7-28-2021 10:00 AM

Trends in Mental Health Service Use Among Youth and Emerging Adults in Canada

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A thesis submitted in partial fulfillment of the requirements for the Master of Science degree in Psychology

Abstract

Mental disorders among youth (age 12 to 17) and emerging adults (18 to 24) in Canada are common, but few receive mental health (MH) services. We examined trends in patterns and predictors of MH service use in this population. Secondary data analyses were conducted on six cycles of the Canadian Community Health Survey (2011 to 2016). From 2011 to 2016, the prevalence of MH service use increased by 4.3%. In 2016, 85.1% of those with poor self-rated MH accessed services, greater than in previous years; however, this subgroup represents only 1% of the total population. Psychiatrists had the largest provider caseload; social workers had the smallest. Sex, ethnicity, self-rated MH status, and mood or anxiety disorder consistently predicted likelihood of MH service use across time. The increased patterns of MH service use and variation in predictors of service use highlight the need for an effective and equitable mental healthcare system.

Keywords: Mental health service use, mental health, youth, emerging adults, time trends, help-seeking, Canada, CCHS

Summary for Lay Audience

Mental disorders among youth (age 12 to 17) and emerging adults (18 to 24) in Canada are common but few people from this age group receive mental health (MH) services. We examined trends in patterns and predictors of MH service use in this population. We used data from six cycles of the annual Canadian Community Health Survey collected by Statistics Canada from 2011 to 2016. We examined trends in the rate of MH service use, self-rated MH, and type of health provider (HP) contacted among the youth and emerging adult population. We found that the percentage of the population that used MH services increased by 4.3% from 2011 to 2016. However, the percentage of the population who perceived their MH as fair or poor also increased across time by 2.7% and 0.5%, respectively. While 85.1% of people who perceived their MH as poor accessed services in 2016, a proportion greater than in previous years, this only reflected 1% of the total population. Psychiatrists saw the greatest number of service users when compared to number of available providers in 2011 and 2016. Social workers saw the smallest number of service users compared to available providers but had the largest increase in number of available social workers (42.8%) from 2011 to 2016. There is a discrepancy between the providers who see the most MH users (i.e., psychiatrists) and the providers with the greatest increase in provider availability (i.e., social workers) from 2011 to 2016. Further, an investigation of predictors of MH service use revealed that females were more likely to use MH services than males and Caucasians were more likely to use services compared to Asian individuals in all years. These demographic differences between people who were likely to use MH services highlight the need for an equitable mental healthcare system. Need for MH services based on perceived mental health, stress, and diagnosis of a mood or anxiety disorder, increased likelihood of receiving MH services in most years. Trends in patterns and predictors of service use reported in this project may inform investments towards creating an effective and accessible mental healthcare system.

Acknowledgments

First, I would like to thank my supervisor, Dr. Graham Reid. I am grateful for your guidance throughout this thesis.

Second, I thank everyone who worked on the creation and data collection of the CCHS, which was supported by Statistics Canada. Thank you to all the respondents of the CCHS as well. This project would not have been possible without this data. A special thank you to the analysts, Tina Luu Ly and Victoria Gaudin, at the UWO Research Data Centre for vetting numerous analyses for me.

Third, I would also like to thank my supervisory committee members, Dr. Evelyn Vingilis and Dr. Leora Swartzman for offering their time and feedback during the initial stages of my project. A special thank you to Dr. Leora Swartzman for also offering her time as an examination committee member. I would also like to thank Dr. Lindsay Bodell and Dr. Bridget Ryan for serving on my examination committee as well.

Fourth, thank you to my lab twin, Katarina McKenzie, for the support throughout this process. I look forward to beginning the next step of this academic journey with you.

Lastly, I would like to thank my family, without whom, this road would be immensely difficult. Thank you to my mother, Sukirtha Sivayoganathan, and my sister, Raagula Sivayoganathan. I would not be where I am today without you. Thank you to my partner, Schrynel D'Mello. I am so grateful to have you by my side.

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Chapter 1

1. General Introduction

1.1. Overview of Thesis

There is a high prevalence of mental disorders among youth (age 12 to 17; Essau, 2005; Georgiades et al., 2019) and emerging adults (age 18 to 24; Arnett, 2005; Findlay & Sunderland, 2014). However, a minority of this population seek help from MH services (Essau, 2005; Findlay & Sunderland, 2014). This thesis investigated patterns and predictors of mental health (MH) service use among youth and emerging adults in Canada from 2011 to 2016. An overarching aim of this thesis was to identify ways to increase access to MH services within this population.

Chapter 1 provides a general introduction of the overall aims of this thesis. There are two manuscripts, presented in Chapters 2 and 3. The stand-alone manuscripts examine trends in MH service use from 2011 to 2016 using data collected from the Canadian Community Health Survey (CCHS: Statistics Canada, 2011-2016) from provinces British Columbia (BC), Manitoba (MB), Ontario (ON), Quebec (QC), and Newfoundland (NL). Chapter 2 investigates patterns of MH service use including any MH service contact, as well as frequency of MH service use and types of health providers (HP) contacted for MH reasons compared to provider availability. Chapter 3 applies Andersen's Behavioural Model of Health Service Use (Andersen, 1995) as a theoretical framework to assess predictor variables of MH service use across time. Chapter 4 presents a general integrated discussion based on the two studies on increasing access to MH services and efficient service delivery among youth and emerging adults.

1.2. Introduction

In 2011, a study by the Mental Health Commission of Canada (2013) found that one in five individuals in Canada have a MH problem. In 2014, a survey of youth aged 12 to 17 years old in Ontario found the prevalence for any mental disorder (i.e., anxiety, depression, attention-deficit, conduct) ranged between 18.2% to 21.8% (Georgiades et al., 2019). In 2005, a U.S. based study (Kessler et al., 2005) found that 50% of lifetime cases of mental disorders start by age 14 and 75% by age 24 using retrospective reports. Thus, the prevalence rates of mental disorders among youth (age 12 to 17; Essau, 2005; Georgiades et al., 2019) and emerging adults (age 18 to 24; Arnett, 2005; Findlay & Sunderland, 2014) is high and may be increasing. Despite this, a

minority of this population seek help from MH services (Essau, 2005; Findlay & Sunderland, 2014).

In 2018, 17% of Canadians aged 12 to 24 years old reported that they had used MH services in the past year (Wiens et al., 2020). In Ontario, among individuals with a diagnosable disorder, the overall rates of MH service contact from MH providers (i.e., psychiatrist, psychologist, social worker or counsellor) was 22.3% (diagnosis based on youth report) to 33.7% (diagnosis based on parent reports; Georgiades et al., 2019). The overall rates of MH service contact from general healthcare providers (i.e., family doctor, pediatrician, other healthcare provider, other physician type, or nurse) was 24.4% (diagnosis based on youth reports) to 35.1% (diagnosis based on parent report; Georgiades et al., 2019). These studies indicate that, though many youths and emerging adults suffer from mental and emotional problems, few access MH services.

Understanding trends in MH service use can yield valuable information on how the mental healthcare system is being used. Time trend studies can reveal changes in the type of services used as well as predictors of service use. These studies can reveal demographic changes among service users and inform issues such as changes in the need for services between adolescence and young adulthood. Trend studies may identify areas for additional investment of resources to create a more effective mental healthcare system today. For instance, investigating trends in types of healthcare providers accessed for MH needs among youth and emerging adults can reveal whether there is a growing need for a particular healthcare professional (e.g., MH counsellor) for a specific age group (e.g., emerging adults). This information might be used by health care planners and policy makers to allocate resources to meet this demand.

This thesis examines trends in MH service use and predictors of service use among youth and emerging adults in Canada. Data from British Columbia (BC), Manitoba (MB), Ontario (ON), Quebec (QC), and Newfoundland (NL) collected in the Canadian Community Health Survey during the years 2011 to 2016 was used (CCHS; Statistics Canada, 2011-2016). To our knowledge, there are three studies that examined trends in MH service use among youth and emerging adults in Canada. (1) Gardner et al. (2019) examined rates of visits to Ontario emergency departments (ED) for self-harm and mental disorders among youth aged 13 to 17

years between 2003 to 2017. The rates of adolescents with MH concerns presenting to EDs increased from 13.5 per 1000 adolescents in the population to 24.1/1000 adolescents, a 78% increase, between 2009 and 2017 (Gardner et al., 2019). (2) Gandhi et al. (2016) conducted a population-based cross-sectional study of MH services provided by physicians between 2006 and 2011 among Ontario residents aged 10 to 24 years using administrative databases (i.e., physician billing data). MH-related ED visits and hospitalizations increased by 32.5% and 53.7% respectively, while outpatient physician visits increased by 15.8% across disorders (i.e., mood disorders, schizophrenia, substance abuse; Gandhi et al., 2016). (3) A recent cross-sectional study by Wiens et al., (2020) examined MH service use (i.e., any mental health consultation with a health care provider) between 2011 and 2018 using CCHS data among youth aged 12 to 24 years old and found a 5.3% increase in MH service use over this 7-year time period. Though these studies demonstrate the increased overall use of MH services, they did not examine patterns of MH service use such as frequency of MH service use or types of providers accessed. This thesis addressed these gaps in the literature.

1.3. Patterns of MH Service Use

Patterns of MH service use in the population provides more information on how people are accessing services including 1) any MH service use, as well as the frequency of visits among those that access MH services, 2) need for MH services in the population, and 3) types of health providers (HP) accessed for MH concerns. The literature on each aspect of MH service use is reviewed below.

1.3.1. Frequency of MH Service Use

Some MH interventions require occasional visits (e.g., once every 3-6 months) to healthcare settings, such as filling up a prescription for psychotropic medication. Other interventions are more intensive and may require weekly visits to a MH clinic for a set amount of time, as is the case for most cognitive behaviour therapy programs (Epp & Dobson, 2010). Essau (2005) examined frequency of MH service utilization in inpatient (e.g., psychiatric clinic) and outpatient settings (e.g., counseling services) and factors related to service use among adolescents with depression and anxiety in Bremen, Germany. The study found that an individual's frequency of service use varied based on type of MH disorder, as well as severity of the disorder; for example,

greater disorder severity was associated with more frequent service use (Essau, 2005). Kurdyak et al. (2020) also examined number of patients with urgent MH needs served as well as number of visits per patient seen by primary care physicians (PCP) and psychiatrists in Ontario from 2015 to 2016. They further categorized these two provider types as physician psychotherapists or non-psychotherapists based on whether 50% of their outpatient billing was related to the provision of psychotherapy. The study found significant differences in the number of users seen and number of visits per patient based on type of care provided. PCP non-psychotherapists had the highest number of patients and lowest number of visits per patient, whereas PCP psychotherapists and psychiatrist psychotherapists had a lower number of patients, but greater number of visits per patient (Kurdyak et al., 2020). These studies demonstrate that increased frequency of service use may be necessary based on severity of the disorder and type of MH treatment but can also further strain the mental healthcare system. As such, Chapter 2 examines frequency of MH service use in addition to any MH service use for more information on how people are using the mental healthcare system.

1.3.2. Need for MH Services

In addition to examining trends in MH service use, it is also important to examine MH needs in the population as an indicator of whether the current MH system is meeting demand for services. Perceived need for care is a strong predictor of healthcare service use (Andersen, 1995). Past studies have used fair and poor self-rated mental health as an indicator of perceived need (e.g., Chiu et al., 2020; Patten et al., 2014; Simpson et al., 2012). For example, Simpson et al. (2012) used data from the National Population Health Survey (1984-2008) and CCHS (2001-2007) and found that the prevalence of poor and fair self-rated MH increased by 5% from 2001 to 2007 (Simpson et al., 2012). Similarly, Patten et al. (2014) found a 1% increase in fair or poor self-rated MH from 2002 to 2012 in the Canadian adult population. More recently, Wiens et al. (2020) reported a 5.7% increase in fair or poor self-rated MH among youth and emerging adults in Canada from 2011 to 2018. The difference in the prevalence of fair and poor self-rated MH reported in Wiens et al (2020) compared to Patten et al. (2014) could be reflective of a larger increase in the prevalence of fair and poor self-rated MH in recent years, particularly among the youth and emerging adult population.

Given the increase in perceived need for services in recent years within the 12- to 24-year-old age group (Wiens et al., 2020), comparing MH service use with perceived need for services over time can provide a picture of MH service accessibility. Using CCHS data, Chiu et al. (2020) used fair and poor MH status as one indicator of need for care and reported a 22.6% decrease in the proportion of people aged 12 to 24 who did *not* access MH services but needed care in Ontario from 2003 to 2014. Chapter 2 also reports on self-rated fair and poor MH status as a proportion of Canada's youth and emerging adult population to examine trends in need for MH services.

1.3.3. Types of MH Service Contact

Different health providers (HP) receive vastly different training in MH service provision, which translates to different scopes of practice between providers (Ontario Psychological Association [OPA], 2019). For instance, physicians (i.e., primary care physicians and psychiatrists) and psychologists are the only two provider types that can diagnose a mental illness (OPA, 2019). Family physicians and psychiatrists can prescribe psychopharmaceuticals as treatment (OPA, 2019). However, family physicians receive no mandatory psychotherapy training, and there are no specific standards for demonstrating competency in psychotherapy in social work in most provinces (OPA, 2019).

The type of MH provider people see is likely influenced by cost. Across Canada, physician-provided mental healthcare is covered by the universal healthcare coverage system (Ronis et al., 2017). In contrast, only mental healthcare provided by psychologists, social workers, or other MH counsellors in hospitals or primary health care teams are publicly funded (Duncan et al., 2018; Steele et al., 2007). Service provided in private clinics, where a majority of psychologists and MH counsellors are employed, requires patients to pay out of pocket or access extended health insurance benefits (Ronis et al., 2017; Steele et al., 2007). This two-tiered system may result in differences in the type of MH providers accessed by individuals and may be influenced by factors such as family income.

HP availability is another factor that may influence the type of provider people see for MH services. There is a large variation in the supply of different types of HPs (e.g., psychiatrists, psychologists, social workers, family physicians) available to provide MH care in Canada.

Shortages in particular types of providers available may discourage individuals from seeking MH services. Evaluating the types of providers accessed for MH care in tandem with provider availability can be used to inform investments to increase access to the most in-demand provider types for MH service provision. Chapter 2 also examines trends in the number of users that received care from each HP type. First, we report on the number of service users that received care from each HP type as a proportion of the population to inform which HPs most service users receive MH services from. Second, we report on the number of service users that received care from each HP type as a proportion of the number of HP type available to examine differences in the number of MH service users served by different provider types when accounting for provider supply.

1.4. Predictors of MH Service Use

Low MH service utilization despite high prevalence of MH problems among youth and emerging adults is likely driven by multiple factors. These factors include the stigma related to having MH problems (Eisenberg et al., 2009), poor recognition of MH problems (Zwaanswijk et al., 2003), and lack of access to MH services (Moroz et al., 2020). To create an equitable mental healthcare system, trends in predictors of MH service use could be used to develop targeted programs to increase MH service use among individuals who are consistently less likely to access MH services across time. The Behavioural Model of Health Service Use proposed by Andersen (1995) divides factors influencing health service use into 1) population predisposing characteristics, 2) enabling resources, and 3) need for care (Andersen, 1995). Many studies have applied Andersen's theoretical framework to examine past year MH service use using population-level data and found significant variations in service utilization based on these population characteristics (e.g., Fleury et al, 2014, Vasiliadis et al., 2009). As such, Chapter 3 examines trends in predictors of MH service use conceptualized based on the Behavioural Model of Health Service Use among youth and emerging adults in Canada. To our knowledge, this is the first study to report on trends in predictors of any MH service use among youth and emerging adults in Canada over a 6-year time period.

1.5. Current Thesis

This thesis examines trends in patterns and predictors of MH service use among youth and emerging adults aged 12 to 24 years in Canada from 2011 to 2016 using data collected from recent CCHS cycles. It makes five unique contributions to the literature. First, this thesis reports on trends in MH service use and frequency of use for youth and emerging adults (12 to 24 years). The recent study by Wiens et al. (2020) only examined any past-year MH service use as an outcome measure. Second, we examine data from the same set of provinces (i.e., BC, MB, ON, QC, NL) to better understand trends and predictors of MH service use across Canada. See methods for rationale on province selection. The recent study by Chiu et al. (2020) only examined data from Ontario. Wiens et al. (2020) estimated prevalence rates of MH service use in Canada but used varying sets of provinces each year, which may have impacted the accuracy of their estimates. Third, in addition to patterns of MH service use, this thesis examines changes in the need for MH services and unmet need for MH care over time based on self-rated MH status. Fourth, this project examines changes in the type of professional support sought by MH service users based on the number of available providers. Fifth, this thesis reports on trends in predictors of any MH service use among youth and emerging adults in Canada over a 6-year time period.

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Chapter 2

2. Trends in patterns of mental health service use among youth and emerging adults in Canada

2.1. Introduction

Trends in MH service use can provide a better understanding of how the mental healthcare system is used at different points in time. We were specifically interested in trends in MH service use in youth and emerging adults in Canada as many individuals experience an onset of MH concerns during these developmental periods (Essau, 2005; Findlay & Sunderland, 2014; Georgiades et al., 2019). Of the few studies that have examined trends in MH service use among youth and emerging adults in Canada, most have examined trends in specific provinces (e.g., Chiu et al, 2020; Gandhi et al., 2016; Gardner et al, 2019), specific providers or locations accessed (Gandhi et al., 2016; Gardner et al, 2019), or general past-year MH service use (Wiens et al., 2020). However, patterns of service use including frequency of MH service visits and changes in types of providers accessed may provide a more comprehensive picture of how MH services are being used within this population. Further, comparing MH service use with need for services can also inform MH service accessibility across time. The current study examines trends in MH service use, with a focus on patterns of MH service use (i.e., frequency of MH visits, types of providers sought) among youth and emerging adults in Canada.

Trends in frequency of service visits among MH service users extend beyond who is using services to include information on how often people are using services. An individual's frequency of MH service visits may depend on the type and severity of the MH problem (Essau, 2005), sex (Cox, 2014; Newton et al., 2010; Rosic et al., 2019), as well as the type of provider seen (Chiu et al., 2018; Kurdyak et al., 2020). For instance, more frequent MH service use is associated with greater disorder severity (Essau, 2005) and being female (Cox, 2014; Newton et al., 2010; Rosic et al., 2019). While increased frequency of service visits may be necessary to provide adequate care for some individuals, it can also further strain the mental healthcare system and limit the ability of providers to care for a greater number of people in need. To our knowledge, only one study has examined trends in the frequency of MH service visits in Canada. Chiu et al., (2018) used health-administrative databases (i.e., physician billing data) to examine trends in the frequency of MH service visits to family physicians and psychiatrists in Ontario

among individuals 16 years and older from 2006 to 2014. The study found that from 2006 to 2014, the number of individuals served by family physicians decreased by 2.1%, while the number of visits per patient increased by 0.2 visits (Chiu et al, 2018). In contrast, the number of individuals served by psychiatrists increased by 0.4%, but the number of visits per patient decreased by 1.3 visits (Chiu et al, 2018). While this study provides valuable information on the intensity of services used by provider type across time, findings are limited to physician-based MH services within Ontario for individuals aged 16 and older (Chiu et al., 2018). To extend the current literature regarding strain on the larger mental healthcare system in Canada, this project examines trends in frequency of MH service use from any MH provider among youth and emerging adults (12 to 24 years). Further, frequency of service use may be driven by individuals accessing MH services through multiple types of HPs. To address this concern, this study reports on the number of HPs consulted by MH service users as well.

Examining MH needs in the population is an important indicator of whether the current MH system is meeting demand for services. Past studies have reported increases in the prevalence of need for services using self-rated mental health status as an indicator of perceived need (e.g., Chiu et al., 2020; Patten et al., 2014; Simpson et al., 2012). More recently, Wiens et al. (2020) reported a 5.7% increase in fair or poor self-rated MH among youth and emerging adults in Canada from 2011 to 2018. However, Chiu et al. (2020) reported a decrease in the proportion of people in Ontario who did not access MH services and had fair or poor self-rated MH (24.2%) from 2003 to 2014. The current study also reports on self-rated fair and poor mental health status as a proportion of Canada's population to examine trends in need for MH services. We stratified fair and poor self-rated MH by MH service use to examine trends in unmet need for care among the youth and emerging adult population in Canada; Chiu et al., (2020) examined trends in unmet need for care in Ontario alone.

There are many different types of MH providers in Canada with different scopes of practice that can influence the type of treatment received (Ontario Psychological Association [OPA], 2019). There is a large variation in the relative supply of these provider types and differences in service coverage that can influence where people receive care (Canadian Institute for Health Information [CIHI], 2019b; Steele et al., 2007). Physician-provided mental healthcare is covered by the universal healthcare coverage system in Canada (Ronis et al., 2017). Yet,

services provided in private clinics, where many psychologists and MH counsellors are employed, require patients to pay out of pocket or access extended health insurance benefits (Ronis et al., 2017; Steele et al., 2007). This two-tiered system may create inequitable access to MH services based on provider type. Considering the differences in provider supply and services covered, investigating the types of HP accessed within the context of HP availability can provide more information on the relative accessibility of different provider types. This study examines trends in the number of users that received care from each HP type (e.g., psychologist, social worker, psychiatrist) as a proportion of the population as well as based on the number of HP type available, to examine variations in the number of MH service users served by provider type when accounting for provider supply.

2.1.1. Objectives and Hypotheses

This project examines trends in patterns of MH service use among youth and emerging adults aged 12 to 24 years in Canada from 2011 to 2016 using data collected from recent CCHS cycles. There were three primary research objectives in this study:

Objective 1) Examine any MH service use and frequency of use among individuals aged 12 to 24 years between 2011 to 2016.

Hypothesis 1) Overall MH service use will have increased over time and individuals are using MH services more often, but most individuals will speak to only one health provider about MH concerns.

Objective 2) Investigate need for MH services (i.e., fair and poor self-rated MH as a proportion of the population) and unmet need for care (i.e., proportion of the population with fair and poor self-rated MH who did not receive MH care) among individuals aged 12 to 24 years between 2011 to 2016.

Hypothesis 2) The prevalence of fair and poor self-rated MH will have increased across time, but there will be a decrease in the proportion of the population with fair and poor self-rated MH who do not use MH services from 2011 to 2016.

Objective 3) Examine patterns in type and supply of health providers (e.g., family doctors, psychiatrists, psychologists, social workers) contacted for MH support among individuals aged 12 to 24 years between 2011 to 2016.

Hypothesis 3) The most common HP to be consulted overall is expected to be family doctors. However, psychiatrists will have the greatest number of users per HP (i.e., caseload).

2.2. Methods

Secondary data analyses of the Canadian Community Health Survey (CCHS) were conducted. The methodology of the CCHS will be summarized, followed by a description of the specific variables used in the current project. Population estimates for the number of HPs are taken from data tables collated by the Canadian Institute for Health Information (CIHI) using data from the Health Workforce Database (HWDB; CIHI, 2019a) and Scott's Medical Database (SMDB; CIHI, 2020) and are described further under study variables.

2.2.1. CCHS Design

The Canadian Community Health Survey (CCHS) is a population-based, cross-sectional survey that aims to gather health-related information at regional and provincial levels of the Canadian population (Béland, 2002). For full details on the survey methodology see Statistics Canada CCHS User Guide (Statistics Canada, 2011-2016). Briefly, the CCHS was launched in 2001 and repeated every two years until 2007, after which, it was conducted annually. A multi-stage stratified cluster sampling approach was used to obtain a representative sample of people aged 12 years or older in private dwellings. The sampling strategy for the CCHS changed in 2015. The sampling strategy before 2015 and since 2015 is described briefly below (see Appendix A for more details on the CCHS 2015 redesign), using information provided by Statistics Canada.

CCHS Redesign. Before 2015, three sampling frames were used to select the sample of households: 1) Area frame designed from the Canadian Labour Force Survey (LFS), 2) List frame of telephone numbers, and 3) Random digit dialing. Once the dwelling or telephone number sample had been chosen, a member in each household was selected from individuals aged 12 years or over. In CCHS cycles 2015 and later, two sampling frames were used to select households: 1) Area frame designed from LFS (similar to pre-2015) and 2) Canadian Child Tax

Benefit (CCTB) frame (see Appendix A for more details on sampling frames). The CCTB frame was used to randomly sample persons aged 12 to 17 years, with stratification by health region (HR).

Due to the changes in survey sampling pre- and post-2015, Statistics Canada (2018) recommends caution when comparing estimates for any variables across those years. It would be unclear whether changes between estimates pre and post the CCHS 2015 redesign reflect the true population characteristic being examined or are due to changes in data collection. The recent study by Wiens et al. (2020) reported secular trends in MH and MH service use from 2011 to 2018 using CCHS data without addressing the 2015 CCHS redesign. To explore the effects of the changes in data collection pre and post 2015, the current study conducted sensitivity analyses using CCHS cycles 2011 to 2018 for provinces Quebec and Newfoundland. The other provinces used in the current study (BC, MB, and ON) did not include the optional CMH module in CCHS 2017 and CCHS 2018 cycles, limiting the ability to conduct sensitivity analyses on those provinces.

All CCHS Cycles. Individuals living on Crown lands, residents of Indigenous communities, those living in health institutions, full-time members of the Canadian Forces, and those living in some remote regions were excluded from the survey. In all selected dwellings, the "person most knowledgeable" household member was asked to supply basic demographic information on all residents of the dwelling as well as household-level information. For adolescents (12-17 years old), this would typically be a parent. Then, one member of the household was selected for a more in-depth interview, referred to as the health content interview. Adolescents and young adults reported on their own health and MH.

Interview. Data were collected using computer-assisted personal interviewing (CAPI) and telephone interview software (CATI) depending on the sampling frame used to contact respondents (See Appendix A for more information). The CCHS interview contains both core, theme, and optional modules. Core modules are questions asked to all respondents, usually every year. Theme modules are comprised of questions relating to a particular topic and are asked to all respondents every two, four, or six years if required. Optional modules fulfil the unique data needs of each province or territory and vary from year to year. Questions on MH were

incorporated as theme modules in some years, or optional modules selected by a subset of provinces and health regions in other years. The average time to complete the survey was 50 minutes.

Survey Language. Respondents were initially offered to complete the interview in either English or French. To minimize language barriers, interviews were sometimes conducted in other languages depending on language competency of available Statistics Canada staff.

2.2.2. Current Study

Details of the participants and measures used in the current study are described below.

Cycle Selection. Data from the CCHS cycles conducted annually from 2011 to 2016 were used. These cycles were selected based on three principles: 1) Included the optional Contacts with Health Providers (CMH) module; 2) Six cycles including the 2016 CCHS cycle; 3) Data from multiple provinces with large sample sizes (BC, ON, QC). Some combinations of cycles included multiple years but primarily with provinces with small populations (e.g., PEI, Yukon) and were not selected as the overall sample size would limit statistical power. Thus, we analyzed data that were from the same set of provinces (BC, MB, ON, QC, NL) each year. See Appendix A, Table A1, for a list of provinces and territories that included the optional CMH module for each CCHS cycle up to CCHS 2018.

Participants. Inclusion criteria were: (a) respondents aged 12 to 24 years; (b) valid response to the "Mental health service use" item (see methods). No exclusion criteria were used.

2.2.3. Study Variables

All mental health service use and need for care variables included in the study are assessed in each CCHS cycle. Table A2 in Appendix A presents a list of the variables in each CCHS cycle with the items and original response options, while Table B6 in Appendix B presents a list of the variables with recoded response options for the current study.

Demographic Variables. Respondents reported their age, sex, ethnicity, marital status, student status, immigrant status, and highest household education. Table B6 shows the response options for these variables.

Outcomes.

1. Mental health service use (MHSU). A single Yes-No item assessed receipt of any form of services for MH in the previous year. “In the past 12 months, have you seen or talked to a health professional about your emotional or mental health?” Those who endorsed any form of MH services were asked about the frequency of visits and type of HP seen.

2. Frequency of service use. Intensity of service use was assessed as follows: “If yes (to MHSU), how many times (in the past 12 months)?” Responses entered numerically ranging from 1 to 366.

3. Health provider consulted. Participants were asked: “Whom did you see or talk to?” and given six options: 1) Family doctor or general practitioner, 2) Psychiatrist, 3) Psychologist, 4) Nurse, 5) Social worker or counsellor, 6) Other. Participants could endorse multiple providers. A variable to examine the number of HPs visited was also created by summing responses. Given the skewed distribution of this variable, number of HP seen was coded as: 1 = “one HP only” or 2 = “two or more HP.”

4. Self-rated mental health status. Participants were asked: “In general, would you say your mental health is” with five response options ranging from “excellent” to “poor.” Past studies have used fair and poor self-rated mental health status as an indicator of perceived need (e.g., Chiu et al., 2020; Patten et al., 2014; Simpson et al., 2012).

5. Provider caseload. The Canadian Institute for Health Information (CIHI) collects data from the Health Workforce Database (HWDB; CIHI, 2019a) and Scott’s Medical Database (SMDB; CIHI, 2020) on the number of health providers in Canada. The HWDB contains information on 30 groups of non-physician health care professionals (e.g., psychologists, social workers) in Canada (CIHI, 2019a); the SMDB provides information on the number of physicians (CIHI, 2020). To maintain consistency with CCHS data, we calculated an estimate of provider supply per 100 000 using the same set of provinces (i.e., BC, MB, ON, QC, NL), weighted by province population, for a better representation of provider supply across Canada. Appendix B, Table B9 lists the values taken from the CIHI data tables (CIHI, 2019a, CIHI, 2020) to calculate the weighted provider supply rates. Using this weighted provider supply rate, the number of users per healthcare provider type (i.e., caseload) was calculated in 2011 and 2016 for family doctors,

psychiatrists, psychologists, and social workers. Data for nurses and other HPs were not available. First, the proportion of people who sought each HP type per 100 000 people was computed using CCHS data; then this estimate was divided by the number of HPs per 100 000 people (CIHI, 2019a-2020; Appendix B, Table B9). This yielded an estimate of the amount of MH users per health provider for each type of provider.

2.2.4. Ethics Approval

Ethics approval from a research ethics board is not necessary for this study since we conducted a secondary analysis of data. Permission was received from the Statistics Canada Research Data Centre (RDC) to access these data at The University of Western Ontario.

2.3. Data Analyses

All statistical analyses were performed using Stata version 15 and weighted using Statistics Canada's sample weights. Balance repeated replication was used with 500 bootstrap weights (provided by Statistics Canada) to estimate 95% confidence intervals (CIs) and ensure valid variance estimation despite clustering in the multi-stage sampling procedures.

To examine trends, all CCHS derived prevalence estimates were age-sex standardized using the CCHS 2011 Canadian Census as the standard population. Age and sex standardization control for differences in population structure across time by applying age and sex-specific rates from the study population to the population distribution of the standard population. This yields prevalence estimates that would be expected if the study population had the same age and sex distribution as in 2011, the standard population (Bains, 2009).

Prevalence estimates for frequency of service use were reported both as a mean (i.e., average number of service visits by a service user each year) and as a proportion categorized as "one service visit only" or "two or more service visits" for analyses of proportion of people who were repeat users.

2.3.1. Segmented Regression Analyses

Prevalence estimates and 95% confidence intervals for mental health service use variables and type of HP contacted were graphically represented and assessed visually to identify any changes in trajectory at a particular time point (see Gardner et al., 2019; Wagner et al., 2002). If visual

assessment suggested a change in trajectory at a particular time point, via different slope direction or less overlap between 95% CI, a segmented regression analysis (UCLA Statistical Consulting Group, n.d.) was conducted to model trends in MH service use.

2.3.2. Test of Significant Differences

Due to the complex survey design, post hoc tests of significance to compare population-level prevalence estimates between years were not possible. A procedure by Cummings (2009) was used; specifically, a 50% proportion of overlap (POL) between confidence intervals of two prevalence estimates was indicative of a statistically significant difference at $p < .05$. As long as the margin of error between estimates is not greater than a factor of 2, POL tests are robust at detecting statistically significant differences (Cummings & Finch, 2005). Exact POL values to confirm statistical significance ($p < .05$) were calculated only when one of three independent raters indicated 50% or less POL between CI of two prevalence estimates for an outcome. Interrater agreement for POL tests was 80%. Two of the three raters were undergraduate student research assistants; the third was the primary investigator of this study. See Appendix B for detailed information on rater materials and POL tests. Chi-square tests of association were conducted to examine self-rated mental health with mental health service use in each year.

2.3.3. Missing Values

MHSU variable had no missing values, as a valid response to this variable was required as part of inclusion criteria for this study. Frequency of service use and type of health professional consulted had 0.19% and 0.07% missing values, respectively. Missing values for self-rated MH status (missing = 0.14%) were replaced with the mode response for each year. See Table B8 in Appendix B for more information on the percent of missing values.

2.4. Results

2.4.1. Sensitivity Analyses

Sensitivity analyses of the CCHS 2015 redesign found that out of seven variables examined, highest household education was the only variable that may have been impacted by the 2015 CCHS data collection redesign (See Table B2, Appendix B). Therefore, prevalence estimates

from CCHS cycles prior to 2015 can be compared to post 2015 cycles as differences between prevalence estimates are likely a reflection of true population characteristics being examined.

2.4.2. Sample Characteristics

Across the six cycles/years analyzed, the sample size ranged from N= 5670 (2016) to N= 7474 (2011). Mean age was 18 years, with a range of 18.2 to 18.4 years; about half (50.3% - 52.1%) were male. Most respondents were Caucasian (67.7%-75.0%). See Table 2.1 for more information on descriptive statistics of the sample.

Table 2.1. Sociodemographic characteristics of study population by year

	2011	2012	2013	2014	2015	2016
	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]
N	7474	7125	7071	6771	5531	5670
Age (M)	18.2 [18.1, 18.3]	18.4 [18.3, 18.5]	18.3 [18.2, 18.4]	18.4 [18.3, 18.5]	18.4 [18.3, 18.6]	18.3 [18.2, 18.4]
Sex (%)						
Male	50.3% [49.4, 51.3]	51.0% [50.0, 52.1]	51.3% [50.4, 52.2]	51.5% [50.5, 52.5]	52.1% [50.7, 53.5]	51.2% [49.8, 52.5]
Ethnicity (%)						
Caucasian	75.0% [73.4,76.5]	71.7% [69.7, 73.7]	71.4% [69.9, 72.9]	70.4% [68.4, 72.4]	68.4% [66.4, 70.3]	67.7% [65.7, 69.7]
Black	2.9% [2.3, 3.7]	3.7% [3.0, 4.6]	3.5% [2.8, 4.3]	3.8% [3.1, 4.6]	4.2% [3.3, 5.3]	3.7% [2.9, 4.7]
East and Southeast Asian	8.2% [7.1, 9.4]	9.9% [8.4, 11.5]	9.0% [7.9, 10.1]	11.1% [9.8, 12.6]	10.3% [8.9, 11.8]	11.5% [10.0, 13.2]
South Asian	5.1% [4.3, 6.0]	6.3% [5.4, 7.5]	6.4% [5.5, 7.5]	6.6% [5.5, 7.9]	6.6% [5.4, 8.2]	6.1% [5.1, 7.2]
Arab and West Asian	2.7% [2.1, 3.4]	2.2% [1.7, 2.9]	2.4% [1.8, 3.1]	2.1% [1.7, 2.8]	2.8% [2.1, 3.8]	3.1% [2.5, 3.8]
Latin American and other	2.5% [1.9, 3.3]	3.3% [2.6, 4.2]	3.0% [2.5, 3.7]	2.6% [2.0, 3.3]	3.5% [2.7, 4.4]	4.7% [3.7, 5.8]
Multiple ethnic groups	3.7% [2.9, 4.6]	2.9% [2.2, 3.9]	4.4% [3.7, 5.2]	3.4% [2.7, 4.2]	4.2% [3.4, 5.2]	3.3% [2.6, 4.1]
Marital Status (%)						
Single	93.6% [92.8, 94.3]	93.6% [92.7, 94.5]	94.0% [93.1, 94.8]	93.3% [92.1, 94.4]	94.6% [93.7, 95.4]	94.6% [93.7, 95.3]
Married/Common Law	6.4% [5.7, 7.2]	6.4% [5.5, 7.4]	6.0% [5.2, 6.9]	6.7% [5.7, 7.9]	5.4% [4.6, 6.3]	5.5% [4.7, 6.3]

Immigrant status (% yes)	15.1% [13.8, 16.4]	15.9% [14.2, 17.7]	16.5% [15.0, 18.1]	15.3% [13.8, 16.9]	17.4% [15.6, 19.4]	18.4% [16.8, 20.2]
Student status (% yes)	73.5% [72.1, 75.0]	71.3% [69.5, 73.1]	71.2% [69.7, 72.7]	70.3% [68.6, 72.0]	71.2% [69.2, 73.1]	71.7% [69.9, 73.3]
Highest Household education (%)						
High school or less	16.8% [15.5, 18.1]	16.1% [14.6, 17.8]	20.1% [18.7, 21.7]	17.2% [15.9, 18.7]	15.2% [13.9, 16.5]	15.3% [13.9, 16.8]
Trade certificate	7.3% [6.5, 8.2]	7.6% [6.7, 8.7]	7.4% [6.6, 8.4]	7.4% [6.5, 8.4]	6.3% [5.5, 7.3]	6.9% [6.1, 7.9]
College	36.0% [34.3, 37.8]	32.9% [31.1, 34.8]	31.4% [29.9, 33.0]	34.3% [32.4, 36.2]	33.6% [31.8, 35.6]	29.5% [27.7, 31.3]
Bachelor's degree	27.7% [26.1, 29.4]	32.5% [30.7, 34.3]	29.3% [27.7, 31.0]	29.2% [27.5, 30.9]	32.9% [30.9, 35.0]	34.3% [32.2, 36.5]
University degree greater than bachelor's	12.2% [10.9, 13.6]	10.9% [9.7, 12.2]	11.7% [10.7, 12.8]	12.0% [10.9, 13.1]	12.0% [10.5, 13.6]	14.0% [12.5, 15.6]

Note. M = mean, % = percentage reported; 95% CI = 95% confidence intervals

Table 2.2 Yearly prevalence estimates, 95% confidence intervals and summary of statistically significant differences

	2011	2012	2013	2014	2015	2016
	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]
N	7474	7125	7071	6771	5531	5670
Mental health service use (%)	11.5%$_{a}$ [10.4, 12.6]	12.0%$_{ab}$ [10.7, 13.2]	10.9%$_{a}$ [9.8, 12.0]	11.5%$_{a}$ [10.4, 12.7]	13.8%$_{bc}$ [12.3, 15.2]	15.8%$_{c}$ [14.3, 17.3]
Frequency of service use (M)	7.8$_{ab}$ [6.2, 9.3]	8.5$_{ab}$ [7.0, 10.0]	7.6a$_{a}$ [6.4, 8.8]	7.8$_{ab}$ [6.6, 9.0]	9.1$_{ab}$ [7.3, 10.9]	9.5$_{b}$ [8.3, 10.7]
Frequency of service use (%)						
One visit	3.3%$_{a}$ [2.6, 4.0]	3.0%$_{ab}$ [2.3, 3.6]	2.3%$_{b}$ [1.8, 2.8]	2.5%$_{ab}$ [2.0, 3.1]	3.0%$_{ab}$ [2.3, 3.7]	2.8%$_{ab}$ [2.2, 3.4]
Two or more visits	8.0%$_{a}$ [7.1, 8.9]	8.9%$_{ab}$ [7.8, 10.0]	8.6%$_{a}$ [7.6, 9.6]	8.9%$_{a}$ [7.9, 9.9]	10.7%$_{bc}$ [9.4, 12.0]	12.5%$_{c}$ [11.2, 13.8]
Type of health provider consulted (%)						
Family doctor	5.0%$_{ab}$ [4.3, 5.7]	4.7%$_{ab}$ [3.9, 5.4]	4.5%$_{a}$ [3.8, 5.3]	4.8%$_{ab}$ [4.1, 5.5]	5.9%$_{b}$ [4.9, 6.8]	5.9%$_{b}$ [5.0, 6.9]
Psychiatrist	1.9%$_{a}$ [1.5, 2.4]	2.1%$_{a}$ [1.6, 2.7]	2.3%$_{ab}$ [1.7, 2.8]	2.0%$_{a}$ [1.5, 2.5]	2.0%$_{a}$ [1.4, 2.6]	3.1%$_{b}$ [2.4, 3.8]
Psychologist	3.2%$_{ab}$ [2.5, 3.9]	3.2%$_{ab}$ [2.5, 3.9]	2.6%$_{a}$ [2.0, 3.1]	3.9%$_{bc}$ [3.2, 4.5]	3.7%$_{bc}$ [2.8, 4.5]	4.9%$_{c}$ [4.0, 5.7]
Nurse*	0.3% [0.2, 0.4]	0.6% [0.4, 0.9]	0.4% [0.3, 0.6]	0.7% [0.4, 0.9]	0.7% [0.4, 1.1]	0.8% [0.5, 1.2]
Social worker or counsellor	3.3%$_{a}$ [2.7, 3.9]	4.0%$_{a}$ [3.3, 4.8]	4.2%$_{a}$ [3.5, 4.9]	3.8%$_{a}$ [3.1, 4.4]	4.3%$_{a}$ [3.6, 5.0]	5.8%$_{b}$ [4.8, 6.7]
Other*	0.7% [0.5, 0.9]	1.2% [0.7, 1.6]	0.5% [0.3, 0.6]	0.8% [0.3, 1.3]	1.0% [0.6, 1.5]	1.2% [0.7, 1.6]
Number of health providers consulted (%)						
None	88.6%$_{a}$ [87.5, 89.6]	88.1%$_{ab}$ [86.8, 89.3]	89.1%$_{a}$ [88.0, 90.2]	88.5%$_{a}$ [87.4, 89.7]	86.3%$_{bc}$ [84.9, 87.8]	84.3%$_{c}$ [82.8, 85.8]
One	9.4%$_{ac}$ [8.4, 10.4]	9.3%$_{ac}$ [8.2, 10.4]	8.3%$_{a}$ [7.3, 9.3]	8.5%$_{a}$ [7.4, 9.5]	10.9%$_{bc}$ [9.6, 12.2]	11.8%$_{b}$ [10.4, 13.1]

Two or more	2.1%$_{a}$ [1.6, 2.5]	2.6 %$_{ab}$ [2.0, 3.2]	2.6 %$_{ab}$ [2.0, 3.1]	3.0%$_{bc}$ [2.5, 3.6]	2.8%$_{ab}$ [2.2, 3.4]	3.9%$_{c}$ [3.1, 4.7]

Note. Means and proportions within rows with no subscripts in common are statistically significantly different, $p<.05$. * Denotes variables where statistical significance could not be interpreted between some years because the margin of error is greater than a factor of 2 (see Cummings, 2009). M = mean, % = percentage reported.

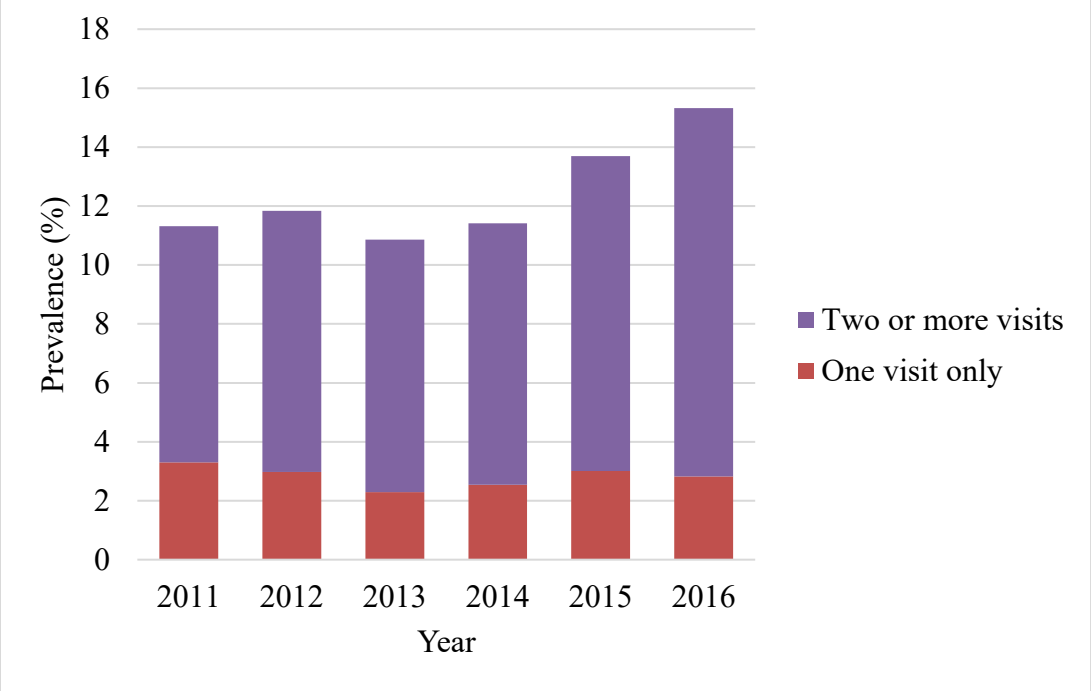
2.4.3. Objective 1) Examine any MH service use and frequency of use sought by individuals aged 12 to 24 years between 2011 to 2016

Prevalence of Service Use. From 2011 to 2016, the prevalence of MH service use increased from 11.5% (10.4-12.6; 95% CI) to 15.8% (14.3-17.3). Significant increases in any mental health service use were as follows: from 2011, 2013, 2014 to 2015 and 2016, and from 2012 to 2016 (p <.05) (see Table 2.2).

Among those who received some services, rates for visiting two or more times were: 8.0% (7.1-8.9; 2011) to 12.5% (11.2-13.8; 2016). Although the average number of visits increased from 2011 to 2016, it was not a significant increase. The proportion of people who had two or more service visits increased from 2011-2014 to 2015-2016 (see Table 2.2 for significant differences, Figure 2.1 presents paired comparisons). Trends in the number of different HPs consulted indicate that across all years, most people spoke to one HP about MH concerns (9.4% to 11.8%).

Figure 2.1

Frequency of mental health service visits in the population



Note. Frequency of mental health (MH) visits illustrated is the proportion (%) of the population in a given year who had one MH visit only or two or more MH visits from 2011 to 2016.

Table 2.3 Segmented regression analysis of prevalence estimates for mental health service use variables

Segments	Coefficient	CI- Lower Limit	CI- Upper Limit	*p* value
Mental health service use [a]				
2011-2014 segment	-0.0011	-0.0108	0.0087	.6870
2015 -2016 segment	0.0202	-0.0105	0.0510	.1050
Change in slope	0.0213	-0.0110	0.0535	.1050
Frequency of service use (M) [b]				
2011-2014 segment	-0.0842	-0.9870	0.8186	.7270
2015 -2016 segment	0.3801	-2.4749	3.2351	.6250
Change in slope	0.4643	-2.5301	3.4586	.5730
Family doctor visits [a]				
2011-2014 segment	-0.0006	-0.0046	0.0034	.6070
2015 -2016 segment	0.0004	-0.0122	0.0131	.8950
Change in slope	0.0010	-0.0123	0.0143	.7760
Psychologist visits [a]				
2011-2013 segment	-0.0031	-0.0167	0.0105	.4290
2014 -2016 segment	0.0049	-0.0086	0.0185	.2600
Change in slope	0.0080	-0.0112	0.0272	.2140

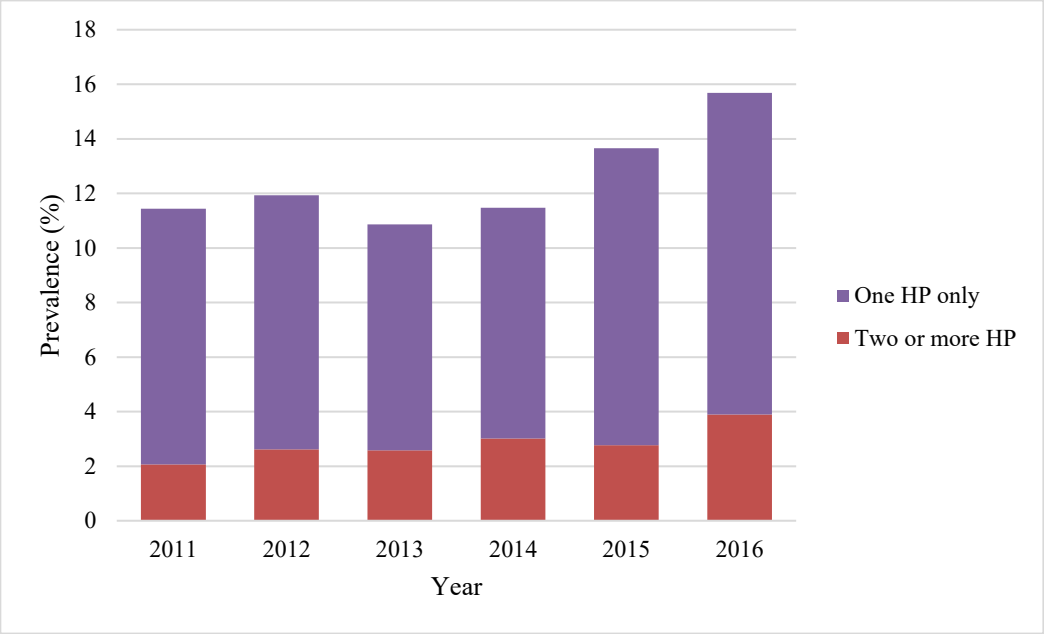
Note. Sample size varies per year: 2011, $N = 7474$; 2012, $N = 7125$; 2013, $N = 7071$; 2014, $N = 6771$; 2015, $N = 5531$; 2016, $N = 5670$.
[a] Mental health service use, family doctor visits, and psychologist visits: proportion of the population with at least one visit; [b] Frequency of service use: Mean (M) number of visits Coefficient = slope. CI = 95% confidence interval.

Changes in the prevalence estimates of two mental health service use variables (i.e., any mental health service use and mean frequency of service) across the study years were examined to look for potential time points with change. Both variables appeared to change in 2015. However, segmented regression models found no statistically significant differences in slopes between segments at these time points for either variable (see Table 2.3).

Number of HPs consulted. The proportion of people who spoke to one HP about MH concerns was stable from 2011-2014 and increased from 2014 to 2015-2016 (see Table 2.2, Figure 2.2). The proportion of people who saw two or more HPs about MH concerns increased in 2016 compared to all other years (i.e., 2011 to 2015).

Figure 2.2

Number of health providers visited for mental health reasons



Note. Number of health providers visited is illustrated as the proportion (%) of the population in a given year who had mental health-related visits with one health provider only, or two or more health providers from 2011 to 2016.

2.4.4. Objective 2) Investigate need for MH services and unmet need for care among individuals aged 12 to 24 years between 2011 to 2016

There was a significant association between self-rated mental health status and mental health service use in all years: $F(3.96, 1978.31) = 63.58$, $p < .001$ in 2011; $F(3.85, 1920.1) = 105.30$, $p < .001$ in 2016 (see Table 2.4).

Need for MH Services. From 2011 to 2016, there was an increase in fair self-rated MH as a proportion of the population, from 3.4% to 6.1%, and poor self-rated MH (0.7% to 1.2%; see Table 2.4). The categories of fair and poor self-rated MH are often combined to index those in need of MH services (e.g., Chiu et al., 2020; see Figure 2.3). Overall, the prevalence of need for MH (i.e., fair or poor self-rated MH) increased by 3.2% from 4.1% (2011) to 7.3% (2016).

Unmet need for Care. Table 2.4 shows MH service use for each level of self-rated MH status. The proportion of people with fair self-rated MH who accessed MH services increased from 43.4% (2011) to 58% (2016), while the proportion of people with poor self-rated mental

health who accessed MH services increased from 52.9% (2011) to 85.1% (2016). Combining those with fair or poor self-rated MH, the proportion of this subgroup who accessed MH services increased by 15.3% from 46.3% (2011) to 61.6% (2016).

The relationship between MH status and unmet need for care was examined by computing the percentage of individuals with fair or poor MH who ***did not*** access MH care from 2011 to 2016. The proportion of the population with self-rated fair MH who did not use MH services increased from 1.9% to 2.6%, while the proportion of the population with poor self-rated MH who did not use MH services decreased from 0.3% to 0.2% (See Table 2.4). Overall, the prevalence of unmet need for care (i.e., fair or poor self-rated MH and no mental health service use) increased by 0.6% from 2.2% (2011) to 2.8% (2016). These data are presented graphically in Figure 2.3.

Table 2.4 Association between self-rated mental health status and mental health service use

Year	Self-rated MH status		Mental health service use				
	Category	Prevalence [a] (%)	None [b] (%)	One or more [b] (%)	*F* [c] (df)	*p*	Row [d] (%)
2011					63.58 (3.96, 1978.31)	<.001	
	Excellent	38.9%	37.0%	1.9%			4.9%
	Very Good	37.8%	33.8%	4.0%			10.5%
	Good	19.2%	15.3%	3.9%			20.5%
	Fair	3.4%	1.9%	1.5%			43.4%
	Poor	0.7%	0.3%	0.4%			52.9%
	Total	100.0%	88.3%	11.7%			
2012					52.56 (3.81, 1900.17)	<.001	
	Excellent	36.5%	34.6%	1.9%			5.1%
	Very Good	39.0%	35.2%	3.8%			9.8%
	Good	19.4%	15.2%	4.2%			21.5%
	Fair	3.9%	2.4%	1.5%			38.6%
	Poor	1.2%	0.4%	0.8%			67.5%
	Total	100.0%	87.8%	12.2%			
2013					100.30 (3.94, 1964.49)	<.001	
	Excellent	35.9%	34.8%	1.1%			3.1%
	Very Good	39.0%	35.8%	3.2%			8.3%
	Good	20.2%	16.0%	4.2%			20.7%
	Fair	4.0%	2.1%	1.9%			47.4%
	Poor	0.9%	0.3%	0.6%			63.5%
	Total	100.0%	89.0%	11.0%			
2014					71.73 (3.61, 1803.30)	<.001	
	Excellent	33.6%	32.0%	1.6%			4.7%
	Very Good	39.1%	36.1%	3.0%			7.7%
	Good	21.0%	17.0%	4.0%			19.2%
	Fair	5.4%	3.0%	2.4%			44.7%
	Poor	0.9%	0.4%	0.5%			56.1%
	Total	100.0%	88.5%	11.5%			
2015					72.48 (3.96, 1975.76)	<.001	
	Excellent	38.2%	36.2%	2.0%			5.4%
	Very Good	35.0%	31.3%	3.7%			10.5%
	Good	20.8%	16.1%	4.7%			22.7%
	Fair	5.3%	2.4%	2.9%			54.3%
	Poor	0.7%	0.2%	0.5%			73.8%

	Total	100.0%	86.2%	13.8%		
2016				105.30 (3.85, 1920.10)	<.001	
	Excellent	34.7%	33.3%	1.4%		3.9%
	Very Good	35.8%	31.6%	4.2%		11.8%
	Good	22.2%	16.5%	5.7%		25.5%
	Fair	6.1%	2.6%	3.5%		58.0%
	Poor	1.2%	0.2%	1.0%		85.1%
	Total	100.0%	84.2%	15.8%		

Note. Sample size varies per year: 2011, $N = 7474$; 2012, $N = 7125$; 2013, $N = 7071$; 2014, $N = 6771$; 2015, $N = 5531$; 2016, $N = 5670$.

All prevalence estimates (%) reported are rounded to the nearest tenth.

[a] Prevalence (%) = prevalence of self-rated MH as a percentage of the population.

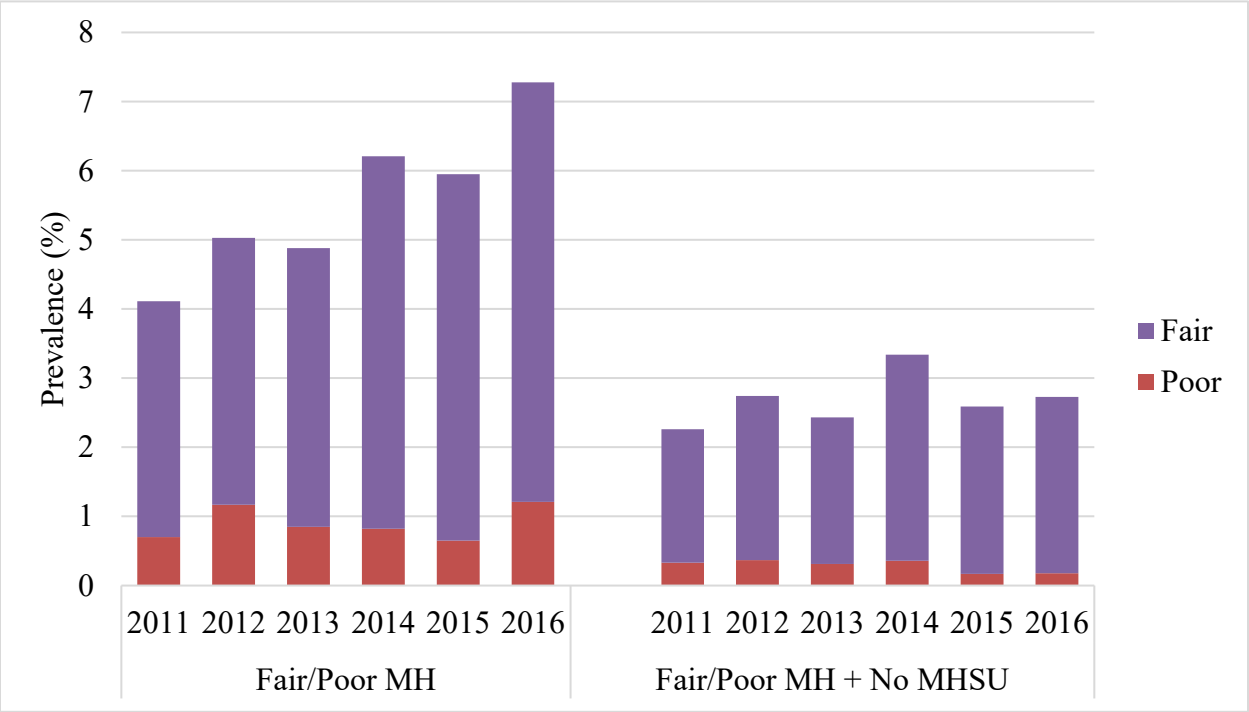
[b] Percentage values reported under Mental Health Service Use categories: None and One or more are reported as a proportion of the population each year.

[c] Design-based *F* statistic reported is a corrected weighted chi-square statistic for valid *p* values, testing the relationship between self-rated mental health status and mental health service use.

[d] Row % = Mental health service use (i.e., those who accessed services as a percentage of self-rated MH status) based on within row percentage using unrounded estimates.

Figure 2.3

Need for MH services and unmet need for care



Note. Left side of this figure shows the proportion of the population with fair and poor self-rated mental health; right side of the figure shows the proportion of the population with fair and poor self-rated mental health who did not use MH services.

2.4.5. Objective 3) Examine patterns in type and supply of health providers contacted for MH support among individuals aged 12 to 24 years between 2011 to 2016

Prevalence of Types of Health Providers Visited. Across all years, family doctors were the HP most often consulted with for MH concerns (4.5-5.9%), followed by social workers/counsellors (3.3-5.8%), psychologists (2.6-4.9%), psychiatrists (1.9-3.1%), other health professionals (0.5-1.2%), and lastly, nurses (0.3-0.8%).

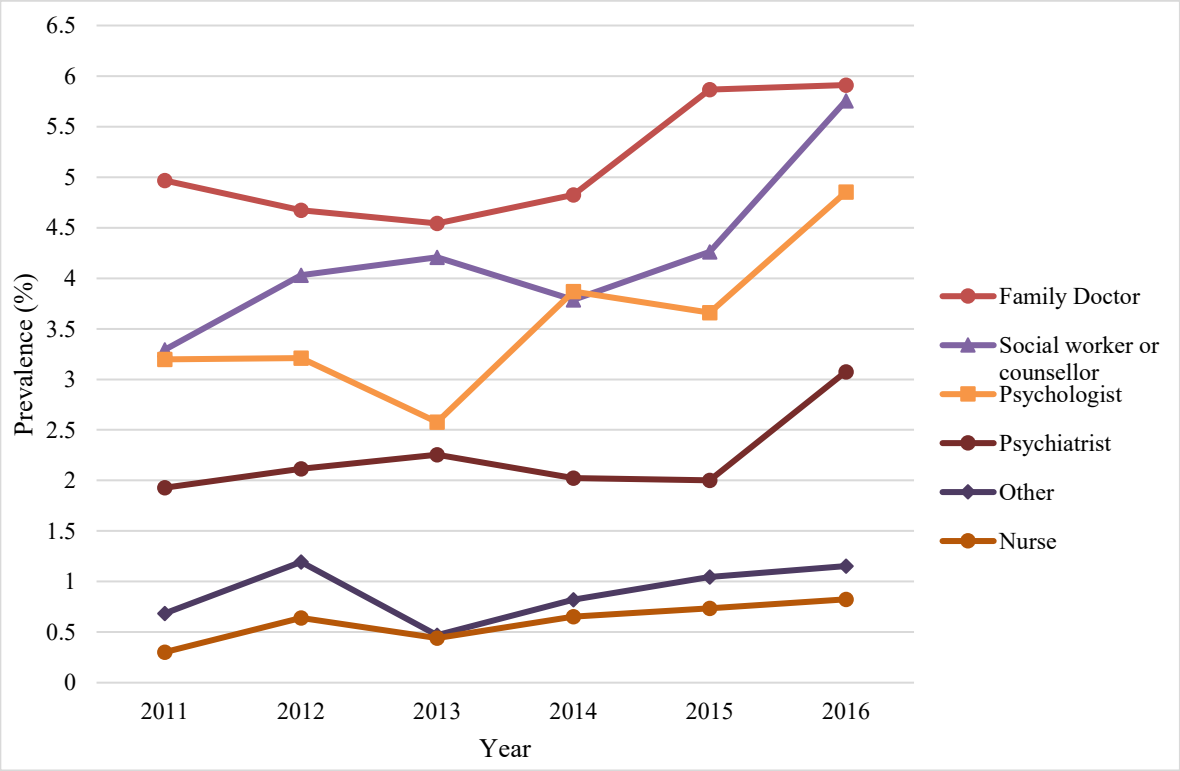
The proportion of youth and young adults who had contact with each type of HP was relatively stable from 2011-2015 with an increase in 2016 for multiple types of HPs. Increases across providers from 2011 to 2016 ranged from 0.5% (nurses and other HPs) to 2.5% (social workers and counsellors). The proportion of the population visiting a family doctor, social worker, psychologist, or psychiatrist were all highest in 2016, and significantly different

compared to many, but not all previous years (see Table 2.2, Figure 2.4). Significant differences could not be interpreted for Nurses or Other HP consulted because the margin of error between some years was greater than a factor of 2 (See Table 2.2).

There appeared to be a change in trajectory for the proportion of the population with family doctor visits in 2015 and with psychologists in 2014; however, segmented regression models found no statistically significant differences in slopes between segments before vs after these time points for either variable (see Table 2.3).

Figure 2.4

Prevalence estimates of type of healthcare provider consulted with for MH concerns



Note. Prevalence estimates of type of healthcare provider consulted with for mental health concerns is illustrated as the proportion (%) of the population in a given year who visited each type of provider from 2011 to 2016.

Provider Type and Availability. The number of people accessing MH services increased between 2011 and 2016 with the increase varying by 19.0% for family physicians to 74.9% for social workers. During that same period, the supply of HPs increased by 9.5% for family physicians, 7.9% for psychiatrists, 0.5% for psychologists, and 42.8% for social workers.

The “caseload” (users/provider) also increased for all providers. In 2016, summing across the five provinces included in this study, each psychiatrist saw 205 individuals, each psychologist: 105 individuals, each family physician: 51 individuals, and each social worker saw 42 individuals. This represented an increase in caseload ranging from an 8.6% increase for family physicians to a 50.9% increase for psychologists (see Table 2.5).

Table 2.5 Estimates of service users and health providers per 100 000 people between 2011 and 2016

	2011			2016			Δ 2011-2016		
Healthcare provider	Users	Supply	Caseload	Users	Supply	Caseload	Δ User	Δ Supply	Δ Caseload
Family doctor	4968.52	105.59	47.05	5911.41	115.64	51.12	19.0%	9.5%	8.6%
Psychiatrist	1928.26	13.94	138.36	3075.95	15.04	204.51	59.5%	7.9%	47.8%
Psychologist	3197.18	45.84	69.74	4851.93	46.09	105.27	51.8%	0.5%	50.9%
Social worker	3292.48	96.28	34.20	5756.80	137.49	41.87	74.9%	42.8%	22.4%

Note. Users= Number of service users per 100 000; Supply = weighted estimate of the number of health providers per 100 000 from provinces BC, MB, ON, QC, NL; Caseload = Number of users per one health provider. Δ 2011-2016 = Percent change from 2011 to 2016. Δ Users = Percent change in users per 100 000 from 2011 to 2016, Δ Supply = Percent change in supply per 100 000 from 2011 to 2016, Δ Caseload = Percent change in users per provider type from 2011 to 2016.

2.5. Discussion

As hypothesized, overall MH service use increased by 4.3% from 2011 to 2016. Consistent with past studies (e.g., Chiu et al., 2020; Gardner et al., 2019; Wiens et al., 2020), the proportion of individuals accessing MH services increased most notably in 2015. Note, sensitivity analyses of demographic variables did not suggest that changes in the CCHS in 2015 would have affected the findings. We found an increase in the frequency of service use overall; there was little change in the percentage of people who had only one visit, with most service users accessing services multiple times. The majority of service users spoke to only one HP type about their MH concerns. There are two possible explanations for why mental health service use has increased: 1) the proportion of the population who need MH services is increasing, or 2) a greater proportion of the population who need services are able to access care. Each possibility is considered in turn.

First, the prevalence of self-rated fair or poor MH increased by 3.2% between 2011 and 2016. Other studies that have examined the prevalence of fair and poor self-rated MH status (e.g., Chiu et al., 2020; Wiens et al, 2020) found similar increases. Second, contrary to our hypothesis, the proportion of the population with fair and poor self-rated MH who did not access services increased by 0.6% from 2011 to 2016. When stratified by MH service use, there was a 0.7% increase in the proportion of the population with fair self-rated MH who did not access care and a 0.1% decrease in those who reported poor self-rated MH and no MH service use. These findings suggest that the increase in mental health service use is likely due to a greater need for services in the population as opposed to improved access to care, particularly for those with fair self-rated MH.

Mental health service provision has improved for those with an extreme need for MH services in recent years, as identified by the decrease in those who reported poor self-rated MH and no MH service use from 2011 to 2016. This is promising. Those most in need appear to have experienced enhanced access to care. However, when expressed as a proportion of the population, this only represents a 0.6% increase in service use from 2011 to 2016 among those with poor self-rated MH. Although there was an increase in the proportion of people with fair-MH who accessed services across time, fair self-rated MH also increased in the population

across time. This is concerning. Using a U.S. based population survey, Kessler et al. (2003) found that mild cases of mental health problems significantly predicted greater rates of hospitalization, work disability, suicide attempts, and serious mental illness compared to healthy controls at a ten-year follow up. Higher severity of MH problems also correlates with poorer treatment outcomes and increased intensity of service use (Essau, 2005). Therefore, greater prevention efforts and early intervention targeting those with fair self-rated MH should be viewed as a cost-effective strategy to prevent further deterioration of MH in the population. It might also reduce the overall number of visits, freeing capacity within the "system" which could increase access to care. Finally, overall, 2.2% to 2.8% of the population have fair and poor self-rated MH and still do not receive MH care. Unmet need for care remains a prevalent issue.

Trends in HP supply and access. Although overly simplistic, there are two key approaches to increase access to MH care: (a) increase the number of providers, or (b) increase the caseload per provider. a) In terms of changes in the number of providers, psychologists saw the smallest increase in available providers (0.5%) while social workers saw the largest increase in providers (42.8%) from 2011 to 2016. There was a marginal increase in the number of available providers for family doctors (9.5%) and psychiatrists (7.9%). However, the increase in providers did not match the number of users seen by each of the providers in 2016. b) The increase in caseloads per provider showed that psychologists and psychiatrists had the highest caseloads in both 2011 and 2016 and saw the highest rate of increase in caseloads by 2016 as well. Social workers had the lowest caseload relative to all other providers in both years despite a 22.4% increase in provider caseload by 2016. Family physicians had the second lowest caseload of service users and saw the smallest increase in caseload (8.6%) by 2016.

These findings have three implications:

1) Psychiatrists and psychologists have high caseloads and are further increasing their caseloads to provide MH services to more individuals. Increasing caseloads is possible by dedicating a greater number of hours to providing care or shortening the amount of time spent with each MH service user. Increasing caseloads may be a feasible short-term option if providers are not working full-time hours currently. However, if providers are taking on more patients than they can provide adequate MH treatment for, this can lead to longer wait times between

appointments and shorter duration of MH visits, which can reduce the quality of MH care provided. Increasing provider caseloads is not sustainable in the long term and can lead to an ineffective mental healthcare system. More investment is needed to strategically increase the supply and therefore accessibility of these HPs.

2) The increase in the number of users who visited social workers and counsellors in recent years may indicate an increased willingness among youth and emerging adults to speak to this type of provider for MH concerns. Social workers and counsellors have the smallest caseload among the four major types of MH providers but saw the largest increase in MH service users from 2011 to 2016. Therefore, social workers and counsellors may be an important resource to meet the increasing demand for MH services.

3) Family doctors had the highest overall rate of service contact in all years. This is consistent with the literature showing that family physicians are usually the first health professional that people turn to for help with MH problems (e.g., Lesage et al., 2006). However, by 2016 the percentages of the population seeing social workers/counsellors and psychologists were very similar to family physicians. Since most primary care physicians and psychiatrists do not provide psychotherapy services (Kurdyak et al., 2020), a preference for psychotherapy services may explain the shift in youth and emerging adults speaking to non-physician providers about their MH concerns. Cunningham et al. (2017) explored MH treatment preferences among college students using latent class analysis and identified three groups of participants. Two out of three groups (60.7%) preferred alternative services such as diet and exercise or psychotherapy while the remainder of students (39.3%) preferred a range of treatment options with a choice of alternative services, psychotherapy, or medication (Cunningham et al., 2017). None of the groups preferred medication alone as a treatment option (Cunningham et al., 2017). Sunderland and Findlay (2013) examined unmet need for mental healthcare among individuals 15 years or older using the 2012 CCHS-Mental Health data and found that 12% of people reported a need for psychotherapy services and 10% of people reported a need for medication. However, the most common unmet need for services was for psychotherapy (Sunderland & Findlay, 2013). There is a national shortage in the number of family physicians with 15% of people in Canada without regular access to a family doctor (Statistics Canada, 2020). Further, there is hesitancy in providing MH services among family physicians; only 23% reporting feeling well prepared to

care for patients with severe MH problems (CIHI, 2019b). Thus, other mental healthcare providers may be able to fill this gap through collaborative care.

2.5.1. Strengths and Limitations

A major strength of this study was our ability to examine patterns of MH service use using population-based data over a recent 6-year period. We used data from provinces with large sample sizes and used the same set of provinces each year to produce the most accurate results and limit the ability of any one province with a large sample size to skew findings. We also conducted sensitivity analyses on a subset of the provinces and determined that prevalence estimates reported in the study are likely a reflection of true population characteristics being examined rather than due to the CCHS 2015 redesign. Finally, we reported on patterns of MH service use and provider availability among youth and emerging adults, an age group with high prevalence rates of mental illness (Chiu et al., 2020; Kessler et al., 2005).

There are, however, limitations that should be noted when interpreting study findings. First, when calculating provider caseload, we calculated the number of users per service provider type in 2011 and 2016. This is a crude measure of MH service provision. For instance, the type of service provided is not considered but can greatly impact providers' caseloads. The frequency of MH service use can vary based on type of treatment received; prescribing psychotropic medication requires less frequent visits than providing psychotherapy services (Kurdyak et al., 2020). This may explain why psychiatrists who tend to prescribe psychopharmaceuticals (Kurdyak et al., 2020) have a greater caseload than psychologists who tend to provide psychotherapy services (Murdoch et al., 2015; OPA, 2019). Some providers may also play a supporting role in MH service provision or may not be full-time equivalent providers. For instance, many social workers do not provide psychotherapy but help with general case management for complex patients (Towns & Schwartz, 2012). While past studies have examined the type and intensity of MH service provision among physicians specifically (e.g., Chiu et al., 2018; Kurdyak et al., 2020), future studies should include other provider types (e.g., psychologists, social workers, and counsellors) in this assessment to inform efficient service delivery. Second, we were unable to consider providers' competencies and match the age range of our sample to populations with which providers work. Considering that only a subset of available MH providers specialize in MH service provision for youth and emerging adults,

provider caseloads are likely under-estimates for this population. Future studies should consider provider competencies when examining the number of available providers compared to the number of service users for youth and emerging adults separately. Third, the CCHS item on type of provider contacted grouped “social worker” and “counsellor” together. However, the number of counsellors was not provided in provider supply data (CIHI, 2019a) and therefore excluded in the calculation of social worker caseload. As a result, the caseload estimate provided for social workers in this study is likely to be an overestimate as it does not account for the large supply of counsellors in the workforce as well (Government of Canada, 2019ab). Finally, we considered provider supply at a national level and did not look at regional differences in provider supply that may impact provider accessibility and number of users seen. Future research should consider regional variation in provider caseloads to better inform efficient MH service provision across health regions.

2.5.2. Conclusion

The current study makes unique contributions to the MH service use literature by examining trends in MH service use, frequency of service use, need for care, and type of providers accessed among youth and emerging adults across Canada from 2011 to 2016. Despite increased mental health service use, and intensity of service use, there remains a proportion of the population with unmet need for care. There are also large variations in the type of providers accessed by MH service users compared to provider supply. The increased patterns of service use within an already strained mental healthcare system highlight the need for an effective and accessible mental healthcare system for this age group. The patterns of MH service use reported in this study can inform investments towards improving accessibility of mental health services. Future studies should examine the type and intensity of services by provider type as well as provider competencies to inform efficient service delivery.

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Chapter 3

3. Trends in predictors of mental health service use among youth and emerging adults in Canada

3.1. Introduction

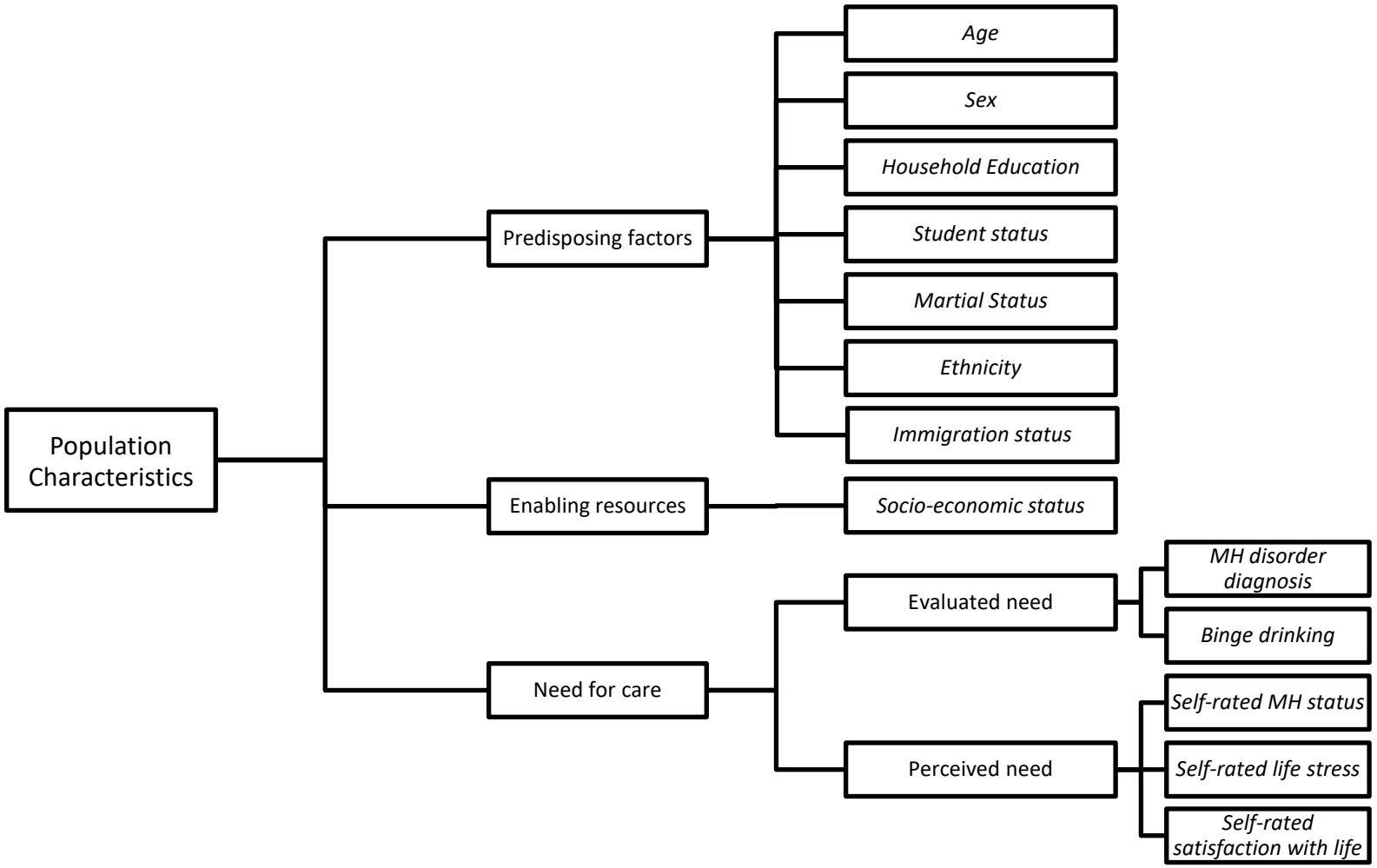
Despite a high prevalence of fair and poor self-rated MH among youth and emerging adults, there remained 2.2% to 2.8% of the population with fair and poor MH who did not receive MH services (Chapter 2). Unmet need for MH care remains a prevalent issue across time. MH stigma (Eisenberg et al., 2009), poor recognition of MH problems (Zwaanswijk et al., 2003), and lack of access to MH services (Moroz et al., 2020) may contribute to low MH service utilization among those in need. These barriers to MH service use may be especially salient for members from particular demographic groups. Examining predictors of MH service use can provide information on who is, and is not, able to access MH services which can then be used to develop targeted programs that can promote equitable MH service delivery. The current study examines trends in predictors of MH service use among youth and emerging adults in Canada, using Andersen's Behavioural Model of Health Service Use (Andersen, 1995) as a theoretical framework. The literature on predictors for MH service utilization in Canada is summarized below. A rationale for the inclusion of specific provinces in the current study is presented in the Current Study section under Methods.

3.1.1. Theoretical Framework

The Behavioural Model of Health Service Use divides factors influencing service use into 1) population predisposing characteristics, 2) enabling resources, and 3) need for care (Figure 3.1; Andersen, 1995). 1) Predisposing characteristics include demographic factors, social structure, and health beliefs that can contribute to an individual's ability to seek health services (Andersen, 1995). 2) Enabling resources occur at the level of the family and the community and consist of the availability of health services in the community, as well as means and access to such services by individual members (Andersen, 1995). Community-level factors are important for system planning and improvement. 3) Need for care is influenced by both perceived and evaluated need for health services. The literature on these factors will be briefly reviewed.

Figure 3.1

Predictor variables organized using the Behavioural Model of Health Service Use



Note. Figure adapted from Andersen (1995). Variables included in the study (in italics) modelled using a modified version of the Behavioural Model of Health Services focusing on population characteristics.

Predisposing characteristics. Past studies have found significant differences in MH service use as a function of population characteristics including a) age, b) sex, c) ethnicity, and d) educational attainment. (a) Regarding age, Ryan et al., (2011) found that factors associated with healthcare service use differed among adolescents at different developmental stages (early and middle adolescents, young adults). Among young adults, the number of self-perceived need variables (e.g., self-perceived MH, self-perceived health, stress) associated with intensity of use increased with age, as decisions to seek health care shifted from parents to young adults (Ryan et al., 2011). These differences in developmental stages are particularly salient when seeking services for MH problems since parents must first recognize a MH issue in their child and then make the decision to seek care (Godoy et al., 2014). Georgiades et al., (2019) found lower prevalence estimates of internalizing disorders when based on parent reports (e.g., 5.2% for depression, 11.3% for any anxiety disorder) compared to youth (12 to 17 years) reports (e.g., 7.5% for depression, 14.9% for any anxiety disorder); the reverse was true for externalizing disorders (e.g., prevalence rate of 9.9% according to parent reports and 9.3% according to youth reports). Further, rates of service contact were lower when disorder classification was based on youth reports (22.3%) compared to parent reports (33.7%; Georgiades et al., 2019). (b) In terms of sex difference, Wiens et al. (2020) examined trends in MH service use stratified by age and sex from 2011 to 2018 and found that females were more likely to use MH services than males, for both youth (12 to 18 years) and emerging adulthood (19 to 24 years), across all years. From 2011 to 2018, 13.2% to 20.1% of females aged 12 to 18 used MH services compared to 7.3% to 7.4% of males in the same age group. Among emerging adults, 17.6% to 25.6% of females were using MH services compared to 8.9% to 14.9% of males.

(c) Consistent ethnic differences in MH service use have been found. For instance, Tiwari and Wang (2008) used data from CCHS cycle 1.1 and found differences in MH service use among different ethnic groups. Caucasian participants were more likely to use MH services (9.8%) than participants who had immigrated from China, South Asia, and Southeast Asia (2.5%, 5.7%, and 4.8%, respectively; Tiwari & Wang, 2008). (d) Educational attainment is also a consistent predictor of MH service use. Steele et al. (2007) found relationships between educational attainment and type of mental healthcare provider consulted with among adults (aged 18 and over) with a mental illness using data from the CCHS Cycle 1.2. For each additional level

of education (e.g., completed high school), individuals were 12% to 16% more likely to see a family doctor (12%), psychiatrist (15%), psychologist (16%), and social worker (16%; Steele et al., 2007). Other studies have identified parental education attainment as a significant predictor of children's MH service use, with greater parental education associated with increased service use (Farmer et al., 1999; Flores et al., 1999; Padgett et al., 1993). The current study includes age, sex, ethnicity, immigrant status, and highest household education as predictors of youth and emerging adult MH service use.

Enabling resources. At the family level, a key enabling factor is socio-economic status (SES). However, the approach to measuring SES varies across studies, producing inconsistent findings in the literature. For instance, Wichstrøm et al. (2014) assessed predictors of MH service use among children aged 4 and 7 years in Trondheim, Norway and used SES based on parental occupations. Low parental SES (farmers, skilled and unskilled workers vs professionals/leaders) significantly increased the likelihood of children's MH service use, even when the presence of disorders was considered (Wichstrøm et al., 2014). In contrast, Steele et al. (2007) found no association between an individual's income level and MH service use when controlling for mental health needs. It could be that differences in the health care systems influence whether income influences MH service use. However, in another Canadian study, Fleury et al. (2014) found that individuals in Montreal QC without mental disorders who used mental healthcare services for other MH concerns had greater household income and resided in neighbourhoods with a higher mean household income. Given the variability in the literature, the measure of income distribution used in this study incorporates both household and neighbourhood level SES by calculating the adjusted ratio between respondent's total household income and the low-income cut-off (LICO; Statistics Canada, 2011-2016). See Methods and Appendix A for a detailed description and calculation of the income distribution measure.

Need for care. The most consistent predictor of MH service use is need for services, whether indexed by presence of a mental disorder (Fleury et al., 2014; Vasiliadis et al., 2009) or self-rated MH (Simpson et al., 2012; Vasiliadis et al., 2009). Fleury et al. (2014) examined predictors of mental health service use from 2009 to 2010 using a representative sample of individuals aged 15 to 65 years in Southwestern Montreal. Emotional problems and presence of a mental disorder (i.e., MDE, panic disorder, social phobia) were significantly associated with

healthcare service utilization (Fleury et al., 2014). These studies demonstrate that perceived need for MH services and/or mental disorder diagnoses play an important role in MH service use (Chiu et al., 2020; Fleury et al., 2014; Simpson et al., 2012). The current study assesses both perceived and evaluated MH needs as predictors of MH service use. Perceived need was assessed by self-rated satisfaction with life (SWL), MH status (poor to excellent), and life stress. Evaluated need represents both professional judgement and objective measurement about a patient's health status (Andersen & Davidson, 2007). Our ability to measure evaluated need was limited to self-report items in the CCHS which is subject to recall and social desirability bias. Self-report professional diagnosis of a mood or anxiety disorder was used to reflect professional judgement of a patient's health status. We used a self-report measure of binge drinking as an objective indicator of evaluated need. While this variable relies on self-report to measure the frequency of binge drinking behaviour, it uses established cut-off values recommended by the National Institute on Alcohol Abuse and Alcoholism (NIAAA, n.d.) to indicate binge drinking.

3.1.2. Objective and Hypothesis

This project examines trends in predictors of MH service use among youth and emerging adults aged 12 to 24 years in Canada from 2011 to 2016 using data collected from recent CCHS cycles. Past studies have examined predictors of MH service use in one year (e.g., Fleury et al., 2014; Vasiliadis et al., 2009) or correlates of MH service use across time (e.g., Chiu et al., 2020). To our knowledge, this is the first study to report on trends in predictors of any MH service use among youth and emerging adults in Canada using data from multiple provinces (i.e., BC, MB, ON, QC, and NL) over a 6-year time period.

Objective. Investigate predictors of MH service use, and how these predictors have changed over time.

Hypothesis. Utilization of MH services will be predicted by: (1) predisposing factors (i.e., Caucasian, female, and from households with members who had higher education), (2) enabling resources (i.e., higher SES), and (3) need for care (i.e., diagnosed mood or anxiety disorder by a professional, binge drinking, self-rated satisfaction with life, self-rated MH status and self-rated life stress).

3.2. Methods

Secondary data analyses of the Canadian Community Health Survey (CCHS) were conducted. The Canadian Community Health Survey (CCHS) is a population-based, cross-sectional survey that gathers health-related information at regional and provincial levels of the Canadian population (Béland, 2002). Individuals living on Crown lands, residents of Indigenous communities, those living in health institutions, full-time members of the Canadian Forces, and those living in some remote regions were excluded from data collection across all cycles. See Chapter 2 and Appendix A for a detailed summary of the CCHS design and methodology. The specific modules included by provinces in each cycle varies. For full details on the survey methodology, see Statistics Canada CCHS User Guide (Statistics Canada, 2011-2016).

The CCHS underwent a redesign in 2015 which included changes to the sampling frame used to select respondents. However, sensitivity analyses (described in Chapter 2 and Appendix B) showed few demographic changes in the youth and emerging adult sample pre and post CCHS redesign. Therefore, changes in estimates reported are likely a reflection of true population characteristics being examined.

3.2.1. Current Study

Cycle selection: Data from the CCHS cycles conducted annually from 2011 to 2016 was used. Reasons for cycle selection are described in depth in Chapter 2. Briefly, these cycles were selected based on three principles: 1) included the optional Contacts with Health Providers (CMH) module, 2) included 6 cycles and the more recent 2016 CCHS cycle, and 3) data from the same set of provinces with large sample sizes (i.e., BC, MB, ON, QC, NL) to produce the most accurate results and limit the ability of any one province with a large sample size to skew findings. See Appendix A, Table A1, for a list of provinces and territories that included the optional CMH module for each CCHS cycle up to CCHS 2018.

Participants: Inclusion criteria were: (a) respondents aged 12 to 24 years; (b) valid response to the “Mental health service use” item (see methods). No exclusion criteria were used.

3.2.2. Study Variables

Outcome Variable. Mental health service use (MHSU). A single Yes-No item assessed receipt of any form of services for MH in the previous year. “In the past 12 months, have you seen or talked to a health professional about your emotional or mental health?” Studies have shown that using a self-report measure of past-year MH service use can lead to reports of higher frequency of mental health visits among service users when compared to administrative records (Palin et al., 2011, Rhodes & Fung, 2004), particularly among individuals with MH problems due to recall bias (Rhodes & Fung, 2004). However, studies that have examined *any* past-year MH service use (e.g., Chiu et al., 2020; Vasiliadis et al, 2009; Wiens et al, 2020), regardless of *frequency* of visits, have not reported on the reliability or validity of this item. The advantage of using a self-report measure of MH service use is that it includes non-physician-based MH service use (i.e., psychologists, social workers, and counsellors), which is not reported in administrative data and provides a better picture of overall MH service use.

Predictors. Predictor variables are organized using Andersen’s Behavioural Model of Health Services Use (Andersen, 1995). Response options for each variable are provided in Table B6, Appendix B.

Predisposing Characteristics. Demographic variables to be included: age (in years), sex (male, female), marital status, ethnicity, immigrant status, highest household education, and current student status. Highest household education indicates the highest level of education attained by a member in the household and is used in place of parental education attainment, which is not explicitly asked in the CCHS.

Enabling Resources. A measure of income distribution provided by Statistic’s Canada was used as a measure of SES. Income distribution is computed using the adjusted ratio between total household income and LICO calculated in the CCHS master files provided by Statistics Canada (Statistics Canada, 2020). There were three steps to calculating the income distribution for each household: 1) calculate the LICO ratio, 2) calculate the adjusted household income ratio using the LICO ratio, 3) calculate the income distribution using the adjusted household income ratio. The final household income distribution assigned to households ranged from 1 to 10 where decile 1 represents households in the lowest income distribution while decile 10 represents those

in the highest income distribution. Appendix A includes a detailed description of the method used by Statistics Canada to calculate income distribution. Using data from a hospital sample in Toronto ON, Leung et al. (2007) assessed SES using LICO and the Hollingshead index, which evaluates SES based on occupation and education for up to two parents/guardians. The study found a significant correlation between the two SES indicators ($r = 0.596$), providing support for the use of a LICO-based measure as an indicator of SES (Leung et al., 2007).

Need for Care. **1) Perceived MH needs** were assessed using three items: A) Self-rated mental health status: "In general, would you say your mental health is:" with five response options ranging from "excellent" to "poor." B) Self-rated life stress: "Thinking about the amount of stress in your life, would you say that most of your days are…?" with five response options ranging from "not at all stressful" to "extremely stressful." C) Self-rated satisfaction with life (SWL): "Using a scale of 0 to 10, where 0 means "Very dissatisfied" and 10 means "Very satisfied", how do you feel about your life as a whole right now?" Other studies have assessed self-reported mental health status, life stress, and SWL separately in trend analyses (e.g., Patten et al., 2014; Simpson et al., 2012; Wiens et al., 2020) and as predictors of service use (e.g., Fleury et al., 2014; Vasiliadis et al., 2009). In the current study, these items were assessed separately as predictors of MH service use.

2) Evaluated need was assessed in two ways: A) report of diagnosis of a mental disorder by a health professional and B) binge drinking. **A)** ***Diagnosis*** by a health professional was assessed by two Yes/No items treated as separate variables. Both items begin "We're interested in conditions diagnosed by a health professional." 1) Diagnosis of mood disorder asks, "Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia?" 2) Diagnosis of an anxiety disorder asks: "Do you have an anxiety disorder such as a phobia, obsessive-compulsive disorder or a panic disorder?" Previous studies have also examined self-report diagnoses of a mood or anxiety disorder as predictors of MH service use (e.g., Fleury et al., 2014; Vasiliadis et al., 2009).

B) ***Binge drinking:*** In CCHS cycles 2013 to 2016, the item asked, "How often in the past 12 months have you had [5 (males)/4 (females)] or more drinks on one occasion?" with six response options ranging between "never" to "more than once a week." Binge drinking was

recoded to capture clinically significant drinking: 0 = never; 1=once a month or less; 2= 2 times a month or more. In CCHS cycles 2011 to 2012, the item asked, “How often in the past 12 months have you had 5 or more drinks on one occasion?” To account for the change in question wording for the item on binge drinking in the CCHS cycles after 2012, additional bivariate analyses examined frequency distributions of response options from 2011 to 2012 with 2013 to 2016 among females. We found that the percentage of females who endorsed each of the response options (i.e., never, once a month, 2+ times a month) was similar in both time segments (See Appendix B, Table B7). Thus, the change in wording did not impact the rate of endorsement for this item for females and could be compared across years. Wiens et al. (2020) also reported on trends in binge drinking among youth and emerging adults from 2011 to 2018.

3.2.3. Ethics Approval

Ethics approval from a research ethics board was not necessary for this study since we conducted secondary analyses of data. Permission was received from the Statistics Canada Research Data Centre (RDC) to access these data at The University of Western Ontario.

3.3. Data Analysis

All statistical analyses were performed using Stata version 15. All analyses were weighted using Statistics Canada’s sample weights. Balance repeated replication was used with 500 bootstrap weights provided by Statistics Canada to estimate 95% confidence intervals (CIs) and ensure valid variance estimation despite clustering in the multi-stage sampling procedures.

Descriptive statistics of predictor variables were analyzed within each year. Missing value analysis was conducted to determine any patterns of missing data across predictor variables. Missing values for most predictor variables were less than 1.5% and replaced with the mode response option for that year. Variables with missing values greater than 1.5% were ethnicity (6.5%), student status (9.5%), and highest household education (8.1%). Further missing value analyses was conducted for student status and highest household education. Crosstabulations of student status and age indicated that the majority of missing values (82%) were from respondents under the age of 18, who were likely to be in school. Therefore, missing values were imputed with the mode response "yes". For highest household education, missing data were imputed based on mode response for highest household education within income

groups for each year. For instance, crosstabulation analyses revealed that in 2014, most households with an income distribution of between “1” and “8” deciles reported their highest household education as “College”. Therefore, missing values for highest household education were replaced with “College” for respondents within this income distribution. See Table B6 in Appendix B for more information on the treatment of missing data and Table B8 for the percent of missing values for each predictor variable.

Logistic regression models were used to examine predictors of MH service use for each CCHS cycle. The outcome variable was MH service use measured dichotomously (yes/no). Predictor variables were entered in blocks based on Andersen’s Behavioural Model of Health Service Use for each CCHS cycle; thus, a total of six regression models were conducted. A Wald statistic was used to assess whether the addition of each block of variables contributed significantly to model fit. Significant predictors across time were assessed using odds ratios and $p < .05$ in each model.

3.4. Results

3.4.1. Sample Characteristics

Across the six cycles/years analyzed, the sample size ranged from N= 5670 (2016) to N= 7474 (2011). Mean age was 18 years, with a range of 18.2 to 18.4 years; about half (50.3% - 52.1%) were male. Most respondents were Caucasian (67.7% - 75.0%) followed by East and Southeast Asian (8.2% - 11.5%). The majority of the sample were students (70.3% - 73.5%). See Table 3.1 for more information on descriptive statistics of the sample by cycle year.

Table 3.1 Descriptive statistics of study population by year

	2011	2012	2013	2014	2015	2016
	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]	M or % [95% CI]
N	7474	7125	7071	6771	5531	5670
Weighted *N*	4 315 788	4 393 070	4 256 655	4 327 992	4 253 525	4 087 689
Predisposing Characteristics						
Age (M years)	18.2 [18.1, 18.3]	18.4 [18.3, 18.5]	18.3 [18.2, 18.4]	18.4 [18.3, 18.5]	18.4 [18.3, 18.6]	18.3 [18.2, 18.4]
Sex (%)						
Male	50.3% [49.4, 51.3]	51.0% [50.0, 52.1]	51.3% [50.4, 52.2]	51.5% [50.5, 52.5]	52.1% [50.7, 53.5]	51.2% [49.8, 52.5]
Ethnicity (%)						
Caucasian	75.0% [73.4,76.5]	71.7% [69.7, 73.7]	71.4% [69.9, 72.9]	70.4% [68.4, 72.4]	68.4% [66.4, 70.3]	67.7% [65.7, 69.7]
Black	2.9% [2.3, 3.7]	3.7% [3.0, 4.6]	3.5% [2.8, 4.3]	3.8% [3.1, 4.6]	4.2% [3.3, 5.3]	3.7% [2.9, 4.7]
East and Southeast Asian	8.2% [7.1, 9.4]	9.9% [8.4, 11.5]	9.0% [7.9, 10.1]	11.1% [9.8, 12.6]	10.3% [8.9, 11.8]	11.5% [10.0, 13.2]
South Asian	5.1% [4.3, 6.0]	6.3% [5.4, 7.5]	6.4% [5.5, 7.5]	6.6% [5.5, 7.9]	6.6% [5.4, 8.2]	6.1% [5.1, 7.2]
Arab and West Asian	2.7% [2.1, 3.4]	2.2% [1.7, 2.9]	2.4% [1.8, 3.1]	2.1% [1.7, 2.8]	2.8% [2.1, 3.8]	3.1% [2.5, 3.8]
Latin American and other	2.5% [1.9, 3.3]	3.3% [2.6, 4.2]	3.0% [2.5, 3.7]	2.6% [2.0, 3.3]	3.5% [2.7, 4.4]	4.7% [3.7, 5.8]
Multiple ethnic groups	3.7% [2.9, 4.6]	2.9% [2.2, 3.9]	4.4% [3.7, 5.2]	3.4% [2.7, 4.2]	4.2% [3.4, 5.2]	3.3% [2.6, 4.1]
Marital Status (%)						
Single	93.6% [92.8, 94.3]	93.6% [92.7, 94.5]	94.0% [93.1, 94.8]	93.3% [92.1, 94.4]	94.6% [93.7, 95.4]	94.6% [93.7, 95.3]
Married/Common law	6.4% [5.7, 7.2]	6.4% [5.5, 7.4]	6.0% [5.2, 6.9]	6.7% [5.7, 7.9]	5.4% [4.6, 6.3]	5.5% [4.7, 6.3]

Immigrant status (% yes)	15.1% [13.8, 16.4]	15.9% [14.2, 17.7]	16.5% [15.0, 18.1]	15.3% [13.8, 16.9]	17.4% [15.6, 19.4]	18.4% [16.8, 20.2]
Student status (% yes)	73.5% [72.1, 75.0]	71.3% [69.5, 73.1]	71.2% [69.7, 72.7]	70.3% [68.6, 72.0]	71.2% [69.2, 73.1]	71.7% [69.9, 73.3]
Highest Household education (%)						
High school or less	16.8% [15.5, 18.1]	16.1% [14.6, 17.8]	20.1% [18.7, 21.7]	17.2% [15.9, 18.7]	15.2% [13.9, 16.5]	15.3% [13.9, 16.8]
Trade certificate	7.3% [6.5, 8.2]	7.6% [6.7, 8.7]	7.4% [6.6, 8.4]	7.4% [6.5, 8.4]	6.3% [5.5, 7.3]	6.9% [6.1, 7.9]
College	36.0% [34.3, 37.8]	32.9% [31.1, 34.8]	31.4% [29.9, 33.0]	34.3% [32.4, 36.2]	33.6% [31.8, 35.6]	29.5% [27.7, 31.3]
Bachelor's degree	27.7% [26.1,29.4]	32.5% [30.7, 34.3]	29.3% [27.7, 31.0]	29.2% [27.5, 30.9]	32.9% [30.9, 35.0]	34.3% [32.2, 36.5]
University degree greater than bachelor's	12.2% [10.9, 13.6]	10.9% [9.7, 12.2]	11.7% [10.7, 12.8]	12.0% [10.9, 13.1]	12.0% [10.5, 13.6]	14.0% [12.5, 15.6]
Enabling resources						
Income distribution (M decile)	4.82 [4.72,4.91]	4.93 [4.81, 5.05]	4.84 [4.73, 4.95]	4.85 [4.74, 4.96]	4.76 [4.63, 4.89]	4.89 [4.77, 5.01]
Need for care						
Satisfaction with life (M)	8.17 [8.12, 8.23]	8.18 [8.13, 8.23]	8.19 [8.14, 8.24]	8.15 [8.10, 8.20]	8.37 [8.31, 8.42]	8.33 [8.27, 8.38]
Mental health status (M)	1.89 [1.86,1.93]	1.94 [1.91, 1.98]	1.95 [1.92, 1.98]	2.01 [1.97, 2.04]	1.95 [1.91, 1.99]	2.03 [1.99, 2.08]
Stress (M)	2.69 [2.66, 2.72]	2.67 [2.64, 2.70]	2.68 [2.65, 2.71]	2.74 [2.71, 2.78]	2.67 [2.63, 2.71]	2.65 [2.61, 2.68]
Binge drink (%)						
Never	56.0% [54.3, 57.6]	53.9% [52.2, 55.6]	54.8% [53.1, 56.5]	56.7% [54.9, 58.6]	56.3% [54.4, 58.3]	56.2% [54.2, 58.3]
Once a month or less	27.7% [26.2, 29.3]	31.1% [29.4, 32.8]	29.6% [28.0, 31.2]	29.6% [27.9, 31.4]	28.8% [27.0, 30.6]	31.3% [29.3, 33.4]
2+ times a month	16.4% [15.1, 17.7]	15.0% [13.8, 16.4]	15.6% [14.3, 17.0]	13.7% [12.4, 15.0]	14.9% [13.3, 16.7]	12.4% [11.0, 13.9]
Disorder diagnoses (%)						

No diagnosis	92.6% [91.7, 93.5]	91.7% [90.6, 92.7]	91.5% [90.5, 92.4]	90.2% [89.0, 91.2]	87.9% [86.2, 89.3]	87.7% [86.2, 89.0]
Mood disorder only	2.0% [1.6, 2.5]	2.4% [1.9, 3.1]	2.3% [1.9, 2.8]	2.0% [1.6, 2.6]	2.9% [2.2, 3.8]	2.3% [1.8, 2.9]
Anxiety disorder only	3.7% [3.0, 4.4]	3.5% [2.8, 4.2]	3.8% [3.2, 4.5]	4.6% [3.8, 5.5]	5.8% [4.8, 7.1]	5.4% [4.5, 6.4]
Both mood and anxiety disorder	1.7% [1.4, 2.1]	2.5% [1.9, 3.2]	2.4% [2.0, 3.0]	3.3% [2.7, 4.0]	3.4% [2.8, 4.3]	4.7% [3.9, 5.7]

Note. Values in brackets contain 95% confidence intervals for proportion estimates and means. M denotes mean values. Satisfaction with life where 0 “very dissatisfied”-10 “very satisfied.” Income distribution where decile 1 represents households in the lowest income distribution while decile 10 represents those in the highest income distribution. Mental health status where 1 “excellent”-5 “poor”. Stress where 1 “not at all stressful”-5 “extremely stressful”).

3.4.2. Model Summaries

Across all models, predisposing characteristics significantly improved model fit compared to the baseline model (p <.001). When adding enabling resources (i.e., income distribution) to the model with predisposing characteristics, there was a significant improvement in model fit in 2012, 2013, 2014, and 2016. The addition of the need for care block further improved model fit for all models (p <.001). The final models including all three blocks were statistically significant for all years, p <.001 (See Table 3.2).

Table 3.2 Adjusted Wald tests for each block of variables organized by Andersen's model of health service use and full model summaries between 2011 to 2016

	F stat	Df between	Df within	*p-value*
2011				
Predisposing characteristics	7.49	15	484	<.001
Enabling resources	3.35	1	498	.068
Need for care	34.33	7	492	<.001
Final Model summary	17.08	23	476	<.001
2012				
Predisposing characteristics	5.20	15	485	<.001
Enabling resources	7.7	1	499	.006
Need for care	23.21	7	493	<.001
Final Model summary	12.44	23	477	<.001
2013				
Predisposing characteristics	5.20	15	484	<.001
Enabling resources	11.36	1	498	<.001
Need for care	51.33	7	492	<.001
Total Model summary	20.58	23	476	<.001
2014				
Predisposing characteristics	3.66	15	485	<.001
Enabling resources	4.72	1	499	.030
Need for care	23.47	7	493	<.001
Final Model summary	9.24	23	477	<.001
2015				
Predisposing characteristics	8.38	15	483	<.001
Enabling resources	0.17	1	497	.684
Need for care	37.98	7	491	<.001
Final Model summary	15.63	23	475	<.001
2016				

Predisposing characteristics	8.35	15	485	<.001
Enabling resources	4.67	1	499	.031
Need for care	50.7	7	493	<.001
Final Model summary	21.41	23	477	<.001

Note: Sample size varies per year: 2011, $N = 7474$; 2012, $N = 7125$; 2013, $N = 7071$; 2014, $N = 6771$; 2015, $N = 5531$; 2016, $N = 5670$.
Degrees of freedom within varies slightly in some models because one or more parameters could not be estimated in some BRR replicates.

3.4.3. Changes in Predictors over Time

Predisposing characteristics. Among predisposing characteristics, sex and ethnicity were the only two predictors that were statistically significant in all models. Females were consistently more likely to use MH services than males from 2011 (OR: 2.07) to 2016 (OR: 1.74). Caucasians also had higher odds of using MH services compared to other ethnic groups; specific group differences varied by year (see Table 3.3). Student status was a statistically significant predictor of service use in 2011 (OR: 1:53), 2012 (OR: 1.50), and 2016 (OR: 1.68); students were more likely to use MH services than non-students. Age, marital status, immigrant status, and highest household education were not statistically significant predictors of MHSU in any model (see Table B10 in Appendix B).

Enabling resources. Under enabling resources, income distribution was not a statistically significant predictor of service use in any model (see Table B10 in Appendix B).

Need for care. Self-report MH status, self-report mood disorder, and self-report anxiety disorder were the only three predictors that were statistically significant in all models. Across all years, lower self-rated MH status (OR:1.62 in 2011; OR: 1.83 in 2016) and presence of a mood (OR:7.86 in 2011; OR: 5.85 in 2016) or anxiety disorder (OR: 6.80 in 2011; OR: 5.20 in 2016) was associated with increased likelihood of using MH services. Self-report SWL was a statistically significant predictor of MH service use in 2014 and 2016, such that higher SWL (OR:0.89 in 2014; OR:0.86 in 2016) was associated with a decreased likelihood of MHSU. Self-rated stress was also a significant predictor of service use in 2012 (OR: 1.31), 2013 (OR: 1.30), 2015 (OR: 1.26), and 2016 (OR: 1.37) such that those with higher stress ratings were more likely to use MH services. Binge drinking was not statistically significant in any model (see Table B10 in Appendix B).

Table 3.3 Significant predictors of mental health service use between 2011 to 2016

	Cycle year					
Significant predictors [a]	2011	2012	2013	2014	2015	2016
	OR (SE)	OR (SE)	OR (SE)	OR (SE)	OR (SE)	OR (SE)
Predisposing characteristics						
Female	**2.07 (0.27)*** **	**1.86 (0.24)*** **	**1.65 (0.23)*** **	**1.59 (0.25)** **	**1.71 (0.27)** **	**1.74 (0.25)*** **
Student	**1.53 (0.31)***	**1.50 (0.29)***	1.29 (0.23)	1.23 (0.27)	1.10 (0.23)	**1.68 (0.34)***
Ethnicity						
Black	0.92 (0.42)	0.45 (0.19)	0.37 (0.22)	1.05 (0.41)	0.70 (0.40)	0.38 (0.28)
East and Southeast Asian	**0.45 (0.15)***	0.46 (0.19)	**0.32 (0.12)** **	0.59 (0.20)	**0.14 (0.07)*** **	**0.26 (0.09)*** **
South Asian	**0.45 (0.18)***	**0.37 (0.18)***	0.81 (0.39)	**0.29 (0.14)***	**0.19 (0.11)** **	0.45 (0.24)
Arab and West Asian	1.34 (0.81)	0.91 (0.56)	0.59 (0.32)	0.52 (0.31)	2.24 (1.43)	0.36 (0.19)
Latin American and other	**0.30 (0.16)***	0.38 (0.21)	0.94 (0.40)	0.95 (0.49)	**0.21 (0.11)** **	0.66 (0.27)
Multiple ethnic groups	1.13 (0.44)	0.69 (0.37)	0.56 (0.20)	0.95 (0.37)	0.65 (0.24)	1.89 (0.79)
Need for care						
Satisfaction with life	0.92 (0.05)	0.94 (0.05)	0.90 (0.05)	**0.89 (0.05)***	0.91 (0.06)	**0.86 (0.05)***
Mental health status	**1.62 (0.13)*** **	**1.64 (0.16)*** **	**2.10 (0.17)*** **	**1.72 (0.16)*** **	**1.72 (0.18)*** **	**1.83 (0.16)*** **
Stress	1.15 (0.09)	**1.31 (0.12)** **	**1.30 (0.11)** **	1.15 (0.12)	**1.26 (0.12)***	**1.37 (0.11)*** **
Mood disorder	**7.86 (2.11)*** **	**8.21 (2.34)*** **	**5.04 (1.08)*** **	**3.34 (0.86)*** **	**4.40 (1.15)*** **	**5.85 (1.69)*** **
Anxiety disorder	**6.80 (1.61)*** **	**3.74 (0.86)*** **	**6.19 (1.18)*** **	**3.54 (0.81)*** **	**4.66 (1.05)*** **	**5.20 (1.13)*** **
Constant	**0.01 (0.01)*** **	**0.01 (0.00)*** **	**0.01 (0.01)*** **	**0.02 (0.02)*** **	**0.01 (0.01)*** **	**0.01 (0.01)*** **

Note. OR (SE) = Odd Ratios (Standard Errors)
Sample size varies per year: 2011, *N* = 7474; 2012, *N* = 7125; 2013, *N* = 7071; 2014, *N* = 6771; 2015, *N* = 5531; 2016, *N* = 5670.
[a] Variables that were controlled for in each model include age, marital status, immigrant status, highest household education, income distribution, and binge drinking. See Table B10 in Appendix B for the odds ratios of all variables included in each model. Variables included were found to be significant predictors of MH service use in at least one logistic regression model.

Comparison groups: Females compared to males; student compared to not a student; Ethnicity= all response options compared to Caucasians; Presence of mood disorder compared to no mood disorder; Presence of anxiety disorder compared to no anxiety disorder; Satisfaction with life treated numerically where 0= “very dissatisfied” and 10= “very satisfied.” Mental health status treated numerically where 1= “excellent” and 5= “poor.” Stress treated numerically where 1= “not at all stressful” and 5= “extremely stressful.”

* $p < .05$; ** $p < .01$; *** $p < .001$.

3.5. Discussion

The findings of this study revealed a consistent pattern of predictors of MH service use from 2011 to 2016. We found that two predisposing factors: sex and ethnicity, and four need for care factors: self-rated MH status, self-report life stress, self-report mood disorder, and self-report anxiety disorder, were significant predictors of MH service use in the final models for at least four out of the six years.

1) Predisposing characteristics. We hypothesized that individuals that are female, Caucasian, and from households with members who had higher education would be more likely to access MH services. This hypothesis was partially supported. Consistent with past studies (e.g., Fleury et al., 2014; Wiens et al., 2020), females had a greater likelihood of using MH services compared to males. Studies show that while MH problems affect men and women differently, they are equally prevalent in both sexes (American Psychiatric Association [APA], 2013; Fleury et al., 2014; Wiens et al., 2020). For instance, males are more likely to have externalizing problems in their youth and substance abuse disorders in their adulthood, while females are more likely to suffer from internalizing problems (APA, 2013). Yet, Slaunwhite (2015) reported that men are more likely to report 'acceptability' barriers to care related to the perception of MH issues (e.g., thought nothing of the MH problem) and usefulness of healthcare services (e.g., preferred to self-manage).

We also found, as expected, that people who identified as Caucasian had higher odds of using MH services compared to some, but not all, ethnic groups across all six years. East and Southeast Asians as well as South Asians were the least likely to use MH services. This is particularly interesting considering that the percentage of the population who identified as East and Southeast Asian as well as South Asian increased by 3.3% and 1%, respectively (see Table 3.1). The increasing proportion of people in the population who identified as Asian coupled with the consistently low likelihood of MH service use among people from these ethnic groups suggests that access to MH services may have worsened over time for these ethnic minorities. Tiwari & Wang (2008) also examined MH service use among ethnic minorities using data from the 2003 CCHS cycle and found that Asian immigrants were less likely to use MH services than Caucasian people. A more recent study by Chiu et al. (2018) presented pooled prevalence

estimates of ethnic differences in MH status and MH service use in Ontario based on data from CCHS 2001 to 2014. Mental health service use was lower among South Asian, Chinese, and Black respondents compared to Caucasians (Chiu et al., 2018). While there were no significant differences in the prevalence of fair and poor self-rated MH between Caucasians and South Asian or Black respondents, Chinese immigrants had a significantly greater prevalence of fair and poor MH compared to Caucasians (Chiu et al., 2018). These findings suggest that low MH service use cannot be attributed to low need for MH services among ethnic minorities (Chiu et al., 2018). Rastogi et al. (2014) explored clinician perceptions of MH symptom presentations and barriers to treatment in South Asians living in the U.S. and found that stigma and denial of mental illness were identified as major barriers to treatment. According to this study, a lack of understanding and acceptance of MH treatments also contributed to South Asian patients refusing MH treatment (Rastogi et al., 2014). Similarly, Leong and Lau (2001) synthesized the literature on barriers to providing effective MH treatment to Asian Americans. The authors reported that perceptions of mental illness as a disruption to the social group, increased rates of somatization of psychological problems, and MH stigma can impede help-seeking behaviours among Asian Americans. Considering that males and members of Asian ethnic backgrounds are consistently less likely to access MH services than females and Caucasian people across time, outreach programs targeted towards these groups to provide psychoeducation and decrease MH stigma are warranted. Collaborating with cultural leaders in the local community to provide culturally sensitive outreach programs can increase community engagement and trust among ethnic minorities (Grinker et al, 2012; Rastogi et al., 2014).

Contrary to our hypothesis, household education was not a significant predictor of MH service use, yet current student status was, at least in some of the years (i.e., 2011, 2012, and 2016). Students were more likely to use MH services than those who were not. Youth and emerging adults who are students usually have access to mental health services provided by the school or post-secondary institution, as well as additional insurance coverage which may increase the likelihood of receiving MH services. However, student status was not a significant predictor of MH service use across all years. If student insurance plans or school-based MH services varied from year to year, this may impact students' ability to access MH care. Future research should investigate trends in students' utilization of MH services compared to post-secondary student insurance and school-based MH services to inform policies on MH service

provision for students. The type of provider seen might also vary by student status, which again could be considered in future research.

2) Enabling resources. We hypothesized that individuals from households with higher SES would be more likely to access MH services. This hypothesis was not supported. While income distribution significantly improved model fit when added to the model with "predisposing characteristics" block in 4 out of the 6 models, income distribution was no longer a significant predictor of MH service use in any of the final models when the "need for care" block was added. Steele et al. (2007) also found no association between an individual's income level and MH service use when controlling for mental health need. Fleury et al. (2014) found that individuals without mental disorders who used MH services had a greater household income than those with mental disorders. The same study also found that presence of mental disorders was associated with lower household and personal income. It may be that people from lower SES groups may use publicly funded MH services, in which priority is often given to those with a higher need for services. In contrast, those from higher SES groups may be able to use private MH services that are not based on need. This would account for the current study's finding that income was no longer a significant predictor of service use after "need for care" was included in the model.

3) Need for care. We hypothesized that all variables in the need for care block would predict likelihood of MH service use. This hypothesis was partially supported. All variables except binge drinking significantly predicted likelihood of MH service use in at least two out of the six cycles. However, there were differences in the magnitude of effect sizes that should be noted. While lower self-rated MH status and presence of a mood or anxiety disorder significantly increased likelihood of MH service use in all models, the presence of a mood or anxiety disorder had the greatest effect size in all models. Andersen (1995) theorized that perceived need would inform initial help-seeking behaviours while evaluated need would be related to the amount of treatment provided after a patient seeks care. The CCHS asked about a mood or anxiety disorder diagnosis made by a health professional, though not necessarily in the past year. Thus, individuals who endorsed this item would have already received MH services from a health provider at some point in their past, which likely influenced current MH service use. Future studies should differentiate between initial MH service use and subsequent use, a distinction not

made in the CCHS items, when examining perceived and evaluated needs as predictors of MH service use. Binge drinking was not a significant predictor of MH service use. There was a relatively high prevalence of binge drinking at least two or more times a month (16.4% in 2011 to 12.4% in 2016), which is similar to other studies among youth and emerging adults (e.g., Wiens et al., 2020). Thus, binge drinking may be normalized within this age group; as such, problematic drinking behaviour is unlikely to be seen as a "perceived need" to seek help.

Life stress predicted MH service use in four of the six years. To understand why stress may be a significant predictor of MH service use beyond MH status and the presence of a disorder, it is important to differentiate between the definitions of stress and mental health. Stress is broadly defined as a state of mental or emotional strain resulting from situational pressures or demanding circumstances (Schneiderman et al., 2005). According to the World Health Organization (2018), mental health is defined as "a state of well-being in which an individual realizes his or her own abilities, (and) can cope with the normal stresses of life". The magnitude of stress can be dependent on the situation as well as based on individual differences in stress responses (Keller et al., 2012). However, many studies have documented that prolonged stress can increase the risk of mental health problems (e.g., Keller et al., 2012; Schneiderman et al., 2005; Toussaint et al., 2016), and effective coping strategies can reduce stress (Compas et al., 1993; Schneiderman et al., 2005; Toussaint et al., 2016). Youth and emerging adults may be using MH services to learn effective coping strategies to reduce stress responses to prevent deterioration of mental health and disorder development. Other MH resources and public health response measures may be more appropriate to decrease stress in the population as opposed to the use of specialty MH services. The Mental Health Commission of Canada (2012) has identified that an important strategic direction towards improving the mental health of the population is mental health promotion and mental illness prevention through education and awareness in everyday settings such as homes, schools, and workplaces.

3.5.1. Strengths and Limitations

A major strength of this study was our ability to examine predictors of MH service use in Canada using population-based data over a recent 6-year period; to our knowledge, we are the first to do so. We used data from provinces with large sample sizes and used the same set of provinces each

year to produce the most accurate results and limit the ability of any one province with a large sample size to skew findings.

There are limitations that should be noted. First, the varying content of the CCHS questionnaire from year to year constrained our ability to examine a range of variables specifically under 1) enabling resources and 2) evaluated need for care. 1) Under enabling resources, we were only able to examine income distribution in this study. Other studies have also reported on possible interactions between other enabling resources and access to MH services including population density (Harrington et al., 2013) and proximity of services (e.g., Zayed et al., 2016). Availability (e.g., proximity of services, number of providers) and accessibility (e.g., waitlists, costs) of MH services may be important predictors of MH service use and should be examined in future trend studies. 2) Under evaluated need for care factors, some CCHS cycles included objective measures of psychopathology such as depression or distress measures. However, these psychopathology modules were often optional and were not included in every CCHS cycle examined nor by all provinces included in the study. Therefore, we were unable to include these variables in our assessment of evaluated need for care. Future studies should also examine objective measures of psychopathology as opposed to self-report diagnoses from a health provider to be able to examine differences between MH service users and non-users among those with evaluated need for services.

Second, we used highest household education as a proxy for parental education since parental education was not explicitly asked in the CCHS. Many emerging adults may not necessarily live in the same household as parents and this variable might not reflect parental education. This may explain why highest household education was not found to be a significant predictor of MH service use. As such, this finding should be interpreted with caution and future studies should examine parental education specifically as a predictor of MH service use.

Lastly, people also tend to seek help from different health providers, but there has been a push for collaborative care between providers for a more effective healthcare system. To understand how to promote collaborative care efficiently, future direction should also look at trends in predictors of service use by provider type. For instance, Vasiliadis et al. (2009) examined determinants of MH service use by provider type using the CCHS 2002 cycle and

found that individuals with a past diagnosis of depression and those unable to handle day-to-day demands were more likely to consult with family physicians and psychiatrists. However, respondents with worse self-rated MH were likely to consult a combination of family physicians, psychiatrists, and psychologists (Vasiliadis et al., 2009). Identifying where people are seeking services from based on type of mental health problem can help inform efforts to redirect individuals to appropriate MH services based on need.

3.5.2. Conclusion

Consistent with past cross-sectional research, we found that predisposing characteristics and need for care factors conceptualized based on the Behavioral Model of Health Service Use (Andersen, 1995) contributed to healthcare service utilization for mental health reasons. Need for care factors were the strongest predictors of MH service use. However, there were consistent differences in demographic variables across time that emphasize the need to improve outreach and accessibility of MH services for particular groups of people, namely males and individuals from Asian ethnic groups. Further, changes in significant predictors within perceived need for care variables also suggest changing motives in the population for seeking services, such as increased stress, which may be better addressed by other MH resources as opposed to specialized MH services. The trends in predictors of MH service use reported in this study can inform investments towards improving accessibility of mental health services. Future studies should examine predictors of service use by provider type.

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Chapter 4

4. General Discussion

4.1. Overview

The overarching goals of this thesis were to examine trends in patterns and predictors of MH service use among youth and emerging adults from 2011 to 2016 in Canada. Chapter 2 reported that patterns of MH service use, including overall MH service use, frequency of MH service use, and types of MH providers contacted, all varied over time. Chapter 3 investigated predictors of MH service use across time using Andersen's Behavioural Model of Health Service Use (Andersen, 1995) as a theoretical framework.

In this chapter, the findings across the two stand-alone manuscripts (Ch 2 and 3) will be discussed, along with the limitations, implications, and future directions of research on increasing access to mental health services among youth and emerging adults.

4.2. Trends in Patterns of MH Service Use

Chapter 2 identified a 4.3% increase in MH service use, as well as an increase in the frequency of service use with most service users accessing services multiple times from 2011 to 2016. Majority of service users indicated speaking to only one HP type about their MH concerns. The need for MH services also increased across time, indicated by the increasing prevalence of fair and poor self-rated MH in the population. As such, the overall increase in MH service use ***does not*** reflect better accessibility of services across time. However, when considering access to services as a proportion of need for services (i.e., fair or poor self-rated MH), a greater proportion of people with poor self-rated MH were accessing services in 2016 compared to 2011. Thus, access to MH services ***has*** improved for those with the most extreme need. Despite this, unmet need for care remains a prevalent issue as 2.2% to 2.8% of the population have fair and poor self-rated MH and still do not receive MH care.

Trends in types of providers accessed for MH concerns found a much greater provider caseload for psychiatrists and psychologists in 2011 and 2016 relative to other providers. Yet, the number of providers increased marginally for psychiatrists and virtually not at all for psychologists. The lower rate of increase in the number of psychologists and psychiatrists in the

field is likely impacted by the limited number of training programs, limited number of student seats available within the programs, and time taken to degree completion (Murdoch et al., 2015; OPA, 2019). Psychiatrists and psychologists may be increasing the number of MH users they see by working more hours with clients or shortening duration of time spent with each client. Social workers and counsellors had the greatest increase in number of service users across time. Social workers also had the greatest number of providers in 2011 and 2016 compared to other provider types.

While family physicians had the highest overall rate of service contact in all years, by 2016, social workers/counsellors and psychologists saw a similar percentage of the population for MH reasons. The shift in receiving MH care from non-physician providers may be explained by increased preferences towards psychotherapy services as opposed to pharmacotherapy generally provided by physicians. The increased patterns of service use within an already strained mental healthcare system highlight the need for an effective and accessible mental healthcare system for this age group. The patterns of MH service use based on provider type reported in this study can inform investments towards increasing accessibility of MH services.

4.3. Trends in Predictors of MH Service Use

Chapter 3 identified a consistent pattern of predictors of MH service use from 2011 to 2016. Two predisposing factors (i.e., sex and ethnicity) and four need for care factors (i.e., self-rated MH status, self-report life stress, self-report mood disorder, and self-report anxiety disorder) were significant predictors of MH service use in the final models for at least four out of the six years.

Under predisposing characteristics, females had a greater likelihood of using MH services compared to males across all years. Caucasians also had higher odds of using MH services compared to Asian ethnic groups (i.e., East and Southeast Asian, South Asian) in all years. The lack of change in these two predictors across time describes a consistent pattern of underutilization of MH services for particular groups of people in Canada. This may be due to increased stigma of MH problems (Leong & Lau, 2001; Rastogi et al., 2014; Wang, 2006), decreased knowledge of MH problems and therefore worse problem recognition (Rastogi et al., 2014; Wang, 2006), and greater physical barriers to accessing MH services (i.e., affordability and proximity to MH services; Moroz et al., 2020; Wang, 2006) within these subgroups of

people. Interestingly, there was an increase in the proportion of individuals who self-identified as Asian across time, yet the likelihood of MH service use remained low within these groups, suggesting that access to MH services may have worsened over time for people of Asian ethnic backgrounds.

Income distribution was a significant predictor of MH service use in some years (i.e., 2012-2014, 2016) prior to controlling for need for care variables in the final models. However, once need for care was adjusted for, income distribution was no longer a significant predictor of MH service use, a finding replicated in other studies (e.g., Steele et al., 2007). Under need for care factors, lower self-rated MH and self-report diagnosis of a mood or anxiety disorder were significant predictors of MH service use in all years. Life stress was also a significant predictor of MH service use in four of the six years. However, self-report diagnosis of a mood or anxiety disorder had the greatest effect size in all models.

4.4. Limitations

This thesis has limitations worth noting. First, both studies conducted secondary data analyses on the CCHS, which relies on self-reported data which is subject to recall bias and social desirability bias, particularly when reporting on MH service use. Second, the varying content of the CCHS questionnaire from year to year constrained our ability to examine a range of variables (e.g., psychopathology measures, enabling resources). Third, when calculating provider caseload in Chapter 2, we calculated the number of users per service provider type. Some providers may not work full time or may dedicate a smaller amount of time towards MH service provision relative to other job-related tasks. Other metrics of MH service provision such as direct client service hours or number of MH visits may also be useful to provide a comprehensive picture of service utilization across providers. Additionally, we were unable to include counsellor supply in the provider caseloads as these estimates were not provided by the CIHI. We also did not examine regional differences in provider supply that can greatly impact MH service accessibility within health regions. Fourth, we used highest household education as a proxy variable for parental education in Chapter 3. Readers should be aware of these limitations when interpreting findings from this thesis.

4.5. Implications

The results from these studies have several implications. First, while MH service use is increasing, the mental healthcare system has not become better at meeting demand for services. The increasing need for MH services coupled with little increase in availability of specific provider types (i.e., psychologists and psychiatrists) has resulted in increased provider caseloads. Increasing caseloads is not a sustainable way to improve access to MH services as it would eventually degrade the quality of MH care. However, trends in providers visited show an increase in youth and emerging adults speaking to non-physician providers (i.e., social workers/counsellors, psychologists) about their MH concerns. A preference for psychotherapy services may explain this shift since most primary care physicians and psychiatrists do not provide psychotherapy services (Kurdyak et al., 2020). Considering the increased willingness to seek care from other providers among this age group as well as the national shortage of primary care physicians and psychiatrists, coordinated care efforts should emphasize the use of other MH providers to improve MH service accessibility as a short-term strategy. A long-term direction should be to invest strategically in increasing provider supply for psychologists and psychiatrists as specialty MH service providers and regulate the provision of psychotherapy by social workers and counsellors to provide quality MH care in Canada.

Second, the increase in the prevalence of fair self-rated MH reported in Chapter 2 and increased likelihood of MH service use due to stress found in Chapter 3 highlight that early intervention and prevention strategies are imperative to decreasing strain on the mental healthcare system. Considering that stress can increase the risk of MH problems (Keller et al., 2012) and untreated MH problems are at greater risk of worsening over time (Kessler et al., 2003), greater prevention and early intervention efforts targeting those with fair self-rated MH and increased stress should be viewed as a cost-effective strategy to prevent further deterioration of MH in the population. Mental health initiatives in everyday settings that foster healthy emotional development and positive coping strategies to promote positive mental health in youth and emerging adults can, in turn, reduce the number of people within this age group in need of specialty MH services (Mental Health Commission of Canada [MHCC], 2012). The Mental Health Commission of Canada (2012) has recommended increasing resources for parents,

caregivers, schools, and post-secondary institutions to promote positive mental health and targeted prevention efforts for youth and emerging adults in everyday settings.

A stepped care model may be another way to enhance efficiency, as service delivery is based on need for care factors (Bower & Gilbody, 2005). For instance, a stepped care model may consist of early intervention programs provided by social workers and counsellors, who are in greater supply and have relatively less training in MH service provision, to promote wellbeing and positive mental health for those with increased stress, fair self-rated MH, and lower satisfaction with life. More intensive care and specialized services provided by psychologists and psychiatrists, who are in shorter supply and receive the most training in MH service provision, can be reserved for those with poorer self-rated MH and greater evaluated need for services. Family physicians may provide referrals, information, and general case management as needed. Collaborative stepped care models are evidence-based (Goodrich et al., 2013; MHCC, 2017), have demonstrated improved treatment outcomes (Craven & Bland, 2005; MHCC, 2019), and provide improved access to MH services (Oosterbaan et al., 2013; MHCC, 2019). Collaborative stepped care models may be the road to improving access and efficiency of MH service delivery.

Third, despite increased MH service use, there remain stable predisposing characteristics (i.e., being male, a member of Asian ethnic groups) that predict groups of people who are consistently less likely to use MH services across time. Targeted outreach programs may be necessary to provide psychoeducation and decrease MH stigma within these groups. Collaborating with community stakeholders (e.g., cultural leaders) to explore approaches to improving equitable access to MH services for these groups remains a priority.

4.6. Future Directions

While this thesis answered some questions regarding patterns and predictors of MH service use across time to inform mental healthcare accessibility, it also raised questions on how to promote effective and equitable use of MH services. First, more research on trends in predictors of service use by specific provider type is needed to understand how to promote collaborative care across providers efficiently. Identifying where people are seeking services based on Andersen's Model of Health Service Use (1995) can help inform policies and programs to promote equitable access to care and direct individuals to appropriate MH services based on need. Second, other metrics of

MH service provision by provider type such as hours dedicated to MH service provision, type of treatment provided (psychotherapy, pharmacotherapy), and regional differences in practice patterns should also be researched to provide a comprehensive picture of MH services and gaps in MH care.

4.7. Conclusion

This thesis examined trends in patterns and predictors of MH service use among youth and emerging adults across Canada from 2011 to 2016 using data collected from the CCHS to inform efforts to improve MH service accessibility within this age group. We found that despite increased MH service use, there remained a proportion of the youth and emerging adult population with unmet need for MH care. Further, the increase in supply of the different MH provider types from 2011 to 2016 did not correspond with the number of MH service users served by the different provider types (i.e., provider caseloads). While need for care factors were the strongest predictors of MH service use, there were also consistent demographic differences that predicted decreased likelihood of MH service use among males and those of Asian ethnic backgrounds that need to be addressed to improve equitable access to MH services. The increased patterns of MH service use in a mental healthcare system that is already strained emphasize the need for continued investment and possible restructuring of MH service provision for this age group. Predictors of MH service use and trends in provider caseloads can inform investments towards improving accessibility of MH services.

4.8. References

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Appendices

Appendix A. Information on Canadian Community Health Survey (CCHS) Cycles and Study Variables

This appendix provides detailed information on 1) Statistics Canada CCHS data collection, including changes in the CCHS 2015 redesign, 2) CCHS variables included in this thesis, and 3) Statistics Canada derived income distribution measure. Information was derived from Statistics Canada CCHS Master Files (2011 to 2016) and accompanying documentation (i.e., data dictionary and user guide).

1. Statistics Canada CCHS Data Collection

CCHS 2015 Redesign

CCHS Pre 2015. A sample of 65 000 respondents was obtained on an annual basis to provide reliable estimates at the health region (HR) level. The sample allocation strategy gave relatively equal importance to the HRs and the provinces. The sample was first allocated among provinces based on 1) total province population and 2) number of HRs each province contained. Then, each province's sample was allocated among its HRs. Three sampling frames were used to select the sample of households (described below). Once the dwelling had been chosen, a member in each household was selected from individuals aged 12 years or over.

Pre-2015 Sampling Frames. Three sampling frames were used to select households:

1) Area frame (proportion varies from year to year, approximately 49% of the total CCHS sample). CCHS used the area frame designed for the Canadian Labour Force Survey (LFS) as its primary frame. The LFS plan is a complex two-stage stratified design in which each stratum is formed of clusters. The LFS first selects clusters using a sampling method with a probability proportional to size (PPS), and then the final sample is chosen using a systematic sampling of dwellings within the cluster. The CCHS uses the LFS clusters, which it then stratifies by HRs. Lastly, it selects a sample of clusters and dwellings in each HR.

2) List frame of telephone numbers (proportion varies from year to year, approximately 50% of the total CCHS sample). The list frame is an external administrative frame of telephone numbers

updated every 6 months. It is stratified by HR by means of a postal code conversion file to match the HRs to the telephone numbers. Telephone numbers are selected using a random sampling process in each HR.

3. Random digit dialing (approximately 1% of the total CCHS sample). The Random Digit Dialling (RDD) sampling frame of telephone numbers was used following the working banks technique, whereby only 100-number banks with at least one valid residential telephone number are retained. The banks are grouped in RDD strata to encompass, as closely as possible, the HR areas. Within each stratum, a 100-number bank is randomly chosen and a number between 00 and 99 is generated at random to create a complete, ten-digit telephone number. This procedure is repeated until the required sample size is reached.

Prior to 2015, Sample units selected from the area frame are interviewed using the CAPI method while units selected from the Random Digit Dialing (RDD) and telephone list frames are interviewed using the CATI method.

CCHS 2015 and later. A sample of 130,000 respondents was obtained on a two-year basis: 120,000 respondents to cover the population aged 18 and over and 10,000 respondents to cover the population aged 12 to 17 years. For each age group (12 to 17, 18 and over, etc.), the sample was first allocated among the provinces according to the size of their respective population. Each province's sample is then allocated among its HRs according to the size of the population in each HR. Two sampling frames were used to select households (described below). A simple random sample (SRS) of children aged 12 to 17 were selected within each HR.

Post-2015 Sampling Frames. Two sampling frames were used to select households:

1) Area frame designed from LFS. Using the Area frame, a sample of dwellings is selected to target the population aged 18 and over. During collection, all members of the dwelling are listed, and a person aged 18 years or over is automatically selected using various selection probabilities based on age and household composition.

2) Canadian Child Tax Benefit (CCTB) frame. The CCTB frame is used to sample persons aged 12 to 17 years. One child is then pre-selected to complete the survey. For the CCTB frame, an HR is assigned to each child in the target population based on the address. The CCTB frame is

then stratified by HR. A simple random sample (SRS) of children aged 12 to 17 is selected within each HR.

Since 2015, cases from the area frame are collected using a combination of CAPI and CATI modes, while CCTB cases are collected exclusively by telephone interview.

Table A1.

Provinces/Territories by Cycles (2003-2018) that included Contact with Mental Health Professionals (CMH) modules

Province/ Territory	Year of CCHS Cycle																
	2003	-04	-05	-06	-07	-08	-09	-10	-11	-12	-13	-14	-15	-16	-17	-18	Total cycles
BC*									**X***	**X***	**X***	**X***	**X***	**X***			6
AB	x		x		x	x	x	x	x	x			x	x			10
SA							x		x	x			x	x			5
MB*							x	x	**X***	**X***	**X***	**X***	**X***	**X***			8
ON*	x		x		x	x	x	x	**X***	**X***	**X***	**X***	**X***	**X***			12
QC*	x						x	x	**X***	**X***	**X***	**X***	**X***	**X***	x	x	11
NS					x	x			x	x			x	x	x	x	8
NB	x		x		x	x	x	x	x	x			x	x			10
NL*	x					x			**X***	**X***	**X***	**X***	**X***	**X***	x	x	10
PEI	x				x	x	x	x	x	x			x	x			9
NT	x				x	x	x	x	x	x	x	x	x	x			11
YU							x	x	x	x			x	x			6
NU					x	x			x	x	x	x	x	x	x	x	10
Total provinces	7		3		7	8	9	8	13	13	7	7	13	13	4	4	

Note. BC=British Columbia, AB=Alberta, MB=Manitoba, ON=Ontario, QC=Quebec, NS=Nova Scotia, NB=New Brunswick, NL=Newfoundland, PEI=Prince Edward Island, NT=Northwest Territories, YU=Yukon, NU=Nunavut. Total provinces= total number of provinces that included the CMH module in each cycle. Total cycles= total number of cycles in which each province included the CMH module. **X*** denotes provinces and cycles included in the current study.

2. CCHS Variables

Table A2.

List of CCHS questionnaire items and original response options included in this thesis

Variable	CCHS Questionnaire item	Original Response options
Outcome Variables		
Mental Health Service Use		
Contacts with health professionals	In the past 12 months, that is, from [CURRENTDATE – 1] to yesterday, have you seen or talked to a health professional about your emotional or mental health?	1. Yes 2. No 3. Refusal 4. Don't Know
Frequency of contact	How many times (in the past 12 months)?	Numeric, 1 to 366
Type of professionals	Whom did you see or talk to?	1. Family doctor or general practitioner 2. Psychiatrist 3. Psychologist 4. Nurse 5. Social worker or counsellor 6. Other 7. Refusal 8. Don't Know
Descriptive/Predictor Variables		
Predisposing Characteristics		
Age	What is your age?	Numeric
Racial/cultural background	Derived variable	1. White only 2. South Asian only 3. Chinese only 4. Black only 5. Filipino only 6. Latin American only 7. Arab only 8. Southeast Asian only 9. West Asian only 10. Korean only 11. Japanese only

		12. Other racial or cultural origin (only) 13. Multiple racial or cultural origins 14. Valid skip 15. Not stated
Sex		1. Male 2. Female
Immigration status	Derived variable	1. Landed immigrant / non-permanent resident 2. Non-immigrant (Canadian born) 3. Not stated
Marital status		1. Married 2. Living common-law 3. Widowed 4. Separated 5. Divorced 6. Single, never married 7. Don't know 8. Refusal 9. Not stated
Household education status	Highest level of education attained by a member in the household - Household, 9 levels - (D)	1. Gr 8 or lower 2. Gr 9 – 10 3. Gr 11 – 13 4. Secondary school graduate, no post secondary education 5. Trade Certificate or diploma 6. Non-university certificate or diploma from a college, cegep 7. University certificate or diploma below bachelor's Level 8. Bachelor's degree 9. University certificate, diploma or degree above bachelor's level 10. Not stated
Student status	Are you currently attending school, college, CEGEP or university?	1. Yes 2. No 3. Don't know 4. Refusal

		5. Not stated
Enabling Resources		
Income Distribution	Derived variable calculated using household income, household size and population size group.	Numeric, 1 (lowest 10%) to 10 (highest 10%)
Need for Care		
Perceived Need		
Self-rated satisfaction with life	Using a scale of 0 to 10, where 0 means "very dissatisfied" and 10 means "very satisfied", how do you feel about your life as a whole right now?	Numeric, 0 (very dissatisfied) to 10 (very satisfied) 11. Don't know 12. Refusal
Self-rated mental health	"In general, would you say your mental health is:"	1. Excellent 2. Very good 3. Good 4. Fair 5. Poor 6. Don't know 7. Refusal
Self-rated life stress	Thinking about the amount of stress in your life, would you say that most of your days are…?	1. Not at all stressful 2. Not very stressful 3. A bit stressful 4. Quite a bit stressful 5. Extremely stressful 6. Don't know 7. Refusal
Evaluated Need		
Diagnosis of mood disorder by health professional	"We're interested in conditions diagnosed by a health professional. Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia?"	1. Yes 2. No 3. Don't know 4. Refused
Diagnosis of anxiety disorder by health professional	"We're interested in conditions diagnosed by a health professional. Do you have an anxiety disorder such as a phobia, obsessive-compulsive disorder or a panic disorder?"	1. Yes 2. No 3. Don't know 4. Refused

Binge Drinking	(pre-2013): How often in the past 12 months [have/has] [you/he/she] had **5** or more drinks on one occasion? (2013 and later): How often in the past 12 months have you had [5 (males)/4 (females)] or more drinks on one occasion?	1. Never 2. Less than once a month 3. Once a month 4. 2 to 3 times a month 5. Once a week 6. More than once a week 7. Don't know 8. Refusal

Note: Questionnaire items with specific years in parenthesis denote options that were only provided in that year.

3. Statistics Canada derived Income Distribution

The measure of income distribution provided by Statistic's Canada was used as a measure of SES in Chapter 3. The income distribution is computed using the adjusted ratio between total household income and LICO calculated in the CCHS master files provided by Statistics Canada (Statistics Canada, 2020). There were three steps to calculating the income distribution for each household: 1) calculate the LICO ratio, 2) calculate the adjusted household income ratio using the LICO ratio, 3) calculate the income distribution using the adjusted household income ratio.

1) Calculating the LICO ratio. The LICO ratio was calculated by dividing household income by the corresponding low-income cut-off (LICO) assigned to each household based on household and community size. The low-income cut-offs before tax (LICO) are income thresholds below which a family will likely devote a larger share of its before-tax income on the necessities of food, shelter, and clothing than the average family. The approach is to estimate an income threshold at which families are expected to spend 20% more than the average family on food, shelter, and clothing, based on the 1992 Family Expenditures Survey. LICOs are calculated in this manner for seven family sizes and five community sizes. For instance, in 2015, for a family of four people residing in a community with a population under 30 000, the LICO-BT was $35 799 (Statistics Canada, 2018). The LICO ratio is calculated as follows: 1) LICO for each family and community size are obtained using the previous year's Survey of Labour and Income Dynamics (SLID). 2) A LICO is linked to all respondents based on their household size and community size. 3) Ratios are calculated by dividing the respondent's household income by the corresponding LICO assigned to the household. Ratios greater than 1.00 reflect households that are above the low income cut off while ratios that are equal to or less than 1.00 reflect households that are at or below the low-income cut-off.

2) Calculating the adjusted household income ratio. Adjusted household income ratios to the LICO are obtained by dividing the original LICO ratios by the highest ratio among all survey respondents. This results in ratios ranging from 0 to 1, with ratios closer to 1 representing households with adjusted household incomes that are closest to the highest adjusted household income in Canada.

3) Calculating the income distribution. The final income distribution is a distribution of respondents in deciles (ten categories including approximately the same percentage of residents for each province) based on their adjusted household income ratio. Deciles are generated using weighted data. Adjusted ratios are presented in increasing order, from smallest to largest, for all 10 provinces irrespective of household and community size and assigned deciles where decile 1 consists of the first 10% of respondents from the list of adjusted ratios and decile 10 consists of the last 10% of respondents from the list of adjusted ratios. Therefore, decile 1 represents households in the lowest income distribution while decile 10 represents those in the highest income distribution.

Appendix A References

Statistics Canada. (2011). *Canadian Community Health Survey (CCHS) (Master file).* Statistics Canada (producer). Using University of Western Ontario Research Data Centre (distributor). Accompanying documentation: electronic data dictionary and user guide.

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Appendix B. Detailed Information on Methods, Analyses, and Results

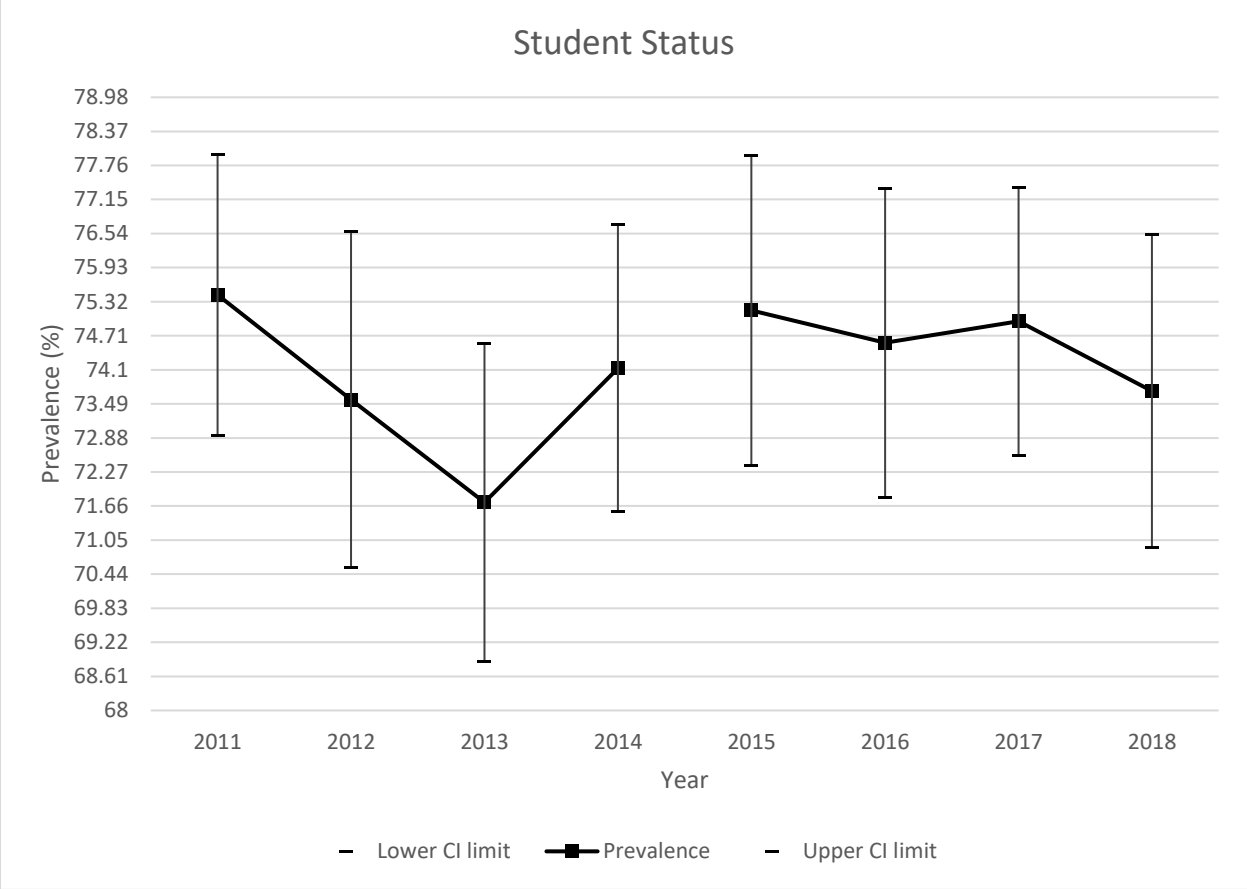
Appendix B contains detailed information on 1) the sensitivity analyses examining the CCHS 2015 redesign, 2) proportion of overlap (POL) tests of significance, 3) CCHS study variables (e.g., recoded response options, phrase changes, and missing value analyses), 4) CIHI's estimates of provincial provider supply rates and 5) complete logistic regression models conducted in Chapter 3.

1. Sensitivity Analyses

Sensitivity analyses were conducted to compare prevalence rates of demographic variables from CCHS cycles 2011 to 2018 for provinces Quebec and Newfoundland. Three raters independently assessed standardized graphs of prevalence estimates for each demographic variable (e.g., age, household education status, marital status, etc.) and compared slopes between 2011 to 2014 and 2015 to 2018 (see Figure B1) using a decision-making chart (see Table B1). Two of the three raters were undergraduate student research assistants; the third rater was the primary investigator of this study. After independent ratings were recorded, interrater agreement was calculated and any rating discrepancies between raters were discussed to reach a consensus for a variable's rating. Interrater agreement for the sensitivity analyses was 82.4% exact agreement (see Table B2). Out of seven variables examined, highest household education was the only variable that may have been impacted by the 2015 CCHS data collection redesign (See Table B2). Therefore, prevalence estimates from CCHS cycles prior to 2015 were compared to post 2015 cycles as differences between prevalence estimates were likely a reflection of true population characteristics being examined.

Figure B1.

Example of a standardized graph for sensitivity analyses



Note. Example of a standardized graph used by raters to compare slopes and intercept of prevalence estimates for the demographic variable student status. All prevalence estimates are age-sex standardized using 2011 census data.
Scale for the y-axis is standardized across all graphs using the formula: (highest standard error of prevalence estimate – lowest standard error of a prevalence estimate) x 2.
If a rater identified the slope direction between the two segments as the same in the example graph above, they would then examine whether there was a clear increase or decrease in absolute y values between the two segments. If a clear increase or decrease in absolute values between the segments is identified, then the rater would compare the proportion of overlap between confidence intervals for the two most extreme values in each of the segments to assess whether the change in absolute values is significant at $p < .05$. Extreme values in each segment were chosen as these values are likely to have the smallest proportion of overlap between confidence intervals, allowing for a more sensitive test of significant differences in absolute values. In the example graph above, the extreme value in segment 2011-2014 is 2013 as it is the lowest value in that segment; the extreme value in segment 2015-2018 is 2015 as it is the highest value in that segment.

Table B1.

Sensitivity analyses decision-making chart

Item:	**Explanation**	**Options**
2011-2014 segment slope	What is the general direction of the slope for this segment?	Negative linear, positive linear, flat, or non-linear
2015-2018 segment slope	What is the general direction of the slope for this segment?	Negative linear, positive linear, flat, or non-linear
Slope comparison	Is the slope direction for 2011-2014 same as that of 2015-2018 or different?	Same or different
If different, then:	**No change caused by methodology**	
If similar, then:		
Any change in absolute values pre-/post-2015	Was there a clear increase or decrease in absolute y values for 2015-2018 compared to 2011-2014?	No or yes
If no, then:	**No change due to methodology**	
If yes, then POL test of significance	POL test of significant difference by comparing CI overlap for two most extreme values pre-/post-2015.	More than 50% overlap in CI arm for two most extreme points (not significant) OR 50% or less overlap in CI arm for two most extreme points (significant at $p<.05$)

Table B2.

Interrater agreement for sensitivity analyses

List of variables	Consensus	Exact Agreement (%)
Age	No	100%
Student Status	No	100%
Marital Status	No	100%
Immigrant Status	No	100%
Household education	Yes	
Highschool or less	No	100%
Trade school	No	100%
College	Yes	100%
Bachelor's degree	No	100%
Degree greater than Bachelor's	No	100%
Income Distribution	No	100%
Cultural background	No	
Caucasian	No	66%
Black	No	66%
East and Southeast Asian	No	100%
South Asian	No	100%
Arab and West Asian	No	66%
Latin American and other	No	100%
Multiple origins	No	100%
Rater agreement (%)		82.4%

Note. Exact agreement (%) for each response option was calculated by determining number of raters who indicated the same decision (i.e., impact vs no impact due to change in methods) divided by total number of raters. Rater agreement was calculated as number of response options where raters indicated the same decision divided by the total number of response options across all demographic variables. Consensus ratings indicate that out of seven variables, household education was the only variable that showed some evidence of impact by the 2015 CCHS data collection redesign.

2. Proportion of Overlap (POL) Test of Significance

Cummings (2009) recommended using a 50% proportion of overlap (POL) between 95% confidence intervals (CI) of two prevalence estimates as indicative of a statistically significant difference at $p<.05$. This test is robust at different sample sizes and when homogeneity of variance cannot be assumed, as long as the margin of error between estimates is not greater than a factor of 2.

Formula to calculate exact POL between two 95% CI:

$$\text{Proporton of overlap (POL)} = \frac{\text{Vertical distance of overlap}}{\text{Average length of both CI arms}}$$

$$= \frac{(\mathrm{X} - \mathrm{Y})}{[(\mathrm{X} - \mathrm{A}) + (\mathrm{B} - \mathrm{Y})]/2}$$

$$= \frac{2(\mathrm{X} - \mathrm{Y})}{(\mathrm{X} - \mathrm{A}) + (\mathrm{B} - \mathrm{Y})}$$

where:

X = Year 1 Upper Confidence Interval Value
A = Year 1 prevalence estimate
Y = Year 2 Lower Confidence Interval Value
B = Year 2 prevalence estimate
Vertical distance of overlap = X – Y
Length of Year 1 CI arm = (X – A)
Length of Year 2 CI arm = (B-Y)
Average length of both CI arms = [(X-A) + (B-Y)]/2

In the current study, we applied this procedure in two steps:

1) We had three raters independently assess standardized graphs of population-level prevalence estimates for all variables and compare each pair of prevalence estimates to indicate whether POL between 95% CI was 50% or less (see Figure B2 and Table B3).

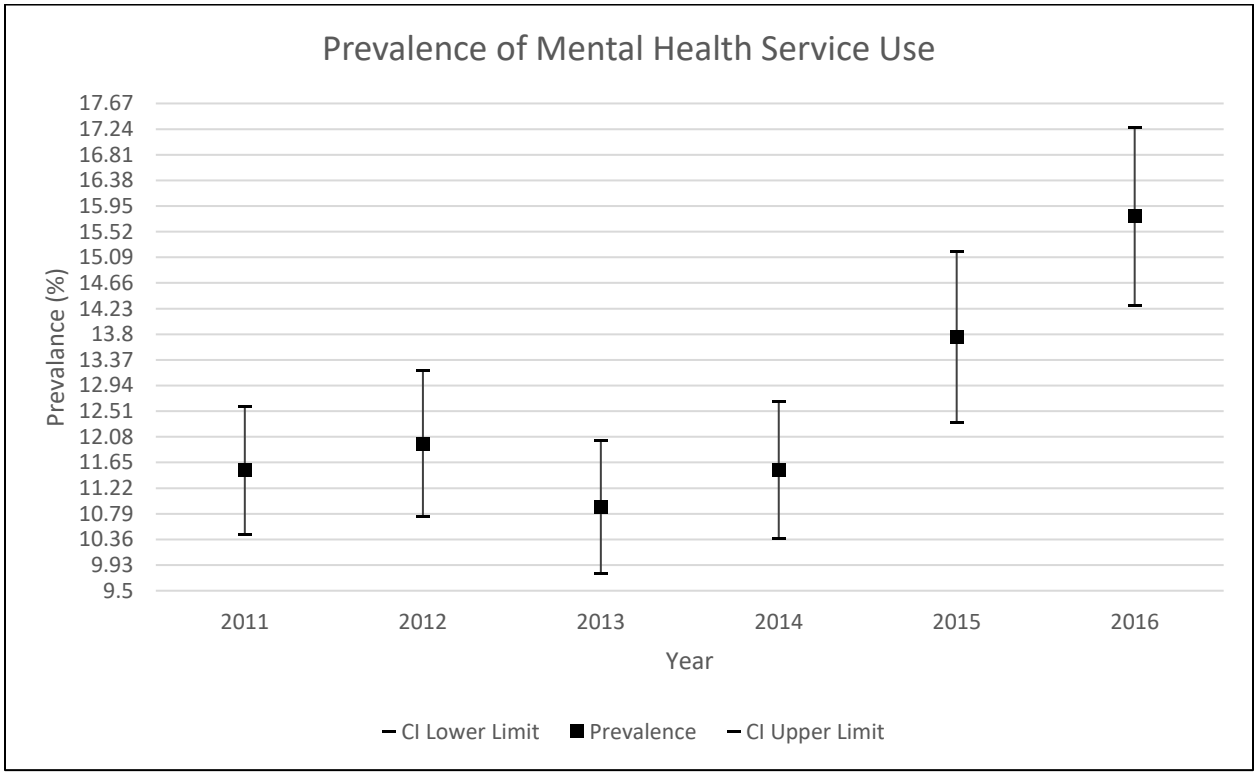
2) We calculated exact POL values using the formula described above only when a rater indicated between 50% and 0% POL to confirm statistical significance at $p < .05$.

We use Figure B2 to provide a step-by-step example of how we applied this procedure to interpret statistical significance. Figure B2 is an example of a standardized graph used by raters to compare POL between 95% CI for the variable, Mental Health Service Use. Using Figure B2, raters would complete Table B3, indicating whether the POL between 95% CI of point estimates

was greater than 50%, between 50% and 0%, or if there was no overlap at all. If all three raters indicated no overlap at all, then statistical significance at $p < .05$ was interpreted. For instance, if all three raters indicated "0" denoting no overlap of 95% CI in Table B3 for the comparison between 2015 and 2013, then statistical significance at $p < .05$ is interpreted. However, if at least one rater indicated between 50% and 0% overlap of 95% CI between two point estimates, then we used the formula described above to calculate exact POL values. Table B4 provides a sample calculation of the exact POL between 2011 and 2015 for Mental Health Service Use using prevalence estimates and 95% CI values for both years (see Table 2.2 in Chapter 2). Calculations showed a 20.8% exact POL between 95% CI for 2011 and 2015. Therefore, there was a statistically significant difference between prevalence estimates for Mental Health Service use between 2011 and 2015, $p < .05$.

Figure B2

Example of a standardized graph for POL tests



Note. Example of a standardized graph used by raters to compare POL between 95% confidence intervals for Mental Health Service Use. All prevalence estimates are age-sex standardized using 2011 census data. Scale for the y-axis is standardized across all graphs using formula: (highest standard error of prevalence estimate – lowest standard error of a prevalence estimate) x 2.

Table B3.

Example matrix used by raters to indicate POL using Figure B2

	2011	2012	2013	2014	2015	2016
2011	-	2	2	2	1	0
2012	-	-	2	2	1	0
2013	-	-	-	2	0	0
2014	-	-	-	-	1	0
2015	-	-	-	-	-	2
2016	-	-	-	-	-	-

Note. "2" denotes greater than 50% overlap, "1" denotes between 50% and 0% overlap, "0" denotes no overlap. If all raters indicated "0", then statistical significance at $p < .05$ was interpreted, whereas if all raters indicated "2" then $p > .05$ and statistical significance was not interpreted. If any rater indicated "1", further calculations were computed to determine exact POL.

Table B4.

Calculation of exact POL values between 2011 and 2015

Formula description	**Formula**	**Values**
Estimates		
2011 upper CI value	X	12.5859
2011 prevalence estimate	A	11.51734
2015 lower CI value	Y	12.32516
2015 prevalence estimate	B	13.75781
Calculations		
Vertical distance of overlap	X-Y	0.26074
Length of 2011 CI arm	X-A	1.06856
Length of 2015 CI arm	B-Y	1.43265
Average length of both CI arms	[(X-A) + (B-Y)]/2	1.250605
Proportion of overlap (POL)	$\frac{(X-Y)}{[(X-A)+(B-Y)]/2}$	0.20849109

Note. CI= 95% Confidence Intervals.
Values of prevalence estimates and 95% CI are taken from Table 2.2 in Chapter 2.

Table B5.

Summary of interrater agreement for POL between prevalence estimates

Variable	**Exact Agreement (%)**
MHSU (%)	87%
Frequency of service use (M)	87%
Frequency of service use (%)	
One visit	87%
Two or more visits	87%
Health professional consulted (%)	
Family doctor	73%
Psychiatrist	67%
Psychologist	80%
Nurse	73%
SW Counsellor	73%
Other	87%
Number of professionals contacted (%)	
None	80%
One	93%
Two or more	67%
Rater agreement (%)	80%

Note. Each response option had 15 possible comparisons (see Table B3). Exact agreement (%) for each response option was calculated by determining number of comparisons where raters indicated the same POL rating divided by total number of comparisons made. Rater agreement was calculated as number of comparisons where raters indicated the same POL rating divided by the total number of comparisons across all variables. M = mean, % = percentage.

3. CCHS Variables

Table B6.

List of variables included in Chapter 2 and Chapter 3, recoded response options, and treatment of missing data

Variable	Recoded response options	Treatment of missing data
Outcome Variables		
Mental Health Service Use		
Mental health service use	1. No 2. Yes	Respondents with missing values were excluded from study
Frequency of service use (Mean)	Numeric	Missing data not imputed
Frequency of service use (2 groups)	1. One visit only 2. Two or more visits	Missing data not imputed
Type of health providers consulted	1. Family doctor or general practitioner 2. Psychiatrist 3. Psychologist 4. Nurse 5. Social worker or counsellor 6. Other 7. Refusal 8. Don't Know	Missing data not imputed
Number of health providers consulted	1. None 2. One 3. Two or more	Missing data not imputed
Descriptive/Predictor Variables		
Predisposing Characteristics		
Age	Numeric	No missing data
Ethnicity	1. White only 2. Black only 3. East and Southeast Asian 4. South Asian 5. West Asian and Arab 6. Latin American and other 7. Multiple ethnic origin	Missing data replaced with mode ("White only") for each CCHS cycle
Sex	1. Male 2. Female	No missing data
Immigration status	1. Landed immigrant 2. Canadian born	Missing data replaced with mode ("Canadian born") for each CCHS cycle
Marital status	1. Single 2. Married/Common-law	Missing data replaced with mode ("Single") for each CCHS cycle
Highest household education	1. Highschool or less 2. Trade Certificate	Missing data imputed using mode response based on cross-tabulations

	3. College diploma or equivalent 4. Bachelor's degree 5. University degree greater than Bachelor's	of household education and income distribution.
Student status	1. No 2. Yes	Missing data replaced with mode ("Yes") for each CCHS cycle
Enabling Resources		
Income Distribution	1 (lowest 10%) to 10 (highest 10%)	No missing data
Need for Care		
Perceived Need		
Self-rated satisfaction with life	0 (Very dissatisfied) to 10 (Very satisfied)	Missing data replaced with mode option for each CCHS cycle
Self-rated mental health	1. Excellent 2. Very good 3. Good 4. Fair 5. Poor	Missing data replaced with mode option for each CCHS cycle
Self-rated Life Stress	1: Not at all stressful 2: Not very stressful 3: A bit stressful 4: Quite a bit stressful 5: Extremely stressful	Missing data replaced with mode option for each CCHS cycle
Evaluated Need		
Diagnosis of mood disorder by health professional	1. No 2. Yes	Missing data replaced with mode ("No") for each CCHS cycle
Diagnosis of anxiety disorder by health professional	1. No 2. Yes	Missing data replaced with mode ("No") for each CCHS cycle
Binge drink	1. Never 2. Once a month or less 3. 2 + times a month	Missing data replaced with mode ("Never") for each CCHS cycle

Table B7.

Average percentage of "Binge drink" response options endorsed by females between 2011-2012 and 2013-2016

	2011-2012	2013-2016
Never	28.9%	27.7%
Once a month or less	14.8%	15.1%
2+ times/month	5.7%	5.8%

Note. Average percentages were calculated for years 2011 and 2012 compared to years 2013 to 2016 where the change from 5 drinks to 4 drinks on one occasion was introduced for females.

Table B8.

Percentage of missing values for variables included in Chapter 2 and Chapter 3

	2011	2012	2013	2014	2015	2016	Lower limit	Upper limit	Total
Mental health service use variables									
Mental health service use	0%	0%	0%	0%	0%	0%	-	-	0%
Frequency of service use	0.04%	0.02%	0.01%	0.02%	0.01%	0.08%	0.01%	0.08%	0.19%
Health provider consulted	0.02%	0.01%	0.01%	0.01%	0.02%	0.02%	0.01%	0.02%	0.07%
Descriptive/Predictor variables									
Sex	0%	0%	0%	0%	0%	0%	-	-	0%
Age	0%	0%	0%	0%	0%	0%	-	-	0%
Marital status	0.40%	0.30%	0.30%	0.50%	0.20%	0.20%	0.20%	0.50%	0.32%
Immigration status	1.30%	1.10%	0.90%	0.60%	2.50%	2.10%	0.60%	2.50%	1.43%
Student status	15.60%	13.30%	13.10%	12.80%	0.90%	0.90%	0.90%	15.60%	9.54%
Highest household education	14.10%	12.20%	4.90%	5.00%	6.50%	5.70%	4.90%	14.10%	8.13%
Ethnicity	5.90%	5.90%	6.20%	5.20%	8.10%	7.60%	5.20%	8.10%	6.48%
Income distribution	0%	0%	0%	0%	0%	0%	-	-	0%
Satisfaction with life	0.20%	0.20%	0.20%	0.20%	0.30%	0.30%	0.23%	0.30%	0.23%
Mental health status	0.10%	0.10%	0.10%	0.30%	0.10%	0.10%	0.10%	0.30%	0.14%
Stress	0.10%	0.20%	0.10%	0.20%	0.10%	0.10%	0.10%	0.20%	0.14%
Binge drink	0.25%	0.11%	0.29%	0.26%	0.24%	0.40%	0.11%	0.40%	0.26%
Mood disorder	0.10%	0%	0.10%	0.10%	0.30%	0.20%	0%	0.30%	0.14%
Anxiety disorder	0.20%	0.10%	0.20%	0.10%	0.30%	0.10%	0.10%	0.30%	0.17%

Note. Table provides percentage of missing values for variables in each CCHS cycle.

4. CIHI Raw Estimates of Provincial Provider Supply per 100 000

Table B9.

Province population and CIHI estimates of provider supply per 100 000 for provinces included in Chapter 1

	ON		MB		QC		BC		NL	
	2011	2016	2011	2016	2011	2016	2011	2016	2011	2016
Province population (in thousands)	13 323	13 972	1 242	1 324	8 029	8 256	4 536	4 887	526	529
Provider Type										
Family doctor	96	110	106	107	113	119	119	127	119	129
Psychiatrist	14	15	13	13	14	15	14	16	13	13
Psychologist	26	27	18	16	96	95	24	26	37	48
Social worker	99	134	70	153	107	162	56	86	273	284

Note. Values displayed in table are number of providers per 100 000 people. Provincial rates of family doctor and psychiatrist supply are taken from data tables collated by the CIHI using data from the Scott's Medical Database (CIHI, 2020). Psychologists and social worker supply estimates are taken from data tables collated by CIHI using data from the Health Workforce Database (CIHI, 2019a). Province population estimates are provided by CIHI (2020), informed by Statistics Canada.

5. Complete Logistic Regression Models of Predictors of Mental Health Service Use

Table B10.

Logistic regression models showing all predictors, organized by Andersen's model of health service use, for each data cycle from 2011 to 2016

	Cycle year					
	2011	2012	2013	2014	2015	2016
	OR (SE)	OR (SE)	OR (SE)	OR (SE)	OR (SE)	OR (SE)
Predisposing characteristics						
Female	**2.07 (0.27)*** **	**1.86 (0.24)*** **	**1.65 (0.23)*** **	**1.59 (0.25)** **	**1.71 (0.27)** **	**1.74 (0.25)*** **
Age	1.04 (0.03)	1.04 (0.03)	1.02 (0.03)	1.03 (0.03)	1.02 (0.03)	1.02 (0.03)
Married/common law	0.98 (0.31)	0.92 (0.27)	0.77 (0.21)	0.93 (0.30)	1.72 (0.56)	1.18 (0.32)
Immigrant	0.58 (0.17)	0.87 (0.26)	1.01 (0.26)	0.92 (0.29)	0.93 (0.28)	0.78 (0.21)
Student	**1.53 (0.31)***	**1.50 (0.29)***	1.29 (0.23)	1.23 (0.27)	1.10 (0.23)	**1.68 (0.34)***
Highest Household education						
Trade certificate	1.25 (0.36)	1.24 (0.40)	0.91 (0.23)	1.04 (0.28)	0.83 (0.24)	1.17 (0.38)
College	1.26 (0.25)	1.47 (0.39)	0.86 (0.17)	1.04 (0.22)	0.80 (0.17)	1.26 (0.29)
Bachelor's degree	1.22 (0.28)	1.45 (0.37)	1.18 (0.25)	1.23 (0.28)	0.91 (0.21)	1.53 (0.36)
University degree greater than bachelor's	1.01 (0.28)	1.52 (0.51)	0.94 (0.23)	1.61 (0.41)	1.28 (0.38)	1.16 (0.33)
Ethnicity						
Black	0.92 (0.42)	0.45 (0.19)	0.37 (0.22)	1.05 (0.41)	0.70 (0.40)	0.38 (0.28)
East and Southeast Asian	**0.45 (0.15)***	0.46 (0.19)	**0.32 (0.12)** **	0.59 (0.20)	**0.14 (0.07)*** **	**0.26 (0.09)*** **
South Asian	**0.45 (0.18)***	**0.37 (0.18)***	0.81 (0.39)	**0.29 (0.14)***	**0.19 (0.11)** **	0.45 (0.24)
Arab and West Asian	1.34 (0.81)	0.91 (0.56)	0.59 (0.32)	0.52 (0.31)	2.24 (1.43)	0.36 (0.19)
Latin American and other	**0.30 (0.16)***	0.38 (0.21)	0.94 (0.40)	0.95 (0.49)	**0.21 (0.11)** **	0.66 (0.27)

Multiple ethnic groups	1.13 (0.44)	0.69 (0.37)	0.56 (0.20)	0.95 (0.37)	0.65 (0.24)	1.89 (0.79)
Enabling resources						
Income distribution (in deciles)	1.00 (0.03)	0.97 (0.03)	0.99 (0.03)	0.97 (0.03)	1.05 (0.03)	1.02 (0.03)
Need for care						
Satisfaction with life	0.92 (0.05)	0.94 (0.05)	0.90 (0.05)	**0.89 (0.05)***	0.91 (0.06)	**0.86 (0.05)***
Mental health status	**1.62 (0.13)*****	**1.64 (0.16)*****	**2.10 (0.17)*****	**1.72 (0.16)*****	**1.72 (0.18)*****	**1.83 (0.16)*****
Stress	1.15 (0.09)	**1.31 (0.12)****	**1.30 (0.11)****	1.15 (0.12)	**1.26 (0.12)***	**1.37 (0.11)*****
Binge drink						
Once a month or less	1.06 (0.17)	1.21 (0.23)	1.36 (0.23)	1.23 (0.23)	1.01 (0.21)	1.13 (0.19)
2+ times a month	1.17 (0.27)	1.58 (0.40)	1.07 (0.23)	0.82 (0.19)	0.80 (0.23)	1.18 (0.32)
Mood disorder	**7.86 (2.11)*****	**8.21 (2.34)*****	**5.04 (1.08)*****	**3.34 (0.86)*****	**4.40 (1.15)*****	**5.85 (1.69)*****
Anxiety disorder	**6.80 (1.61)*****	**3.74 (0.86)*****	**6.19 (1.18)*****	**3.54 (0.81)*****	**4.66 (1.05)*****	**5.20 (1.13)*****
Constant	**0.01 (0.01)*****	**0.01 (0.00)*****	**0.01 (0.01)*****	**0.02 (0.02)*****	**0.01 (0.01)*****	**0.01 (0.01)*****

Note. OR (SE) = Odd Ratio (Standard Error).

Comparison groups: Females compared to males; married/common-law compared to single; immigrant compared to non-immigrant; student compared to not a student; highest household education= all response options compared to high school or less; Ethnicity= all response options compared to Caucasians; Binge drink= all response options compared to never; Presence of mood disorder compared to no mood disorder; Presence of anxiety disorder compared to no anxiety disorder; Income distribution treated numerically where decile 1= households in the lowest income distribution while decile 10= those in the highest income distribution; Satisfaction with life treated numerically where 0= "very dissatisfied" and 10= "very satisfied." Mental health status treated numerically where 1= "excellent" and 5= "poor." Stress treated numerically where 1= "not at all stressful" and 5= "extremely stressful."

* denotes $p<.05$. ** denotes $p<.01$. *** denotes $p<.001$

Appendix B References

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Curriculum Vitae

Thipiga Sivayoganathan

Education

2019-Present **Masters of Science in Clinical Psychology**
University of Western Ontario, London, ON
Supervisor: Dr. Graham Reid
Thesis: *Trends in mental health service use reported by youth and emerging adults in Canada*

2014-2018 **Honours Bachelor of Arts and Science**
McMaster University, Hamilton, ON
Graduated with Honours in a double major program focusing on Arts and Science with a combination in Psychology, Neuroscience, and Behaviour
Supervisor: Dr. Mat Savelli
Thesis: *The impact of mental health workshops on university students' subjective well-being,*
Summa Cum Laude

Awards and Scholarships

2021	CRDCN National Policy Challenge, Second Place
2019-2020	Western Graduate Research Scholarship, University of Western Ontario
2018	Second place in the Undergraduate Non-Clinical Research Category Poster Presentation, McMaster Psychiatry Research Day
2014-2018	Dean's Honour List in Level I, II, III, and IV Arts and Science, McMaster University
2017	Arts and Science Undergraduate Student Research Award, McMaster University
2017	Edward Frank Davis Community Contribution Award, McMaster University
2017	Trainee Poster Competition- Gold Award in the Undergraduate category for Research Excellence, McMaster Institute of Research on Aging
2014	Honours Award, McMaster University

Related Work Experience

01/2021-04/2021	Teaching Assistant, Psych 2320: Abnormal Child Psychology *University of Western Ontario, London, ON*
09/2019-12/2020	Teaching Assistant, Psych 1000: Introduction to Psychology *University of Western Ontario, London, ON*
07/2018- 04/2019	Research Assistant, Patient-Centered Research *Ron Joyce Children's Health Centre, Hamilton, ON*

09/2017-07/2018 Research Assistant, Anxiety Treatment and Research Clinic
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Publications

Cunningham, C., Rimas, H., Sivayoganathan, T., Stewart, B., Munn, C., Zipursky, R., Christensen, B., Bieling, P., Wilson, F., Furimsky, I., and Madsen, V. (2020). Modeling the Reduction of Attrition in Campus Mental Health Services: A Discrete Choice Conjoint Experiment. *Emerging Adulthood*. Advanced online publication. https://doi.org/10.1177/2167696820946894

Presentations

Sivayoganathan, T. & Reid, G. (2021, June) Policy implications for mental health service delivery based on mental health service use trends among youth and emerging adults in Canada. Oral presentation at the annual CRDCN National Policy Challenge, Virtual.

Sivayoganathan, T. & McKenzie, K. (2021, February) Mental Health Myths. Oral presentation as part of the Finding Your Way Lecture Series, Virtual.

Sivayoganathan, T. & Savelli, M. (2018, November) The impact of mental health workshops on university students' subjective wellbeing. Oral presentation at The International Conference on Wellbeing, Singapore.

Posters

Sivayoganathan, T. & Reid, G. (2021, June) Mental health service use trends reported by youth and emerging adults in Canada. Poster presented at the annual Canadian Psychology Association Convention, Virtual.

Sivayoganathan, T., Rowa, K., Hoang, C., Milosevic, I., Moscovitch, D., & McCabe, R. (2018, May) Performance predicts likeability in an initial interaction task. Poster presented at the McMaster Psychiatry Research Day, Hamilton, Canada.

Sivayoganathan, T., Joshi, A., & Ryan, E. (2017, December). Perceived impact of social participation and resilience among older adults. Poster presented at the McMaster Institute of Research on Aging Research Day, Hamilton, Canada.

Sivayoganathan, T., Joshi, A., & Ryan, E. (2017, October). Perceived impact of social participation and resilience among older adults. Poster presented at the 46th Annual

Canadian Association of Gerontology Conference, Winnipeg, Canada. Peer-reviewed abstract published in the CAG 2017 online program as well as the Abstract Book. URL: http://cagacg.ca/wp-content/uploads/2017/10/CAG2017_AbstractBook.pdf (page range 158-159)

Scholarly and Professional Activities

03/2021-Present	Clinical Equity Diversity and Inclusion Committee (EDI) *University of Western Ontario, London, ON*
06/2020-Present	Clinical Student Advisory Committee (CSAC) *University of Western Ontario, London, ON*
10/2020-Present	MindPad, Reviewer *Canadian Psychological Association*
10/2019-04/2021	Advocacy through Action, Outreach Committee Member *University of Western Ontario, London, ON*