Degenhardt, Hall, & Lynskey, 2003; Lev-Ran et al., 2014). For example, a report by Bersani and colleagues (2016) found that patients with cannabis use disorder present significantly more severe negative symptoms of depression when compared to patients without cannabis use disorder. They also note that cannabis use is frequent among depressed patients, which could lead to "amotivational syndrome," which combines symptoms of affective flattening and loss of emotional reactivity.

Unfortunately, the literature about the link between depression and cannabis use is almost exclusively focused on adolescents or younger adults with very little research related to older adults. Whether these results can be generalized to older adults is unclear.

4.7 Suicide

The rate of completed suicide is disproportionately high in the older adult population, especially males. Substance use disorder (SUD), especially AUD, is the second most common type of psychiatric disorder associated with completed suicide in the older adult population, following only depression (Blow, Brockmann, & Barry, 2004).

Drinking alcohol increases suicide risk through interactions with many age-related factors, including medical illness, negatively perceived health status and low socio-economic support. The acute use of alcohol is also associated with increased likelihood of a suicide attempt, particularly when large amounts are consumed (Borges et al., 2017). There is also evidence that the presence of an AUD significantly increases the risk of suicidal ideation, suicide attempt and completed suicide — suggesting that AUD could be an important predictor of suicide and premature death (Darvishi et al., 2015). A Swedish study of individuals aged 70 years or older who had attempted suicide found a strong association between AUD and hospital-treated suicide attempts in both sexes, with AUD observed in 26% of cases versus just 4% in a comparison group (Morin et al., 2013).

Alcohol misuse and comorbid psychiatric illness represent a potentially lethal combination that accounts for a large number of suicides in late life. However, because the relationship between alcohol use and late-life suicide is so complex, more research will be required to develop better detection and prevention strategies (Koh, Gorney, Badre, & Jeste, 2015).

A study of emergency department visits for drug-related suicide attempts among middle-aged adults (ages 45 to 64) found a dramatic increase in the rate of such visits between 2005 and 2011 (Tesfazion, 2013). In 2011, the majority of the drug-related suicide attempts involved prescription drugs and over-the-counter medications such as anti-anxiety and insomnia medications (48%), analgesics (29%) and antidepressants (22%). More recently, Bohnert and colleagues (2017) studied SUDs and the risk of suicide mortality among American veterans. They found that a diagnosis of any current SUD and a specific current diagnosis of alcohol, cocaine, cannabis, opioid, amphetamine or sedative use disorder are all significantly associated with an increased risk of suicide in both males and females. Although the greater suicide risk among females was observed only among those with "any current SUD" and opioid use disorder, the correlations are significantly stronger for women than men, suggesting the presence of an SUD might be an especially important marker for women. The authors note that other co-occurring psychiatric disorders might partially explain the associations between SUDs and suicide.

Substance Use In Canada—Improving Quality of Life: Substance Use and Aging

CLINICAL VIGNETTE

ARTHUR

Arthur, 65, first started using prescription opiates after experiencing gallstone pain 10 years ago. Although a surgeon had recommended a cholecystectomy, Arthur feared taking time off work without pay, opting instead to pursue supportive management for recurring episodes of pain with the help of his family doctor.

Due to the ongoing difficulties with the pain — and the resulting missed days at work — Arthur was unable to continue his full-time job as a librarian. As a result, he had to move further outside the city for work, settling into a small third-floor apartment and taking up his current job as a part-time bookkeeper. When his family doctor retired a few years ago, Arthur was forced to see several different walk-in doctors for the prescription of his medication, hydromorphone, in addition to acquiring pills through people he knows. As he became more tolerant to the medication, his use gradually escalated over the years; today, Arthur admits to taking five 3-milligram (mg) tablets of long-acting hydromorphone each day. He first started inappropriately using in response to the many stressors in his life — the ongoing pain, financial issues, the death of his wife — but now uses regularly in the morning before going to work to prevent withdrawal. Arthur has been late for work or missed days because he ran out of hydromorphone, and has taken to dealing with his stress through illicit diazepam acquired through a friend: between three to five 10-mg tablets most days of the week.

While he has no identified mobility issues, Arthur admits that living on the third floor is worrisome, especially when the elevator is out. He was eventually referred for help with suggestions of opiate maintenance therapy. He has never been on opiate maintenance therapy and has heard different stories about methadone in the community. He would like to know more about the consequences of his past use and how he can get support for the future.

4.8 Substance Use and Drug Interactions

One of the most concerning harms related to substance use among older adults is the potential for interaction with medications and the resulting consequences. For example, the interaction of alcohol and medication can affect drug metabolism through the microsomal ethanol oxidizing system (MEOS). Chronic alcohol consumption induces greater enzymatic capacity in the MEOS as it works to keep alcohol levels in check. Older adults often take a large number of prescribed medications, which are also metabolized by the MEOS; following alcohol-induced enzymatic induction, the MEOS can become saturated with the metabolites of these medications, resulting in potentially toxic levels of metabolites in the liver (Moore, Whiteman, & Ward, 2007). In a cross-sectional analysis of older individuals in the Irish population, 72% of participants had been exposed to alcohol-interactive medications, with 60% of those reporting concomitant alcohol use (Cousins et al., 2014). Twenty-eight percent of those reporting antihistamine use identified themselves as heavy drinkers, nearly one-fifth combined heavy drinking with the use of anticoagulants/antiplatelets and cardiovascular agents, and 16% combined heavy drinking with central nervous system agents.

Older adults may not receive adequate information about their medications and alcohol use, making it difficult for them to make an informed decision about concurrent use. In addition, many older adults do not discuss alcohol use with their healthcare providers and the written warnings found on the packaging of some over-the-counter medications might not reflect age-specific recommendations (Slattum & Hassan, 2017). Because many older adults use prescription or over-the-counter medications to help with poor sleep or pain, the use of alcohol to further manage sleep or pain issues increases the risk of harmful interactions.

The consequences of drug–drug interactions are especially pronounced when examining opioid-related drug interactions. A study by the Canadian Institute for Health Information (2013) found that among older adults who had an adverse drug-related hospitalization, opioids was the third-most common drug class. Of these, the most common co-occurring toxicity was with benzodiazepines (19%) followed by acetaminophen (14%), including both combination products and acetaminophen alone. The combination of opioids and benzodiazepines significantly increases the risks of harms such as overdose, respiratory depression and death (Karaca-Mandic, Meara, & Morden, 2017).

To improve patient outcomes, Gudin and colleagues (2013) made strong recommendations for monitoring treatment adherence (e.g., through urine screening) and ruling out psychiatric comorbidity when screening for possible benzodiazepine–alcohol interactions is indicated.

4.9 Substance Withdrawal

Different substances present a spectrum of withdrawal-related consequences. Among older adults, some of these consequences are aggravated by the unique physiological changes that occur later in life. However, as a general principle, an extra order of conservativism is appropriate because of the lower threshold for complications among older adults.

In alcohol withdrawal, the risk of seizures and delirium is well-recognized and regarded as potentially fatal in older adults because of their physiological vulnerability. Sudden cessation, even with lower levels of alcohol use, is not advised and a gradual taper is recommended. One systematic review of alcohol withdrawal among older adults reported mixed results with respect to severity and duration compared to younger patients (Karounos et al., 2013). Another study stressed the need for screening of all older adults for level of alcohol use when admitted to an acute care facility in order to avoid acute withdrawal and the development of delirium tremens (Letizia & Reinbolz, 2005).

In light of the high degree of medical comorbidity and potentially increased severity and duration of alcohol withdrawal in older adults, inpatient elective withdrawal management is generally recommended (O'Connell, Chin, Cunningham, & Lawlor, 2003). Outpatient management might not be appropriate for older individuals who are frail, live alone with limited family support, or have multiple medical problems and prescribed medications (Liskow, Rinck, Campbell, & DeSouza, 1989). Because withdrawal management from any addictive substance in an outpatient setting could pose significant risks for older adults, it should be carefully supervised, ideally in a hospital.

Benzodiazepine-assisted withdrawal is the mainstay of both alcohol and benzodiazepine withdrawal management. It should be undertaken with care in older adults because of their altered pharmacokinetics and increased sensitivity to the adverse effects of benzodiazepines (Hurt, Finlayson, Morse, & Davis, 1988; Sabioni, Bertram, & Le Foll, 2015). Short-acting benzodiazepines could prove less problematic with older adults, lessening the chances of sedation and harmful drug–drug interactions (Dufour & Fuller, 1995). Benzodiazepine withdrawal often requires careful tapering, with older adults experiencing greater insomnia and anxiety during withdrawal (Ashton, 2005; Authier et al., 2009).

While opioid and cannabis withdrawal are encountered in clinical geriatric practice, they do not appear to have been extensively studied in the literature. It is generally regarded that the instability of blood pressure brought on by any withdrawal, independent of the features described above for alcohol and benzodiazepines, leave older adults vulnerable because of their underlying physiological state. CCSA has created a useful care pathway for older adults experiencing psychoactive prescription drug harms. It includes guidance on treating withdrawal from benzodiazepines and opioids, including medication-assisted withdrawal and psycho-social interventions such as cognitive behavioural therapy (Canadian Centre on Substance Abuse, 2016).

Bonnet and Preuss (2017) recently reviewed the literature on cannabis withdrawal syndrome. They conclude that cessation from long-term and regular cannabis use precipitates a specific withdrawal syndrome (mainly mood and behavioural symptoms) of light to moderate intensity. There is very little information available on cannabis withdrawal in older adults, although there is a case report of suspected dronabinol withdrawal in a medically ill older adult patient (Muramatsu, Silva, & Ahmed, 2013).

4.10 Social Consequences

The literature on social consequences among older adults is somewhat limited. However, some information is available on abuse of older adults, family breakdown, homelessness, crime and social isolation/loneliness.

4.10.1 Abuse of Older Adults

Substance use, whether by the victim or the perpetrator, has long been associated with violence and abusive behaviour. In the United States, Jogerst and colleagues (2012) studied the association of state-reported domestic elder abuse with regional levels of substance abuse. They found that elder abuse investigations and substantiations are associated with various forms of substance abuse and because the measures of documented elder abuse are minimal, being able to associate substance abuse with elder abuse is a significant finding.

A report by the World Health Organization (2011) notes the following links between alcohol and the abuse of older adults:

- Individuals with alcohol problems may be financially dependent on relatives, including older adults. This reliance can include funding their alcohol use, possibly leading to financial or material coercion.
- Caregivers who drink excessively might neglect their responsibilities to the older adults who depend on them.
- Impaired judgment and memory through harmful alcohol use by older adults can leave them more vulnerable to abuse.
- Caregivers can encourage older adults to drink to make them more compliant or exploit them financially.
- Older adults may use alcohol as a means of coping with abuse or neglect.
- Hazardous and harmful levels of alcohol use are risk factors for intimate partner violence.

Two Canadian studies were mentioned in the World Health Organization report, including a report from an outreach program for older adults with alcohol or other substance use problems, which found that 15 to 20% of its clients were suffering from psychological, physical or financial abuse (Bradshaw & Spencer, 1999). In addition, a study of older adult abuse case files from agencies across Canada reported that severe drinking bouts by the abuser led to harmful incidents in 14.6% of all older adult abuse cases (Pittaway & Gallagher, 1995). In a seven-city European study of alcohol use among people between the ages of 60 and 84, it was found that psychologically abused older adults are more likely to use alcohol (Tredal et al., 2013).

Some of the factors that might increase the risks of older adults suffering elder abuse include cognitive or physical impairment and social isolation. Gender is also important in some regions, where females are generally more at risk. Both older adult abuse and harmful alcohol use can lead to physical injury, financial problems, social withdrawal, malnourishment, depression and cognitive impairment.

4.10.2 Family Breakdown

While a breakdown in family cohesion can contribute to substance use, the relationship can also work in the opposite direction, with substance use straining family relationships and leading to family dysfunction. The cravings associated with SUDs can lead to financial difficulties as well as irrational, violent or criminal behaviour, all of which place strain on the family. Individuals dealing with addiction can also become self-centred, selfish and oblivious to the needs of others around them.

There is limited literature focused on older adults. A study by Moos and colleagues (2011) compared personal, family and social functioning of older husbands and wives, concordant or discordant for high-risk alcohol consumption. They concluded that high-risk and discordant alcohol consumption does not seem to be linked to decreased family functioning among older couples in long-term, stable marriages. However, a different study reported that discrepancies in alcohol consumption between spouses (as opposed to consumption levels) are more closely related to the probability of subsequent divorce, with couples comprising two abstainers or two heavy drinkers having the lowest rates of divorce (Ostermann, Sloan, & Taylor, 2005). A study from Norway reported similar findings: heavy drinking among men and women increases the risk of future divorce, with concordant abstainers and concordant heavy drinkers having a lower risk of divorce (Torvik, Røysamb, Gustavson, Idstad, & Tambs, 2013).

4.10.3 Homelessness

In a U.S. study of older homeless adults aged 50–69, 30% had a history of binge drinking and 16.8% had a history of "drug problems," based on an addiction severity index (Brown, Kiely, Bharel, & Mitchell, 2012). In a more recent study of homeless individuals aged 50 and older, almost two-thirds of participants had moderate or greater severity symptoms for at least one illicit drug, while 25.8% had moderate or greater severity alcohol symptoms (Spinelli et al., 2017). The authors noted an association between a history of psychiatric hospitalization and moderate or greater illicit drug symptoms, and also linked the presence of major depressive symptoms with moderate or greater severity alcohol symptoms.

In a study of homeless veterans in the United States, 21% had a complex mix of physical, mental and substance abuse conditions (Byrne et al., 2015). In another study of homeless veterans, 23% had a history of drug abuse and 25% had a history of alcohol abuse (Van den Berk-Clark & McGuire, 2013).

4.10.4 Crime

According to a report from Correctional Service Canada (CSC), more than 50% of older offenders are first-time offenders (Uzoaba, 1998). Comparing data on older and younger offenders with respect to substance use, CSC found that older offenders are significantly more likely to have started drinking at an early age, drink regularly, combine alcohol and drugs, and drink to excess in social situations. They are also more likely to have a history of daily binges and view alcohol as a means of relieving stress.

In another study of inmates of all ages in Canadian federal institutions, 41% had consumed alcohol at least once per week in the six months prior to arrest, with 24.5% using cannabis, 17.9% cocaine and 4.2% heroin during the same period (Brochu et al., 2001). An estimated 40% of crimes are associated with the consumption of psychoactive substances, with intoxication possibly playing a role in impairing cognitive functions, including disinhibition.

4.10.5 Loneliness and Social Isolation

The concept of loneliness is based on a person's subjective evaluation of feeling without companionship, isolated or not belonging (Victor et al., 2002). Social isolation, which is an objective measure of the size and diversity of one's social network and frequency of social interaction, is distinct from loneliness — although the two are associated (Coyle & Dugan, 2012).

Akerlind and Hornquist (1992) reviewed the interplay between loneliness and alcohol abuse. Although the literature was sparse, they suggest loneliness may be a significant contributing and maintaining factor in the development of alcohol abuse. They also note an association between loneliness and a broad array of psychopathology. In contrast, Canham and colleagues (2016) recently reported on the association of alcohol use and loneliness among middle-aged and older adult drinkers aged 50 and above, with their results suggesting loneliness is associated with reduced alcohol use frequency — and no association between loneliness and at-risk or binge drinking. Possible explanations for the association between frequent alcohol use and decreased loneliness is that alcohol can cultivate an environment of friendship and togetherness; in certain settings, alcohol has been described as a "social facilitator." However, future research is needed to explore whether there is a threshold level at which being lonely can lead to excessive alcohol consumption.

Regarding social isolation, the absence of close friends is associated with several mood and anxiety disorders (Chou, Liang, & Sareen, 2011). Similarly, the absence of frequently contacted members of a network (e.g., a religious group) is linked to alcohol abuse, alcohol dependence, drug abuse and nicotine dependence.

4.11 Conclusion

Based on the limited evidence available, it is clear that substance use by older adults can lead to a number of harmful consequences. However, more research is required to understand the full impact of substance use among different subgroups of the older adult population, including those with significant comorbidities. Substance use guidelines for older adults are also needed to provide better guidance for care and harm reduction related to both short- and long-term substance use. The next chapter of this report focuses on substance use issues in older adults with significant medical and psychiatric comorbidities.

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05

CHAPTER

Considerations for Co-occurring Health Conditions

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CHAPTER AT A GLANCE

- A large proportion of older adults with psychiatric disorders, such as schizophrenia, bipolar disorder, depression and anxiety, use illicit drugs or prescription drugs for non-medical purposes.
- Physical health problems among older adults, such as cardiovascular disease, might be worsened by problematic substance use.
- Older adults who experience co-occurring psychiatric disorders and physical health problems (e.g., diabetes, stroke, insomnia, chronic pain) are at greater risk of developing substance use disorders.
- Substance use disorders that co-occur with physical or mental illnesses might be related to chronic pain or insomnia, resulting in problematic substance use or harmful drug–drug interactions between prescription and non-prescription medications.
- As demand increases for integrated physical health, mental health and addiction services for older adults, there is a need for more research focused on older adults with substance use disorders and co-occurring physical or mental illnesses.
- Preventive and integrated treatments are critical in addressing co-occurring health conditions in the older adult population.

5.1 Introduction

By 2061, older adults are projected to make up as much as 28% of Canada's population (Statistics Canada, 2016). Yet while older adults have higher life expectancies than ever because of the latest advances in health care (Gfroerer, Penne, Pemberton, & Folsom, 2003), they still face a number of negative health outcomes as they age, including a greater risk of delirium and falls, as well as comorbid diagnoses such as diabetes, hypertension and dementia.

At the same time, older adults have lower rates of substance use disorders (SUDs) than younger populations. Approximately 1.9% of adults aged 45 and older and less than 1% of those aged 65 and older have an SUD, much lower than the 11.9% prevalence rate observed among youth (Pearson, Janz, & Ali, 2013). There are also fewer numbers of older adults admitted into substance treatment programs (Kuerbis, Sacco, Blazer, & Moore, 2014). As such, there is a common misperception that older adults do not display problematic substance use. However, recent evidence suggests the prevalence of SUDs among the "baby boomer" generation compared to earlier cohorts of older adults is increasing (Gfroerer et al., 2003; Kuerbis et al., 2014).

The baby boomers are a distinct population born between 1946 and 1965, a period of shifting views toward alcohol and other drugs compared to the preceding cohort, known as the "greatest generation" (Ekerdt, De Labry, Glynn, & Davis, 1989; Gfroerer et al., 2003; Savage, 2014). The number of baby boomers with an SUD is expected to increase from 2.8 million in 2006 to 5.7 million in 2020 (Han, Gfroerer, Colliver, & Penne, 2009). As shown in Table 1, the scope of SUDs in this population includes both licit and illicit substances, with alcohol being the most commonly reported SUD.

Table 1. Prevalence of SUDs in the older adult population (age 50 years and older)

SUD	Prevalence (%)	Reference
Alcohol	2–22	Kuerbis et al., 2014; Oslin, 2005
Benzodiazepines	11	Holroyd & Duryee, 1997
Cannabis	1.3–4.5	Blazer & Wu, 2009a, 2009b; Hasin et al., 2015; Wu & Blazer, 2014
Cocaine	2	Rivers et al., 2004
Hallucinogens	0.1	Blazer & Wu, 2009a
Heroin	< 0.05	Blazer & Wu, 2009a
Methamphetamine	5	Klassen, Katzman, & Chokka, 2010
Nonmedical opioids	1.4	Blazer & Wu, 2009b
Stimulants	< 1	Blazer & Wu, 2009a
Tobacco	13–14	Marinho, Laks, Coutinho, & Blay, 2010

SUDs co-occurring with medical or mental illnesses may be related to acute or chronic pain and insomnia, resulting in misuse, "abuse" or harmful drug–drug interactions with prescription and non-prescription medications (Kuerbis et al., 2014). The effects of cognitive impairment (e.g., mild cognitive impairment, dementia) on substance use and vice versa in people under 65 years of age have also been strongly related, particularly with cannabis (Lyketsos, Garrett, Liang, & Anthony, 1999). Furthermore, co-occurring psychiatric disorders in older adult cohorts have been strongly associated with certain SUDs (in particular, schizophrenia and tobacco use disorder).

Yet there is limited research on SUDs in co-occurring older adult and psychiatric populations (Kuerbis et al., 2014). Most publicly funded substance treatment programs have focused on younger populations, with only 7% of admissions involving patients aged 50 and older (Substance Abuse and Mental Health Services Administration, 2000). Modifying the focus of treatment care primarily toward older populations will be critical to meeting the special needs of this subgroup of substance-using individuals. Addressing this co-occurrence is imperative given that, by 2020, the 50 and older age groups will include all surviving baby boomer and post-baby boomer cohorts (those born between 1965 and 1970), which have high rates of illicit drug use (Substance Abuse and Mental Health Services Administration, 1996).

5.2 Clinical Aspects of Co-occurring Substance Use Disorders and Mental Illness in Older Adults

The current edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5) defines "substance use disorder" as a psychiatric disorder (First, 2013). Notably, other psychiatric disorders often co-occur with SUDs, meaning older adults can experience SUDs in addition to other psychiatric disorders that might relate to mood, psychosis, anxiety or other SUDs.

Since the 1990s, there has been evidence of increasing illicit substance use by older adults with comorbid psychiatric illnesses (Han et al., 2009; Patterson & Jeste, 1999; Simoni-Wastila & Yang, 2006). One study showed a 20% prevalence of SUDs in older adult psychiatric outpatients, mainly comprising alcohol, narcotics and benzodiazepines (Holroyd & Duryee, 1997). Another study demonstrated that mood and personality disorders were most commonly associated with "alcohol abuse" in 21% of psychiatric inpatients aged 55 years and older (Speer & Bates, 1992). Goldstein and colleagues (1996) further supported this finding, demonstrating that alcohol use disorders were prevalent in 23 to 44% of elderly psychiatric inpatients.

Despite this rising prevalence, there have been limited studies of SUDs in older adult psychiatric populations. However, some of the psychiatric disorders known to commonly co-occur with SUDs include schizophrenia/psychosis, mood and anxiety disorders, Alzheimer's/Parkinson's disease and other co-occurring SUDs.

5.2.1 Schizophrenia/Psychosis

Nearly 50% of patients with schizophrenia suffer from co-occurring SUDs (Volkow, 2009), which is consistent with the rate of SUDs in the general population. However, the prevalence of co-occurring SUDs in older age cohorts is lower than in younger patients. Research has suggested that because schizophrenia typically appears between the ages of 18 and 24, older patients are more stable and less likely to have an addiction to drugs (Vanasse et al., 2012). A recent study in Quebec found that patients with schizophrenia aged 65 years and older were less likely to use substances or have frequent visits to emergency departments than younger patients with schizophrenia (Ngamini-Ngui et al., 2014). These findings were in line with an earlier study from Montreal that found no consistent increase over time in yearly visits for treatment for SUDs in older schizophrenia patients (Chaput & Lebel, 2007).

The co-occurrence of chronic schizophrenia is most commonly associated with SUDs specific to tobacco use (72 to 90%; Smith, Mazure, & McKee, 2014), cannabis use (20 to 65%; Koskinen, Lohonen, Koponen, Isohanni, & Miettunen, 2010; United Nations Office on Drugs and Crime, 2015) and alcohol use (20.6%; Koskinen, Lohonen, Koponen, Isohanni, & Miettunen, 2009). Studies have suggested that neurobiological vulnerability in patients with schizophrenia, as well as environmental stressors (e.g., substance use), can result in the relapse and continuation of psychotic symptoms co-occurring with drug use (Kozak, Barr, & George, 2017). Cognitive deficits have also been suggested to be more apparent in older patients with schizophrenia, resulting in greater "substance abuse" (Bowie, Serper, Riggio, & Harvey, 2005).

Researchers have also shown that detrimental long-term effects of substance use on brain structure and function might manifest more strongly in older patients with schizophrenia compared to younger groups (Allen, Goldstein, & Weiner, 2001). Consequently, it has been suggested that premature mortality among patients with schizophrenia is highly associated with the secondary effects of drugs such as tobacco and cannabis, specifically the increased risk of cardiovascular disease and lung cancer (Olfson, Gerhard, Huang, Crystal, & Stroup, 2015). Addressing this comorbidity is therefore important given that SUDs among those with schizophrenia are associated with worsened negative symptoms, cognitive deficits and the interference of functional recovery (Volkow, 2009). Increasing healthcare costs each year among other psychosis disorders, such as bipolar disorder, also highlight the importance of addressing this comorbidity.

5.2.2 Bipolar Disorder

There are few studies focusing exclusively on SUDs in aging patients with bipolar disorder (type I or II). However, the high prevalence of SUDs in those with bipolar disorder (9 to 29%) has attracted attention (Sajatovic, Blow, & Ignacio, 2006). The major concerns raised with co-occurring SUDs in older adults with bipolar disorder relate to the negative medical and functional consequences of excessive substance use, which can lead to a more severe course of illness (Lagerberg et al., 2010). Importantly, patients are more vulnerable to both physical and medication side effects due to age-related changes in pharmacokinetics, polypharmacy and multiple medical comorbidities (Lala & Sajatovic, 2012). Relative to patients with bipolar disorder alone, comorbid patients are also found to have increased rates of hospitalizations, suicides, mood instability, medication non-adherence, and greater manic and depressive episodes (Strakowski, DelBello, Fleck, & Arndt, 2000). End-stage complications of alcohol dependence and toxicity/overdose from opioids and stimulants have also been suggested to shorten lifespans by 10 to 12 years (Hjorthoj et al., 2015).

Compared to other psychiatric disorders, bipolar disorder among older adults has the highest rate of comorbid alcohol use disorder, ranging from 13 to 25% (Dols et al., 2014; Grey & Hall, 2016). Other common drugs misused among those with bipolar disorder include tobacco, benzodiazepines, cocaine, amphetamines, prescription opioids, illicit opioids and cannabis (Bhuvaneswaran, Hargrave, & Brown, 2017). Bipolar disorder and alcohol use disorder are highly co-occurring because of common risk factors that include greater impulsivity, fewer years of education, late age of diagnosis, greater depressive episodes and criminal behaviour (Aas et al., 2016).

Treatment options for older adults with co-occurring bipolar disorder and SUDs are limited, but include various medications and behavioural therapies. For example:

- Sedative-hypnotic and benzodiazepine use can be treated with cholinesterase inhibitors, oxcarbazepine and phenobarbital. Although these treatment options have yet to be tested, they are promising given the efficacy for mood and improved cognitive function within this population (Lehmann & Forester, 2017).
- Cocaine use disorder among older adults with bipolar disorder has been treated with citicoline, lamotrigine and quetiapine. However, treatment efficacy varies and has been shown to diminish over time (Brown et al., 2015).
- Opioid use disorder among patients with bipolar disorder has been treated with office-supervised opioid treatment and methadone maintenance treatment (Lehmann & Forester, 2017).
- Valproate maintenance has been used in patients with bipolar disorder and alcohol dependence. However, as this was investigated in a study with a mean age of 37.5, the suitability of valproate maintenance for older adults is not known (Salloum et al., 2005).

5.2.3 Depression

Heavy drinking is strongly associated with mood disorders such as anxiety and depression among adults aged 65 and older (Kirchner et al., 2007; Loscalzo, Sterling, Weinstein, & Salzman, 2017). Alcohol also appears to be related to an increased risk of falls and medical morbidity in older patients, and is an independent predictor of suicide risk among this population (Dombrowski, Norrell, & Holroyd, 2016; Waern, 2003).

A longitudinal epidemiologic survey by the National Institute on Alcohol Abuse and Alcoholism found a four-fold increase of major depressive episodes among those with a history of alcohol dependence (Hasin & Grant, 2002). Another study found that older adults who reported depressive symptoms were at higher risk of problematic alcohol use, particularly at the younger end of the older adult age spectrum (Rodriguez, Schonfeld, King-Kallimanis, & Gum, 2010).

Dombrowski and colleagues (2016) recently conducted a retrospective study collecting data over a 10-year period from 1,788 elderly psychiatric patients. Of those patients, 11.7% had an SUD, with alcohol use disorder the most common (73.3%) and major depression the most frequent comorbid diagnosis (26.1%). However, one study found that depressed older adults had a lower prevalence of alcohol use disorder (Merrick et al., 2008). These mixed findings warrant the need for further research in comorbid SUDs and psychiatric disorders among older populations.

5.2.4 Anxiety Disorders

Anxiety disorders have been found to co-occur with SUDs among the older adult population. For example, nearly 30% of adults aged 50 years and older with anxiety had a cannabis use disorder within the past year (Choi, DiNitto, & Marti, 2016). In addition, the National Comorbidity Survey found that older adults with an alcohol use disorder were two to three times more likely to also have an anxiety disorder than those without a comorbid alcohol use disorder (Kessler et al., 1997).

Alcohol use disorders have consistently been shown to co-occur with certain mood and anxiety disorders (National Institute on Alcohol Abuse and Alcoholism, 2016), with a study by Chou and colleagues (2011) finding that, over a three-year span, 2% of adults aged 60 years and older with alcohol use disorders had developed a new generalized anxiety disorder. Older age has also been implicated in the onset of alcohol dependence due to the social and medical complications that occur as people grow older (Brady & Sinha, 2005; Hurt, Finlayson, Morse, & Davis, 1988). Interestingly, co-occurring anxiety and alcohol use disorders are seen in both older males and females (Byers, Yaffe, Covinsky, Friedman, & Bruce, 2010).

The significant impacts of co-occurring SUDs and anxiety disorders on health outcomes warrant further research and treatment options for this population.

5.2.5 Post-Traumatic Stress Disorder

Psychiatric disorders such as post-traumatic stress disorder (PTSD) are commonly treated with psychotropic drugs (predominantly benzodiazepines and antidepressants) to help with sleep abnormalities. With this treatment, there is an increased risk of developing an SUD given that older individuals might "abuse" prescribed or non-prescribed drugs (e.g., cannabis) to relieve the symptoms of PTSD (Brady & Sinha, 2005). Many veterans are found to have co-occurring PTSD and SUD, with 64 to 84% of those with PTSD meeting the criteria for lifetime alcohol use disorder and 40 to 44% meeting the criteria for nicotine dependence (Vorspan, Mehtelli, Dupuy, Bloch, & Lepine, 2015).

5.2.6 Alzheimer's/Parkinson's Disease

It is often reported that healthcare professionals underdiagnose, misdiagnose or undertreat older patients with symptoms related to SUDs by attributing them to Alzheimer's or Parkinson's disease. Although there is no literature investigating the prevalence of SUDs co-occurring with either disease, it is important to recognize the possibility of this comorbidity given the severe drop in blood pressure associated with the combination of alcohol and drugs prescribed for Parkinson's disease (Lieber, 1991). Because of the sedative effects of substances such as alcohol (Hendler, Ramchandani, Gilman, & Hommer, 2013), those with cognitive impairment should not drink alcohol (Ridley, Draper, & Withall, 2013), despite evidence suggesting that light to moderate drinking prevents pre-existing cognitive impairment (Moore, Whiteman, & Ward, 2007).

Some studies have also investigated the extent to which alcohol use influences the risk for developing Alzheimer's disease. While it might be plausible based on biological evidence, epidemiologic evidence does not support this relationship (Tyas, 2001). Additional research in this area is needed.

5.2.7 Multiple SUDs

The prevalence of having multiple SUDs is high among older adults, with comorbid tobacco and alcohol SUDs being the most common (Moore et al., 2009). In one study of older adults with SUDs, 4% had multiple SUDs, less than the 32% seen in the 18–64 age group (Chaput, Beaulieu, Paradis, & Labonte, 2011). Another study found that more than 60% of individuals who previously used cannabis and 80% of those who used cannabis in the past year also had SUDs other than cannabis (Choi et al., 2016). Among the older population, cannabis use often precedes the use of other illicit drugs (Fergusson, Boden, & Horwood, 2006) and dependence occurs much faster in individuals who use cannabis than those who use alcohol or tobacco (Lopez-Quintero et al., 2011). Interestingly, older individuals are more likely to seek treatment if they have comorbid SUDs of cannabis and other drugs or tobacco use disorder (Choi et al., 2016).

There is a risk of biological changes when using multiple drugs, which can increase the sedative effects of drugs such as benzodiazepines or opiates (Kuerbis et al., 2014). However, older adults might not be aware of such harmful drug–drug interactions, resulting in greater health repercussions. Little is known about the simultaneous use patterns of multiple substances in the older adult population. Given that older adults have high rates of psychiatric comorbidities with multiple drug–alcohol dependencies, developing treatments targeting this co-occurrence is important.

5.2.8 Conclusions

A large portion of older patients with psychiatric disorders use illicit drugs or misuse prescription drugs (Woo & Chen, 2010). Co-occurring SUDs ultimately worsen the severity and prognosis of primary mental illnesses. The high prevalence of positive urine screens in psychiatric emergency services provides evidence for the importance of determining treatment options and disposition for older adults with co-occurring SUDs and mental illnesses. In addition, the economic burden on healthcare systems resulting from co-occurring mental health and SUDs in older patients (e.g., prolonged hospital stays, frequent visits) highlights the importance of more research in this area. Patients are living longer but enduring several disorders requiring greater care, making improved diagnostic criteria and better treatment options critical to addressing this global issue.

5.3 Clinical Aspects of Substance Use Disorders with Medical Comorbidities in Older Adults

Certain medical problems found in older adult populations can be worsened with problematic substance use. During aging, the body develops a lower tolerance for substances; as a result, older adults might experience the effects of substances more quickly and severely than when they were younger. Older adults are also less likely to seek treatment for their substance use problems, given that co-occurring medical conditions diminish their ability to perform the basic activities of daily life. This lack of treatment can then exacerbate health problems such as heart disease, hypertension, diabetes and memory problems.

5.3.1 Coronary Heart Disease

Co-occurring SUDs and cardiovascular medical conditions such as heart disease can have detrimental effects on the physical health of older adults. While it is commonly reported that light to moderate alcohol consumption reduces the risk of coronary heart disease (CHD) and deaths, heavy alcohol use can worsen cardiovascular disease as well as diabetic neuropathy and retinopathy (Moore et al., 2007). In addition, among methadone maintenance patients aged 50 and older, approximately 18% have a heart condition (Rosen, Smith, & Reynolds, 2008). Tobacco smoking is also a determinant of CHD among older adults, with the attributable risk of CHD due to tobacco smoking most prevalent among older women, as well as those with a history of myocardial infarction or diabetes (Steptoe, Kerry, Rink, & Hilton, 2001; Willett et al., 1987).

Evidence also suggests that by quitting alcohol, older adults with CHD can reduce the risks of negative health outcomes, including death (LaCroix et al., 1991). Therefore, addressing the detrimental effects of co-occurring SUDs and CHD are critical to increasing awareness of these otherwise preventable conditions.

5.3.2 Cerebrovascular Disease

SUDs among older adults have commonly been found to predate ischemic stroke (Williams, Ghose, & Swindle, 2004). For instance, heavy alcohol consumption can increase risk or exacerbate hemorrhagic stroke and atherosclerotic cardiovascular disease in older adults (Kalla & Figueredo, 2017; Reynolds et al., 2003). The risk of all forms of stroke is also increased with tobacco smoking and decreased with quitting smoking (Shah & Cole, 2010). Although smoking rates are generally lower among adults aged 65 years and older (Shah & Cole, 2010), many biological and psychosocial mechanisms increase the mortality risk for smoking co-occurring with stroke. These mechanisms include impairments in immune functioning, cognitive and functional disability, poor nutrition and unemployment (Williams et al., 2004). Post-stroke depression can further exacerbate problematic substance use and contribute to increased long-term mortality in older adults (Williams et al., 2004). Ultimately, biological and psychosocial mechanisms that drive greater risk among older adults with co-occurring SUDs and stroke should be further explored.

5.3.3 Diabetes

There is a high prevalence of alcohol use disorders in older adulthood, resulting in deficiencies in essential vitamins (e.g., thiamine, folate), mental health problems (e.g., mood disorders, short-term memory loss) and fatty liver disease (Ferreira & Weems, 2008). Among individuals with diabetes, heavier drinking of alcohol is associated with diabetic retinopathy (Young, McCulloch, Prescott, & Clarke, 1984) and neuropathy (McCulloch, Campbell, Prescott, & Clarke, 1980). Given that alcohol suppresses energy metabolism in the liver, individuals with diabetes who consume alcohol without eating are also at high risk of hypoglycemia (Turner, Jenkins, Kerr, Sherwin, & Cavan, 2001).

In contrast, a lower incidence of non-insulin-dependent diabetes in older adults is related to light to moderate use of alcohol (Djousse, Biggs, Mukamal, & Siscovick, 2007). In fact, some studies have demonstrated overall beneficial effects of moderate alcohol consumption in decreasing risk of death due to CHD among individuals with older-onset diabetes (Valmadrid, Klein, Moss, Klein, & Cruickshanks, 1999). Nonetheless, the increased risk of alcohol exacerbating the side effects and interfering with the therapeutic effects of diabetes medications makes additional research important to clear these inconsistent findings.

There is also a high prevalence of diabetes among older adults taking methadone for the treatment of an SUD, with Rosen and colleagues (2008) finding that 11.4% of methadone maintenance patients aged 50 years and older had diabetes.

5.3.4 HIV/AIDS

Nearly 50% of persons with HIV/AIDS have reported current or past histories of SUDs (Bing et al., 2001), while slightly more than half of HIV-positive women (51%) have a history of SUDs (Morrison et al., 2002). Co-occurring SUDs and HIV in older adults consist frequently of cannabis use disorders, with 13% of HIV-positive older adults commonly using cannabis (in medical or recreational forms) to enhance appetite and relieve persistent neuropathic pain (Rabkin, McElhiney, & Ferrando, 2004). Studies have also shown that alcohol and cocaine are heavily used by older adults with HIV/AIDS (Durvasula & Miller, 2014; Tobias, Lippmann, Pary, Oropilla, & Embry, 1989).

In general, the co-occurrence of SUDs and HIV/AIDS results in immunosuppression (the reduction of the activation of the immune responses), increased risky sexual behaviour (e.g., not using condoms, having multiple sex partners) and high healthcare utilization (Chander, Himelhoch, & Moore, 2006). Older adults with HIV/AIDS and SUDs are also found to transmit the virus directly due to riskier sexual behaviours or the sharing of contaminated injection equipment (Klinkenberg & Sacks, 2004). Given that older adults with HIV/AIDS could have differential risks of SUDs, identifying this co-occurrence is important.

5.3.5 Insomnia

SUDs involving benzodiazepines have commonly been related to greater rates of insomnia and anxiety within the older adult population (Egan, Moride, Wolfson, & Monette, 2000). One study found that 42% of older adults with insomnia have been prescribed benzodiazepines in primary care (Simon & Ludman, 2006). Another study found that benzodiazepines have been prescribed to 31.4% of individuals 65 to 80 years of age versus 14.7% of those between 18 and 35 years of age, with twice the prescription rate among older females than males (Olfson, King, & Schoenbaum, 2015). This is not surprising given that the prevalence of insomnia increases with age; however, clinical guidelines have recommended non-pharmacological options for treating insomnia, including sleep hygiene, stimulus control and relaxation, with benzodiazepines prescribed on a short-term basis (National Institute for Health and Care Excellence, 2004). Yet reports show that 24.3% of Canadian adults aged 65 years and older are using long-acting benzodiazepines (Preville et al., 2012), which is alarming given the risks associated with the age-related changes in pharmacokinetics and pharmacodynamics with extended periods of action (Madhusoodanan & Bogunovic, 2004).

Chronic insomnia is defined as two or more weeks of trouble falling asleep or waking too early (Ford & Kamerow, 1989). Among older adults, a common misperception among those who use alcohol is that it helps them fall asleep. While this is plausible for younger individuals, tolerance rapidly develops and can lead to sleep interference and trouble staying asleep, resulting in disrupted sleeping patterns and insomnia in older adults (Roehrs & Roth, 2001). Interestingly, one study found that insomnia might be a potential causal factor of late-life alcohol problems as well as relapse (Oslin & Liberto, 1995). Additional research is warranted to determine whether the use of alcohol further worsens insomnia among older adults.

CLINICAL VIGNETTE

JANE

Jane, a 67-year-old woman from Halifax, recently retired from the company where she worked for 37 years. Her husband passed away six months ago and her only daughter, Samantha, lives in Edmonton with her own two-year-old daughter. With Samantha having just gone through a messy divorce, Jane wanted to see both her daughter and granddaughter.

In the past, Jane had been treated by her family doctor for major depression, high blood pressure and type 2 diabetes. She recently developed anxiety and experienced panic attacks for the first time, likely brought on by having to take care of so many more commitments since her husband died. About four months ago, Jane's family doctor gave her a monthly prescription for a benzodiazepine (lorazepam, 1 mg) to help with her sleep and anxiety problems. Even though Jane vowed to use the drugs only if she really needed them, she has taken this new medication virtually every day.

In her rush to make her flight to Edmonton, Jane forgot her medications. Because she and her husband were frequent business travellers, she was able to get an upgrade to business class. It was a turbulent flight and she admits to having "a few too many free drinks" to calm her nerves. Two days after arriving in Edmonton, Jane told Samantha she wasn't "feeling right." Within a few hours, she had a seizure and was rushed to a local emergency department. The attending doctor concluded that Jane had a sedative-hypnotic withdrawal-related seizure and admitted her to hospital for further observation.

5.3.6 Chronic Pain

Over the past decade, many older adults have reported the non-medical use of prescription drugs for chronic pain. The non-medical use of prescription drugs has become part of an invisible epidemic of polypharmacy in older adults (Kalapatapu & Sullivan, 2010). The drug used most often by baby boomers to relieve the symptoms of chronic pain and physical health conditions is cannabis (Lau et al., 2015a). It is a common misperception that there is minimal risk in using cannabis, especially when compared to other illicit drugs or alcohol. Many older adults view cannabis as a safer alternative, with a low risk of addiction and less-adverse side effects (Lau et al., 2015b). Yet trauma patients aged 50 years and older who test positive for cannabis have higher odds of hospital admissions, operations and stays than those who test negative.

Most adults who smoke cannabis in later life have been doing so since their teens; this long-term use could be associated with the exacerbation of existing physical and mental health problems (Choi et al., 2016). A higher prevalence of older adults using cannabis today compared to previous generations could have implications for the healthcare system, such as increased healthcare costs resulting from longer hospital stays caused by cannabis-related adverse events (Pacula, Ringel, Dobkin, & Truong, 2008).

5.3.7 Conclusions

Medical conditions co-occurring with SUDs in older adults are highly prevalent. While healthcare providers can easily rule out serious physical problems such as heart conditions, diabetes, HIV/AIDS or chronic pain in younger patients, it is not as clear and straightforward in older patients. Given that common medical disorders can influence SUDs in the older adult population, better diagnostic and treatment options are needed.

5.4 Evidence-based Treatment of Comorbidities in Older Adults

It is estimated that the percentage of the population aged 50 years and older requiring substance use treatment will increase from 4% in 1995 to as high as 34% by 2020 (Wu & Blazer, 2011). In addition to the common underdiagnosis of SUD comorbidities in older populations, adults over the age of 60 are often excluded from clinical trials examining the safety and efficacy of existing or new treatments for SUDs. That said, the existing models of SUD treatment — including direct observation and methadone maintenance (in specific subgroups of individuals who use substances), motivational interviewing and cognitive behavioural therapy — have been shown to enhance adherence and reduce substance use in older outpatients (Durvasula & Miller, 2014).

The effects of aging on the reward system and the psychological changes that occur with advancing age (e.g., greater wisdom, less risk taking) might have an influence on the types and patterns of SUDs experienced by older adults, as well as the effectiveness of behaviour change (Lim & Yu, 2015). Existing comorbid medical and psychiatric disorders could also influence treatment choices and options. The distinctive biological and psychosocial characteristics of older adults that predispose them to addiction, along with other risk factors such as polypharmacy, must therefore be considered when using various treatment options.

Treatment programs specific to older adults have been shown to have better retention rates in experimental groups compared to control groups (Kofoed, Tolson, Atkinson, Toth, & Turner, 1987). These programs include pharmacological options, psychosocial interventions and integrated approaches.

5.4.1 Pharmacological Options

Depending on the SUD, there are several pharmacological treatments available for older adults. Given the age-related pharmacokinetic and pharmacodynamic changes, the level of dosing required for older populations is generally lower than that of younger age groups. To date, most of the research in this area has focused on medications for treating tobacco smoking and alcohol use in older adults. Pharmacological treatments for tobacco use include smoking cessation aids such as varenicline, bupropion and nicotine replacement therapies, such as nicotine patches (Tait et al., 2007). For alcohol use disorder, naltrexone and disulfiram have commonly been used and are effective at both reducing drinking and preventing relapse (Oslin, Liberto, O'Brien, Krois, & Norbeck, 1997). Treatment of opioid use disorder has commonly included methadone and buprenorphine/naloxone (Gossop & Moos, 2008).

Pharmacotherapies are less commonly used for SUDs co-occurring with physical and psychiatric conditions in older adults due to the numerous potential interactions of these medications with the drugs already being taken to treat the comorbid conditions. Nonetheless, some studies have been conducted in comorbid populations, such as one looking at the use of lamotrigine in adults with HIV using crack cocaine (Margolin, Avants, DePhilippis, & Kosten, 1998). Varenicline has also been shown to be effective in smoking cessation outcomes among patients with schizophrenia (Pachas et al., 2012; Williams et al., 2012) and bipolar disorder (Chengappa et al., 2014). However, these studies were completed in populations with mean ages of approximately 46 years.

5.4.2 Psychosocial Interventions

Several psychosocial interventions have been proven to be effective in older adults with SUDs, with some of the less-intensive options including brief interventions (such as relatively unstructured counselling) aimed at reducing substance use (Fleming, Barry, Manwell, Johnson, & London, 1997). For instance, 10 to 30% of individuals who engage in problematic drinking have been found to reduce their drinking after just one to three brief intervention sessions (Fleming, Manwell, Barry, Adams, & Stauffacher, 1999).

If brief interventions are not effective in older adults, motivational interventions should be considered. Such techniques evaluate an individual's willingness to change their substance use (Purath, Keck, & Fitzgerald, 2014). Cognitive behavioural therapy (CBT) has also led to reductions in alcohol use in older adults with SUDs by helping them set goals and identify strategies for change (Morin et al., 2004). CBT has shown promise among older adults with co-occurring physical and psychiatric disorders (Edinger, Wohlgemuth, Radtke, Marsh, & Quillian, 2001). In individuals with SUDs and HIV/AIDS, gay-specific CBT and social support therapy (which contextualize treatment to the societal and interpersonal experiences of gay men) have resulted in two-fold decreases in substance use (Durvasula & Miller, 2014). Educational groups, which use similar concepts and processes as those found in CBT, have also been found effective in older adults with SUDs (Kuerbis et al., 2014).

5.4.3 Integrated Care Approaches

In general, compared to younger adults, older patients have been found to engage well and over a longer duration of time in integrated treatment programs that include combinations of psychosocial and pharmacotherapy (Lemke & Moos, 2003). For example, motivational interviewing has often been integrated into methadone maintenance programs, resulting in less risky sexual activity among individuals with HIV/AIDS and co-occurring SUDs (Durvasula & Miller, 2014). However, the specific study demonstrating this result involved middle-aged individuals, signalling the need for additional research among older adults.

Integrating screening and brief interventions for comorbid SUDs and physical or mental health disorders into mainstream primary care could result in decreases in healthcare costs in older populations. Currently, the availability of such approaches is limited in the older adult population, which highlights the importance of appropriately involving older adults in existing integrated approaches.

In addition, given the age-related pharmacokinetic and pharmacodynamic changes, older adults might require lower drug doses compared to the general population. Future studies should therefore seek to include older adults for treatment trials.

5.5 Conclusion

There is a clear need for specific programs that support older adults with SUDs. While alcohol is the primary problematic substance later in life, the increasing non-medical use of prescription drugs (such as opioids and benzodiazepines) and the increasing use of illicit drugs are emerging issues that need to be addressed.

By 2020, an estimated 56% of adults aged 50 years and older will have used drugs at some point during their lifetime — nearly double the rate (26%) reported in 2001 (Gfroerer et al., 2003). Even more alarming, the number of older adults who will require treatment for illicit drug use is projected to increase by 500% between 1995 and 2020 (Gfroerer & Epstein, 1999). With the world's population of older adults expected to grow dramatically in the decades to come, the need for effective treatments and healthcare services targeting older adults with SUDs will likewise continue to grow. Furthermore, these numbers highlight the need to continue targeting younger populations, as doing so could help reduce the number of older adults with SUDs in the future.

The high prevalence of SUDs in older populations raises concerns, especially considering the potential impact of comorbid diagnoses such as psychiatric illnesses, hypertension, anemia, dementia, diabetes, delirium and suicide. Also concerning is the prevalence of SUDs being under-reported due to stigma or underdiagnosis by healthcare professionals (DeMers, Dinsio, & Carlson, 2014; McGinty, Goldman, Pescosolido, & Barry, 2015). Clinicians treating older adults often overlook SUD diagnoses, resulting in a lower index of suspicion for comorbidities that might otherwise present covertly as falls or cognitive impairment. However, surveillance data indicate that one in 10 admissions among the older adult psychiatric population are associated with an SUD, underscoring the importance of better treatment programs and recognition of co-occurring diagnoses.

Raising awareness of SUDs among older adults and their healthcare providers could help clinicians' efforts to identify and treat these conditions. Knowing which mental health diagnoses are co-occurring with SUDs among older adults might also provide better risk prediction and decreased healthcare costs. The following chapter provides an in-depth examination into the screening and assessment of problematic substance use among older adults.

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Substance Use In Canada—Improving Quality of Life: Substance Use and Aging

06

CHAPTER

Detection, Screening and Assessment

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CHAPTER AT A GLANCE

- While physicians and caregivers often overlook the possibility of problematic alcohol and substance use among older adult patients, there are also many barriers to detecting such use in this population.
- Screening tools and processes should be tailored specifically to older adults and take into account their sensitivities, including concerns about stigma.
- There is no consensus on the most appropriate and useful screening tools for older adults.
- Screening for substance use should be carried out for all older adults during routine health examinations and hospitalizations, when certain physical or mental health problems arise, or if the person is experiencing a major stressful life event.
- Standard diagnostic criteria might have limited applicability for older adults.
- A comprehensive assessment of older adults is essential, including a full history of substance and medication use, comorbid medical and psychiatric illnesses, social and family history, and functional assessment and cognitive screening.
- There is an urgent need for better training of healthcare professionals and students on the prevention, detection and care of older adults with substance use disorders.

6.1 Introduction

There is a common belief that problematic substance use is an issue that affects only young people. However, there is increasing evidence to suggest a growing number of older adults in many countries are experiencing substance-related problems (Substance Abuse and Mental Health Services Administration, 2013; Office for National Statistics, 2013; Hallgren, Hogberg, & Andreasson, 2010; Searby, Maude, & McGrath, 2015).

Consider the "baby boomers," who grew up in a time of greater acceptance of substance use. As they have aged, they have continued to use illicit drugs (especially cannabis), often combined with alcohol. As a result, it is projected that the number of older adults in the United States who misuse substances will grow from 2.5 million in 1999 to 5 million in 2020 (Gfroerer, Penne, Pemberton, & Folsom, 2003). In Canada, 72.1% of adults aged 65 and older drink alcohol, with 8.4% exceeding the limits set out in *Canada's Low-Risk Alcohol Drinking Guidelines* (Health Canada, 2013). More specifically, 11% of Canadians aged 65–74 are exceeding the recommended limits, along with 3.7% of those 75 and older.

With the number of older adults expected to rise rapidly over the coming decades, the prevalence of all disorders affecting older adults will also rise at a significant rate. The imminent legalization of non-medical cannabis, the rapid growth in the use of medical cannabis and the ongoing opioid crisis will also present significant challenges for Canadians of all ages.

Despite the evidence of harm related to the use of alcohol and other substances, there has been a lack of research and interventions aimed specifically at older adults (O'Connell, Chin, Cunningham, & Lawlor, 2003). Most individuals who misuse substances never receive appropriate treatment due to a number of barriers, with one of the most notable being a lack of detection. In fact, approximately two-thirds of all cases of problematic alcohol use in older adults remain undetected by physicians (Beullens & Aertgeerts, 2004).

6.2 Barriers to Identifying Substance Use in Older Adults

Researchers have noted numerous barriers to the detection of substance use disorders in older adults, with Koh and colleagues (2016) compiling a comprehensive list of potential barriers faced by both clinicians and older adults. Their findings are summarized in Table 1.

Table 1: Clinician and older adult barriers to identifying substance abuse

Clinician's barriers	
• Age-related assumptions (e.g., belief that substance use is less prevalent in older age) • Failure to recognize or attribute symptoms to substance abuse, which can be masked by other physical ailments	• Problems in effectively screening for substance abuse in older adults • Discomfort with addressing substance abuse with older adult patients • Absence of collateral information from family members and caretakers
Older adults' barriers	
• Symptoms are attributed to getting older or another illness • Lack of insight into their substance use and failure to voluntarily seek help • Stigma of seeking help and of the terms "addiction" and "substance abuse" • Knowledge gap about how psychiatrists can help with substance abuse	• Reluctance to report due to shame, denial, desire to continue using or pessimism about treatment and recovery • Cognitive problems, including substance-induced amnesia or underlying dementia • Family members and caretakers might not adequately report concerns about substance abuse

Source: Koh, Gorney, Badre, & Jeste (2016), adapted from Royal College of Psychiatrists (2011).

In their overview of detection of alcohol-related problems among older adults, Taylor and colleagues (2014) added societal factors to their list of barriers: societal attitudes and assumptions, ageism, stigma, governmental policies that focus only on younger people and a lack of research involving older adults. They also include organizational factors such as the lack of suitable detection tools, clinical guidelines and training opportunities for professionals related to the care of older adults. Another challenge to identifying substance use in older adults is that there is still significant debate about how to define "risky" and "problematic" use of certain substances such as cannabis (Casajuana et al., 2016).

6.2.1 Training and Education of Healthcare Practitioners

There is evidence of an overall lack of awareness and knowledge about alcohol and other substance use disorders among healthcare practitioners. In a literature review, Ram and Chisholm (2016) described the urgent need for improving substance use and addiction training, noting insufficient exposure to these topics in medical schools. Current training focuses mainly on transmitting knowledge with relatively little emphasis on the attitudes and skills that are vital to effective prevention and treatment. Given the gap between clinical need and physician education, increased training in medical schools will ultimately enhance the practice of evidence-informed care.

A study from Australia focused on the role of general practitioners, who are in a unique position to detect and manage patients with comorbid mental health and substance use disorders (Marshall & Deane, 2004). The study found that more than 30% of patients presenting to general practice have a diagnosable mental health disorder, with 12% having co-occurring mental health and substance use disorders. However, it is suggested that 30–50% of these disorders go undetected in the general practice setting, likely due to limited education and training. The study's authors also found significant deficiencies in the use of screening tools, provision of counselling and referral to specialist services, further emphasizing the need for additional training.

Similarly, an Irish study of healthcare professionals working in emergency departments found low rates of detection of problematic substance use (Kelleher, 2007). Deficiencies in healthcare professionals' knowledge and attitudes about substance use could have a negative influence on the care patients receive, causing such problems to be misdiagnosed or undetected. In comparison, a study looking at nursing students' experiences following training on the use of a screening, intervention and referral tool noted that the students said the training had a positive impact on their attitudes and feelings of self-efficacy (Braxter et al., 2014).

6.3 Screening

The utility of screening programs is the subject of much debate. Any recommendations for screening must weigh the potential benefits of identifying a disorder and the treatability of a particular disorder versus any potential adverse effects from the screening process as well as cost considerations.

One argument in favour of screening is that once a disorder is identified, there is evidence older adults can benefit from a variety of intervention programs. For example, a study by Fleming and colleagues (1999) found two brief counselling sessions that incorporated advice, education and a contract led to a 34% reduction in weekly alcohol use, a 47% reduction in binge drinking episodes over a 12-month period and a 62% reduction in excessive drinking.

In contrast, there is limited evidence on the harms of screening and subsequent behavioural counselling for substance use. Possible harms could include anxiety, labelling and discrimination, or interference with the doctor-patient relationship. The United States Preventive Service Task Force concluded that the benefits of screening and brief counselling for alcohol misuse outweigh any risks among adults aged 18 or older in primary care settings (Moyer, 2013).

Some organizations recommend screening all older adults for substance use as part of a routine health check (Royal College of Psychiatrists, 2011). For example, the U.S. Substance Abuse and Mental Health Services Administration recommends that every person over the age of 60 be screened for problematic use of alcohol and psychoactive prescription drug use during their regular physical examination. Screening should also be done when certain physical symptoms are present, or if the older adult is undergoing major life changes or transitions. There are a number of physical symptoms that can be used as cues to conduct screening on older adults. These symptoms include sleep difficulties, cognitive impairment, seizures, malnutrition, muscle wasting, irritability, unexplained chronic pain, incontinence or other urinary problems, poor hygiene

and self-neglect, unusual restlessness and agitation, blurred vision, dry mouth, unexplained nausea or gastrointestinal symptoms, tremor, motor incoordination, slurred speech, frequent falls and unexplained bruising (Substance Abuse and Mental Health Services Administration, 2012).

6.3.1 Screening Tools and Approaches

With older adults, the screening process should be tailored to reflect the specific sensitivities of this population, including concerns about stigma. It should also take into account sensory, cognitive, cultural and environmental issues.

Screening for Alcohol

Taylor and colleagues (2014) provided an in-depth analysis of the various screening tools available for problematic alcohol use in older adults. One approach described was to ask about a patient's alcohol history as a basic form of screening. Specifically, this involves asking patients if they have consumed alcohol within the past three months; if the answer is "yes," the next step is to take their full alcohol history. This type of screening is easy to do as part of a clinical assessment and may be more sensitive than other screening methods, such as the CAGE questionnaire (see following page).

Some primary healthcare professionals prefer to use one or two simple screening questions as a useful starting point. Recognizing the important role screening plays in primary care, in 2012 the Canadian Centre on Substance Use and Addiction (CCSA) and the College of Family Physicians of Canada produced *Alcohol Screening, Brief Intervention and Referral: A Clinical Guide*. Focused on alcohol use, this toolkit incorporates the recommendations set out in CCSA's *Canada's Low-Risk Alcohol Drinking Guidelines.*

Spotlight: Low-risk drinking guidelines for older adults

On behalf of the National Alcohol Strategy Advisory Committee, a group of independent experts from Canada and around the world developed *Canada's Low-Risk Alcohol Drinking Guidelines* (LRDGs). The LRDGs are a key component of the National Alcohol Strategy and were informed by the technical report, *Alcohol and Health in Canada: A Summary of Evidence and Guidelines for Low-Risk Drinking* (Butt, Beirness, Gliksman, Paradis, & Stockwell, 2011).

To reduce the long-term health risks of alcohol use, the LRDGs recommend no more than two drinks a day or 10 drinks a week for women, and no more than three drinks a day or 15 drinks a week for men, balanced with non-drinking days. As the LRDGs were designed for adults 25 to 65 years old, they do not recommend a specific lower level of drinking for older adults. However, CCSA (2017) recommends that older adults never exceed the limits prescribed in the LRDGs, noting that older adults might process alcohol more slowly, resulting in increased sensitivity to its effects and associated risks.

In the United States, the National Institute on Alcohol Abuse and Alcoholism recommends a lower level of consumption for older adults: a maximum of seven drinks per week or three drinks in a single day.

The Canadian Coalition for Seniors' Mental Health has recently received funding to create guidelines for older adults related to four substances (alcohol, benzodiazepines, cannabis and opioids). These guidelines will be released in 2018 and may include specific recommendations for low-risk drinking.

The widely used CAGE questionnaire is an acronym for the four questions it asks about **cutting** down on drinking, being **annoyed** by criticism about one's drinking, having **guilty** feelings about drinking and starting the day with a drink (an **eye opener**) — making it easy to remember and administer (Ewing, 1984). Buchsbaum and colleagues (1992) found that one or more "yes" responses on the CAGE questionnaire had a sensitivity of 86% and specificity of 78% in medical outpatients over the age of 60.

What are sensitivity and specificity?

The **sensitivity** of the CAGE questionnaire refers to the probability that the screening test will be positive among those who have problematic drinking.

In contrast, **specificity** reflects the probability that the screening test will be negative among those who do not have problematic drinking.

One study comparing the CAGE questionnaire with the Michigan Alcohol Screening Test (MAST) concluded that while both have low sensitivities in older adults, the CAGE questionnaire is more effective overall (Jones, Lindsey, Yount, Soltys, & Farani-Enayat, 1993). Some disadvantages of the CAGE questionnaire include the fact that it was not specifically developed for older adults, it focuses on dependence and not harmful use, and it looks at lifetime use and not current habits. In addition, fewer than half of those who screen positive on either the CAGE questionnaire or the Short Michigan Alcohol Screening Test — Geriatric (SMAST-G; see Table 2) screen positive on both measures, suggesting the two tests might be capturing different aspects of problematic alcohol use (Moore, Seeman, Morgenstern, Beck, & Reuben, 2002).

As the full version of the SMAST can take about 10 minutes to administer, its usefulness in clinical practice is limited. The shorter version of the test, the SMAST-G, is preferred. Blow and colleagues (1998) found that the SMAST-G had a sensitivity of 85% and specificity of 97% compared with a *Diagnostic and Statistical Manual of Mental Disorders* diagnosis of alcohol abuse or dependence.

A group supported by the World Health Organization developed the Alcohol Use Disorders Identification Test (AUDIT). In addition to being widely tested in multiple countries, this screening tool has been validated cross-culturally, including in older adults. A 10-question tool that takes only a few minutes to complete, the AUDIT provides information on current quantity and frequency of drinking. Its strength lies in its ability to identify those who have problems with alcohol but might not yet be dependent (Berks & McCormick, 2008). However, the AUDIT was not developed specifically for older adults and has been found to perform poorly in older adults in some studies (Culberson, 2006).

Table 2. Short Michigan Alcoholism Screening Test — Geriatric

Scoring: Two or more "yes" responses indicates an alcohol problem
1. When talking with others, do you ever underestimate how much you drink?
2. After a few drinks, have you sometimes not eaten or been able to skip a meal because you didn't feel hungry?
3. Does having a few drinks help decrease your shakiness or tremors?
4. Does alcohol sometimes make it hard for you to remember parts of the day or night?
5. Do you usually take a drink to relax or calm your nerves?
6. Do you drink to take your mind off your problems?
7. Have you ever increased your drinking after experiencing a loss in your life?
8. Has a doctor or nurse ever said they were worried or concerned about your drinking?
9. Have you ever made rules to manage your drinking?
10. When you feel lonely, does having a drink help?

Source: University of Michigan Alcohol Research Center (1991).

The AUDIT-C is a shortened version of the AUDIT that uses only three questions:

- How often did you have a drink containing alcohol in the past year?
- How many drinks did you have on a typical day when you were drinking this year?
- How often did you have six or more drinks on one occasion in the past year?

Each question is scored on a scale from 0 to 4, with a higher score assigned to heavier or more frequent alcohol use. For older adults, a total AUDIT-C score of 4 or higher (out of 12) could indicate problematic drinking (Aalto, Alho, Halme, & Seppa, 2011). The AUDIT-C has been shown to have nearly identical sensitivity as the full instrument in a general primary care population (Bradley et al., 2007).

Another tool, the Senior Alcohol Misuse Indicator (SAMI), is popular in some areas of Canada. The SAMI tool was designed to be sensitive to the feelings of older adults by asking questions in a nonjudgmental way, initially focusing on physical or emotional symptoms. It is also designed to provide for a collaborative discussion between clinician and patient with opportunities for education about the harmful effects of alcohol (Lum, 2005).

In their overview of the available alcohol screening tools, Taylor and colleagues (2014) concluded there is a need for better detection tools for specific use in older adults. They suggest no one screening tool is adequate on its own and that no tool or questionnaire can be an adequate substitute for taking a full patient history of alcohol use. They also note the need for clinicians to consider the possibility of alcohol use disorders across a variety of different settings. For example, the Substance Abuse and Mental Health Services Administration (2012) recommends using the CAGE questionnaire and the MAST-G for screening for alcohol use among older adults, and the AUDIT for identifying alcohol problems among older adults in minority ethnic groups.

Screening for Other Substances

Screening tools for substances other than alcohol include the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST), the Prescription Drug Use Questionnaire Patient Version (PDUQp) and the Drug Abuse Screening Test (DAST-10).

The ASSIST, which was developed by the World Health Organization and validated in older adults, screens for problematic or risky substance use through eight questions covering tobacco, alcohol, cannabis, cocaine, amphetamine-type stimulants, inhalants, sedatives, hallucinogens, opiates and other drug use (Humeniuk et al., 2008). This tool is user-friendly and quick to administer, with the advantage of screening for multiple substances at the same time. Significant correlations with other measures of alcohol use disorders were found using the ASSIST in French geriatric outpatients (Khan et al., 2012).

The PDUQp was recently tested in patients aged 50 or older who went to an emergency department due to prescription opioid misuse and opioid use disorder (Beaudoin, Merchant, & Clark, 2016). The study's authors concluded that it could be a viable instrument, but likely requires some modifications to increase its predictive value in the older adult population. The PDUQp also takes about 20 minutes to complete, which might limit its use in many clinical settings.

The DAST-10 is a brief general screening tool for "drug abuse," excluding alcohol and tobacco, and can be completed in under eight minutes (Skinner, 1982).

A recent Australian study used both the AUDIT-C and the ASSIST to screen for alcohol and substance use among older adults in both a geriatric hospital and community health setting (Draper et al., 2015). The results showed that 19.5% of participants screened positively for alcohol and substance use, with 17.1% positive for alcohol use, 3.3% for non-medical benzodiazepine use and 1% for non-medical opioid use. Using the ASSIST, 12.4% were rated as medium-high risk. A score of five or higher on the AUDIT-C was used to determine risky alcohol use. The study's authors concluded that, while many patients in geriatric health services have risky alcohol or substance use, there are few clinical features that distinguish them from other patients. As a result, they recommended routine screening of alcohol and substance use in these settings.

Screening for inappropriate use of prescription drugs requires questions that focus on adherence, prescriptions from multiple physicians, where prescriptions are filled, and the use of over-the-counter and alternative medications. Simoni-Wastila and Yang (2006) listed a number of additional warning signs that could indicate inappropriate use of prescription drugs, including:

- Excessive worry about whether psychoactive medications are working or about the supply and timing of medications;
- Detailed knowledge about or attachment to a particular drug;
- Complaints about other physicians who refuse to write prescriptions;
- Excessive daytime sleepiness;
- Changes in personal grooming and hygiene; and
- Social withdrawal.

When considering which screening tool to use with older adults, it is important to keep in mind that each tool varies in terms of ease of use, sensitivity, specificity and applicability to different subsets of this population. Therefore, it might be useful to employ more than one tool to improve screening effectiveness (Moore et al., 2002; Koh et al., 2016). Some laboratory tests, such as mean cell volume and liver function tests, can be used as a form of screening. These tests can show damage relating to alcohol use in older adults at lower levels of consumption, making it a more sensitive test in this population.

6.4 Assessment

There is always a need for comprehensive assessment when evaluating older adults. A guide from the United Kingdom's Royal College of Psychiatrists (2015) provides useful considerations about history-taking and systematic assessment in older adults. It emphasizes the need for a non-judgmental, non-ageist approach that takes into account the values and experiences of the patient. It is also points out that it is important to adjust the tempo of the assessment according to the needs of the patient.

In the case of a possible diagnosis of a substance use disorder, considerable information must be gathered from the patient and often from providers of collateral information such as family members and caregivers. An essential biopsychosocial approach includes the following items:

- A full history of the patient's medical and psychiatric illnesses;
- The patient's use of medications and other substances;
- The patient's personal and family history;
- A mental status examination, including cognitive screening;
- Where appropriate, a physical examination or blood and urine tests (or both); and
- Neuroimaging for individuals with recent head injuries or when there is evidence of cognitive impairment.

6.4.1 Diagnosing a Substance Use Disorder

A diagnosis of a substance use disorder can be made using the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5; American Psychiatric Association, 2013). However, unlike in DSM-IV, DSM-5 does not separate the diagnoses of substance abuse and dependence. Instead, criteria are provided for substance use disorder accompanied by criteria for intoxication, withdrawal, substance/medication-induced disorder and unspecified substance-induced disorder.

For the most part, the criteria for substance use disorder are identical to the combined DSM-IV diagnoses of substance abuse and dependence, but with two exceptions:

- First, the criterion of "legal problems" was deleted from DSM-5 and a new criterion of "craving or a strong desire or urge to use a substance" was added.
- Second, the number of criteria required for a diagnosis of a substance use disorder is now set at two or more. The severity of the disorder is based on the number of criteria endorsed, with two or three criteria indicating a mild substance use disorder, four or five criteria indicating a moderate substance use disorder, and six or more criteria indicating a severe substance use disorder.

Early remission is defined as at least three but less than 12 months without meeting any criteria, while sustained remission is defined as at least 12 months without any criteria, except craving.

Many of the DSM-5 criteria are more relevant to younger people, particularly those that focus on functional level (Farkas, 2014). In addition, these diagnostic items might not be especially relevant or useful for many older adults, especially those who are socially isolated and do not drive, work or volunteer. Observations of physical symptoms and changes in health are more appropriate when assessing this population, with poor sleeping and eating habits being common and often related to substance use in older adults.

6.4.2 Diagnostic Challenges of Co-occurring Disorders

The multiple overlapping medical problems often seen in older adults can create a complex diagnostic challenge for clinicians. In many cases, older adults will attribute health symptoms to their underlying medical conditions rather than substance use. The relationship between alcohol use and cognition in older adults is also complicated, as chronic alcohol use can lead to a variety of cognitive disorders such as alcohol-related dementia and Wernicke-Korsakoff syndrome. To complicate matters further, patients could present with evidence of mixed dementia, including features of vascular dementia and Alzheimer's disease, in addition to a history of excessive alcohol use.

Specific criteria for alcohol-related dementia have been proposed and validated in at least one study (Oslin & Cary, 2003). It is important that clinicians use an appropriate standardized cognitive screening test during assessment, such as the Mini-Mental State Examination or the Montreal Cognitive Assessment (Folstein, Folstein, & McHugh, 1975; Nasreddine et al., 2005). In addition to cognitive screening, clinicians should evaluate the person's ability to function, including basic functions ("activities of daily living") and more complex tasks ("instrumental activities of daily living"; Lawton & Brody, 1969). It is also important to evaluate the presence of chronic pain, which is commonly associated with alcohol and other substance use.

Delirium and withdrawal

In hospital inpatient units and emergency departments, it is especially important to rule out delirium. One common cause of delirium is delirium tremens related to acute alcohol withdrawal, which most commonly presents as a hyperactive delirium with agitation and visual hallucinations. The Confusion Assessment Method is a validated and easy-to-use screening instrument that is widely recognized for its use in detecting delirium (Inouye et al., 1990).

There is significant co-occurrence of substance use disorders and other mental health disorders. For example, the vast majority of older adults with a DSM-IV diagnosis of either alcohol abuse or alcohol dependence have a history of depression. Similarly, depressed older adults are at least three times more likely than non-depressed older adults to have an alcohol use disorder (Caputo et al., 2012; Devanand, 2002). Older adults with generalized anxiety disorder are more than twice as likely as those without an anxiety disorder to have a substance use disorder (Mackenzie, Reynolds, Chou, Pagura, & Sareen, 2011). There is also a particularly high suicide rate among the older adult population, especially in men, with alcohol abuse and dependence being the second most common category of psychiatric disorder associated with completed suicide in this population (Blow, Brockmann, & Barry, 2004).

Some older adults can have an early onset disorder that has been present throughout much of their adult life (Farkas, 2014). These individuals may have a history of multiple treatment attempts as well as multiple medical and psychiatric problems associated with their substance use. There is often a history of marital and family dysfunction and estrangement, and there might be associated homelessness in some cases. The prognosis for early onset clients is often worse because of their lack of social support, chronic physical problems (such as liver and cardiovascular illness) and cognitive impairment.

In comparison, people with a late onset disorder are characterized by a history of more significant alcohol or drug use after mid-life. Some of these individuals may have been social drinkers. There is often a strong association between late onset of substance use and many of the mental and physical deficits associated with aging. Physicians might also unwittingly worsen the situation by prescribing additional medications that either interact with alcohol or lead to an additional substance use disorder. However, the prognosis for late onset substance use disorder is often good. When compared to those with early onset disorders, these individuals will typically have developed coping skills that do not involve the use of alcohol or other substances, and they often have stronger social support systems along with better physical and mental health (Farkas, 2014).

6.4.3 Atypical Presentations in Older Adults

Detection and diagnosis in older adults can be difficult as the signs of problematic substance use and addiction can be confused with symptoms of aging and a variety of other health problems associated with older age such as dementia, depression, Parkinson's disease, falls, sedation or insomnia. Changes in level of functioning can be attributed to other conditions or the aging process itself.

The signs of problematic alcohol or other substance use could also present differently from one older adult to the next, and might include a number of mental and cognitive health issues, behavioural changes, or physical signs and symptoms. Cognitive presentations can include signs of memory difficulty, delirium or even dementia, and there is sometimes an overlap between cognitive disorders and inappropriate substance use. Some patients could present with symptoms of depression or irritability. Behavioural changes could include isolation, lack of self-care and loss of interest or motivation. Physical changes could include weight loss or malnutrition, ataxia (lack of muscle control), falls, bruising, urinary incontinence or increasing frailty.

Depending on the setting, atypical presentation of substance use in older adults could include substance withdrawal states. Although alcohol withdrawal is the most common form, it is also possible for individuals to present with benzodiazepine or opioid withdrawal. Some patients who present with significant cognitive impairment could also have alcohol-related dementia or the associated Wernicke-Korsakoff syndrome (Oslin & Cary, 2003). Symptoms can include ataxia, confusion, vision changes (e.g., abnormal eye movements, double vision, drooping eyelids), significant short-term memory dysfunction, hallucinations and confabulation (distorted or misinterpreted memories).

Finally, as polypharmacy (the use of multiple pharmaceutical medications) is prevalent among older adults, the risk of misusing prescription and over-the-counter medication rises with aging. Clinicians should always consider the possibility that patients are using excessive amounts of medication related to either misuse or prescribed amounts, often by multiple physicians.

6.5 Training Needs for Healthcare Professionals

A recent report on alcohol, drugs and health by the Surgeon General of the United States stated that integration of mental health and substance use disorder care into general health care will not be possible without a workforce that is competently cross-educated and trained in all areas (U.S. Department of Health and Human Services, 2016). The report notes that only 8% of American medical schools require students to take a separate course on addiction medicine, while only 36% offer an elective course on that topic. Minimal or no professional education on substance use disorders is available for other health professionals. The report recommends that federal and state policies should require or incentivize medical schools to provide mandatory courses that will equip young healthcare professionals to address substance use and its consequences. Associations of clinical professionals are also encouraged to provide continuing education and training courses for those already in practice.

Ram and Chisholm (2015) reviewed the literature on the current inadequacies in substance use and addiction training in medical schools and suggested strategies to address this gap, focusing particularly on physician education. They emphasized that physicians often fail to adequately screen, diagnose and manage substance use disorders, with one study finding that less than one-third of primary care physicians carefully screened for substance abuse (O'Brien, 2008). Other studies have shown that physicians at outpatient clinics have a success rate in detecting individuals with substance use disorders of just 25–50% (Miller, Sheppard, Colenda, & Magen, 2001; Sillanaukee, Kaariainen, Sillanaukee, Poutanen, & Seppa, 2002).

Many factors contribute to the lack of appropriate screening and diagnosis. In addition to feeling unprepared or lacking confidence, some physicians can have negative or pessimistic attitudes about substance use disorder treatment (Miller et al., 2001). Such attitudes make the training of medical students especially critical: medical school represents the most formative time in a physician's career and exposure to the culture of medicine at that time can have a significant impact on professional identity.

Studies have suggested that, on average, U.S. medical schools devote only 12 hours of curricular time to substance use and addiction. In one survey, 119 of 125 accredited medical schools in the U.S. reported providing some education in substance use and addiction. However, only 12 had a separate required course in the curriculum and only 45 offered a separate elective course (Yoast et al., 2008). In addition, much of this training is focused on the biology of addiction, with relatively little education on appropriate attitudes such as respect, compassion and integrity, or on the treatment skills necessary to care for individuals who use substances.

Based on their findings, Ram and Chisolm (2015) suggested that medical schools expand the focus of their curricula to include information about evidence-informed substance use treatments, foster humanistic and professional attitudes, and provide students with opportunities to practice evidence-based treatment skills through standardized patients or clinical simulations.

6.5.1 Training Programs and Curricula

Despite the lack of formal training in substance use offered by medical schools, there are a number of innovative teaching programs currently in place, including a four-day service elective at homeless shelters; a web-based program focused on screening, brief intervention and referral to treatment; and a course that includes 14 web-based video modules with associated faculty development training (Packer, Carnell, Tomcho, & Scott, 2010; Tanner, Wilhelm, Rossie, & Metcalf, 2012; MedU, n.d.).

Other successful programs include Project Engage at Christiana Care Health System (one of the largest healthcare providers in the U.S.), which trains nurses to screen all patients about their substance use patterns. A positive screening results in a referral to behavioural counsellors for a brief intervention in the emergency department, as well as a referral for further treatment. Initial results suggest this program has had a positive impact on nurses' screening and referral behaviours — and also on their attitudes toward screening and referral (Pecoraro et al., 2012).

In their review of curriculum improvements in family medicine residency programs, Seale and colleagues (2010) described an eight-module curriculum based on the substance abuse core competencies defined by Project Mainstream of the Association for Medical Education and Research in Substance Abuse (2005). The core curriculum is focused on screening, brief intervention and referral to treatment, and can then be adapted by residency programs to meet their individual needs. The curriculum also encourages direct observation of family medicine residents to ensure the core competencies are learned adequately. Project Mainstream's core competencies for family medicine residents are summarized in Table 3 below.

It should be noted that the implementation of such a curriculum on a broad scale would require a new faculty development initiative to train supervisors, as well as a series of workshops to create a network of trained faculty.

6.6 Conclusion

Following the assessment and formal diagnosis of a substance use disorder, the next challenge for clinicians is to develop a treatment plan that includes full consideration of the wide variety of options. For older adults, the options for treatment are both pharmacological and non-pharmacological in nature, and can involve detoxification, short-term treatment and maintenance treatment.

Chapter 7 of this report provides more details on the available prevention and treatment options for older adults, taking into account the effective interventions and unique considerations for this population.

Table 3. Core competencies in substance abuse for family medicine residents

Residents will:
• Perform age-, gender- and culture-appropriate screening for unhealthy substance use
• Effectively assess patients with unhealthy substance use
• Provide brief interventions to patients with unhealthy substance use
• Demonstrate effective counselling methods to help prevent unhealthy substance use
• Refer patients with substance use disorders to treatment settings that provide pharmacotherapy or psychosocial counselling for relapse prevention
• Recognize, treat or refer comorbid medical and psychiatric conditions in patients with substance use conditions
• Refer patients with substance use disorders to appropriate treatment and supportive services
• Be aware of the ethical and legal issues around physician impairment from substance use and the resources for referring potentially impaired colleagues, including employee assistance programs, hospital-based committees, physician health programs and licensure boards
• Identify the legal and ethical issues involved in the care of patients with unhealthy substance use
• Provide pharmacologic withdrawal to patients with substance dependence
• Provide or refer to treatment for relapse prevention (both pharmacotherapy and psychosocial counselling) in patients with substance use disorders

Source: Seale, Shellenberger, & Clark (2010).

CLINICAL VIGNETTE

BARBARA

Barbara, an 81-year-old retired teacher, fell at home and fractured her hip, requiring surgery at her local hospital. She has a history of hypothyroidism, hypertension, urinary incontinence, cholecystectomy and high cholesterol. She also experienced mid-life depression and has taken citalopram for almost 20 years. When asked about her alcohol intake, Barbara said she was only a social drinker. She also told her doctor that she stopped taking her antidepressant several months earlier as she felt she didn't need it any longer.

On the third day after surgery, Barbara suddenly became agitated and disoriented, with vivid visual and tactile hallucinations, paranoid delusions and day/night reversal with severe insomnia. She was also experiencing tremors and a sensation of bugs crawling on her skin. Terrified and demanding to leave the hospital, Barbara was treated with haloperidol (5 mg intramuscular) and briefly put in physical restraints. A diagnosis of post-operative delirium was made but the cause was uncertain: blood work was normal with no evidence of infection. She scored 18 out of 30 on the Mini-Mental State Examination, and was unable to correctly place the numbers and hands when asked to draw a clock set to 10 past 11. When her daughters arrived, they said Barbara enjoys several large martinis every evening — and has been drinking significantly more since her husband died. They also reported some evidence of forgetfulness and told the doctor that Barbara had at least three falls during the past four months.

Barbara's presentation is classic for acute alcohol withdrawal. Delirium tremens generally occurs two to four days after a person's last alcoholic drink. During hospitalization, this diagnosis is often overlooked as many individuals lie about their alcohol intake. In this case, information from the family provided the essential details about Barbara's increased alcohol intake. Screening tools for substance use disorders are useful only when individuals provide an honest estimate of their intake.

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Substance Use In Canada—Improving Quality of Life: Substance Use and Aging

07

CHAPTER

Substance Use Treatment for Older Adults

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CHAPTER AT A GLANCE

- As the number of older adults with substance use disorders increases, it will become particularly important for treatment centres to offer age-specific services.
- Older adults face societal barriers as well as unique complexities in their physical and mental health, all of which make it difficult to identify and treat substance use disorders in this population.
- Physicians play a key role in increasing older adults' awareness of the relationship between substance use and health outcomes.
- A variety of patient-centred approaches and techniques can be incorporated into clinical practice to help identify, refer and treat substance use in older adults.
- Although age-specific services can lead to better treatment outcomes in older adults, the availability of such services in North America is limited.

7.1 Introduction

The baby boomer generation grew up in the 1960s when permissive attitudes toward drugs and alcohol were common. As a result, today's cohort of older Canadians have higher rates of past or current substance use disorders than previous cohorts (Gfroerer, Penne, Pemberton, & Folsom, 2003). As this generation continues to age, the number of older adults in need of substance use treatment services is expected to grow exponentially (Ialomiteanu, Hamilton, Adlaf, & Mann, 2013; Rotondi & Rush, 2012).

Historically, older adults have not participated in treatment programs as often as younger adults. There also remains a common societal misconception that problematic substance use and substance use disorders in older adults either do not exist or are not worth treating. However, there is a growing body of evidence that addiction treatment for older adults can reduce or stop substance use — improving both health outcomes and quality of life (Whitlock, Polen, Green, Orleans, & Klein, 2004; Kuerbis et al., 2015; Schonfeld et al., 2015; Ettner et al., 2014; Satre, Mertens, Areán, & Weisner, 2004; Oslin, Pettinati, & Volpicelli, 2002).

Older adults face unique barriers that contribute to the failure to identify and treat of substance use disorders (SUDs). For example, ageist beliefs cause older adults and healthcare professionals alike to internalize false stereotypes about aging (Butler, 1969; Blow, 1998; Morgan, Brosi, & Brosi, 2011). It is also common to see permissive attitudes toward older adults' use of alcohol and drugs. Caregivers, family, friends and medical professionals often view these substances as "one of the last few pleasures" for older adults, so they let the behaviour continue under the assumption that addiction cannot be treated in later life. While they might recognize problematic substance use among older adults, they choose not to address it (Klein & Jess, 2002; Benshoff, Harrawood, & Koch, 2003). Other barriers such as gender, religious beliefs, diminished social support and a lack of financial resources also contribute to the low levels of identification and treatment of SUDs in the older adult population.

Society's lack of understanding that addiction is not a choice but a chronic disease further contributes to the stigma and shame that often prevents older adults from seeking treatment for SUDs (U.S. Department of Health and Human Services [DoHHS], 2016). For others, the treatment options are limited or not specific to older adults. Issues related to diagnostic classification also lead to the underdiagnosis or misdiagnosis of SUDs in older adults.

7.2 Recognizing Substance Use Disorders in Older Adults

The most important step toward recognizing SUDs in older adults is simply accepting that such disorders are possible in this population (Taylor & Grossberg, 2012). The U.S. Substance Abuse and Mental Health Services Administration recommends yearly screening for all adults ages 60 and older as part of their regular physical examinations, as well as additional screening when experiencing changes in health status, major life events or transitions (e.g., loss of a partner or spouse, retirement, move to new home or location), a decrease in cognitive or behavioural functioning, or before prescribing new medications (Blow, 1998).

While some older adults will acknowledge their problematic use of alcohol or other drugs on their own, it is also common for the problem to be identified by concerned family or friends. In some cases, an SUD is identified while a patient is hospitalized for another health issue, usually because the sudden lack of access to alcohol or drugs causes withdrawal symptoms to emerge. For this reason, medical professionals, particularly primary and emergency care personnel, are especially well positioned to identify SUDs in older adults. (See Chapter 6 for more information on the various methods used to assess substance use in older adults.)

The low percentage of older adults in treatment for SUDs could be due partly to the fact that the symptoms of an SUD in older adults often mimic or are complicated by other health conditions. Comorbid health conditions common to the aging process (such as diabetes, high blood pressure, chronic pain, insomnia and gastrointestinal distress) can mask the signs of an SUD, making it more difficult to identify. Emotional and cognitive challenges such as dementia, Alzheimer's disease and depression can also mask the symptoms of an SUD, complicating assessment and treatment.

Due to the natural aging process, older adults experience unique complexities in their physical and mental health that make them more vulnerable to the effects of alcohol and medications. This increased vulnerability puts them at greater risk for harmful drug interactions, cognitive decline, injury, sleep problems, memory problems, liver disease, cardiovascular disease and mental health issues (Blow, 1998; Barry, 1997; Kirchner et al., 2007; Oslin, 2000; Maree, Marcum, Saghafi, Weiner, & Karp, 2016; Simoni-Wastila & Yang, 2006). Although some individuals use psychoactive prescription medications to "get high," many unintentionally develop a substance use disorder due to pain, anxiety, depression or insomnia (Simoni-Wastila & Yang, 2006; Blow et al., 2006).

7.2.1 Co-occurring Mental Health Issues

Major life changes that are, in some cases, unique to the aging process (such as the loss of a loved one, retirement and health issues) can all cause or worsen existing depression and anxiety — and increase the use of alcohol or drugs to cope with the stress. Studies show that older adults with SUDs have high rates of co-occurring psychiatric illnesses (ranging from 21% to 66%) and are associated with poorer health outcomes, higher health care utilization, social dysfunction, higher rates of suicide ideation, heightened mortality and poorer prognosis of mental illness when compared to individuals with either an SUD or psychiatric illness alone (Blow, 1998; Devanand, 2002; Salmon & Forrester, 2012; Blow, Loveland Cook, Booth, Falcon, & Friedman, 1992; Brennan, Schutte, & Moos, 2005; Blazer & Williams, 1980; Jinks & Raschko, 1990; U.S. DoHHS, 1999; Jeste et al., 1999).

A study by Blixen and colleagues (1997) found 38% of older adults admitted to a psychiatric hospital had both a psychiatric disorder and an SUD. This finding highlights the importance of systematic screening and specialized treatment for both substance use and comorbid psychiatric conditions.

7.3 Treatment Options for Older Adults

Depending on the type and severity of an SUD, the American Society of Addiction Medicine recommends that treatment begins with the least intensive option and then progress to more intensive options (David, 2013). The different levels of care available include:

- Outpatient care (weekly individual or group counselling);
- Intensive outpatient care (daily individual or group counselling over a longer period of time);
- Residential care (24-hour supervision and clinical monitoring); and
- Medically managed inpatient care (treatment services in a supervised medical or psychiatric hospital setting).

While many older adults benefit from low-intensity interventions, others do not. However, unless there is significant impairment, active suicidal ideation or other acute health concerns, older adults must be free to choose their preferred method of treatment. In general, older adults prefer a gentler motivational approach to a confrontational approach. Table 1 compares and contrasts these two treatment approaches.

Table 1. Substance abuse treatment preferences for older adults

Motivational approach	Confrontational approach
• De-emphasis on labels	• Accept self as addict
• Gentle, warm and caring	• Assertive
• Emphasis on personal responsibility	• Judgmental and controlling
• Elicit concern	• Present evidence of problem
• Meet resistance with reflection	• Meet resistance with correction
• Individual identifies goals	• Goals are prescribed
• Strategies are negotiated	• Strategies are prescribed

7.3.1 Acute Care: Intoxication and Withdrawal

An SUD cannot be fully addressed until the individual has been stabilized from a medical and psychiatric perspective (Bommersbach, Lapid, Rummans, & Morse, 2015). Once the individual has been identified as at-risk for an SUD, assessments for acute intoxication and potential for withdrawal are needed.

Older adults tend to have more medical and psychological comorbidities that go unrecognized than younger patients. They also have greater clinical risks associated with withdrawal and medical stabilization, especially if they have been taking a very high dose or have prolonged use of alcohol or other drugs. In these cases, detoxification in a medical setting is suggested. For safety, acutely intoxicated older adults should be referred to a medically monitored or managed setting. Under hospital supervision, clinicians are able to work on a safe detoxification and withdrawal process, while also managing medical and psychiatric comorbidities to minimize the chance of severe complications. Inpatient treatment could also be needed for individuals who are experiencing suicidal ideation, are frail, are experiencing relapse or are addicted to multiple substances.

The substances of most concern for older adults are alcohol, tobacco and psychoactive prescription medications, primarily benzodiazepines, sedatives and opioids used to treat sleep, pain and anxiety issues.

Treatment for Alcohol Use Disorder

Although clinicians can use their discretion in determining the setting for care, inpatient detoxification is generally recommended for older adults with alcohol use disorder. If the patient's history is well known and the symptoms are mild, outpatient monitoring might be appropriate as long as close daily monitoring is possible. However, it is important to note that even at lower daily intake, older adults experience an increased sensitivity to alcohol detoxification symptoms. They are more likely to have more severe and longer lasting alcohol withdrawal symptoms than their younger counterparts. Common symptoms of alcohol withdrawal in older adults include tremors, anxiety, insomnia, tachycardia (rapid heart rate) and diaphoresis (excessive sweating). Untreated symptoms can bring about serious complications such as seizures, delirium tremens (rapid onset of confusion), hallucinations and death (Goodson, Clark, & Douglas, 2014).

Initial treatment for alcohol withdrawal should include fluids, electrolytes, thiamine and magnesium. Depending on the severity, medication assisted therapy (MAT) can be used to alleviate the discomfort associated with withdrawal symptoms, although few studies have examined the use of MAT for alcohol withdrawal in older adults. Sedative hypnotics, such as shorter-acting benzodiazepines (lorazepam, alprazolam or oxazepam) have been recommended for delirium and seizures, but there is little information on dosing for older adults (Kraemer, Conigliaro, & Saitz, 1999; Taheri et al., 2014).

Studies of middle-aged adults have shown that anti-craving medications such as acamprosate and oral naltrexone can reduce return-to-drinking rates. However, none of these studies have focused on older adults (Jonas et al., 2014).

Naltrexone, an opioid antagonist approved by both Health Canada and the U.S. Food and Drug Administration (FDA), has been shown to reduce alcohol cravings and has some efficacy in preventing relapse to heavy drinking (O'Malley et al., 1992). Evidence of its safety and effectiveness in older adults is limited (Srisurapanont & Jarusuraisin, 2005; Barrick & Connors, 2002; Oslin, Liberto, O'Brien, Krois, & Norbeck, 1997). Naltrexone can be administered orally or via injection on a monthly basis for patients who are unable to adhere to a daily regimen (Ciraulo, Dong, Silverman, Gastfriend, & Pettinati, 2008). There have been no studies conducted on the safety and efficacy of injectable naltrexone in older adults. Naltrexone is not recommended for individuals who use opioids for pain management or those with acute disorders of the liver.

Acamprosate has also been approved by Health Canada and the U.S. FDA for the treatment for alcohol use disorder due to its ability to reduce alcohol craving in adults. Unlike naltrexone, acamprosate can be used by patients with liver issues or those who are on opioids for pain, but it cannot be used by those with inadequate renal function (Jonas et al., 2014). Once again, no studies have assessed its efficacy or safety in older adults. As a result, acamprosate is seldom used in the long-term treatment of alcohol use disorders among older adults (Sass, Soyka, Mann, & Zieglgansberger, 1996; Pelc et al., 1997; Anton et al., 2006).

Treatment for Opioid Use Disorder

When an older adult undergoes an opioid overdose, it should be treated as a life-threatening emergency. Due to the physiological changes that are part of the aging process, older adults experience higher concentrations of opioid metabolites in their systems. Older adults with pulmonary disorders also have an increased likelihood of pulmonary suppression during an overdose. Naloxone, starting at lower doses, has been shown to be an effective treatment for opioid overdoses in older adults.

Once the individual has been stabilized, a controlled environment such as a hospital or intensive outpatient program might be necessary to reduce the risk of uncomfortable withdrawal symptoms (David, 2013; U.S. Department of Veterans Affairs [DoVA] & U.S. Department of Defense [DoD], 2015). Because older adults are more likely to have comorbid chronic pain, the severity of opioid withdrawal can be magnified by the effect of worsening pain, causing the individual significant discomfort.

To help alleviate extreme withdrawal symptoms, antipsychotics such as quetiapine can be used, but only on a short-term basis. Benzodiazepines are not recommended for older adults undergoing opioid detoxification due to their sedating and cognitive side effects. In addition, benzodiazepines combined with opioids increase the chances of overdose and death. In most cases, a tapered approach, which incorporates careful monitoring along with the use of clonidine or gabapentin to reduce the severity of withdrawal symptoms, is most effective for opioid detoxification (Le Roux, Tang, & Drexler, 2016). Buprenorphine and methadone, at low doses, can also be used for opioid detoxification in older adults. Buprenorphine is preferred as it is the safer choice over methadone and can also have an antidepressant effect (Karp et al., 2014).

Once stabilized, the individual and their clinician must agree on a treatment plan. Due to the high relapse rates among this population, older adults have more success with opioid maintenance therapy compared to detoxification without maintenance therapy (Northrup et al., 2015; Sees et al., 2000).

Three types of maintenance medications are used for older adults with opioid use disorder: naltrexone, methadone and buprenorphine. Naltrexone can be given to patients who want to eventually abstain from opioids, but is less useful for those who need long-term pharmacotherapy or have chronic pain. For these patients as well as those with recurring opioid relapse, buprenorphine maintenance therapy is a better option. Buprenorphine can be more convenient than methadone, which requires daily administration at a supervised clinic. It is also associated with pain relief and, when compared to methadone, is more cost-effective and carries less risk for overdoses and harmful drug–drug interactions in older adults.

Treatment for Benzodiazepine Dependence

Although it is rare for individuals to experience a non-intentional benzodiazepine overdose, the risk is higher in older adults due to age-associated changes in medication metabolism. In the event of an overdose, the benzodiazepine antagonist flumazenil can be safely administered to older adults at low doses. Psychotherapy, along with a medically supervised stepped withdrawal schedule and education about benzodiazepine use, is the preferred initial approach for benzodiazepine withdrawal (U.S. DoVA & U.S. DoD, 2015; Gould, Coulson, Patel, Highton-Williamson, & Howard, 2014).

Withdrawal symptoms can be similar to those of alcohol withdrawal, including anxiety and sleep disturbances, as well as life-threatening complications such as seizures. The risk of such complications emphasizes the importance of a gradual, tapered approach to treatment. Tapering can last from four to 12 weeks and, on occasion, can be combined with additional medications such as trazodone, which is used to treat sleep disturbances. It is also, more rarely, combined with carbamazepine, which is used to treat seizures (Rickels et al., 1999; Markota, Rummans, Bostwick, & Lapid, 2016). Tannenbaum and colleagues (2014) found that a 22-week tapering protocol and minimum intervention strategy was associated with 27% of individuals discontinuing benzodiazepines within six months compared to just 5% in the control group. Similar results were noted by Paquin and colleagues (2014), whose literature review of 28 studies found success rates of 32% among older adults who did tapering alone, 32% with tapering plus cognitive behavioural therapy and 36% with tapering plus medication substitution.

It is recommended that all patients on MAT keep an emergency naloxone kit in case of overdose. They should also attend community-based mutual help meetings such as Narcotics Anonymous.

Treatment for Nicotine Dependence

Tobacco use disorders are the most common and harmful SUD among all age groups. In its 2016 Canadian Community Health Survey, Statistics Canada estimated that approximately 9.5% of adults aged 65 years and older are daily or occasional smokers (Statistics Canada, 2017). Older adult smokers are at increased risk of chronic obstructive lung disease, lung cancer and Alzheimer's disease (Burns, 2000; Peters et al., 2008). They also have lower scores on cognitive function tests and experience an accelerated rate of cognitive decline (Mons, Schöttker, Müller, Kliegel, & Brenner, 2013; Cawkwell, Blaum, & Sherman, 2015; Zhong, Wang, Zhang, Guo, & Zhao, 2015).

Although many older adults feel it is "too late" to quit smoking, studies show they are indeed able to quit and actually have higher success rates of smoking cessation than younger adults (Abdullah & Simon, 2006). Nicotine replacement therapy is the most widely studied smoking cessation treatment for older adults, with evidence showing it is both safe and effective, especially when combined with behavioural counselling (Cawkwell et al., 2015). Other treatments, such as bupropion (an antidepressant) and varenicline (which alleviates nicotine cravings), have advanced rapidly and been shown to be safe and effective in the general population (Cohen, Haglund, & Mooney, 2016). However, there remains a lack of high-quality data specific to older adults on ideal dosing, adherence and adverse events related to bupropion and varenicline.

Treatment for Cannabis Use Disorder

As the landscape shifts regarding cannabis legalization and the social acceptance and availability of marijuana increases, clinicians can expect to see more older adults with cannabis use disorders.

Discontinuing cannabis after long-term use can lead to withdrawal (Gorelick et al., 2012), with symptoms that include irritability, anxiety, depression, sleeping difficulties and dysphoria, all of which can complicate cessation and lead to relapse (Budney, Novy, & Hughes, 1999; Budney, Roffman, Stephens, & Walker, 2007). There is a lack of evidence on how best to manage cannabis use disorder in both the general population and in older adults. Most studies are adaptations of alcohol interventions and include psychological interventions that consist of motivational enhancement therapy, cognitive behavioural therapy and contingency management. While most adults respond well to these interventions, many have problems similar to those who are dependent on other illicit drugs (Moore & Budney, 2003). Reduced use of cannabis, but not total abstinence, is the most common outcome of many randomized control trials.

To date, there have been few pharmacological interventions for cannabis use disorder. One promising study found that oral THC (the psychoactive component of cannabis) reduced withdrawal symptoms associated with cannabis cessation (Haney et al., 2004). More studies on pharmacotherapies for cannabis use disorder are needed as well as interventions designed specifically for older adults.

Inpatient Residential Treatment

Before they are able to safely and successfully detoxify, some individuals need to be placed in inpatient residential treatment settings to stop their continual access to alcohol and drugs. These individuals could have a lack of social support in stopping their alcohol or drug use, or could be dealing with social isolation that would make detoxification on their own too difficult or dangerous. Residential treatment can also be a good option for individuals who do not have the mobility to get to and from treatment appointments, or who have no other options to receive specialized care. Inpatient residential treatment programs can be delivered in settings such as group homes, halfway houses, extended care facilities, nursing homes and specialized rehabilitation programs.

As there is a shortage of residential treatment programs designed for older adults, there have been few studies on the effectiveness of such programming for this population. Slaymaker and Owen (2008) studied 67 alcohol dependent older adults in a residential treatment program designed for older adults. The program, which had a mean duration of 26 days, was based on a 12-step model and included detoxification and stabilization, individual and group therapy, lectures, and attendance at community meetings. Therapeutic approaches included a combination of motivational enhancement and cognitive behavioural therapy. Special seminars were also offered on topics unique to older adults such as continuing care, grief, life-stage transitions, leisure and recreation. Results showed that 71% of the older adults were abstinent at six months and 60% were abstinent 12 months after leaving the program.

Outpatient Treatment

Outpatient treatment is the most commonly studied treatment for older adults. As part of a case-management model of care, non-traditional settings for SUD treatment (such as community-based agencies and primary care settings) are an effective way to engage older adults in treatment and connect them to resources within the community (Kuerbis, Sacco, Blazer, & Moore, 2014).

The PRISM-E study compared an integrated care model, where participants received services in a primary care clinic, to an enhanced specialty referral model, which provided referrals from primary care to a specialty mental health or substance use clinic. Results from both treatment groups found significant reductions in frequency and quantity of binge drinking over six months, despite lower levels of engagement (Oslin et al., 2006).

7.3.2 Behavioural Treatments

One of the primary goals of addiction treatment is to educate and motivate individuals to engage in their recovery (Le Roux et al., 2016). Older adults do best in programs that offer age-appropriate care with clinicians who understand the unique issues and complexities of older adults (MacFarland, 2014; Lemke & Moos, 2003; Kuerbis & Sacco, 2013; Rothrauff, Abraham, Bride, & Roman, 2011). Programs must be individualized, easily accessible and open to the involvement of the older adult's friends and family. They should also have structure, but not be overly strict (U.S. DoHHS, 1999; Holland et al., 2016; Kashner, Rodell, Ogden, Guggenheim, & Karson, 1992).

In general, older adults prefer treatment approaches that offer:

- Structured but flexible programs;
- Gender-specific treatment;
- A focus on building self-esteem;
- Written materials with large print;
- Staff who specialize in elder issues;
- An available sliding scale;
- Individualized attention or counselling;
- Optional family or friend involvement;
- Accommodations for physical disabilities;
- Group-based treatment;
- Transportation;
- Peer support;
- Food, clothing or shelter;
- Counsellors who practise good self-care;
- A focus on coping skills;
- Counsellors who genuinely care
- Linkages to outside services; and
- Accommodations for sensory declines or deficits.

Two treatment modalities that have been adapted specifically for older adults are cognitive behavioural therapy (CBT) and supportive therapy models (STM). Both techniques take a psychotherapeutic and psychosocial approach, focusing on building social support, improving self-esteem and developing ways to cope with one's substance use — and both have been shown to lead to improved outcomes in older adults (Kuerbis & Sacco, 2013; Schonfeld et al., 2000; Schonfeld & Dupree, 2002).

CBT is especially useful for older adults given its highly structured and individualized approach (U.S. DoHHS, 1999). CBT models for SUD treatment help the individual focus on the way they think and behave so they can better manage their choices (Walters & Rotgers, 2012).

Brief Interventions

Brief interventions typically comprise one to five sessions ranging from a few minutes to an hour in duration. These sessions are designed to increase an individual's motivation to change their behaviours (specifically, to reduce or eliminate substance use) and, for those with severe substance use disorders, to engage in additional or more intensive treatment programs (Miller & Rollnick, 2012; Barry & Blow, 1999). For clinicians and staff in fast-paced healthcare settings who have limited time with patients, they represent a cost-effective and efficient way to provide immediate attention to individuals who are at risk for or experiencing substance use problems.

Rooted in cognitive and social psychology, brief interventions are based on the transtheoretical model of change, which conceptualizes behaviour change as a movement through five stages: precontemplation, contemplation, preparation, action and maintenance (Prochaska & DiClemente, 1986). To help patients progress through these stages, clinicians seek to motivate them to identify their own intrinsic desire to change. This identification is done when the clinician, using a conversational style, illustrates the discrepancy between the patient's personal goals and priorities and their current behaviours.

Most brief interventions are based on the principles of motivational interviewing, which is a non-judgmental, patient-centred approach to discussing substance use and encouraging positive goals and life changes (Miller & Rollnick, 2012). In motivational interviewing, clinicians ask open-ended questions that help the patient explore and identify both the positive and negative aspects of their substance use. The clinician summarizes and reflects back to the patient the key motivational points, then gives feedback on how to develop a plan for change. For older adults, possible motivations for behaviour change might include the desire to maintain independence as well as optimal health and mental capacity (Blow, Walton, Chermack, Mudd, & Brower, 2000; Blow, Walton, Barry, et al., 2000). Studies have shown that brief interventions are acceptable for older adults and effective across treatment settings, especially in primary care or health clinic settings (Whitlock et al., 2004; Kuerbis et al., 2015; Schonfeld et al., 2010, 2015; Ettner et al., 2014; Havard, Shakeshaft, & Sanson-Fisher, 2008; Moore et al., 2011; Mowbray & Quinn, 2015).

Screening, Brief Intervention and Referral to Treatment

Screening, brief intervention and referral to treatment (SBIRT) is a simple, consistent and time-sensitive technique designed to be incorporated into clinical practice within existing screening and intake procedures (Barry & Blow, 1999). The key aspect of SBIRT is the integration of its four components — screening, brief intervention, referral and

treatment — into a network of diagnostic, early intervention and referral services within the community (Saitz, 2007; Babor et al., 2007).

As the initial approach to treatment, SBIRT is a comprehensive model designed for medical settings to screen and intervene early with individuals who are at risk of or have developed an SUD. It takes a non-judgmental and motivational approach that is based on the public health principles of universal systematic screening, integrated into the normal routines at medical facilities and community settings.

Case and Care Management

Case and care management models (CMM) are offered in non-traditional settings such as community agencies and primary care. The CMM approach to SUD treatment takes a comprehensive approach to addressing an individual's overall health instead of focusing solely on their substance use. It also aims to connect the individual to resources within the community such as Alcoholics Anonymous or Narcotics Anonymous. There is some evidence that the CMM approach is effective at engaging and maintaining older at-risk drinkers in treatment, possibly because it seeks to reduce stigma by taking a broader approach to overall health (Blow, 1998).

Contingency Management

Another strategy for the treatment of SUDs in older adults is contingency management: the systematic reinforcement of desired behaviours and the withholding of reinforcement (or punishment) of undesired behaviours (Higgins, Silverman, & Washio, 2008). Contingency management is based on the principle that rewarded or reinforced behaviours are likely to reoccur. As an abstinence-based approach, treatment programs using contingency management can involve urine drug screens with monetary rewards or other incentives given for "clean" tests. By improving an individual's ability to remain abstinent, contingency management allows them to take fuller advantage of other components of their treatment program. As such, it is meant to be a platform for other treatments rather than a stand-alone strategy (Prendergast, Podus, Finney, Greenwell, & Roll, 2006).

Contingency management is an effective approach for treating SUDs (Prendergast et al., 2006; Higgins & Silverman, 1999; Petry, Tedford, & Martin, 2001; Petry, Martin, Cooney, & Kranzier, 2000; Dutra et al., 2008). While there is some evidence that the approach works well in older adults, more studies are needed (Weiss & Petry, 2013; Petry et al., 2000). Because the magnitude of the therapy's effects decline slowly over time after the individual leaves contingency management, this approach should be used only as a supplement to other treatment methods — as a way to motivate the individual to remain abstinent and engage more productively in addiction treatment (Prendergast et al., 2006).

7.3.3 Addiction Treatment in Primary Care

Older adults seeking treatment for problematic substance use often face difficulties navigating the various treatment services and supports. Most primary care practices have an acute care orientation, with limited time and resources to detect and treat SUDs among older adults. While it is not expected that primary care providers will have the resources available to treat older adults with SUDs, they must develop linkages to and have knowledge of the available resources within the community for doing so (McLellan, Lewis, O'Brien, & Kleber, 2000). As part of their continuum of care, providers should be prepared to write referrals to treatment providers and then follow up with patients to determine if the referral was successful (Crome, Wu, Rao, & Crome, 2014).

The Canadian Centre on Substance Use and Addiction has developed a series of care pathway guides, including one focused on older adults, to guide treatment for prescription drug use disorders (Canadian Centre on Substance Abuse, 2016). These pathways outline the continuum of care that should be followed to provide better, more efficient support to people experiencing harms from problematic substance use, moving from awareness and screening to assessment, treatment options, and recovery and relapse prevention. At each stage in the pathway, the guides help providers identify their own roles, apply the right tools and help patients navigate the treatment system.

In the United States, the Substance Abuse and Mental Health Services Administration and the Center for Substance Abuse Treatment have developed the Treatment Improvement Protocol (TIP) series to help guide the treatment of substance use disorders. TIP 26, which focuses on older adults, recommends that people aged 65 and older consume no more than one standard drink per day or seven standard drinks per week (Blow, 1998). However, these limits might not be appropriate for the majority of older adults due to their increased likelihood of taking alcohol-interactive medications. One study showed that 77.8% of older adults who drank alcohol were also using alcohol-interactive medications, emphasizing the need for primary care providers to discuss the risks of combining any amount of alcohol use with these medications (Breslow, Dong, & White, 2015).

As older adults often find it difficult to acknowledge their problematic substance use, clinicians can help by informing their older patients about age-related changes in metabolism and how alcohol can interact with sedatives and anti-anxiety medications. Discussions about the relationship between alcohol and drugs and other health problems (such as falls, hypertension and depression) can also increase older adults' awareness of the connections between substance use and health outcomes (Blazer & Wu, 2009; Atkinson, 1999).

7.3.4 Prescribing Practices

It is critical that clinicians thoroughly understand how their prescribing behaviours contribute to the problem of non-medical use of prescription drugs. Many older adults unintentionally misuse prescription drugs due to a lack of knowledge about them, including their high potential for addiction and the effects of improper dosing. This type of misuse is particularly common among individuals with chronic pain, who tend to find the diagnosis of a prescription drug use disorder difficult to accept — resulting in them seeking to obtain opioids through various legal or illegal methods rather than seeking treatment, putting them at a high risk of accidental overdose (Fischer & Argento, 2012; Volkow & McLellan, 2011).

In Ontario, accidental deaths related to prescription opioids doubled between 1994 and 2004 and continue to rise (Dhalla et al., 2009). Although older adults have a higher prevalence of chronic conditions that leads to an increased use of prescription drugs, clinicians have a responsibility to periodically evaluate the appropriateness of prescribed medications, including their dosing. However, the 2008 Canadian Survey of Experiences with Primary Health Care found that only 48% of older adults with chronic conditions had their regular prescription medications reviewed by a doctor in the previous 12 months (Canadian Institute for Health Information, 2009).

National guidelines, such as the Beers Criteria, can help educate physicians on specific medications that are potentially inappropriate for older adults (Steinman et al., 2015). Efforts such as the Opioid Safety Initiative have also significantly affected the way clinicians prescribe opioids and helped individuals learn about drug-free methods for pain management (U.S. DoVA, 2014). Clinicians can also use strategies such as the "brown bag" approach, in which the patient brings all of his or her over-the-counter preparations, supplements and medications in a bag to their clinical visit, to gain reliable information about medication use. Finally, prescription monitoring programs have been developed throughout Canada to promote the safe and effective use of controlled prescription medications. Although these programs have met with some success, they have high variability in their management, types of substances monitored and prescribing definitions (Furlan et al., 2014).

7.4 Conclusion

It is well established that SUDs in older adults are underdiagnosed and undertreated. As the number of older adults with SUDs and problematic substance use increases, greater efforts aimed at screening and treating problematic substance use with a specific focus on older adults will be needed. In particular, it will become even more important to be able to accurately identify SUDs among the older adult population and for treatment centres to offer age-specific services.

Older adults face unique barriers that contribute to the lack of identification and treatment of SUDs. Yet older adults are more likely than younger adults to complete treatment programs. They also have comparable or better treatment outcomes than younger adults, including reduced or eliminated substance use as well as improvements to overall health and quality of life. While evidence shows age-specific services can lead to better outcomes in older adults, the availability of such services remains limited across North America.

ROBERT

Robert retired at age 65, selling the hardware store he had owned with his wife, Jean, for 36 years. They had planned to travel and enjoy their "twilight" years together; however, shortly after selling the business, Robert injured his back doing yard work. Now 70, Robert is plagued by chronic back pain that limits his mobility and daily activities.

Because the couple's lives had revolved almost entirely around the hardware store and family activities, they had little time left for friends. Now that Robert is retired, his days feel empty and he is irritable from the chronic back pain. He has a lot more time on his hands but hasn't developed many outside interests because he's limited in the activities he can do.

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CLINICAL VIGNETTE

While he was a drinker in his 20s, 30s and early 40s, Robert's use of alcohol was limited to when he was watching Sunday football games and during family meals. He had to cut back on his drinking due to high blood pressure and gastritis. Now, however, he finds that drinking helps alleviate some of the pain and stress from his chronic pain and boredom. He generally has about three drinks a day.

Robert came to the clinic at the retirement complex for a follow-up on his hypertension and a flare-up of his gastritis. When asked how he was feeling, he said, "I guess I'm fine for an old man with a bad back. Not sure if it really matters how I feel at this age, nothing can be done for me." He was also asked about what he does with his spare time, through which it was discovered that he has trouble sleeping, takes over-the-counter sleep medications and uses alcohol in excess.

Robert's clinician is concerned about his alcohol intake, as well as his mixing of alcohol with sleep and other alcohol-interactive medication. Robert was counselled on his alcohol intake and the risks of mixing alcohol with his medications, and was given a referral to a pain specialist for his back. He was also provided with a monthly schedule for activities at the local senior centre.

Robert began doing physical therapy on his back three times a week and takes anti-inflammatory medication for it. He and his wife started attending activities at the senior centre, and ended up making new friends. Robert enjoys playing cards with a group of friends twice a week, and going out with them for weekly lunch and coffee outings. Robert's pain and sleep have improved and his alcohol intake has decreased.

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Substance Use In Canada—**Improving Quality of Life: Substance Use and Aging**

08

CHAPTER

A Call to Action

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CHAPTER AT A GLANCE

- Healthcare providers, caregivers, family members and the general public need to be more aware of the issue of substance use in the older adult population.
- Healthcare professionals require more education and training on how to effectively prevent, detect, assess and treat substance use in older adults.
- Tailored guidelines and recommendations should be developed for substance use in older adults, reflecting the unique nature of this demographic.
- Age-specific services for the treatment of substance use disorders need to be made available and accessible to older adults.
- Guidelines for substance use and available treatments for substance use disorders in older adults should be communicated to healthcare professionals and the general public.

8.1 Introduction

Older adults constitute the fastest growing subgroup of the Canadian population: by 2036, approximately one-quarter of the people in this country will be over the age of 65. It is imperative that strategies to promote positive aging outcomes be brought to the forefront of healthcare initiatives and resources dedicated to minimize and buffer the adverse impact this demographic change could have on the Canadian healthcare system.

This report focuses on substance use within the older adult population, an issue that will only become more important as this demographic continues to grow. The expectation that the issue will become more prevalent in the coming years reinforces the need for action now. Several chapters in this report suggest there is a need to differentiate within the broad category of "adults" because older adults have unique physiological, psychological and socio-environmental characteristics that differentiate them from younger adults.

Although substance use is less common in older adults than younger adults, the effects of substance use can be more pronounced and problematic when it does occur. Similar to the period of rapid neurodevelopmental change seen during adolescence, aging is associated with several anatomical and physiological changes that increase a person's vulnerability to the effects of substances. In particular, older age is associated with decreased homeostatic reserves (the capacity to adapt and bounce back physiologically) to compensate for the adverse effects of drugs on the brain and other organs, such as the liver and kidneys.

Older adults are also prescribed more medications than younger people and, given the high rates of sleep abnormalities and pain in the older adult population, they can develop dependence to medications such as benzodiazepines and opiates. This tendency increases the risk for drug interactions with alcohol and other drugs. Even "moderate drinking" by older adults, as defined by *Canada's Low-Risk Alcohol Drinking Guidelines*, can result in health consequences severe enough to lead to hospitalization, further emphasizing the need to revise these definitions and guidelines specifically for older adults.

Drug use in older adults can also result in consequences that mimic certain age-related trends such as cognitive decline, the development of mental health issues and increases in physical falls. Not only do the similarities intensify the consequences of substance use, they can also contribute to the under-recognition, under-diagnosis and under-reporting of substance use disorders in older adults. Many older adults have chronic health conditions that can complicate the diagnosis of substance use disorders. Social barriers also play a role, with false stereotypes about aging and age-related stigma affecting the reporting of substance use disorders in this population as well as proper diagnosis and treatment.

This call to action seeks to address the issues of under-diagnosis and under-reporting of substance use disorders in older adults. It also points to the need to raise awareness of the growing issues associated with substance use by older adults. Raising awareness includes increasing healthcare professionals' capacity and skills for screening and diagnosing these issues. This call to action advocates for clinical guidelines and recommendations that are tailored for the diagnosis and treatment of substance use disorders in older adults. Finally, it underlines the need to communicate effectively this information to the general public, healthcare professionals, decision makers and older adults.

8.2 Recommendations

There is a need for increased awareness of substance use in older adults among healthcare providers, caregivers and older adults.

First and foremost, there is a need for increased awareness of substance use problems in the aging population. Throughout this report, it has been established that substance use disorders are under-diagnosed and under-treated in older adults for a number of reasons, including the stigma faced by older adults and the under-recognition of the issue by healthcare professionals, who often confuse signs of substance use with signs of aging. To effectively address this issue, a greater acknowledgement and understanding of substance use disorders among older adults as well as their healthcare providers is needed.

Raising awareness

The Canadian Longitudinal Study on Aging is an ongoing research initiative funded by the Canadian Institutes of Health Research that will help raise awareness of substance use in older adults and help bridge the knowledge gaps that exist in this area.

Ageist social attitudes about substance use also need to be shifted. Doing so will require more research on substance use that focuses specifically on older adults. This population should also be included and taken into consideration in government policies, which tend to focus on the needs of younger populations. Healthcare providers can help facilitate this attitudinal shift by increasing their knowledge of the physical and mental health conditions that tend to co-occur alongside substance use disorders in older adults (e.g., depression, anxiety, insomnia, chronic pain). And if providers are encouraged or incentivized to identify and treat substance use disorders and co-occurring conditions more actively, it could help improve the quality of life of older adults while decreasing the costs to Canada's healthcare system.

There is a need for more education and training for healthcare professionals and students on substance use disorders in older adults.

From a healthcare standpoint, there is an urgent need to improve the training offered in educational programs for medical and paramedical professionals for the prevention, diagnosis and treatment of substance use disorders among older adults. Students and practising healthcare professional alike need more education and training to better integrate mental health and substance use care into general health care. Policies that require or incentivize schools to provide mandatory courses on both substance use disorders and mental health are recommended.

Although some healthcare providers explore the possibility of problematic substance use with older adults, many do not. Because of such variable practices, there is a need to have this exploration incorporated into standard practice. Screening for substance use — using a non-judgmental, non-ageist approach that takes into account the unique values, experiences and sensitivities of older adults — should be part of routine health checks. Such assessment tools will also need to disentangle symptoms of harmful substance use from symptoms of aging. While there is sufficient knowledge among healthcare providers to implement these changes, this need must be recognized and addressed in a standardized way across the entire system. Furthermore, initiatives related to professional development should be ongoing and flexible enough to adapt to the fast-growing aging population and their access to an expanding choice of drugs.

There is a need for guidelines and recommendations on substance use in older adults tailored to the unique nature of this demographic.

Another important thread running through this report is the need for a nuanced and tailored approach to guidelines and recommendations on substance use in the older adult population. Although there is widespread recognition that the aging population requires unique guidelines, these must continue to evolve and adapt such that they can be standardized, consistent with existing evidence, and take into consideration how the definition of "aging" will change as the number of older adults continues to increase. To reflect this changing overall definition, there is a need to better define the different stages of aging and the nuances within the broad spectrum of the aging population.

National guidelines

The Canadian Coalition for Seniors' Mental Health recently received funding from Health Canada to develop guidelines for the prevention, assessment and treatment of alcohol, opioid, benzodiazepine and cannabis use disorders. These evidence-informed guidelines will help healthcare professionals, older adults and their families recognize and manage issues related to substance use.

As the older adult population grows in the years to come, it will be increasingly important to acknowledge the differences among individuals in the "older adult" demographic as well. To reflect the uniqueness of each stage of life and its variability, the process of aging must be looked at as a continuum rather than categorically. Although it can be useful to divide age groups into discrete categories, an individualized approach would better reflect the aging process and provide more effective results. Because the degree to which the older adult population is met with tailored guidelines and recommendations varies widely, there is a need to standardize the definition of "older adult" as well as the classifications used for other demographic groups, without obscuring the nuances and interacting factors that can differ on a case-by-case basis. The creation of age-specific recommendations for substance use must begin with a more precise and non-ageist understanding of the stages of development in older adulthood.

There is a need to improve the availability and accessibility of age-specific substance use disorder treatments and individualized care.

A greater number of treatment services and programs designed specifically to support older adults with substance use disorders is required. Although older adults face unique complexities in their physical and mental health that make them more vulnerable to the effects of substances, they are often excluded from clinical trials examining the safety and efficacy of new or existing treatments for substance use disorders. Treatments need to be designed that specifically cater to the older adult population. This need is intensified by the fact that older adults who require substance use treatment are increasing in needs and numbers, making it essential that future studies include older adults in treatment trials or conduct trials specific to this population.

Considering the host of unique factors at play when discussing the older adult population, it is not surprising that age-specific care options have been found to lead to better treatment of substance use disorders. As put forth in this report, various patient-centred approaches and elder-specific techniques can be integrated into clinical practice to help identify and treat substance use disorders in the older adult population. For example, older adults tend to do better when social engagement and the involvement of family and friends are integrated into their treatment programs. Thus, age-specific programs where healthcare providers move beyond questions of physical health to develop a more individualized, interpersonally focused treatment (e.g., supportive therapy models) should provide optimal results.

Pathways to better treatment

The Canadian Centre on Substance Use and Addiction has developed care pathways to guide the treatment of prescription drug harms in older adults. Based on peer-reviewed literature as well as experiential evidence from subject-matter experts, these pathways outline the continuum of care for providing quality treatment to older adults experiencing harms from substance use.

However, despite the evidence indicating that age-specific services lead to better treatment for older adults, the availability of such programs is limited in North America, pointing to a problematic gap in the system of care. There should be an increase in the number of tailored treatment programs for older adults, as the need for such programs will only increase in the years to come as the number of older adults with substance use disorders continues to grow.

When creating age-specific treatment programs, healthcare providers should actively take the perspectives of older adults into account. As discussed previously in this report, older adults' perception of "successful aging" aligns with the risk and protective factors associated with problematic substance use. This alignment means that interventions designed to promote successful aging, as defined by older adults, could also reduce problematic substance use.

The tools necessary for age-specific treatment of substance use disorders already exist; it is just a matter of implementing them. Doing so will require harnessing the information and evidence that is out there and making age-specific treatment programs more widely available and accessible, as well as incorporating such programs and therapies into current treatment facilities.

Guidelines and treatments for older adults need to be communicated to healthcare professionals and the general public.

In addition to establishing guidelines for substance use and treatment programs for substance use disorders that are customized to the specific needs of the older adult population, it is important to effectively communicate information about those guidelines and programs to healthcare professionals, older adults and their caregivers, and the general public.

The issues raised throughout this report should be disseminated to healthcare professionals to ensure they are prepared to overcome the barriers to identifying and diagnosing substance use disorders in older adults. To effect positive change throughout the healthcare system, it will also be important to convey the information from the existing research to medical students, students in health-related disciplines and policy makers.

One factor that often leads to problems of substance use in older adults is misinformation communicated between clinician and patient or a lack of communication. For example, only about half of older adults with chronic health conditions had their regular prescriptions reviewed by a doctor within the past year. Older adults are also often unaware of the side effects and interactions of their medications. An increased emphasis on interpersonal communication could help address this issue. Similarly, it is important to provide older adults and caregivers with information about what they should do in particular situations related to substance use, along with information on the resources and programs that are available and how older adults can access them.

8.3 Conclusion

This report seeks to bring to the forefront the increasingly significant consequences of substance use in the older adult population. It highlights how the increasing prevalence of substance use disorders among older adults, coupled with the increasing numbers of this population, is making substance use in older adults particularly relevant and consequential to Canada's healthcare system and society as a whole.

Thus, this call to action calls for increased awareness of the occurrence of substance use disorders in older adults, specifically through the training of healthcare professionals and the development of standardized screening tools. This training should take into consideration the specific needs, values and characteristics of older adults that distinguish them from other demographic groups. Similarly, there is a need for age-specific clinical guidelines and recommendations for substance use, as the unique attributes of older adults do not fit with blanket recommendations for adults in general. Likewise, age-specific treatment programs that have already proven to be effective should be made more widely available and accessible. Finally, these recommendations need to be widely disseminated to the public as well as to relevant healthcare professionals and decision makers so the findings in this report can be used in an effective way.

These recommendations aim to mitigate adverse consequences to the healthcare system that might be brought on by the growing issue of substance use in older adults. Creating age-specific services and providing professional training to address the under-diagnosis of substance use disorders in older adults are effective and important ways in which the issues related to problematic substance use in older adults can be controlled and decreased. By doing so, we will help not only the growing and vulnerable population of older adults, but also deliver benefits to our healthcare system and society as a whole.