Measuring and Responding to Mental Health Needs of Emerging Adults Receiving Care in Canadian Psychiatric Settings: Evidence for the Importance of Assessing Anxiety Symptoms

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Background: Emerging adulthood (EA) is a developmental period between the ages of 18-29 that is characterized by numerous life transitions, as well as high rates of psychological distress and onset of several psychological disorders. Despite a high need for mental health services, EA are more likely to disengage from psychological treatment than other age groups, prompting a national policy review on mental health care systems and EA. Lack of comprehensive research on mental health needs and service use patterns among EA, as well as gaps in coordinated care across health systems, were two major issues identified in the report. To address these gaps, this thesis focuses on investigating clinical characteristics among EA receiving care in inpatient psychiatry, emergency departments (EDs), and community mental health agencies across Canada, with a particular focus on issues related to anxiety.

Study one: While several research studies have explored mental health trends among EA in general and post-secondary settings, relatively little is known about individuals accessing formal mental health services. To determine clinical needs and service use patterns among EA in these settings, interRAI mental health assessment data for 18- to 35-year-olds were obtained from three sources: 1) Resident Assessment Instrument – Mental Health (RAI-MH) data from all inpatient psychiatric hospitals and units across Ontario between 2005-2019 (n=85,762); 2) Community Mental Health (CMH) data from participating agencies across Ontario between 2005-2006 and 2017-2019, as well as Newfoundland between 2012-2014 (n=2,548) and; 3) Emergency Screener for Psychiatry (ESP) data from participating departments across Ontario between 2013-2014 and 2018-2019 (n=1,368). While clinical needs did not vary greatly across age groups within EA, a notable exception was observed for substance use, with more non-primary substance use disorders and recent cannabis use among those aged 18-25. Across care settings, clinical characteristics often reflected aspects of system design, such as greater risk of harm to self and others in inpatient psychiatry and more severe symptoms of depression and social withdrawal in community mental health. Unlike the other two settings, the ED observed a greater proportion of primary to non-primary anxiety disorders, signaling potential gaps in continuity of care for anxiety. The depth of information provided in this study can be used to support research targeted at improving coordination of mental health care for EA across Canada.

Study two: To adequately measure anxiety for clinical practice and research, a symptoms scale is needed in addition to diagnosis, but one has not yet been developed for the interRAI assessment instruments. This study fills this gap by creating an initial interRAI anxiety scale using data available through the RAI-MH. Admission and discharge assessments were obtained for adults aged 18+ from 2005-2019, representing all psychiatric inpatient hospitals and units across Ontario (n=237,862). Six items representing psychological symptoms of anxiety were tested, as well as five somatic health items. Factor analysis revealed that a unidimensional factor comprised of only the six psychological indicators was the best fit for the data (CFI=0.94, RMSEA=0.08), and so an additive, continuous scale was created. However, latent class analysis (LCA) and item response theory (IRT) revealed that the compulsive behaviour item did not perform well in the scale, and so an alternative version with five items was created, as well as a class-based structure representing frequency of symptom occurrence. Finally, decision tree algorithms were also developed, incorporating complex interactions between psychological and somatic symptoms. After testing each version through logistic regression analyses with anxiety disorders, the five-item continuous scale was selected as the best candidate (c=0.70). Criterion validity measures of the anxiety scale were explored, as well as responsiveness to treatment, providing support for the creation of an anxiety scale using interRAI items. Although new items may be needed to complete the scale, such as social anxiety and generalized anxiety symptoms, the initial version can be used in research and clinical practice to address issues related to anxiety.

Study three: Although anxiety disorders are prominent in the general population and are a major driver of emergency department visits among youth and EA, they have traditionally been rare in psychiatric hospitals. As rates of anxiety increase in health care settings, it is important to understand the current treatment patterns for individuals admitted to hospital with anxiety. Using RAI-MH admission data from 2005-2019 for EA aged 18-30 (n=65,528), as well as short-stay data (n=98,607), several treatment and social resource variables were examined using anxiety disorders and symptoms. Symptoms of anxiety shared a more consistent pattern with symptoms of depression than vice versa, indicating that anxiety is often treated as comorbid to depression in psychiatric hospitals. This is consistent with primary anxiety disorders demonstrating greater odds of short-stay hospitalizations (OR=1.78), with increasing severity of anxious symptoms decreasing the odds (OR=0.77-0.26). Opposite effects of anxiety disorders and symptoms were also observed for social resource variables, such as lower odds of staff reporting frustration when anxiety disorders were present (OR=0.66-0.56), but greater odds as symptoms of anxiety increased (OR=1.23-2.65). The results of this chapter indicate that anxiety is a major concern for EA seeking psychiatric help, and to properly address this need, both diagnoses and symptoms are required to gain a holistic understanding of care patterns and outcomes.

Conclusions: Cross-sectoral mental health research that identifies gaps in continuity of care among EA is urgently needed to address high rates of disengagement from treatment in this population. To fulfill this need, this thesis provided information on clinical characteristics and service use of EA accessing inpatient psychiatry, ED, and community mental health settings. To better promote care for EA experiencing anxiety, an initial anxiety scale was created for the interRAI health assessment instruments, containing five psychological indicators of anxiety. The anxiety scale was then used to examine treatment patterns among EA receiving services in psychiatric hospitals and units, revealing that anxiety disorders and anxious symptom severity have opposite effects on care outcomes and social resources. Altogether, identifying the needs and service use patterns of EA is essential for building an evidence-based mental health system that promotes effective and coordinated care.

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Table of Contents

List of Figures

List of Tables

List of Abbreviations

Abbreviation	Description
ABS	Aggressive behaviour scale
APA	American Psychological Association
BAI	Beck Anxiety Inventory
CPS	Cognitive performance scale
CAP	Clinical Assessment Protocol
CHA	Canada Health Act
ChYMH	Child and Youth Mental Health
CFA	Confirmatory factor analysis
CIHI	Canadian Institute for Health Information
CMH	Community Mental Health
CMHA	Canadian Mental Health Association
DSI	Depressive severity index
DSM	Diagnostic and Statistical Manual of Mental Disorders
EA	Emerging adults
EFA	Exploratory factor analysis
ESP	Emergency Screener for Psychiatry
GAD	Generalized anxiety disorder
HARS	Hamilton Anxiety Rating Scale
ICD	International Classification of Diseases
IRT	Item response theory
LCA	Latent class analysis
MDD	Major depressive disorder
MHA	Mental Health Act
MHCC	Mental Health Commission of Canada
OCD	Obsessive compulsive disorder
OMHRS	Ontario Mental Health Reporting System
ORs	Odds ratios
PSS	Positive symptoms scale
RAI-MH	Resident Assessment Instrument – Mental Health
RHO	Risk of harm to others
PTSD	Post-traumatic stress disorder
SoS	Severity of self-harm
SCI	Self-care index
WHO	World Health Organization

Introduction

1.1 Emerging adulthood and mental health

Mental illness affects approximately one-fifth of Canadians each year, with elevated rates in younger age groups (Smetanin et al., 2011). While risk of developing mental illness has been well-researched in childhood and adolescence, less attention has been given to young adults, even though one-quarter of lifetime psychological disorders begin in the mid-20s (Kessler et al., 2007). This age group is often referred to as emerging adulthood (EA), which is the developmental period marking the transition between adolescence and adulthood (Arnett, 2000; Arnett, 2007). Characterized by personal exploration, identity formation, newly acquired independence, and increased responsibility, EA occurs roughly between the ages of 18-29 in industrialized societies (Arnett, 2000; Arnett, 2007; Arnett, Žukauskienė, & Sugimura, 2014). Compared to other age groups in Ontario, EA have the highest rates of disengagement from mental health treatment despite higher rates of mental illness (Edlund et al., 2002), with especially low treatment rates for anxiety (O'Donnell et al., 2017; Roberge, Fournier, Duhoux, Nguyen, & Smolders, 2011). Disruptions in treatment among EA occur for a variety of reasons, such as poor transitions between youth and adult mental health systems, lack of coordination between care providers, and insufficient knowledge surrounding clinical needs. To create a better mental health system for EA, it is necessary to identify their clinical needs and pinpoint where gaps in treatment are occurring, particularly for those with anxiety. This dissertation will provide information on clinical characteristics and service use among EA in psychiatric hospital, emergency department (ED), and community mental health settings. By comparing patterns across these settings, disparities in the clinical symptoms that are treated across systems can be identified, which can provide clues about risk factors for disengaging from treatment. The utility of this approach is extended by the creation of a new anxiety symptoms scale, which is then used to examine patterns of psychiatric hospital care and treatment resources associated with anxiety among EA. Policy decision-makers and service providers can make use of this information to adapt to unmet needs among EA and improve collaborative care structures.

The length of time in which EA are exploring personal identity, social relationships, and occupational pathways has gradually increased since the 1950s (Arnett, 2000), which is reflected in recent sociodemographic trends among 18- to 29-year-olds. For example, more Canadian EA are enrolled in post-secondary education, living with parents or roommates, postponing marriage/common-law relationships and age at first birth, and delaying entry into the labour force (Galarneau et al., 2013). These sociodemographic shifts have unique implications for mental health of EA, both as an age group and a recent generational cohort. Longitudinal population health data obtained through Statistics Canada revealed that trends in education, occupation, and marital status were major protective and risk factors for psychological distress and accounted for the variance related to age and cohort (Drapeau, Marchand, & Forest, 2014). For example, the absence of post-secondary education was a risk factor for increased distress among men aged 18-39, while unemployment predicted distress in recent cohorts of women. Additionally, not having a spouse was a risk factor for psychological distress among all age groups except for women over the age of 60. Adverse effects on mental health resulting from reduced access to educational and occupational opportunities, as well as not having a spouse, can all be connected further to financial insecurity, which is a major predictor of psychological distress reported by EA (Newcomb-Anjo, Barker, & Howard, 2017; Power et al., 2015). Since instability in occupation, education, financial resources, and social relationships are heightened during EA, especially in more recent cohorts, this may be one reason that lower mood (McNeil, Stones, Kozma, & Andres, 1994) and increased psychological distress are more prominent in this age group than others (Arnett et al., 2014; Drapeau et al., 2014; Smetanin et al., 2011). However, while sociodemographic factors during EA can increase psychological distress, they can also act as protective factors. For example, formation of new social networks has been associated with positive psychological well-being among EA, as well as stronger familial relationships (O'Connor et al., 2011). Further, EA report greater psychological well-being when they believe that many personal and occupational opportunities are available to them (Baggio, Studer, Iglesias, Daeppen, & Gmel, 2017). These factors may explain why participation in higher education was associated with lower risk of depression in a Canadian cohort (Colman et al., 2014), since post-secondary institutions can provide opportunities for students to move away from home, build new relationships, and fulfill occupational aspirations (Taylor, Doane, & Eisenberg, 2014). Holistic mental health care for EA must account for the influence of these sociodemographic factors, which can contribute both negatively and positively towards mental health.

In addition to several major life transitions, the age range for EA also coincides with the average age-of-onset for multiple psychological disorders (APA, 2013; Kessler et al., 2007; Pearson et al., 2013; Schulenberg & Zarrett, 2006; Smetanin et al., 2011). For example, while substance use often begins during adolescence, substance use disorders are most frequently diagnosed between the ages of 18-25 (APA, 2013; Kessler et al., 2007; Pearson et al., 2013). Similarly, most types of anxiety and depressive disorders are diagnosed in the mid-20s (APA, 2013; Kessler et al., 2007; Pearson et al., 2013). Although they are rarer in the general population, the average developmental onset for schizophrenia, bipolar disorder, and sleep disorders also falls within the period of EA (APA, 2013). It is possible that neurobiological changes, in combination with numerous stressful life events, are what lead some psychological disorders to develop at higher rates during EA (Schulenberg & Zarret, 2006). Despite elevated rates of mental illness, research has shown that few EA engage in mental health treatment (Substance Abuse and Mental Health Services Administration [SAMHSA], 2012; Statistics Canada, 2012), especially those who experience anxiety (O'Donnell et al., 2017; Roberge et al., 2011). In Ontario, EA have the highest rates of disengagement from treatment of any age group (Edlund et al., 2002), indicating that the mental health system does not respond to their unique needs.

1.2 Mental health care system in Ontario, Canada

To determine why EA do not consistently engage in treatment for symptoms of mental illness, it is necessary to broadly understand how the mental health system is organized. The Canada Health Act is the national policy outlining the legal responsibilities for all publicly funded health care services and is based on five principles: universality, comprehensiveness, portability, accessibility, and public administration (Health Canada, 2021). To ensure that provinces and territories have sufficient funding to enact each of these principles, the Canada Health Transfer was written into the Act, which is a shared funding transfer agreement between the federal and provincial/territorial governments. In this agreement, the federal government transfers health care funds per capita to each province and territory to be used in subsidizing their unique health insurance plans. As part of the universal and comprehensive requirements of the Act, provincial/territorial health insurance plans must ensure that sufficient funds are allocated to fully compensate all residents for services that are deemed medically necessary, including diagnostic and treatment resources provided by EDs and psychiatric hospital units (Government of Ontario, 2021b). Further, health insurance plans are also ‘portable,’ meaning that residents will be covered by their home province/territory for up to three months if they move to another province/territory, and if they have left Canada for a limited amount of time (Health Canada, 2021).

While each provincial/territorial government regulates the comprehensiveness, universality, and portability of their health insurance plans, the Act stipulates that as part of the public administration component, the management and provision of insured health care services be handled by not-for-profit health authorities. Until recently, the Ontario Ministry of Health was the provincial body overseeing health care, with regional health authorities separated into 14 distinct Local Health Integration Networks (LHINs) (Office of the Auditor General of Ontario [OAGA], 2017). Each LHIN corresponded to a geographic region that oversaw financial compensation, operation, and monitoring of health care services, including public and private hospitals and certain community mental health organizations. Beginning in 2019, the Government of Ontario dissolved the LHIN system and created Ontario Health, which manages health care delivery across the province through five transitional geographic regions (Ontario Health, 2019). In 2020, Ontario Health created The Mental Health and Addictions Centre of Excellence to oversee mental health care delivery across the province (Ontario Health, 2020). However, while the Ontario Ministry of Health and Ontario Health are responsible for delivering mental health care to adults (aged 18+), mental health care for children and youth (0-18 years) is handled by the Ontario Ministry of Children, Community, and Social Services (MCCS) (2016) under the Child and Family Services Act (CFSA) (MCCS, 2016). As a result, the child/youth and adult mental health systems are handled by separate ministries according to chronological age, meaning that youth accessing mental health treatment in Ontario will need to transition to the adult system once they turn 18 (Mental Health Commission of Canada [MHCC], 2015).

In practice, the transition between the youth and adult mental health systems can be a difficult process for many individuals due to differences in funding allocation of services (MHCC, 2015), which is in opposition to the final principle of the Canada Health Act – accessibility. In addition to ensuring comprehensive and universal coverage of medically necessary services, health care services should be readily accessible to all citizens, regardless of their health status or financial resources. Despite the intention to provide accessible, universal health care, most types of mental health treatments are not covered under the Canada Health Act (Health Canada, 2021) or the provincial health insurance plans for adults. In Ontario, only the provision of emergency hospital services and primary care consultations are considered medically necessary (Government of Ontario, 2021b), creating financial barriers towards community-based services that are antithetical to the values of the Act. As a partial result of these financial impediments, even though the estimated prevalence of mental illness in the population is approximately 20% in any given year (Smetanin et al., 2011), self-reported mental health service use was 10.9% in 2012 (Statistics Canada, 2012). Financial obstacles are compounded further for EA who are transitioning from the youth to the adult mental health system, as the MCSS covers a variety of community mental health services up to the age of 18 (Government of Ontario, 2021a), but the adult health insurance plan does not (Government of Ontario, 2021b). Although private health insurance plans may cover some community-based mental health care costs, many EA do not have jobs that offer these types of plans and are ineligible to benefit from parents' plans at a certain age (Canadian Medical Association [CMA] & Canadian Psychiatric Association [CPA], 2016). Shifts in the financial requirements for psychological treatment between the youth and adult mental health systems causes substantial disruptions to continuity of care among EA, who demonstrate the highest rates of mental health treatment attrition of any age group (Edlund et al., 2002). Due to these gaps in financial coverage, patterns of service use vary substantially between hospital and community-based mental health services, reducing the efficiency of emergency services as a result.

1.2.1 Emergency and inpatient psychiatric services

Emergency departments (EDs) assist in stabilizing acute psychiatric crises and are considered an essential medical service under the Ontario provincial health plan (Government of Ontario, 2021b). Emergency psychiatry is typically provided in the ED of general hospitals (Canadian Institute for Health Information [CIHI], 2019b), but may also be delivered through crisis clinics or mobile intervention teams, particularly in rural areas where there are fewer ED resources (Lofchy, Boyles, & Delwo, 2015). To receive treatment in the ED, no health referrals are required, meaning that individuals can access them freely as needed (Health Canada, 2021). The types of mental health services offered in the ED involve assessment, diagnosis, and treatment of acute symptoms of mental illness, though medical treatment may also be necessary, such as in cases of self-harm and substance abuse (Allen et al., 2002). These services are delivered by an emergency psychiatry team typically consisting of psychiatrists, psychiatric nurses, medical doctors and nurses, and other types of clinicians (e.g., psychologists) (Lofchy et al., 2015). The most common psychological emergencies that service providers are trained to treat in the ED include emotional and behavioural agitation, suicide, substance use-related problems, and comorbidities between psychological and medical conditions. Following stabilization of psychological and medical symptoms, individuals may be discharged home with or without referrals to community services, into a community residence, or into the hospital for ongoing psychiatric care (Lofchy et al., 2015).

While the ED is designed to help treat acute and severe symptoms of mental illness, evidence suggests that many individuals visit the ED for non-acute mental health needs when they are unable to access care in the community (Canadian Mental Health Association [CMHA], 2008). For instance, a qualitative study performed in an ED located in London, Ontario reported that several individuals seeking mental health care presented with concerns related to sociodemographic stressors such as housing, finances, and interpersonal conflict (Coristine, Hartford, Vingilis, & White, 2006). Among youth with or without acute mental health symptoms, the ED may also serve as an initial entry point into the mental health system (CMHA, 2008). For instance, one-third of all Ontarians accessing the ED for psychiatric treatment have not previously been treated for a mental health issue (Brien, Grenler, Kapral, Kurdyak, & Vigod, 2015), though this rate rises to 40-50% when looking at those aged 18-24 (Brien et al., 2015; Gill et al., 2017). Among youth, 15- to 19-year-olds had the highest rate of psychiatric ED visits per 1,000 population (18.1%), followed closely by 20- to 24-year-olds (16.6%) (Brien et al., 2015). Further, ED visits for mental health treatment have grown rapidly over the last decade among youth and EA (CIHI, 2020). These results show that while the ED is an accessible and universal setting for mental health care delivery, gaps in the availability of other types of mental health services have caused overcrowding and long wait times in the ED (CMHA, 2008), especially among EA, who have the longest lengths of stay for psychiatric ED visits (CIHI, 2019b). Consequently, continuity of care between the ED and other mental health services has been identified as a priority in the most recent provincial mental health and addictions plan (Ontario Health, 2020).

The provincial health insurance plan also includes medically necessary services provided by psychiatric hospitals units (Health Canada, 2021), though unlike the ED, admission criteria are regulated. The Mental Health Act (MHA) (1990) is the Ontario legislation outlining the legal responsibilities for designated psychiatric inpatient facilities, including decisions surrounding admission to hospitals, as well as psychiatric assessment, examination, and treatment of patients. There are different admission pathways into psychiatric units in general hospitals, such as primary care doctors or through the justice system, but the most common is through the ED, accounting for 80% of inpatient admissions (CIHI, 2019b). To receive treatment in specialized psychiatric hospitals, referrals are generally needed from general hospitals, primary care doctors, psychiatrists, or another community mental health agency (OAGA, 2016). Admission into inpatient psychiatry is determined using the criteria contained in the MHA (1990), which emphasizes three areas: 1) person has attempted or stated that they will cause bodily harm to themselves, 2) person is behaving violently or has threatened to cause bodily harm to others, and/or 3) person is unable to care for themselves. While these regulations must be followed, admission standards for specialized psychiatric hospitals across the province can fluctuate by facility, creating inconsistencies in care pathways to these settings (OAGA, 2016). Once admitted, patients are required to be assessed within three days for their presenting clinical symptoms and needs (Gibbons et al., 2008). Following assessment and diagnosis, inpatients are expected to receive short-term psychological and/or pharmacological treatment to stabilize severe symptoms of mental illness (Government of Ontario, 1999), though hospital stays may be longer-term in some cases, particularly in specialized psychiatric hospitals (CIHI, 2019b). Additionally, at the time of admission, service providers must begin to formulate a discharge plan that incorporates input from the person being treated, as well as their social support resources and functional needs. Further, discharge plans should involve follow-up contact with community health providers to ensure continuity of care and prevent short-term hospital readmissions (Government of Ontario, 1999). Following the guidelines for hospital discharges in the MHA (1990), as well as the information gathered in the discharge plan, patients are usually discharged when service providers believe that they no longer require acute observation and care.

Psychiatric hospital units are a prominent form of mental health care for those experiencing severe symptoms of mental illness, though it is a less accessible and comprehensive service than the ED. Between 2009-2010, 14.7% of all hospitalizations in Canada involved a diagnosis of mental illness (CIHI, 2012). Psychiatric hospitalizations begin to increase around the age of 15, with approximately 16% of the inpatient psychiatric population between the ages of 15-24. Further, psychiatric hospitalizations among youth are increasing over time, especially for those diagnosed with a mood disorder (Brien et al., 2015). Although inpatient psychiatric treatment is universally available to all residents and is observing increased use over time, given the admission criteria in the MHA (1990), not all individuals with serious mental health needs may be admitted for care. For instance, mood disorders and schizophrenia are the most prevalent psychological diagnoses in both general and specialized psychiatric hospital units (CIHI, 2019b), and are also the most common disorders involved in first-time hospitalizations in Ontario (Brien et al., 2015). However, despite stronger prevalence in ED settings (Brien et al., 2015; CIHI, 2019b), hospitalizations for individuals with anxiety and personality disorders are low (CIHI, 2012), indicating that these settings are either not as comprehensive as they should be, or that better access to community mental health services are needed for individuals with these diagnoses.

Lack of accessible community care for mental health is a well-known issue in Canada, especially when it comes to youth (CMHA, 2008). For instance, even though it is included in operational policy documents for psychiatric hospital units as an important component to discharge planning (Government of Ontario, 1999), fewer youth receive follow-up contact with a health service provider within one week of discharge from a psychiatric hospital unit (Brien et al., 2015). Improved coordination between EDs, hospitals, and community mental health centres has consistently been identified as a target priority for the Canadian mental health system (CIHI, 2019a; CMHA, 2008; Government of Ontario, 1999; Health Ontario, 2019; MHCC, 2015), but for various reasons, access to community mental health has remained an ongoing problem.

1.2.2 Community mental health

Beginning in the late 1950s, Canada's mental health system began a period of deinstitutionalization, closing several psychiatric hospitals so that a greater proportion of mental health treatment could be provided in the community (Lin et al., 2016). By offering a comprehensive range of services covering a spectrum of resource intensity and severity of need, the shift towards community-based treatment was expected to promote greater quality of life, reduce the financial expenses associated with long-term hospital care, and lead to better health outcomes. However, because there is less government regulation and monitoring for community mental health services, it is challenging to summarize the types of treatments that are offered, how they are accessed, and what types of mental health needs are and are not being met. While no resource exists that comprehensively details the structure and function of community health agencies across Canada, a scan of services in each province and territory was performed by CIHI in 2017, providing a better understanding of the types of treatments provided in this setting. Examples across Ontario included outpatient services, addictions rehabilitation, residential treatment, case management, early detection and intervention, vocational training and rehabilitation, and housing services. The scan did not include private practices, such as those offered by psychiatrists and psychologists, though they also serve an important role in provision of community-based mental health treatment.

While the range of mental health treatments offered in the community is diverse, as of 2012, community-based psychological services remain the least accessible form of mental health treatment (Sunderland & Findlay, 2013). There are various obstacles that impede the accessibility and responsiveness of community mental health services. In general, community mental health is a fragmented system, with various services operating in an independent or 'siloed' capacity (CMHA, 2008). Consequently, there is no integrated data collection and reporting strategy for community mental health (CIHI, 2017), meaning that evaluation of clinical needs, service use patterns, treatment efficacy, and evidence-based policy guidelines are not possible, reducing the overall effectiveness of the system. From the user perspective, a challenge arising from the lack of cohesion between community providers is difficulty in navigating the system, with many Canadians reporting that they do not know where to seek help when they need it (Moroz et al., 2020; Sunderland & Findlay, 2013). Pathways into community mental health care typically include referrals from family physicians and health teams, as well as EDs, hospitals, and the criminal justice system (CIHI, 2017). However, gaining these referrals may be difficult for certain individuals, especially those with severe symptoms of mental illness, who are less likely to have a regular family doctor (Ross et al., 2015). Even when a person has received a referral for community mental health care, they still may be unable to access treatment for various reasons, such as long wait times and financial costs (CIHI, 2019b). For instance, Canadians who received the most sessions from community-based psychiatrists had a higher socioeconomic status and a less extensive history of psychiatric hospitalization, indicating disparities in service patterns related to personal income (Brien et al., 2015).

Since community mental health programs are not considered medically necessary in the Canada Health Act (Health Ontario, 2021) or the provincial health insurance plan (Government of Ontario, 2021b), coverage for these services is provided through a mix of private and public funding sources. Private practitioners, such as psychologists and psychiatrists, are generally paid out-of-pocket or through private or occupational health insurance plans, though many Canadians do not have adequate access to these plans (CMA & CPA, 2016). However, some community mental health services are subsidized by funding from provincial and territorial governments, such as facility-based outpatient programs, case management, early detection and intervention, and vocational rehabilitation programs (CIHI, 2017). In these cases, funding is allocated through regional health authorities and non-government agencies, such as the Canadian Mental Health Association (CMHA). While this arrangement helps to reduce the financial barriers involved in accessing community care, Ontario spent less per capita than most other regions on community mental health care between 2016-17 (CIHI, 2019b). Overall, while community mental health agencies are provided with some government funding to help make their services more universal and accessible, evidence of low treatments rates show that current funding levels are insufficient to ameliorate barriers to care.

While fragmented approaches to tracking, funding, and delivering community mental health services prevents individuals from engaging in community-based treatment (CMHA, 2008; Moroz et al., 2020; Sunderland & Findlay, 2013), this problem is even greater among EA. For instance, compared to other age groups, EA have the lowest rates of community mental health treatment (Edlund et al., 2002; SAMHSA, 2012), despite higher levels of psychological distress

(Drapeau et al., 2014; Smetanin et al., 2011) and ED visits involving mental illness (Brien et al., 2015). This pattern is exacerbated further among individuals with primary anxiety disorders, which are relatively uncommon in community mental health settings (O'Donnell et al., 2017; Roberge et al., 2011), despite being the most common psychological diagnosis in the ED among youth (Gandhi et al., 2016). Given that early intervention and continuity of mental health care are predictors of improved health outcomes (Lin et al., 2016), it is essential that timely access to comprehensive and universal mental health treatment is made available to EA.

1.3 Gaps in mental health care for EA

In response to research demonstrating low uptake of mental health services among youth and EA, The Mental Health Commission of Canada (MHCC) published two policy reports focused on redesigning mental health systems to meet the needs of this population: "Taking the Next Step Forward: Building a Responsive Mental Health and Addictions System for Emerging Adults" (MHCC, 2015) and "The Mental Health Strategy for Canada: A Youth Perspective" (MHCC, 2016). As part of the development process for both reports, numerous stakeholders were consulted, including direct input from youth and EA stakeholders with lived experience accessing mental health care in Canada. In combination with environmental scans and literature reviews, the reports provide an extensive overview of the present context for mental health care of youth and EA in Canada, youth perspectives on best practices and existing gaps in service provision, as well as recommendations for policy, service provision, and research. One of the main contributors to low mental health treatment rates identified in the reports was the structure of the Canadian mental health system, which was designed to account for issues related to institutional planning and capacity, rather than research on clinical needs and service use. A prime example of this design is evident in the division of mental health care by chronological age rather than developmental need, causing several EA to disengage from treatment once they turn 18. Specific policy and service factors related to the transition process were described as causing disruptions to treatment, such as differences in funding allocation and out-of-pocket costs for treatment between youth and adult systems, poor coordination between youth and adult service providers, insufficient research for deriving evidence-based care practices specific to EA, and lack of services that specialize in treating EA (MHCC, 2015; Moroz et al., 2020). As part of a systematic approach for improving the transition process, the report calls for a cross-sectoral mental health research strategy focused on tracking the clinical needs, treatment outcomes, and service use trends of EA as they transition into the adult mental health system.

Beyond the period of transition, research supporting mental health care of EA must also focus on the integration of different types of adult mental health service providers. EA frequently report that complications in service navigation poses a major barrier to accessing care (Moroz et al., 2020; Sunderland & Findlay, 2013), especially those without prior exposure to the system or assistance from a primary health care provider. Ensuring that service providers function within a connected network can help relieve the burden of service navigation by encouraging an ‘every door is the right door’ approach, wherein EA are redirected to the resources that most appropriately match their level of need. While service delivery models have been developed in various regions to promote coordinated mental health treatment for EA, there are no national or provincial policy guidelines in place to support implementation of these models, nor any national research mechanisms to enable knowledge exchange and provide data for outcome indicator reporting (MHCC, 2015; MHCC, 2016). Further, because EA are not considered as distinct subgroups in existing policy and service frameworks, their unique clinical and service needs are not well understood, making it difficult to create an evidence-based guideline for integrated service delivery and resource pathways. Without comprehensive data on the clinical needs and service use of EA, the system is unable to adequately respond to the issues affecting this population.

Following the 2015 policy report and consultation with the Canadian Advisory Group on the Mental Health of Emerging Adults, the MHCC (2019) adopted four priority recommendations aimed at improving systemic gaps in mental health care, two of which are relevant to this dissertation. One recommendation emphasizes the need to better integrate health sectors to promote a coordinated approach to mental health care for EA, while the other focuses on research, data reporting, and outcome evaluation. At the most resource-intensive end of the service delivery spectrum, hospital services and community mental health agencies are intended to work together to provide consistent treatment for individuals with more severe mental health needs, with the goal of providing most of the care in the community (Government of Ontario, 1999; Health Ontario, 2020). However, as described earlier, individuals frequently access the ED for non-acute mental health treatment instead of community mental health services (Coristine et al., 2006; CMHA, 2008). To better determine where gaps in continuity of care are occurring, as well as which mental health needs are not well addressed by the current system, clinical assessment data from ED, hospital, and community mental health agencies needs to be analyzed simultaneously.

Within this dissertation, an examination of trends in psychological diagnoses of EA seeking care within ED, hospital, and community mental health services, points to a potential gap in coordinated care for individuals with anxiety. Along with depression, anxiety is the most prevalent psychological disorder worldwide (Kessler et al., 2007), and within post-secondary populations, is the most common disorder present among EA (American College Health

Association [ACHA], 2016; Bayram & Bilgel, 2008; Beiter et al., 2015; Macaskill, 2013). Even though symptoms of anxiety are responsive to a combination of pharmacological and psychological treatment (Andrews et al., 2018; Bandelow et al., 2015), EA with primary diagnoses of anxiety have disproportionately low rates of treatment, especially when compared to those with primary depression (O'Donnell et al., 2017; Roberge et al., 2011). The only mental health care setting in which anxiety disorders are consistently reported to be present is in the ED (Aratani & Addy, 2014; Brien et al., 2015; Gandhi et al., 2016; Horenstein & Heimberg, 2020; Juhás & Agyapong, 2016), indicating that other types of services may be unresponsive to anxiety-related needs. If this is the case, one reason for the disparity in treatment rates for anxiety may be due to barriers in accessibility of treatment, such as the admission criteria for psychiatric hospitals (MHA, 1990) and financial costs for community care. Further, inconsistent mental health service use could also result from under-detection of anxiety by failing to measure symptoms alongside diagnosis. Without cross-sectoral data that accurately measures anxiety, it is not possible to determine service use patterns and treatment outcomes for EA with this concern, which are needed to identify solutions for improving engagement in treatment.

1.4 Measurement-based care and interRAI

Health care policies and services that effectively respond to the clinical and service use needs of the population require ongoing feedback from reliable and valid data sources, such as health assessment tools. The practice of using routine health assessment data to inform service provision is often referred to as measurement-based care (Aboraya et al., 2018; Connors et al., 2021; Kilbourne et al., 2018; Scott & Lewis, 2015). Traditionally, the most common application of measurement-based care in psychiatric practice is the use of self-reported assessment tools to aid in diagnosis and treatment monitoring, though it is increasingly used for evaluation of system performance as well. For instance, some health regions submit mental health assessment data to accreditation organizations, which use the information to generate performance reports and establish quality of care standards (Kilbourne et al., 2018; Scott & Lewis, 2015). Measurement-based care has also been used by some regions to derive population-level benchmarks for mental health symptoms and service use patterns, determine health insurance reimbursement for services, and enable data sharing across different types of health care providers (Kilbourne et al., 2018). Given the research evidence supporting the utility of measurement-based care, this approach has been proposed for adoption in the provincial mental health care system by the Mental Health and Addictions Centre of Excellence of Ontario Health (Kurdyak & Clark, 2021). One of the benefits arising from this recommendation is the ability of measurement-based care to fulfill the recommendations made by the MHCC (2019) for research, data gathering, and outcome reporting to support mental health care of EA. By incorporating mental health care assessment data for EA into system performance reviews, the clinical and service use needs of this population across multiple mental health settings can be used to improve quality and coordination of care, increasing rates of engagement in mental health treatment.

While there are numerous advantages of measurement-based care for clinical practice and health system performance, there are some barriers that can prevent successful implementation of these practices, such as the time involved in collecting and disseminating high quality data, administrative burden on clinical staff, lack of organizational resources, and variations in assessment practices across facilities (Aboraya et al., 2018; Connors et al., 2021; Scott & Lewis, 2015). Consequently, only a small proportion of mental health clinicians report using assessment tools over the course of treatment. Overcoming these limitations to increase clinician buy-in is a necessary endeavour for measurement-based care, prompting several recommendations for psychiatric assessment design. For instance, assessment instruments should have excellent psychometric properties, be easy to use, contain clinically relevant information, and add value for treatment decision-making (Aboraya et al., 2018l Connors et al., 2021). Designed with these features in mind, interRAI (www.interrai.org) is an international, not-for-profit organization that develops comprehensive, person-centered assessment instruments for use in health care settings. Each instrument is designed to be compatible with the overall suite of assessments, offering a common language across multiple care settings that promotes continuity of care (Hirdes et al., 1999). To accomplish this, assessments contain several core sections with items covering a person's strengths, needs and preferences in terms of physical, mental, social, and functional health, including clinical symptoms of anxiety. To improve interpretations of the data, items may be combined into summary scales or clinical assessment protocols (CAPs), which provide an overview of a person's status in a domain, (e.g., risk of harm to self). Data collected from the assessments have been used to inform care planning, decision-making, and outcome monitoring, with the goal of improving quality of care and system performance (Hirdes et al., 2020). interRAI has developed several assessment tools for mental health settings that would enable measurement-based care research for EA, including inpatient psychiatry, emergency psychiatry, and community mental health. Using these tools, clinical needs and service patterns of EA can be analyzed to inform cross-sectoral mental health system design, increasing accessibility and continuity of care.

1.5 Dissertation overview

The overarching goal of this dissertation is to inform accessible and comprehensive mental health care for EA through data-driven research, aligning with the requirements of the research and data gathering recommendation published by the MHCC (2019). To accomplish this objective, a measurement-based care approach - facilitated by the use of interRAI assessment instrument - was adopted to create three chapters covering the following research topics:

1) What are the clinical needs and service use patterns of EA accessing care in psychiatric hospitals and units, emergency departments, and community mental health agencies? Further, what is the optimal cut-off for the age range of EA?

2) Given the need to better address clinical anxiety in mental health settings, can a valid anxiety symptoms scale be created for the interRAI mental health assessment instruments?

3) How do anxiety disorders and severity of symptoms affect psychiatric hospital care for EA?

Chapter 2

2.1 Introduction

Many major life transitions occur during EA, such as moving out of family households, seeking long-term careers, enrolling in post-secondary education, and forming new relationships and communities (Arnett, 2000; Arnett, 2007; et al., 2014; Baggio et al., 2017; Galarneau et al., 2013). At the same time, various forms of mental illness are at their peak severity and/or onset (APA, 2013; Kessler et al., 2007; Pearson et al., 2013; Schulenberg & Zarrett, 2006; Smetanin et al., 2011). In a longitudinal population study of Canadian adults, psychological distress was at its highest between the ages of 18-29, as well as in more recent cohorts (Drapeau, Marchand, & Forest, 2014). Further, comparisons of global mood scores between young, middle-aged, and older adult age groups found that young adults had lower average affect scores and felt less vigorous over the course of the day than older adults (McNeil et al., 1994). Despite a greater level of mental health needs in this population, EA are less likely to engage in treatment than other age groups (Edlund et al., 2002; Kessler et al., 2007; SAMHSA, 2012). To adequately address gaps in mental health care provision for EA, research on their clinical characteristics and service use patterns are needed to identify what their needs are. Currently, the types of psychiatric symptoms that develop and are at their most severe during this period have been identified through interviews and surveys of the general population and post-secondary students. However, less is known about EA who have accessed psychiatric services, as Canada does not have an evidence-based strategy in place to support mental health service provision for EA (MHCC, 2015). Following a measurement-based care approach (Aboraya et al., 2018; Kilbourne et al., 2018; Scott & Lewis, 2015), identifying clinical needs of EA receiving treatment from psychiatric service settings can provide the data needed to construct national and provincial guidelines for care provision (Kurdyak & Clark, 2021). This chapter seeks first to fill this gap by examining EA in psychiatric settings such as hospitals, emergency departments (EDs), and community mental health agencies. Additionally, clinical and service use characteristics are compared across age groups to determine if there are differences in early versus late EA.

2.1.1 Emerging adult mental health

2.1.1.1 General population

The most common diagnoses observed among EA in the general population are mood, anxiety, and substance use disorders. One method of ascertaining prevalence of disorders has been random population sampling with the WHO Composite International Diagnostic Interview (CIDI), a standardized interview for diagnosing psychiatric disorders contained in the International Classification of Diseases (ICD). For instance, adolescents in Mexico were interviewed using the CIDI 2.0 and re-assessed after eight years (Benjet et al., 2016). Between that time, 38% of those who responded had received a new psychiatric diagnosis. The most common disorder diagnosed was substance use followed by mood, anxiety, and eating disorders. Similarly, a Norwegian version of the Munich-CIDI was used to investigate the trajectory of psychiatric disorders among a cohort of twins, beginning when participants were in their twenties (Gustavson et al., 2018). Anxiety was the most prevalent disorder during the previous 12 months (20%), followed by mood (7%) and alcohol use (6%) disorders. By the time participants reached their late thirties, the prevalence of any mental disorder, phobia, and alcohol use diminished substantially. Major depression and other anxiety disorders saw an overall decrease but were still relatively stable, demonstrating the chronicity of these disorders.

A modified version of the CIDI was used to diagnose psychiatric disorders over the past 12 months in the 2012 Canadian Community Health Survey – Mental Health (CCHS-MH), in which phone interviews were held with a random selection of nationally representative households (Statistics Canada, 2012). The report revealed that at 19%, those aged 15-24 had the greatest prevalence of a mood, anxiety, or substance use disorder of any age group. Substance use disorders were the most common (12%), with the next being mood disorders (8%). Since only generalized anxiety disorder (GAD) was reported for anxiety, the prevalence of anxiety disorders could not be determined beyond the 2% prevalence of GAD. Diagnostic trends for mental health disorders were somewhat different in the WHO - World Mental Health Surveys (WHO-WHMS), which used the CIDI 3.0 in 17 countries in Africa, Asia, the Americas, Europe, and the Middle East (Kessler et al., 2007). The inter-quartile range for overall lifetime prevalence of psychiatric disorders was 18-36%, with either mood or anxiety disorders ranking as the topmost diagnosis across countries. Substance use was one of the least prevalent disorders, though the authors noted that estimates may have been inaccurately low due to differences in assessments of illicit drug use and the exclusion of 'dependence' disorders in some countries. Like the CCHS-MH, the odds of having mood, anxiety and substance use disorders were all higher among adults aged 18-34 than older adult age groups in the WHO-WHMS dataset, as well as personality disorders (Huang et al., 2009), indicating that various psychological disorders are highly prominent in the EA population.

In addition to the WHO – CIDI, an interview tool based on the Diagnostic and Statistical Manual (DSM) has also been used to estimate psychiatric disorders nationally. As part of the National Epidemiologic Study on Alcohol and Related Conditions (NESARC) between 2001-2002, phone interviews were conducted using a random sample of nationally representative households in the US (Blanco et al., 2008). Psychiatric disorders were measured using The Alcohol Use Disorder and Associated Disabilities Interview Schedule – DSM-IV version (AUDADIS-IV). The most prevalent mental health disorders diagnosed were substance use and personality disorders, and then anxiety and mood disorders. Among those aged 18-24, the 12-month prevalence of any psychiatric disorder was 46%, which is a remarkably high estimate compared to the previous studies described. Even accounting for differences in study samples and assessment instruments, it is unclear why such a high prevalence estimate was reported in the NESARC study. Regardless, evidence demonstrates that various psychological disorders are heightened during EA, and while research on the general population does not replace the need for investigations of formal psychiatric settings, this information can provide insight into the potential drivers of mental health services among this subgroup.

2.1.1.2 Post-secondary institutions

The greatest source of information available on the mental health of EA is post-secondary students, who have been regularly studied for symptoms of mental illness and on-campus service use. Like the general population, mood and anxiety disorders are the most prevalent psychiatric diagnoses, with conflicting results on substance use disorders. Using the Structured Clinical Interview for DSM-IV Axis I Disorders – Clinician Version (SCID-CV), the prevalence of psychiatric diagnoses was assessed in sample of female university students in Spain. At the time of the interview, 37% met criteria for an existing disorder and 51% had a lifetime disorder (Vázquez, Torres, Otero, & Díaz, 2011). Nicotine dependence was the most common disorder, followed by depression and anxiety. Excluding nicotine dependence, the prevalence of current and lifetime diagnoses dropped to 24% and 38% respectively, which is closer to the estimates reported in the general population described earlier.

Although interviews are methodologically rigorous, they are resource intensive. As a result, a more popular method for investigating the prevalence of disorders among post-secondary students is through surveys. A unique finding from surveys of post-secondary students is increased prevalence of ADHD. As part of the WHO-WMHS International College Student (ICS) project, an online survey screening for seven DSM-IV disorders was administered to first-year students across eight countries (Auerbach et al., 2019). The 12-month prevalence of any psychiatric disorder was 38%, and 68% for lifetime disorders. Using latent class analysis, the researchers identified four classes of psychiatric comorbidities. The smallest class involved four or more diagnoses, typically including mania/hypomania, anxiety, depression, substance use, and ADHD. Among those with only one psychiatric disorder, ADHD was the most prominent diagnosis. The results of this study reveal that there is considerable psychiatric comorbidity among post-secondary students, and that except for ADHD, it is the same types of psychiatric diagnoses that are prevalent in the general population. However, a limitation is that only first-year students were surveyed; data on students at various points in their studies would provide greater information on mental health of EA.

Large-scale, ongoing surveys of post-secondary student mental health are conducted by some institutions. The American College Health Association (ACHA) - National College Health Assessment (NCHA) is an annual survey of physical and mental health of post-secondary students that covers the US and Canada. The survey contains questions about symptoms of depression and anxiety, as well as psychiatric diagnoses and service history. In 2019, a report was released for the Canadian population (ACHA, 2019). In the year preceding the survey, 24% were diagnosed or treated for anxiety, 19% for depression, 13% for panic attacks, 7% each for ADHD and insomnia, and 2% for substance use and addiction. Similar results were reported in the Healthy Minds (2018) study, an annual web-based survey of post-secondary students in the US. In 2018, 39% of students were struggling with at least one mental health problem and 36% had a lifetime diagnosis of a mental health disorder. The most frequent diagnosis was anxiety, followed by depression, attention and learning, and eating disorders. Once again, ADHD was a prominent psychological diagnosis reported in both surveys. Possible explanations may include that more EA with ADHD attend post-secondary school, or it may be identified and subsequently diagnosed more often in these settings. Only two studies have directly compared EA who are attending post-secondary school and those who are not, yielding inconsistent results (Blanco et al., 2008; Wiens et al., 2020). Regardless, variations in patterns of disorders observed in the general population and post-secondary schools demonstrate that there is a need for research that is setting-specific.

While clinical disorders represent the moderate-to-severe spectrum of mental illness, it is also useful to examine the distribution of symptoms more broadly. By limiting research to diagnoses, information on sub-threshold clinical mental health needs is lost. Data on mild-to-moderate symptoms is necessary for health promotion and prevention activities, which seek to prevent symptoms from escalating further, as well as care planning for those with comorbid psychological conditions and sub-threshold disorders. Assessing psychological symptoms can also provide an indication of psychiatric need among those who have not sought diagnosis and treatment. For disorders that are associated with especially low treatment rates, such as substance use (Blanco et al., 2008; Catchpole & Brownlie, 2016; SAMHSA, 2012) and anxiety disorders (Horenstein & Heimberg, 2020; Kessler et al., 2007; O'Donnell et al., 2017), analysis of symptoms may be the best method for detecting such problems.

In Turkey, the Depression, Anxiety and Stress Scale – 42 Item (DASS-42) was administered to university students through classroom recruitment and scores were split into several categories; normal, mild, moderate, severe, and extremely severe (Bayram & Bilgel, 2008). The percentage of students scoring within moderate-to-extremely severe categories were as follows: anxiety (47%), depression (27%), and stress (27%). A shorter version of the same instrument - the DASS-21 – was also filled out by undergraduate students in the US (Beiter et al., 2015). The percentage of students scoring in the moderate-to-extremely severe category were stress (26%), anxiety (25%), and depression (23%). While depression and stress scores were comparable between the Turkish and US studies, anxiety was substantially higher among the sample of Turkish students, which could be due to variations in sampling, geography, and the version of the instrument used. At the least, a quarter of the students in both studies fell in the moderate-to-extreme range of depression, anxiety and stress. A similar value was reported among first-year students living in Belgium, with 24% meeting the threshold for internalizing mental health problems on the Global Appraisal of Individual Needs – Short Screener (GAIN-SS) (Bruffaerts et al., 2018). The estimate was slightly lower in an English study that used the General Health Questionnaire (GHQ) – 28 to assess mental health among undergraduates (Macaskill, 2013). The threshold for potential mental illness was met by 17% of respondents; among that subsample, 97% met criteria for anxiety but only 46% for depression. Further, GHQ scores were higher among second- and third-year students compared to those in first year, indicating that psychological distress was greater among upper-year students. While the exact prevalence varies based on the study sample and the tools used, it is evident that symptoms of mental illness – especially anxiety – are pervasive in post-secondary student populations.

Institution-wide surveys also provide insight into the level of mental health among post-secondary students. In the two weeks preceding the NCHA survey of Canadian post-secondary students, 26% stated that they felt things were hopeless, 52% were overwhelmed by all they had to do, 36% were very sad, 20% felt so depressed that it was difficult to function, 31% felt overwhelming anxiety, and 4% seriously considered suicide (ACHA, 2019). The results indicate that a substantial number of Canadian students experience symptoms of anxiety and depression, and that for one-fifth of students, it was severe enough to seek treatment. Across North America, the Center for Collegiate Mental Health (CCMH) releases an annual report on mental health of post-secondary students, using data collected from on-campus counselling centres. In 2018, 152 post-secondary institutions participated in routine data gathering and reporting, covering 179,964 students in total (CCMH, 2018). Anxiety and depression were the most common presenting concerns, followed by relationship problems and interpersonal functioning. Other issues that were frequently observed were suicidal ideation, unwanted sexual contact, harassment or abuse, traumatic events, and substance use. In the previous two weeks, 38% had engaged in binge drinking and 24% used marijuana over the last two weeks. Further, 27% agreed that they felt the need to reduce their substance use and 16% had someone express concern to them about their use.

Substance use has been identified as a problem distinctly related to EA. Relative to older age groups, the annual National Survey on Drug Use and Health (NSDUH) report found that those aged 18-25 had the highest rates of alcohol, cannabis, and illicit substance use over the past year (SAMHSA, 2018). In Canada, two studies have replicated this finding when comparing EA to adolescents. A sample of 89 participating youth agency services located across the country were screened for substance use and mental health problems using the GAIN-SS (Henderson, Chaim, & Hawke, 2017). The results demonstrated that substance use was lower among adolescents (12-18) than young EA (19-24). Likewise, research conducted in a concurrent mental health disorder program in British Columbia found that relative to adolescents (ages 14-18), EA (ages 19-25) had more lifetime diagnoses of substance use disorders and were more likely to report needing help with alcohol use (Catchpole & Brownlie, 2016).

In addition to comparisons against adults and adolescents, some studies have further narrowed down analysis of substance use within the EA age period. In a study of mental health symptoms and service use in the US, younger EA (18-25) were compared to older EA (26-34) (Adams, Knopf, & Park, 2014). Younger EA scored higher on the Kessler-6 (K6) for psychological distress and had more diagnoses of an alcohol or drug abuse/dependence disorder. In contrast, the 2012 Canadian Community Health Survey – Mental Health (CCHS-MH) reported that the prevalence of alcohol and drug abuse/dependence were similar between adolescents/early EA (15-22) and late EA (23-29), though both groups used more substances than young adults (30-39) (Qadeer, Georgiades, Boyle, & Ferro, 2019). It is possible that the incongruent results are due to overlap in the ages used to define EA, given that substance use tends to be heaviest between 18-24 (APA, 2013). In the Healthy Minds study, undergraduates demonstrated greater use than graduate students (Cranford, Eisenberg, & Serras, 2009). Among undergraduates, half of respondents had engaged in binge drinking during the last two weeks and 17% had used marijuana in the past 30 days. In comparison, graduate students demonstrated lower substance use: 35% had binge drank in the last two weeks and 6% had used marijuana in the last 30 days. Overall, substance use tends to be highest during the ages of 18-25, coinciding with entry into post-secondary school for many EA.

While substance use is an issue among younger EA studying in post-secondary institutions, it is unclear whether this is a greater problem among EA who are not attending school. EA enrolled in post-secondary schools in the US were more likely to report using any amount of alcohol in the last 12 months and equally as likely to use drugs as EA not attending school (Blanco et al., 2008). In contrast, a Canadian study revealed that students were less likely to engage in binge-drinking, cannabis use, and other illicit drug use in the last 12 months than those not attending post-secondary school (Wiens et al., 2020). Contradictory results highlight the importance of recognizing the context of study setting in research with EA.

Prevalence estimates are used to describe the most common mental health issues among EA, but they do not indicate if they are unique to this developmental period. Isolating psychiatric disorders with an average age-of-onset during this timeframe can provide information about newly acquired mental health struggles, which may be concealed when looking solely at prevalence estimates. The most prevalent disorders among EA are also those that often develop during this period. Various anxiety disorders appear on average in the early- to mid-twenties (APA, 2013; de Lijster et al., 2017), while others can develop anywhere between young and middle-aged adulthood (de Lijster et al., 2017; Essau et al., 2018; Kessler et al., 2007). Similarly, major depressive disorder (MDD) is often first diagnosed in the early twenties to late thirties (APA, 2013; Rohde, Lewinsohn, Klein, Seeley, & Gau, 2013). Substance use disorders are also typically diagnosed between the ages of 18-24 (APA, 2013). However, several disorders that do not generally have high prevalence rates also share an average age-of-onset during EA. For instance, psychotic and schizophrenia disorders, bipolar II disorder, and sleep disorders all tend to develop in the early twenties (APA, 2013). For disorders that have an initial onset occurring during EA, they should appear as stronger drivers of service use among this population specifically, reflecting an influx of initial treatment-seeking behaviour.

Post-secondary settings offer a unique opportunity for research on service use among EA, as many institutions offer on-campus resources for mental health. In the Healthy Minds (2018) study, 34% of respondents were accessing some form of mental health treatment. For those with a possible psychiatric condition, treatments rates were higher at 52%. However, the opposite finding was reported when substance use was involved. Among students with co-occurring binge-drinking and psychiatric symptoms, 67% agreed that they needed mental health treatment; however, only 38% had received any form of mental health care in the previous year (Cranford et al., 2009). Similar results were reported in the 2018 CCMH report, wherein one-quarter of students reported that they wanted to reduce their substance intake, but only 3% had received treatment for it. Low uptake for substance use treatment is consistent with findings from other studies (Blanco et al., 2008; Catchpole & Brownlie, 2016; SAMHSA, 2012). The top concerns prompting treatment in the report were anxiety, depression, relationship problems, and stress. Finally, the College Mental Health Survey in the US randomly emailed students to ask about mental health service use (Soet & Sevig, 2006). Among respondents, 30% reported that they had received counseling at least once during their lifetime and 20% were currently in therapy. The top five diagnoses among those receiving counseling were for depression, eating disorders, anxiety, ADHD, and PTSD.

While research conducted in post-secondary settings is fairly consistent with prevalence estimates for psychiatric disorders among EA in the general population, diagnoses with an age-of-onset during this time - such as psychotic, bipolar, and personality disorders - are under-represented (Healthy Minds Network, 2018; Soet & Sevig, 2006). Counselling centre patterns suggest that there is a small group of students with complex mental health needs (CCMH, 2018). Altogether, roughly 2% of students were referred to a hospital for a mental health or substance use concern and of those, 1% were admitted. Overall, 10% of students had been previously hospitalized for a mental health concern. To learn more about the population of EA with more serious mental health needs, investigations of formal psychiatric settings are needed.

2.1.2 Emerging adults in psychiatric care settings

After reviewing mental health trends among EA in general and post-secondary populations, it is evident that depression, anxiety, and substance use are the most prevailing psychological concerns, and that they tend to be higher among this age group relative to others. Consequently, it is likely that depression, anxiety, and substance use are prominent drivers of service use among EA. However, as the MHCC (2015) report on mental health care for EA noted, there are numerous gaps and barriers to service access among this population, such as difficult transitions between the youth and adult policy systems. Since the pathways into mental health care are not straightforward, it cannot be assumed that clinical needs observed in these settings will be a direct match to those of the general population. Further, intensive mental health care settings such as hospitals and community agencies often have specific mandates surrounding admission criteria (MHA, 1990). As a result, psychological disorders that are less commonly observed in the general population, but which are associated with substantial functional impairment or risk of danger to self and others, should have a greater frequency in psychiatric settings. Investigating these clinical trends will reveal which subgroups receive more treatment from mental health services and what care gaps exist, providing necessary information for building a responsive mental health system for EA. To that end, the mental health services explored were emergency departments (ED), hospitals, and community mental health agencies.

2.1.2.1 Emergency departments

The link between psychological distress and ED visits has been previously established (Stockbridge, Fernando, Wilson, & Pagán, 2014), with a stronger association among adolescents and EA (Brien et al., 2015; CIHI, 2017b). For instance, national data from the US demonstrated that EA aged 18-29 were twice as likely to visit an ED when experiencing severe psychological distress (Lin, Burgess, & Carey, 2012). Further, the ED can act as a first point of entry into the mental health care system for younger EA (Brien et al., 2015; Gill et al., 2017), meaning that EDs are a prime setting for early intervention strategies. The need for these types of strategies and research is even more pressing as ED usage continues to grow. The number of ED visits for psychiatric concerns has increased over time among EA aged 18-24 in the US (Kalb et al., 2019), as well as in Ontario among youth aged 10-24 (Gandhi et al., 2016). Across Canada, among youth aged 5-24, the number of individuals accessing the ED for mental health concerns between 2008-2009 and 2018-2019 increased by 61% (CIHI, 2020). As of 2015, the annual rate of psychiatric ED visits per 1,000 people in the population of Ontario was 16.6 for those aged 20-24 (Brien et al., 2015). Projection models from an academic hospital located in Toronto, Ontario estimated that psychiatric ED visits will continue to rise and rapidly outpace current resource capacity, leading to increased wait times and fewer patients treated (Baia Medeiros, Hahn-Goldberg, Aleman, & O’Connor, 2019). The need to plan for the volume of EA accessing EDs for psychiatric treatment is evident, requiring that the clinical needs of EA accessing EDs for mental health treatment are well understood. To accomplish this, analysis of the clinical characteristics of EAs in ED settings must be performed.

To represent clinical mental health needs, most studies make use of psychiatric diagnoses. During the index visit to an ED in California among 17- to 24-year-olds, substance use was the most prevalent disorder followed by anxiety; depression was diagnosed in 8% of the sample and fewer than 5% had psychosis or bipolar disorders (Aratani & Addy, 2014). Substance use disorders were also the most prevalent among 18- to 24-year-olds in EDs across the US, though unlike the previous study, mood disorders were just as common (anxiety disorders were not reported) (Kalb et al., 2019). Given that both studies drew data from ambulatory databases, it is unclear why there is a disparity in the prominence of mood disorders, though it may be related to differences in the sampling procedures (i.e., state versus national). In Canada, various studies have examined psychiatric disorders in ED settings. While analyses were not stratified by age (though 20- to 29-year-olds comprised the largest age group), assessments made by a psychiatric team in the ED of a regional hospital in Alberta revealed that the most prevalent diagnoses were depressive disorders followed by anxiety, substance-related, and personality disorders (Juhás & Agyapong, 2016). Within Ontario, the most common psychological disorders observed in the ED between 2018-2019 among those aged 18-24 were anxiety disorders, followed by substance use, mood, and schizophrenia disorders (CIHI, 2020). Among youth aged 16+ who were accessing the ED for mental health treatment for the first time, the most common psychological diagnoses were substance-related and anxiety disorders, followed by mood/affective disorders, schizophrenia and other psychotic disorders, and personality disorders (Brien et al., 2015). Another study conducted within Ontario examined patterns of ED use among youth aged 0-24, finding that anxiety was the most common psychological disorder driving visits, and that anxiety disorders were increasing more rapidly than other disorders in these settings (Gandhi et al., 2016). Like the general and post-secondary populations, the most common disorders in Canadian EDs appear to be related to anxiety, depression, and substance use.

Certain forms of substance use have been investigated more thoroughly among youth in ED settings, such as alcohol consumption. The Alcohol Use Disorders Identification Test (AUDIT) was used to detect problematic alcohol use in 18- to 29-year-olds visiting a university-affiliated ED in the US (Horn et al., 2002). Half the sample screened positively for alcohol problems, with 9% scoring in the severe range. Notably, those who were intoxicated during their visit were ineligible to participate in the study and so the results may under-represent serious alcohol problems. Data on EDs obtained from the National Surveys on Drug Use and Health also demonstrated that 18- to 25-year-olds consumed more alcohol and drugs than other age groups and were more likely to have substance use disorders overall (Wu et al., 2012). Further, in 2018, Canada adopted the Cannabis Act, which legalizes possession of cannabis for adults aged 18 years and over (Government of Canada, 2018). Following implementation of this policy, prevalence of cannabis use among EA in the general population has probably increased, which should also be reflected in ED settings. A hospital in Toronto sought to examine this hypothesis using a projection model. For the baseline data, the study used the hospital ED data from 2017, in which cannabis accounted for 2.5% of substance use-related visits, while alcohol-related problems comprised 73.6% of visits (Baia Medeiros et al., 2019). Incorporating time-series data available from the state of Colorado, which legalized cannabis in 2013, a projection model was created for the Toronto hospital data. The model demonstrated that overall, ED flow is unlikely to be affected by cannabis legalization. However, a caveat is that the model was predicting visits in which cannabis was the primary reason for care, and so it is possible that comorbid cannabis-use will see an increase overall in ED settings, especially among youth.

Overall, ED settings are likely to resemble the general population in terms of psychiatric disorders, though diagnoses related to psychotic, personality, and bipolar disorders should also be elevated (Brien et al., 2015; CIHI, 2020). However, regardless of the type of mental illness or its severity, even mild levels of psychological distress have been shown to be predictive of future ED visits (Stockbridge et al., 2014), suggesting that any level of mental distress should be addressed seriously. Whether the individual is discharged into the community or admitted for inpatient care, youth need appropriate and adequate resources to maintain mental wellness after discharge.

2.1.2.2 Psychiatric hospitals

Psychiatric hospital units are designed to care for individuals who are experiencing acute and severe mental health crises (Government of Canada, 2019). Provincial health data obtained between 2008-2013 showed that 5/1,000 residents of Ontario were admitted to a psychiatric hospital or unit for treatment each year (Brien et al., 2015). Although this trend remained stable over the six-year period, there was an increase in admissions related to mood disorders among youth aged 0-24. Similar findings were reported in a national survey from the US (Watanabe-Galloway & Zhang, 2007), where over a seven-year period, discharges from general hospitals containing serious mental illness rose by 10%, with the greatest increase observed among those aged 18-24. Like the ED, these results demonstrate that hospitals are a growing care setting for mental health treatment among EA. However, even though the ED is the most common pathway into inpatient psychiatry (CIHI, 2019b), only a small proportion of EA seeking emergency care for psychological distress are subsequently admitted into hospital. For instance, only 13% of referrals from a community response team were subsequently admitted to inpatient psychiatry in the UK (Brooker, Ricketts, Bennett, & Lemme, 2007). Similarly, only 20% of patients accessing the ED for psychiatric concerns were admitted for inpatient care in a hospital in Alberta (Juhás & Agyapong, 2016), with most ED patients in the young adult age group. Considering the volume of EA who visit the ED for psychiatric reasons, a large disparity between ED use and hospital care signifies a mismatch between clinical needs and service design, leading to inefficient resource use and system capacity issues.

Since the MHA (1990) outlines specific criteria for admission into psychiatric hospitals and units, certain types of mental health issues are observed more often. For instance, risk factors for psychiatric hospitalization related to self-harm, harm to others, and severity of psychiatric symptoms were investigated among EA aged 18-24 in Sweden (Beckman et al., 2016). Schizophrenia and other psychotic disorders shared the strongest association with self-harm and hospitalization, with a similar pattern reported for personality, substance use, and affective disorders, which is generally consistent with the diagnoses most frequently seen in psychiatric hospitals. For example, schizophrenia, bipolar disorder, and major depression were the most prevalent disorders in psychiatric hospitals across the US (Watanabe-Galloway & Zhang, 2007). In Ontario, the most responsible diagnoses for all inpatient hospital admissions between 2018-2019 were listed among 18- to 64-year-olds (CIHI, 2020). Giving birth was the number one reason, followed by substance use disorders, mood disorders, and schizophrenia and other psychotic disorders, demonstrating a strong need for mental health care. Within psychiatric hospitals and units specifically, mood disorders are the most common among those aged 18 and over (Martin & Hirdes, 2009), as well as youth aged 0-24 (Brien et al., 2015). Notably, anxiety does not appear to be a common diagnosis in hospitals, despite its prevalence in the general population (Kessler et al., 2007; Statistics Canada, 2012) and in the ED (Aratani & Addy, 2014; Brien et al., 2015; CIHI, 2019; Juhás & Agyapong, 2016). While focusing exclusively on the EA population is unlikely to change this pattern, it may still be the case that anxiety disorders appear more frequently as comorbid disorders and symptoms across all ages. In contrast, some disorders should be more strongly associated with EA. For example, substance use disorders are heightened among those aged 18-25 (APA, 2013; SAMHSA, 2018), and so there should be a strong association between young EA and substance use disorders in hospitals. Similarly, hospitals likely contain a higher proportion of EA diagnosed with eating disorders, which develop and peak during adolescence and young adulthood (APA, 2013).

Outcomes following psychiatric hospitalization indicate the importance of early intervention and ongoing community care among EA. For instance, readmission to hospital within 30 days occurs for roughly 12% of psychiatric inpatients in Ontario aged 16 and over, with an elevated risk for those with psychotic disorders (Brien et al., 2015). Moreover, compared to the general population and those discharged from hospital with no psychiatric disorders, suicide rates following 90-day discharge are substantially higher among those with mental health disorders (Chung et al., 2017). While rates of suicide following 90-day discharge from hospital are lower among adolescents and those admitted for the first time, they remain higher than average for the general population for several years after discharge. These outcomes demonstrate that long-term care-planning is essential at the time of hospitalization. As part of the care planning process, clinical needs of EA need to be accounted for and treated as early as possible.

2.1.2.3 Community mental health

Clinical profiles and service patterns of community mental health agencies are difficult to summarize because unlike hospitals and EDs, admission criteria and the focus of treatment are unique to each individual program. Further, community agencies are widespread not only in terms of geographic location, but also the government ministry they are accountable to (e.g., health, social services, education, etc.,). Consequently, there are no integrated data sources covering community mental health in Canada (CIHI, 2019b), precluding a comprehensive overview of these services and the characteristics of those who access them. An additional problem for data collection that is unique to EA is a particularly high rate of disengagement from mental health treatment (Edlund et al., 2002; MHCC, 2015; Roche, O'Sullivan, Gunawardena, Cannon, & Lyne, 2020), which is due in part to the accessibility barriers described earlier in the introduction, such as the transition between youth and adult mental health systems (MHCC, 2015; Moroz et al., 2020). Despite numerous limitations to gathering data on community mental health care, there are a few community surveys that have either targeted youth specifically or provided age-stratified data, which can be used to identify age-related trends in care gaps.

One trend revealed through surveys of EA with mood and anxiety disorders is a negative association between anxiety and community mental health treatment. Based on data obtained from the 2014 Survey on Living with Chronic Diseases in Canada—Mood and Anxiety Disorders Component, 18- to 34-year-olds were less likely than other age groups to receive any mental health treatment (medication or counselling), with the lowest rates for those with only an anxiety disorder (O’Donnell et al., 2017). Gaps in community care for individuals primarily experiencing anxiety may be one reason that anxiety disorders are prominent in Canadian EDs (CIHI, 2019a; Brien et al., 2015; Juhás & Agyapong, 2016). When EA do engage in community care for mental health, data from the 2012 CCHS-MH survey revealed that family doctors were the most common professional service used (Findlay & Sunderland, 2014). Social workers, counsellors, and psychotherapists were next, with a small proportion seeking help from psychologists and psychiatrists. Among those aged 15-24 with a mental health disorder, 35% reported accessing at least one of these types of professional services for treatment within the past 12 months. However, the prevalence of professional treatment rose to 60% when youth also had a comorbid chronic physical health condition. Overall, treatment was greatest for those with multimorbidity, such as a combination of mental health and addictions disorders, chronic physical conditions, psychological distress, and traumatic childhood events. Altogether, the majority of EA who experience symptoms of mental illness do not receive specialized community mental health treatment. Further, even when EA do access these services, they disengage at a higher rate than other age groups (Satre, Mertens, Areán, & Weisner, 2004) and experience more frequent remissions (Smith, Godley, Godley, & Dennis, 2011). Given the small proportion of EA who receive community mental health services and remain in treatment, as well as the diffuse system of agencies and the lack of a unified data collection system across Canada, there is not enough information to provide a more extensive overview of this area.

2.1.3 Limitations of Research

In general, extensive information is available on the mental health characteristics of EA, providing a good starting point for a more in-depth examination of EA in psychiatric care settings across Canada. Regardless, there are still several gaps that need to be addressed. One such limitation is the inconsistency in the age range that is used to define EA. Initially, it was proposed that EA began at 18 and ended at the age of 25 (Arnett, 2000; Arnett, 2007), and several studies have generally followed this guideline (Baggio et al., 2017; Newcomb-Anjo et al., 2017; Smith et al., 2011). However, revisions to EA theory argue that it may extend up to 29 years of age (Arnett, 2014). Studies that have stratified age groups within EA in an attempt to clarify an age cut-off have returned conflicting results: while one study found differences in substance use disorders between adults aged 18-25 versus 26-34 (Adams et al., 2014), another reported that there were no differences between those aged 15-22 and 23-29 (Qadeer et al., 2019). The evidence surrounding the age period of EA in relation to mental health differences is unclear, which has important implications for how youth and adult mental health services are currently structured in Canada (MHCC, 2015; MHCC, 2016).

Similar to attempts to define the scope of EA, there are also issues surrounding how mental health needs are operationalized. In many studies, disorders classified under either the DSM or the ICD are used to define mental illness (Gustavson et al., 2018). While diagnoses are standard clinical representations of mental illness, they are reserved for those experiencing issues severe enough that functioning has been impacted and/or the person is in serious distress (APA, 2013). While diagnoses capture severe categories of mental illness, persons with sub-threshold symptoms are not distinguished from those with mild or no symptoms. To better account for the spectrum of mental illness, individual symptoms can be assessed rather than diagnoses, allowing for different severity levels to be calculated. However, depending on the tool used, estimates of serious mental illness may be inflated when adding together symptoms. For instance, a meta-regression compared the prevalence of MDD between diagnostic versus symptom-based instruments and found that estimates were considerably higher when using symptoms (Ferrari et al., 2013). Ideally, both diagnoses and symptoms should be used to assess the mental health characteristics of EA, providing a greater level of detail than either could alone.

A related methodological concern of the existing literature is the lack of a comprehensive assessment to measure mental health symptoms, as well as related domains such as occupational and educational functioning, social relationships, and service use. The most exhaustive instruments that have been used to assess mental health among EA are the WHO-CIDI (WHO, 2021) and the DSM-SCID (APA, 2021). Both assessments are administered via an in-person interview with a trained professional, and although the CIDI was initially designed for epidemiological purposes (Wittchen, 1994), both are used to aid in clinical decision-making and determining diagnoses. The advantages of the CIDI and SCID are that they enable an in-depth assessment of clinical diagnoses and service use and rely on trained interviewers to gather data. Inter-rater reliability and diagnostic accuracy of the SCID–5 Clinician Version ranged from good-to-excellent among psychiatrists and psychologists conducting joint interviews and was also reported to have good clinical utility (Osório et al., 2019). A review of reliability studies of the CIDI found good-to-excellent inter-rater reliability for most sections, as well as external validity in various health care settings and countries (Wittchen, 1994). The drawback to these types of interviews is that they are resource-intensive and are not designed to capture a wide range of information related to mental health and well-being, diminishing their utility for informing general practices and policies related to psychological well-being.

Other instruments that have been used to investigate psychological distress of EA include the K-6 (Adams et al., 2014; Drapeau et al., 2014; Lin et al., 2012), though it has demonstrated low sensitivity in some samples (Adams et al., 2014). Additionally, measuring distress through six items may be useful as a general screener for the broader population, but is not indicative of varying mental health needs. The Global Appraisal of Needs – Short Screener (GSS) has also been used in one study, though none of the sub-screeners produced acceptable fit indices in a structural equation model, indicating that it may not be valid for determining specific mental health domains (Henderson et al., 2017). Finally, institutional surveys such as the NCHA have the advantage of wide dissemination and breadth of information (ACHA, 2013), but is susceptible to low response rates.

Table 1. Summary of instruments used, sampling procedures, and response rates for surveys of student mental health conducted in post-secondary institutions.

Research study	Instrument(s)	Sampling Procedure	Response Rate
American College Health Association: Canadian Reference Group (2019)	National College Health Assessment (NCHA)	Administered to nationally participating post-secondary institutions.	20%
Auerbach et al., (2018)	World Health Organization – World Mental Health Surveys	Convenience sample of 14,348 first-year students in 19 post-secondary institutions across 8 countries.	45% weighted response rate; range 7-79%
Bayram & Bilgel (2008)	Depression, Anxiety and Stress Scale (DASS) – 42 items	Convenience sample of 1,617 students during in-class time	Unreported
Beiter et al., (2015)	Depression, Anxiety and Stress Scale (DASS) – 21 items	Convenience sample of 407 undergraduate students	92%
Blanco et al., (2008)	National Institute on Alcohol Abuse and Alcoholism Disorder and Associated Disabilities Interview Schedule - DSM-IV version	Random sampling of adults aged 18+ living in households across the USA – 5,092 aged 19-25	81% (overall general population)
Bruffaerts et al., (2018)	Global Appraisal of Needs – Short Screener (GAIN-SS)	4,921 first-year students randomly sampled as part of the Leuven College Surveys – WMH International College Student project	73%
Centre for Collegiate Mental Health (2019)	Counseling Center Assessment of Psychological Needs (CCAPS) – 34. Standardized Data Set (SDS) and Clinician Index of Client Concerns (CLICC)	179,964 students who accessed counselling services from 152 participating institutions	28% of institutions that hold CCMH membership provide routine data
Cranford, Eisenberg & Serras (2009)	Personal Health Questionnaire (PHQ) – 9 items. Individual substance use items.	Random sample of 5,021 undergraduate and graduate students	57%
Healthy Minds Network (2018)	Healthy Minds Survey – 2016/17	Random sample of ~4000 students from 54 participating institutions	31% (institutional average)
Macaskill (2013)	General Health Questionnaire (GHQ) – 28 items	Convenience sample of 1,197 undergraduate students	90% (admission), 82% (first-year), 82% (second-year), 77% (third-year)

Research study	Instrument(s)	Sampling Procedure	Response Rate
Soet & Sevig (2006)	Counseling Center Assessment of Psychological Needs (CCAPS) – 70 items	Random sample of 5,000 students	19%
Vázquez, Torres, Otero, & Díaz (2011)	Structured Clinical Interview for DSM-IV Axis 1 Disorders – Clinician Version (SCID-CV)	Random sample of 1,054 female students	98%
Wiens et al., (2020)	Canadian Community Health Survey (CCHS)	14,500 students aged 18-25 who participated in annual, cross-sectional surveys from 2011-2017	Unreported

Response rates have proven to be a major limitation to many studies, as can be seen above in Table 1. Cross-sectional surveys of post-secondary students have been as low as 19% (ACHA, 2019; Soet & Sevig, 2006), and as high as 31% (Healthy Minds Network, 2018) and 46% (Auerbach et al., 2019). Singular institutions relying on convenience samples of students have reported better response rates (between 70-90%) (Beiter et al., 2015; Bruffaerts et al., 2018; Macaskill, 2013), though they lack external validity and due to nonrandom sampling, also present some biases. For longitudinal studies conducted in the general population, sample attrition is also an issue. Some studies reported a loss of 20-35% of participants over time, with longer durations associated with greater attrition (Benjet et al., 2016; Gustavson et al., 2018). One method for diminishing the impact of attrition through statistical weighting for nonresponse bias (Benjet et al., 2016); however, caution should be used since these weights may not fully account for unmeasured confounding characteristics of non-respondents. Since convenience samples of students from individual institutions tend to have decent response rates, it is unlikely that general surveys with low response rates are biased in the wrong direction, since both types of studies consistently report a high prevalence of mental health issues. Regardless, low response rates and sample biases reduce the accuracy of the results, accounting for some of the variation observed in exact prevalence estimates across studies.

While response rates and sample biases are a concern, when combined, the large number of studies that focus on mental health of EA in general and post-secondary settings create a fairly consistent account of common symptoms and trends. In contrast, a thorough description of EA receiving care in psychiatric settings could not be written since relatively few studies have examined EA in these contexts and of those, none examined hospital and community settings simultaneously. An issue that was encountered in the psychiatric studies that were found was how age groups were categorized, such as combining young EA with children and adolescents (e.g., 0-24), or alongside adults up to the age of 64. Without creating distinct EA groups, it is not possible to determine whether or not they have unique clinical characteristics and service outcomes across settings. Another major challenge to identifying mental health needs of EA in community settings was low treatment uptake (Edlund et al., 2002; MHCC, 2015; Roche et al., 2020). Further, among EA who did report receiving community mental health treatment, specialized professions such as psychologists and psychiatrists were rarely accessed (Findlay & Sunderland, 2014). In addition to problems with low engagement rates, the community mental health system in Canada is complicated and fractured, with no national data repositories currently available for this sector (CIHI, 2019b). Overall, there is little information available on the clinical characteristics and service use of EA accessing psychiatric services in Canada, highlighting the need to conduct more research in this area.

2.1.4 Rationale and Objectives

As part of the national report on designing mental health systems for EA, the MHCC (2015) noted the need for more data-driven Canadian research that can be used to inform clinical practice and policy guidelines. The purpose of this project is to contribute towards building an evidence-base to support the mental health care of EA, with a specific focus on the most intensive tiers of the service continuum proposed by the MHCC. These tiers include specialized hospital and community-based programs that are designed for individuals with severe and complex needs (MHCC, 2015), where little information on EA could be located in the literature review in comparison to general and post-secondary populations. To better design services that meet the needs of EA, identifying their clinical characteristics and service use patterns across both hospital and community settings is a necessary first step. Secondly, clarifying which characteristics are associated with different stages of EA can provide context on how age groups might be separated for research, as well as detect potential differences in mental health trends.

Having reviewed the studies available on EA located in psychiatric hospital and community settings, some hypotheses were generated about the patterns of clinical characteristics that were likely to be observed. For instance, substance use, mood, and anxiety disorders should be the most prevalent diagnoses in the ED (Aratani & Addy, 2014; Brien et al., 2015; Juhás & Agyapong, 2016), with a higher proportion of primary anxiety disorders in the ED compared to inpatient and community settings. This pattern of mental health disorders is also the most similar to that seen in general and post-secondary populations, which is reasonable since the ED is the most accessible of the specialized care settings (CIHI, 2020). While mood disorders should also be highly prevalent among EA in inpatient psychiatry, given the admission criteria, uniquely high proportions of schizophrenia disorders are also likely to be seen in this setting (Beckman et al., 2016; CIHI, 2020; Watanabe-Galloway & Zhang, 2007). Finally, while no comprehensive data on community mental health of EA could be found, a national survey suggests there may be a greater degree of clinical complexity among those accessing specialized services (Findlay & Sunderland, 2014). As for potential differences between age groups within EA, it is possible that substance use will be greater among those aged 18-25, since this is typically when substance use disorders are at their peak (APA, 2013). However, while one study indicated that substance use was higher in the 18-24 age group (Adams et al., 2014), another demonstrated no differences between 15- to 22-year-olds and 23- to 29-year-olds (Qadeer et al., 2019), so it is unclear to what extent substance use will vary by age group.

Altogether, the primary objective of this study was to investigate the prevalence of clinical characteristics and service use of EA assessed in psychiatric hospitals, EDs, and community mental health agencies located across Canada. The secondary objective was to examine whether there were age-related differences in the clinical characteristics of age groups within EA, which were defined as 18-25, 26-30, and 30-35.

2.2 Methods

2.2.1 Data Sources

To evaluate the clinical needs and service use patterns of EA accessing mental health care services in Ontario, cross-sectional data was obtained from three interRAI assessment instruments. Corresponding to inpatient psychiatry, psychiatric EDs, and community mental health agencies, the three data sources used in this dissertation were the Resident Assessment Instrument – Mental Health (RAI-MH), interRAI Emergency Screener for Psychiatry (ESP), and interRAI Community Mental Health (CMH), respectively.

2.2.1.1 Resident Assessment Instrument – Mental Health (RAI-MH)

The RAI-MH is designed for inpatient psychiatric hospitals and units (Hirdes et al., 2000; Hirdes et al., 2002; Hirdes et al., 2020). Assessments are completed by mental health professionals, such as nurses, social workers, and clinicians, with some self-reported patient items and where possible, information from family and/or friends. Information is collected across a variety of domains, such as mental health symptoms and diagnoses, functional status, cognitive performance, occupational and educational status, socioeconomic indicators, social relationships, and treatment history. Observations of mood, behavior, functioning, and health status are conducted over a three-day period, while treatment use is examined over seven days. Depending on the domain, such as substance use, timeframes may extend up to a year or longer. Assessments are performed at admission, discharge - and for long-stay patients - every 90 days or whenever a significant change in clinical status has occurred. The most current mental health instrument available for inpatient psychiatry is the interRAI Mental Health (MH). However, the province of Ontario continues to use the older version of RAI-MH, which does not contain all the variables present in the newest rendition, including enrollment in post-secondary education. RAI-MH assessments are contained in the Ontario Mental Health Reporting System (OMHRS), which collects and maintains data submitted from hospitals to CIHI (2021). OMHRS was implemented provincially in Ontario beginning in 2005, when the Ministry of Health and Long-term Care mandated the use of the RAI-MH within inpatient psychiatry. Since its development, OMHRS has gathered RAI-MH assessments from 68 participating hospitals across Ontario. Further, RAI-MH data is also submitted to CIHI from two pilot facilities in Newfoundland and Labrador and one pilot facility in Manitoba. At the time of data analysis, RAI-MH assessments were available from October 2005 to March 2019. The reliability and validity of the RAI-MH have been previously established in several studies (Foebel et al., 2013; Gibbons et al., 2008; Hirdes et al., 2008; Hirdes et al., 2020; Martin et al., 2009).

2.2.1.2 interRAI Community Mental Health (CMH)

The interRAI Community Mental Health (CMH) assessment is intended for mental health care professionals providing treatment in the community, including assertive community teams and case managers (Hirdes et al., 2010; Hirdes et al., 2020; Mathias, Hirdes, & Pittman, 2010;). Like the RAI-MH, a three-day observation period is employed for items on mental health symptoms and diagnoses, behaviours, mood, functional status, and physical health. Social relationships, socioeconomic needs, housing environment, and occupational and educational functioning are also addressed. There are also historical items related to a person's health and service use history, including recent and lifetime psychiatric hospitalizations. Assessments are intended to be completed at intake, discharge, and for longer-term clients, every 6 months.

The CMH was pilot tested in 12 participating sites across Ontario between 2005-2006, as well as by the Department of Community Services in Newfoundland and Labrador between 2012-2014 (Mathias et al., 2010). The Chatham-Kent and Bluewater Health regions also implemented the mental health suite of instruments – including the CMH - as of 2017.

2.2.1.3 interRAI Emergency Screener for Psychiatry (ESP)

The ESP is designed to determine acute mental health needs for those accessing emergency departments, psychiatric emergency departments, and mobile crisis teams (Hirdes et al., 2020; Rabinowitz et al., 2013). Unlike the 3-day observation periods used in the RAI-MH and CMH, the ESP relies on a 24-hour look back period, with the expectation that those accessing further psychiatric care will receive either an inpatient or community assessment. There are fewer items than in the other instruments, since the focus is on immediate mental and physical health concerns. Based on the responses to these items, the ESP generates acute risk scales for self-harm, harm to others, and self-care. The ESP was pilot tested across Ontario in 2005, as well as in psychiatric EDs located in the Niagara region of Ontario between 2013-2014. Finally, as of 2018, the ESP has also been implemented in the Chatham-Kent and Bluewater health regions of Ontario.

2.2.2 Study design and sample

A cross-sectional study design was used to compare the clinical characteristics of adults aged 18-25, 26-30, and 31-35 in community, ED and inpatient psychiatric settings. To avoid inflating the prevalence of sociodemographic and clinical characteristics, only the first episode of care was retained for each individual. It is important to note that the first episode of care contained in the dataset does not mean that it was the individual's first time in that care setting overall; it is possible that a person received care prior to implementation of the RAI assessments.

RAI-MH data were obtained from OMHRS for the inpatient psychiatric population. In addition to the age restriction of 18-35 years, forensic patients and assessments with questionable data quality were also excluded. OMHRS monitors data quality control of incoming assessments and flags those that may contain inaccurate data. Forensic patients were excluded from the sample because their care needs, as well as their pathways into and out of psychiatric care, are different from those of other patient types. An additional difference that is unique to the RAI-MH data is the use of the discharge assessment from the first episode of care. Since psychiatric diagnoses are likely more reliable at the time of discharge than at intake, disorders were obtained from discharge assessments and added to the intake data. Figure 1, below, illustrates the process for deriving the final sample.

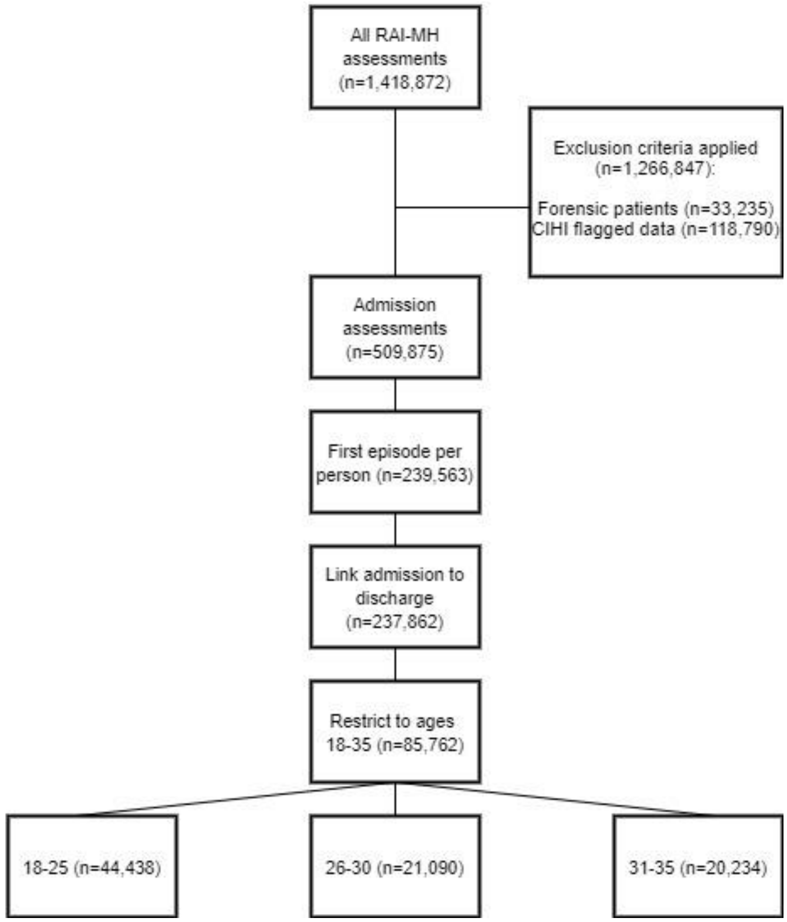

Figure 1. Participant flow chart for the RAI-MH dataset.

In the community sample, CMH intake data were obtained from all available Canadian sources (Newfoundland and Ontario). Other than restricting the age range to 18-35 years, no other exclusion criteria were applied. The total sample was N=2,548 unique individuals, with age groups broken down as follows: 18-25 (n=1,194); 26-30 (n=742); and 31-35 (n=612).

In the ESP dataset, all sources of data were initially planned to be included. However, it was discovered that several assessments were missing data for variables essential to the calculation of some of the key patient risk scales. Considering the importance of these risk scales, it was decided that any assessment missing the information needed to calculate those scales would be excluded. The sites containing the majority of missing data were the Niagara region, as well as the Chatham-Kent region between January 1, 2016 – March 28, 2017. Figure 2, displayed below, shows the process for creating the sample.

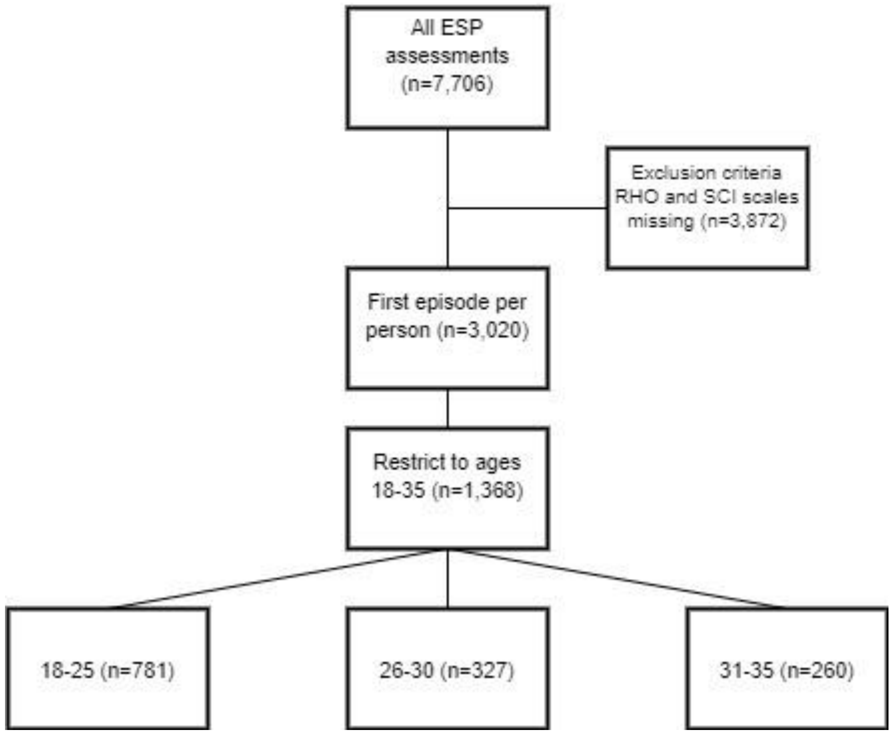

Figure 2. Participant flow chart for the ESP dataset.

2.2.2.1 RAI-MH variables

Sociodemographic characteristics included sex (male, female, or other), marital status (never married, married/significant other, previously married), living arrangement (alone, with family, with others, or in group setting), education (less than high school, high school, more than high school), and employment status (employed, unemployed – seeking employment, unemployed – not seeking employment, or other). As a proxy for socioeconomic status (SES), an item was included on economic trade-offs: "during the last 30 days, because of limited funds, made trade-offs on purchasing any of the following: prescribed medications, sufficient home heat, necessary health care, adequate food."

Post-secondary student status is not an item that is included in the RAI-MH assessment; however, because it is a substantial sub-population of EA, an estimate of potential post-secondary status was created based on existing variables. If all of the following conditions were met, post-secondary status was coded as a '1': education (technical or trade school, some college/university, diploma/bachelor's degree, or graduate degree), employment status (unemployed, NOT seeking employment), and three indicators of risk to unemployment/disrupted education that were scored as a 'yes' or 'no' (increase in lateness or absenteeism in last 6 months; poor productivity or disruptiveness at work/school; expresses intent to quit work/school). If the individual had any other type of educational attainment or employment status, and if the indicators were scored as 'not applicable,' then they were coded as a '0' for post-secondary status.

Items pertaining to social relationships and recent stressors were investigated. Regarding social relationships, two yes/no items were included: "reports having no confidant," and "has a support person who is positive towards discharge/maintaining residence in the community." Under the 'stressors' category, time since the stressor was experienced was collapsed into the following categories: '2' if it occurred within the last seven days, '1' if it occurred after more than seven days, and '0' if it never occurred. The stressors examined were death of close family member or friend, conflict-laden or severed relationship, failed or dropped out of education program, major loss of income or serious economic hardship due to poverty, victim of sexual assault/abuse, and victim of emotional abuse.

Mental health service history was measured as the number of psychiatric admissions (recent), number of psychiatric admissions (lifetime), contact with community mental health in past year, and age at first hospitalization. Since the first episode of care contained in the system was selected for analysis, it was expected that recent and lifetime admissions to a psychiatric hospital would be minimal for most individuals.

Regarding substance use, both alcohol and a selection of drugs were provided. For alcohol use, the number of drinks consumed in any single sitting over the last 14 days was coded using the highest number applicable (0, 1, 2-4, 5+). Time since last use of a substance was categorized as '2' if it occurred within the past month, '1' if it occurred between 30-365 days, and '0' if it was never used or used more than a year ago. The following types of substances were examined: inhalants, hallucinogens, cocaine and crack, stimulants, opiates, and cannabis. Due to the rarity of inhalant consumption, it was removed from analysis.

A variety of clinical needs were examined. DSM-IV diagnoses at admission were selected, as well as discharge diagnoses. While DSM-5 diagnoses replaced DSM-IV categories in 2016, the majority of data used for analysis occurred prior to this change. To ensure consistency among assessments, DSM-5 diagnoses were re-coded to match DSM-IV categories. To represent symptomatic distributions of clinical needs, several scales were analyzed: the Depressive Severity Index (DSI) (Perlman et al., 2013), Aggressive Behaviour Scale (ABS) (Martin et al., 2009; Perlman & Hirdes, 2008), CAGE scale, Cognitive Performance Scale (CPS) (Jones, Perlman, Hirdes, & Scott, 2010; Martin et al., 2009; Perlman et al., 2013), Positive Symptoms Scale – Short Version (PSS-S) (Martin et al., 2009), Social Withdrawal Scale (SWS) (Rios & Perlman, 2017), Severity of Self-Harm scale (SoS), Risk of Harm to Others (RHO) (Neufeld, Perlman & Hirdes, 2012), and Self-Care Index (SCI). Evidence related to the reliability and convergent validity of these scales is described further in a previous research paper (Hirdes et al., 2020). In addition, the following CAPs were investigated: substance use, criminal activity, sleep, social relationships, interpersonal conflict, support systems for discharge, and trauma. Description and scoring of scales and CAPs are provided in Appendix A.

2.2.2.2 CMH Variables

Sociodemographic variables that were examined across age groups included the following: sex (male or female), marital status (never married, married/significant other, previously married), living arrangement (alone, with family, or with others), employment status (employed, unemployed – seeking employment, or unemployed – not seeking employment), and enrollment in a formal education program. Risk of unemployment or disrupted education was also investigated among students (increase in lateness or absenteeism over last 6 months, poor productivity or disruptiveness at work or school, and expresses intent to quit work or school). A proxy for socioeconomic status – financial trade-offs - was also added: "because of limited funds, during the last 30 days, made trade-offs on purchasing any of the following: adequate food, shelter, clothing; prescribed medications; sufficient home heating or cooling; necessary health care."

Individual items related to personal strengths, social relationships and recent stressors were examined. Personal strengths/social relationships encompass four "yes/no" items: reports having a confidant, consistent positive outlook, strong and supportive relationship with family, reports strong sense of involvement in community. The same list of stressors as in the RAI-MH were examined in the CMH (death of close family member or friend, conflict-laden or severed relationship, failed or dropped out of education program, major loss of income or serious economic hardship due to poverty, victim of sexual assault/abuse, and victim of emotional abuse). Time since stressor was last experienced was collapsed into the following categories: '2' if it occurred within the last 30 days prior to the assessment, ‘1’ if it occurred more than 30 days prior, and ‘0’ if it never occurred.

History of mental health service use included the following variables: time since last contact with community mental health agency or professional within the past year, time since last psychiatric hospital discharge, number of psychiatric admissions in last 2 years, number of lifetime psychiatric admissions, and age in years at first overnight stay in a psychiatric hospital or unit.

The same variables covering alcohol and substance use in the RAI-MH were examined in the CMH. Regarding clinical needs, DSM-IV diagnoses were obtained. Just as in the RAI-MH, diagnoses are ranked according to their importance. A primary diagnosis was one in which it was ranked as most important, while Non-primary diagnoses were those ranked as second, third or fourth most important, respectively. In addition, the same scales and CAPs that were used in the RAI-MH were included in the CMH analysis.

2.2.2.3 ESP Variables

Sex (male or female) is the only sociodemographic characteristic that is available in the ESP. In terms of social relationships and stressors, an item on time since conflict-laden or severed relationship was included. Two further “yes/no” items were used: “has a support person who is positive toward discharge or maintaining residence in community,” and “major life stressors in last 90 days” (episode of severe personal illness; death or severe illness of close family member/friend; loss of home; major loss of income/assets; victim of a crime such as robbery or assault; loss of driving license/car). History of mental health service use was measured using two items: “time since discharge from last psychiatric admission,” and “number of lifetime psychiatric admissions.”

The item representing alcohol use is different in the ESP than in the previous two instruments. The number of days in the last 30 days that the person consumed alcohol to the point of intoxication is measured using the following categories: none, 1-2 days, 2-8 days, 9 or more days (but not daily), and daily. The same substances and timeframes covering substance use descriptors in the RAI-MH and CMH were also investigated. DSM-IV disorders were obtained to represent clinical needs, as well as the same set of scales in the previous assessments. However, due to the limited number of items and observation timeframes used, the DSI and PSS-S are modified specifically for the ESP.

2.2.3 Statistical analysis

The prevalence of independent variables in each dataset was explored using cross-tabulated distributions. Differences across age groups were tested using the chi-square procedure. Due to the large sample size of the RAI-MH and multiple comparisons in each dataset, the statistical significance of the p-value was not the only indicator considered. To avoid misinterpretations resulting from Type 1 errors, significance was determined by either the absolute difference in frequency across age groups (more than a 5% difference), or for variables with a low absolute frequency, the relative difference in proportion (more than 50% difference) were used to interpret clinical significance of the results. Two types of cross-setting comparisons were also tested. One type was a difference in the magnitude of frequencies and the other was a divergence in the pattern of characteristics across age groups. To select variables for cross-setting comparisons, the bivariate results described above were examined manually. The datasets were then merged into a composite dataset and chi-square tests were used to test the association between the variables selected.

2.3 Results

The following sections provide descriptive results for the inpatient, community, and ED samples, as well as comparisons across age groups.

2.3.1 Psychiatric hospital inpatients assessed with the RAI-MH

Table 2. Sociodemographic characteristics of psychiatric inpatients aged 18-25 (N=44,438), 26-30 (N=21,090), and 31-35 (N=20,234) receiving hospital care in Ontario, Manitoba, and Newfoundland and Labrador between 2005-2019.

Sociodemographic characteristic		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Gender	*Male*	55.5 (24,664)	54.1 (11,400)	52.2 (10,557)	χ2 (2) = 63.5 p<.0001
Education	*Less than high school*	25.2 (11,209)	18.3 (3,866)	16.9 (3,423)	χ2 (6) = 1701.7 p<.0001
	High school	31.1 (13,834)	26.1 (5,501)	24.9 (5,045)	
	Some post-secondary	38.3 (17,012)	47.0 (9,917)	48.6 (9,834)	
Marital status	*Married or Significant other*	5.5 (2,468)	20.4 (4,304)	32.4 (6,566)	χ2 (2) = 8160.27 p<.0001
Employment	*Employed*	28.3 (12,556)	35.4 (7,457)	38.8 (7,854)	χ2 (4) = 910.9 p<.0001
	Unemployed	54.3 (24,129)	51.6 (10,872)	47.9 (9,687)	
	Other/Unknown	17.4 (7,753)	13.1 (2,761)	13.3 (2,693)	
Lives alone	*Yes*	16.2 (7,209)	26.1 (5,507)	28.3 (5,725)	χ2 (2) = 1552.3 p<.0001
Possible post-secondary student	*Yes*	9.9 (4,423)	6.3 (1,321)	5.1 (1,037)	χ2 (2) = 548.80 p<.0001
Economic trade-offs	*Yes*	5.2 (2,308)	6.4 (1,356)	7.0 (1,423)	χ2 (2) = 96.7 p<.0001

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Table 2, presented above, displays the sociodemographic characteristics of psychiatric patients aged 18-35. Across all age groups, just over half of patients were male. Compared to the 26- 30 and 31-35 age groups, the following traits were less common among those aged 18-25: completed post-secondary school, married or had a significant other, employed, and lived alone. They were also identified more often as possible post-secondary school student.

Table 3. Social relationships and presence of stressors among psychiatric inpatients aged 18-25 (N=44,438), 26-30 (N=21,090), and 31-35 (N=20,234) receiving hospital care in Ontario, Manitoba, and Newfoundland and Labrador between 2005-2019.

Resource/stressor		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Has a confidant	*Yes*	85.7 (38,072)	85.6 (18,052)	85.2 (17,233)	χ2 (2) = 3.0 p = 0.23
Has a support person positive about discharge	*Yes*	78.8 (35,027)	78.2 (16,495)	77.3 (15,643)	χ2 (2) = 18.9 p<.0001
Death of a close family member or friend	*<7 days*	0.8 (334)	0.8 (176)	0.9 (183)	χ2 (4) = 508.7 p<.0001
	>7 days	26.1 (11,611)	30.9 (6,516)	34.4 (6,963)	
	Never	73.1 (32,493)	68.3 (14,398)	64.7 (13,088)	
Conflict-laden or severed relationship	*<7 days*	11.9 (5,293)	12.6 (2,662)	13.7 (2,772)	χ2 (4) = 962.2 p<.0001
	>7 days	21.9 (9,734)	28.0 (5,897)	31.9 (6,450)	
	Never	66.2 (29,411)	59.4 (12,531)	54.4 (11,012)	
Failed or dropped out of education program	*<7 days*	1.5 (682)	0.5 (97)	0.3 (51)	χ2 (4) = 977.8 p<.0001
	>7 days	37.0 (16,428)	31.8 (6,712)	27.4 (5,552)	
	Never	61.5 (27,328)	67.7 (14,281)	72.3 (14,631)	
Major loss of income or serious economic hardship due to poverty	*<7 days*	3.9 (1,729)	5.2 (1,103)	5.7 (1,150)	χ2 (4) = 1263.1 p<.0001
	>7 days	12.6 (5,619)	19.8 (4,178)	21.8 (4,413)	
	Never	83.5 (37,090)	75.0 (15,809)	72.5 (14,671)	
Victim of sexual assault/abuse	*<7 days*	0.5 (213)	0.4 (87)	0.3 (63)	χ2 (4) = 38.1 p<.0001
	>7 days	14.6 (6,488)	15.5 (3,272)	16.2 (3,277)	
	Never	84.9 (37,737)	84.1 (17,731)	83.5 (16,894)	
Victim of emotional abuse	*<7 days*	3.0 (1,335)	2.4 (515)	2.7 (541)	χ2 (4) = 90.9 p<.0001
	>7 days	23.8 (10,565)	25.9 (5,456)	26.8 (5,418)	
	Never	73.2 (32,538)	71.7 (15,119)	70.6 (14,275)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

As seen above in Table 3, within the week prior to assessment, those aged 18-25 had more frequently failed or dropped out of an education program. For stressors occurring more than seven days prior, the 18-25 age group experienced fewer instances of serious economic hardship, conflict-laden or severed relationships, and death of a family member or friend. Across all age groups, the most common stressor to transpire in the week prior to the assessment was a conflict-laden or severed relationship (12-14%). In terms of social resources, across all ages, 85% of people reported having a confidant. Further, 78% had a person in their lives who was supportive of discharge back into the community.

Table 4. History of mental health service use among psychiatric inpatients aged 18-25 (N=44,438), 26-30 (N=21,090), and 31-35 (N=20,234) receiving hospital care in Ontario, Manitoba, and Newfoundland and Labrador between 2005-2019.

Service use history		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Number of psychiatric admissions (last 2 years)	*None*	73.9 (32,828)	73.8 (15,5557)	73.8 (14,932)	χ2 (4) = 8.4 p=0.08
	1-2	21.6 (9,586)	21.2 (4,468)	21.4 (4,326)	
	3+	4.5 (2,018)	5.0 (1,060)	4.8 (965)	
Number of psychiatric admissions (lifetime)	*None*	63.8 (28,343)	57.6 (12,138)	54.4 (10,999)	χ2 (6) = 833.7 p<.0001
	1-3	29.1 (12,914)	32.1 (6,775)	33.2 (6,704)	
	4-5	4.4 (1,968)	5.8 (1,215)	6.7 (1358)	
	6+	2.7 (1,207)	4.5 (957)	5.7 (1,162)	
Time since contact with community mental health	*>365 days*	57.3 (25,480)	55.2 (11,639)	54.1 (10,945)	χ2 (4) = 69.1 p<.0001
	31-365 days	14.5 (6,419)	15.1 (3,193)	15.2 (3,066)	
	<30 days	28.2 (12,533)	29.7 (6,253)	30.7 (6,212)	
Age at first hospitalization	*0-14*	6.0 (2,666)	4.9 (1,022)	4.3 (873)	χ2 (4) = 41,703.7 p<.0001
	15-24	87.6 (38,914)	25.0 (5,263)	18.6 (3,769)	
	25-44	6.4 (2,852)	70.2 (14,800)	77.1 (15,581)	

Note. Data reflects the first episode of care captured in the dataset, so lifetime number of admissions are likely underestimated. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

As seen in Table 4, the number of recent admissions to a psychiatric hospital was similar across all age groups. Since the dataset for this study used the first episode of care contained in the dataset, most of the sample did not have a recent psychiatric admission. Among those who did, 5% or less had more than three admissions. Similarly, age at first hospitalization was often the same as the age at the time of assessment. However, a minority of individuals had been admitted to a psychiatric hospital before the age of 14, representing a more long-term and severe population. There were slight differences in the number of lifetime psychiatric admissions, which increased with age. Among those with a lifetime history of psychiatric admissions, most only had 1-3 visits. Around 5% of those aged 26-35 had 6+ lifetime psychiatric admissions, likely corresponding with a younger age at first hospitalization. In terms of community mental health treatment, slightly more than half of the sample had been in contact with a mental health service at some point within the last 31-365 days, pointing to a divide in service use patterns.

Table 5. Substance use among psychiatric inpatients aged 18-25 (N=44,438), 26-30 (N=21,090), and 31-35 (N=20,234) receiving hospital care in Ontario, Manitoba, and Newfoundland and Labrador between 2005-2019.

Substance		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Number of drinks in any single sitting episode in the last 14 days (code for highest number)	*None*	63.7 (28,294)	62.3 (13,138)	63.8 (12,904)	χ2 (6) = 101.5 p<.0001
	1	5.2 (2,318)	5.2 (1,097)	5.0 (1,014)	
	2-4	13.7 (6,084)	12.9 (2,718)	11.7 (2,370)	
	5+	17.4 (7,742)	19.6 (4,137)	19.5 (3,946)	
Hallucinogens	*Never or more than 1 year ago*	91.4 (40,599)	94.2 (19,871)	96.1 (19,447)	χ2 (4) = 546.7 p<.0001
	Within the last year	4.8 (2,117)	3.4 (713)	2.3 (461)	
	Within the last month	3.9 (1,722)	2.4 (506)	1.6 (326)	
Cocaine	*Never or more than 1 year ago*	82.8 (36,773)	79.5 (16,764)	81.9 (16,566)	χ2 (4) = 177.8 p<.0001
	Within the last year	7.0 (3,114)	7.1 (1,505)	6.0 (1,212)	
	Within the last month	10.2 (4,551)	13.4 (2,821)	12.1 (2,456)	
Stimulants	*Never or more than 1 year ago*	90.9 (40,388)	90.9 (19,170)	92.4 (18,703)	χ2 (4) = 55.1 p<.0001
	Within the last year	3.6 (707)	3.4 (707)	2.7 (546)	
	Within the last month	5.5 (2,445)	5.8 (1,213)	4.9 (985)	
Opiates	*Never or more than 1 year ago*	91.6 (40,712)	88.1 (18,574)	88.6 (17,935)	χ2 (4) = 274.7 p<.0001
	Within the last year	2.9 (1,269)	3.8 (805)	3.3 (670)	
	Within the last month	5.5 (2,457)	8.1 (1,711)	8.1 (1,629)	
Cannabis	*Never or more than 1 year ago*	47.6 (21,164)	57.2 (12,057)	65.1 (13,180)	χ2 (4) = 1887.7 p<.0001
	Within the last year	9.3 (4,110)	8.4 (1,779)	7.7 (1,555)	
	Within the last month	43.1 (19,164)	34.4 (7,254)	27.2 (5,499)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Overall, two-thirds of the sample had not consumed a drink in the 14 days prior to assessment. The 18-25 age group more frequently used hallucinogens within the past year and month compared to the older age groups, and substantially more had used cannabis in the month preceding the assessment. Across all age groups, cannabis was the most common substance used.

Table 6. DSM-IV admission diagnoses among psychiatric inpatients aged 18-25 (N=44,438), 26-30 (N=21,090), and 31-35 (N=20,234) receiving hospital care in Ontario, Manitoba, and Newfoundland and Labrador between 2005-2019.

Psychiatric diagnosis		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Neurodevelopmental disorder	*Primary*	1.9 (836)	0.9 (183)	0.6 (127)	χ2 (4) = 361.2 p<.0001
	Non-primary	2.6 (1,171)	1.6 (343)	1.3 (271)	
Substance use disorder	*Primary*	14.2 (6,310)	19.8 (4,171)	20.9 (4,228)	χ2 (4) = 646.0 p<.0001
	Non-primary	16.6 (7,391)	15.1 (3,192)	12.9 (2,605)	
Schizophrenia or other psychotic disorder	*Primary*	27.8 (12,364)	27.8 (5,863)	25.2 (5,103)	χ2 (4) = 84.0 p<.0001
	Non-primary	3.5 (1,544)	2.9 (622)	2.8 (570)	
Mood disorder	*Primary*	31.9 (14,200)	33.4 (7,038)	35.2 (7,129)	χ2 (4) = 169.3 p<.0001
	Non-primary	8.0 (3,572)	9.1 (1,916)	9.9 (2,001)	
Anxiety disorder	*Primary*	4.1 (1,843)	3.8 (800)	3.9 (789)	χ2 (4) = 11.5 p=0.02
	Non-primary	10.6 (4,695)	10.6 (2,244)	11.2 (2,270)	
Eating disorder	*Primary*	2.1 (929)	1.2 (246)	0.9 (180)	χ2 (4) = 191.6 p<.0001
	Non-primary	1.4 (610)	1.1 (223)	0.9 (183)	
Personality disorder	*Primary*	3.1 (1,367)	1.9 (399)	1.8 (360)	χ2 (4) = 189.5 p<.0001
	Non-primary	8.1 (3,609)	7.4 (1,555)	6.6 (1,342)	
Psychiatric comorbidity	*0 disorders*	0.04 (19)	0.06 (13)	0.04 (9)	χ2 (4) = 80.7 p<.0001
	1 disorder	54.6 (24,286)	56.6 (11,937)	58.3 (11,797)	
	2-3 disorders	45.3 (20,133)	43.3 (9,140)	41.6 (8,428)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Table 6, shown above, displays the prevalence of select DSM-IV disorders and is separated by primary and secondary or tertiary ranking. Overall, disorders were similar across all age groups. 18- to 25-year-olds had a higher prevalence of neurodevelopmental and eating disorders, as well as slightly more personality disorders. In contrast, they had the lowest proportion of primary substance use disorders. The most common disorder across all age groups were mood disorders, followed by schizophrenia or other psychotic disorders and substance use disorders. Except for anxiety and personality disorders, other disorders tended to be ranked as the primary diagnosis rather than secondary or tertiary.

Table 7. interRAI scale categories among psychiatric inpatients aged 18-25 (N=44,438), 26-30 (N=21,090), and 31-35 (N=20,234) receiving hospital care in Ontario, Manitoba, and Newfoundland and Labrador between 2005-2019.

Clinical scale		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Depressive severity index (DSI)	*0*	24.8 (11,008)	24.5 (5,159)	23.0 (4,653)	$\chi2$ (6) = 80.6 p<.0001
	1-3	32.8 (14,586)	32.2 (6,797)	31.1 (6,291)	
	4-7	26.0 (11,577)	26.3 (5,553)	27.3 (5,531)	
	8-15	16.4 (7,267)	17.0 (3,581)	18.6 (3,759)	
Cognitive performance scale (CPS)	*0*	74.9 (33,273)	75.7 (15,959)	76.7 (15,511)	$\chi2$ (4) = 75.2 p<.0001
	1-2	20.7 (9,193)	21.0 (4,426)	20.0 (4,040)	
	3-6	4.4 (1,972)	3.3 (705)	3.4 (683)	
Aggressive behaviour scale (ABS)	*0*	74.0 (32,882)	77.0 (16,248)	78.8 (15,949)	$\chi2$ (6) = 228.6 p<.0001
	1-3	14.3 (6,343)	13.5 (2,851)	12.3 (2,485)	
	4-6	7.9 (3,533)	6.6 (1,393)	6.2 (1,251)	
	7-12	3.8 (1,680)	2.8 (598)	2.7 (549)	
Psychotic symptoms scale (PSS)	*0*	55.1 (24,480)	57.0 (12,017)	59.1 (11,963)	$\chi2$ (6) = 127.1 p<.0001
	1-2	10.7 (4,770)	10.8 (2,272)	10.3 (2,086)	
	3-5	15.6 (6,922)	15.5 (3,272)	15.0 (3,028)	
	6-12	18.6 (8,266)	16.7 (3,529)	15.6 (3,157)	
Social withdrawal scale (SWS)	*0*	23.4 (10,392)	24.6 (5,187)	24.3 (4,926)	$\chi2$ (4) = 18.1 p=0.001
	1-2	32.2 (14,306)	32.0 (6,754)	31.3 (6,335)	
	3-6	44.4 (19,740)	43.4 (9,149)	44.4 (8,973)	

Clinical scale		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Severity of self-harm (SoS)	*0*	18.9 (8,393)	24.0 (5,073)	26.2 (5,305)	χ2 (4) = 685.0 p<.0001
	1-3	32.1 (14,254)	33.6 (7,083)	33.1 (6,701)	
	4-6	49.0 (21,791)	42.4 (8,934)	40.7 (8,228)	
Risk of harm to others (RHO)	*0*	30.0 (13,320)	28.5 (6,008)	28.2 (5,698)	χ2 (4) = 246.8 p<.0001
	1-3	46.7 (20,766)	50.4 (10,629)	52.7 (10,661)	
	4-6	23.3 (10,352)	21.1 (4,453)	19.1 (3,875)	
Self-care index (SCI)	*0*	32.7 (14,543)	34.3 (7,238)	36.4 (7,367)	χ2 (4) = 119.9 p<.0001
	1-3	47.6 (21,149)	47.6 (10,039)	46.6 (9,438)	
	4-6	19.7 (8,746)	18.1 (3,813)	17.0 (3,429)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

In terms of age differences across the scales, the 18-25 age group exhibited a higher risk of self-harm than the older age groups. Otherwise, patterns of mental health symptoms were consistent across age groups. The most prevalent symptoms overall were those related to depression and social withdrawal; two-thirds of inpatients struggled with one or more symptoms in these areas. Around 40% of inpatients experienced positive symptoms of psychosis and approximately one-quarter demonstrated some difficulties with cognitive performance and aggressive behaviour. In terms of risk scales, risk of harm to self was the greatest, with almost half the sample scoring within the moderate-to-high range. For both risk of harm to others and self-care, around half the sample was within the mild-to-moderate range.

Table 8. interRAI CAP triggers among psychiatric inpatients aged 18-25 (N=44,438), 26-30 (N=21,090), and 31-35 (N=20,234) receiving hospital care in Ontario, Manitoba, and Newfoundland and Labrador between 2005-2019.

Clinical Assessment Protocol (CAP)		**18-25 % (n)**	**26-30 % (n)**	**31-35 % (n)**	**Chi-square test**
Substance use	*Not triggered*	34.3 (15,235)	37.6 (7,939)	42.0 (8,505)	χ2 (4) = 409.2 p<.0001
	Past use	5.1 (2,263)	5.4 (1,138)	5.7 (1,148)	
	Current use	60.6 (26,940)	57.0 (12,013)	52.3 (10,581)	
Sleep disturbance	*Not triggered*	63.4 (28,162)	60.5 (12,765)	59.5 (12,039)	χ2 (4) = 130.8 p<.0001
	Sleep disturbance and no worse than moderate cognitive impairment	35.9 (15,940)	38.9 (8,198)	40.0 (8,093)	
	Sleep disturbance and severe cognitive impairment	0.8 (336)	0.6 (127)	0.5 (102)	
Social relationships	*Not triggered*	41.2 (18,323)	42.0 (8,852)	42.3 (8,551)	χ2 (4) = 9.8 p=0.04
	Improve close friendships and family functioning	31.3 (13,918)	30.4 (6,413)	30.6 (6,189)	
	Reduce social isolation and family dysfunction	27.5 (12,197)	27.6 (5,825)	27.1 (5,494)	
Interpersonal conflict	*Not triggered*	62.3 (27,673)	64.2 (13,551)	64.8 (13,111)	χ2 (4) = 75.9 p<.0001
	Reduce conflict within specific relationships	26.0 (11,555)	25.3 (5,326)	25.4 (5,149)	
	Reduce widespread conflict	11.7 (5,210)	10.5 (2,213)	9.8 (1,974)	
Social supports for discharge (SSDIS)	*Not triggered*	72.6 (32,244)	71.5 (15,087)	70.9 (14,348)	χ2 (2) = 20.7 p<.0001
	Triggered	27.4 (12,194)	28.5 (6,003)	29.1 (5,886)	
Criminal activity	*Not triggered*	71.6 (31,813)	71.3 (15,042)	72.9 (14,751)	χ2 (2) = 15.4 p=0.0004
	Reduce risk of violent or nonviolent criminal behaviour	28.4 (12,625)	28.7 (6,048)	27.1 (5,483)	
Traumatic life events	*Not triggered*	83.3 (37,017)	82.6 (17,423)	82.2 (16,639)	χ2 (4) = 67.6 p<.0001
	Reduce the impact of prior traumatic life events	8.1 (3,598)	9.1 (1,929)	9.9 (2,004)	
	Address immediate safety concerns	8.6 (3,823)	8.2 (1,738)	7.9 (1,591)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Relative to the 31-35 age group, more 18- to 25-year-olds triggered the 'current substance use' CAP, despite that fewer of them were diagnosed with a primary substance use disorder. The frequency distribution of other CAPs was similar across age groups. Issues pertaining to substance use, sleep, and social relationships were the most common needs experienced by inpatients. By the age of 18, one-in-five inpatients had already experienced a traumatic event.

2.3.2 Community mental health clients assessed with the CMH

Table 9. Sociodemographic characteristics of community mental health clients aged 18-25 (N=1,194), 26-30 (N=742), and 31-35 (N=612) receiving care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014).

Sociodemographic characteristic		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Gender	*Male*	44.8 (535)	50.9 (378)	47.6 (291)	$\chi2$ (2) = 6.6 p=0.04
Marital status	*Married or significant other*	8.0 (96)	23.0 (171)	25.6 (157)	$\chi2$ (2) = 121.4 p<.0001
Employed*	*Yes*	4.2 (34)	7.1 (37)	8.0 (34)	$\chi2$ (2) = 8.9 p=0.01
Lives alone	*Yes*	12.1 (145)	21.7 (161)	22.4 (137)	$\chi2$ (2) = 43.1 p<.0001
Post-secondary student	*Yes*	32.5 (387)	11.0 (80)	7.0 (42)	$\chi2$ (2) = 216.2 p<.0001
Economic trade-offs	*Yes*	10.6 (126)	13.8 (101)	13.0 (78)	$\chi2$ (2) = 4.8 p=0.09

Note. *31% of the data is missing. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

As can be seen in Table 9, there were slightly more women in the 18-25 age group than in the 26-30 group. Compared to both age groups, fewer 18- to 25-year-olds were married, employed, and living alone, but more were enrolled in a post-secondary education program. Among those aged 18-25, one-third were a post-secondary student.

Table 10. Social relationships and presence of stressors among community mental health clients aged 18-25 (N=1,194), 26-30 (N=742), and 31-35 (N=612) receiving care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014).

Resource/stressor		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Has a confidant	*Yes*	61.4 (732)	63.5 (467)	61.3 (374)	χ2 (2) = 1.1 p=0.59
Consistent positive outlook	*Yes*	38.2 (456)	42.7 (314)	40.2 (245)	χ2 (2) = 3.8 p=.15
Strong and supportive relationship with family	*Yes*	59.1 (705)	64.2 (471)	58.8 (359)	χ2 (2) = 5.8 p=.05
Reports strong sense of involvement in community	*Yes*	20.2 (220)	19.2 (126)	21.1 (114)	χ2 (2) = 0.7 p=.71
Death of a close family member or friend	*<30 days*	2.0 (24)	2.6 (19)	2.7 (16)	χ2 (4) = 6.0 p=.20
	>30 days	45.0 (531)	50.0 (366)	46.8 (280)	
	Never	52.9 (624)	47.4 (347)	50.5 (302)	
Conflict-laden or severed relationship	*<30 days*	8.8 (103)	6.9 (50)	9.7 (58)	χ2 (4) = 30.9 p<.0001
	>30 days	29.3 (345)	34.5 (251)	41.1 (246)	
	Never	61.9 (728)	58.6 (427)	49.2 (295)	
Failed or dropped out of education program	*<30 days*	1.5 (18)	0.8 (6)	0.2 (1)	χ2 (4) = 9.3 p=0.05
	>30 days	43.2 (511)	46.4 (338)	45.6 (273)	
	Never	55.2 (653)	52.7 (384)	54.2 (324)	
Major loss of income or serious economic hardship due to poverty	*<30 days*	4.1 (49)	7.7 (56)	5.8 (35)	χ2 (4) = 47.7 p<.0001
	>30 days	12.4 (147)	17.6 (128)	23.1 (139)	
	Never	83.4 (985)	74.7 (543)	71.0 (427)	
Victim of sexual assault/abuse*	*<30 days*	0.5 (6)	0.5 (4)	0.2 (1)	χ2 (4) = 5.8 p=.21
	>30 days	27.0 (320)	28.6 (208)	31.9 (191)	
	Never	72.4 (857)	70.9 (516)	67.9 (406)	
Victim of emotional abuse	*<30 days*	7.5 (88)	6.7 (49)	5.0 (30)	χ2 (4) = 5.9 p=.20
	>30 days	45.5 (538)	45.9 (333)	50.1 (299)	
	Never	47.0 (555)	47.4 (344)	44.9 (268)	

Note. *some cells contain fewer than 5 cases. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Across all age groups, roughly two-thirds of the sample reported having a confidant and a strong and supportive relationship with their family. However, only one-in-five individuals said that they felt a strong sense of involvement in their community. Those aged 31-35 more frequently experienced a conflict-laden or severed relationship in the past 30 days, as well as major loss of income or economic hardship. Death of a family member or friend, failing or dropping out of an education program, and emotional abuse were all stressors that had occurred within the last 30 days for 40-50% of individuals across all age groups.

Table 11. History of mental health service use among community mental health clients aged 18-25 (N=1,194), 26-30 (N=742), and 31-35 (N=612) receiving care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014).

Service use history		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Time since last contact with a community mental health agency or professional in past year	*No contact*	43.8 (508)	38.0 (274)	41.6 (251)	χ2 (4) = 7.9 p=0.10
	>31 days	18.5 (215)	20.7 (149)	17.1 (103)	
	<30 days	37.7 (438)	41.3 (298)	41.3 (249)	
Time since last psychiatric discharge in last 90 days	*None*	83.0 (964)	84.7 (611)	85.9 (519)	χ2 (4) = 22.1 p=.0002
	>31 days	7.7 (89)	10.4 (75)	9.1 (55)	
	<30 days	9.4 (109)	4.9 (35)	5.0 (30)	
Number of psychiatric admissions in last 2 years	*None*	67.5 (785)	67.7 (488)	70.1 (424)	χ2 (4) = 7.5 p=.11
	1-2	26.5 (308)	25.9 (187)	21.6 (131)	
	3+	6.0 (70)	6.4 (46)	8.3 (50)	
Number of lifetime psychiatric admissions	*None*	61.8 (718)	55.5 (401)	55.1 (333)	χ2 (4) = 28.9 p<.0001
	1-3	30.8 (358)	33.1 (239)	30.5 (184)	
	4-5	4.3 (50)	5.0 (36)	7.6 (46)	
	6+	3.1 (36)	6.4 (46)	6.8 (41)	
Age in years at first overnight stay in a psychiatric hospital or unit	*Never*	61.3 (713)	55.2 (399)	54.7 (331)	χ2 (6) = 148.2 p<.0001
	1-14	6.2 (72)	5.7 (41)	4.6 (28)	
	15-24	31.8 (370)	31.1 (225)	25.3 (153)	
	25-44	0.8 (9)	8.0 (58)	15.4 (93)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Across all age groups, over half the sample had previously been in contact with a mental health agency or professional, usually within the month prior to assessment. Compared to older age groups, more 18- to 25-year-olds had been discharged from a psychiatric hospital in the month preceding the assessment, though they had fewer lifetime admissions overall. Whereas

62% of the 18-25 age group had no lifetime psychiatric admissions, 55% of the 26-30 and 31-35 age groups had none. Among those who had previously been admitted to a psychiatric hospital, most had between 1-3 visits. The most common age at first overnight stay in a psychiatric hospital was between the ages of 15-24, corresponding with the findings in the inpatient sample.

Table 12. Substance use among community mental health clients aged 18-25 (N=1,194), 26-30 (N=742), and 31-35 (N=612) receiving care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014).

Substance		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Number of drinks in any single sitting episode in the last 14 days (code for highest number)	*None*	58.1 (690)	63.1 (462)	62.7 (379)	χ2 (6) = 11.2 p=.08
	1	8.4 (100)	8.9 (65)	9.9 (60)	
	2-4	16.6 (197)	14.2 (104)	14.7 (89)	
	5+	16.9 (200)	13.8 (101)	12.6 (76)	
Hallucinogens	*Never or more than 1 year ago*	75.8 (895)	72.6 (529)	72.5 (436)	χ2 (4) = 13.4 p=.01
	Within the last year	21.9 (258)	26.6 (194)	26.3 (158)	
	Within the last month	2.3 (27)	0.8 (6)	1.2 (7)	
Cocaine	*Never or more than 1 year ago*	75.5 (893)	68.4 (499)	68.3 (409)	χ2 (4) = 30.0 p<.0001
	Within the last year	18.3 (217)	27.6 (201)	26.7 (160)	
	Within the last month	6.2 (73)	4.0 (29)	5.0 (30)	
Stimulants	*Never or more than 1 year ago*	84.3 (995)	79.9 (583)	79.5 (478)	χ2 (4) = 9.3 p=.05
	Within the last year	11.9 (140)	15.6 (114)	15.3 (92)	
	Within the last month	3.8 (45)	4.5 (33)	5.2 (31)	
Opiates	*Never or more than 1 year ago*	88.3 (1,046)	82.7 (601)	82.5 (494)	χ2 (4) = 20.0 p=.0005
	Within the last year	10.2 (121)	14.6 (106)	13.9 (83)	
	Within the last month	1.4 (17)	2.7 (20)	3.7 (22)	
Cannabis	*Never or more than 1 year ago*	31.7 (374)	27.4 (201)	31.5 (189)	χ2 (4) = 33.6 p<.0001
	Within the last year	24.2 (286)	34.4 (252)	33.8 (203)	
	Within the last month	44.1 (520)	38.2 (280)	34.7 (208)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Compared to older age groups, the 18-25 group had less recently consumed cocaine and opiates but had more recently consumed cannabis. Cannabis was the most common substance used; over one-third of the sample had used it in the past month. Conversely, approximately 60% of the sample reported having no drinks in the last 14 days.

Table 13. DSM-IV diagnoses among community mental health clients aged 18-25 (N=1,194), 26-30 (N=742), and 31-35 (N=612) receiving care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014).

Psychiatric diagnosis		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Neurodevelopmental disorder	*Primary*	5.5 (66)	2.6 (19)	2.3 (14)	χ2 (4) = 21.4 p=.0003
	Non-primary	5.3 (63)	3.4 (25)	3.9 (24)	
Substance use disorder	*Primary*	2.4 (29)	2.4 (18)	2.4 (15)	χ2 (4) = 7.0 p=.13
	Non-primary	6.1 (73)	8.6 (64)	9.1 (56)	
Schizophrenia or other psychotic disorder	*Primary*	11.7 (140)	20.9 (155)	22.1 (135)	χ2 (4) = 43.4 p<.0001
	Non-primary	1.7 (20)	1.6 (12)	2.0 (12)	
Mood disorder	*Primary*	25.2 (301)	26.0 (193)	25.0 (153)	χ2 (4) = 0.5 p=.97
	Non-primary	13.1 (157)	13.6 (101)	12.9 (79)	
Anxiety disorder	*Primary*	9.7 (116)	9.0 (67)	9.6 (59)	χ2 (4) = 1.2 p=.87
	Non-primary	22.3 (266)	20.7 (154)	20.9 (128)	
Personality disorder	*Primary*	5.8 (69)	3.9 (29)	4.4 (27)	χ2 (4) = 11.9 p=.02
	Non-primary	6.0 (72)	7.1 (53)	3.6 (22)	
Psychiatric comorbidity	*0 disorders*	39.9 (458)	34.8 (248)	34.5 (203)	χ2 (4) = 13.3 p=.01
	1 disorder	21.5 (247)	27.3 (194)	27.7 (163)	
	2-4 disorders	38.6 (444)	37.9 (270)	37.8 (222)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Compared to the 18-25 age group, more of the older age groups presented with a primary diagnosis of schizophrenia or another psychotic disorder. In contrast, those aged 18-25 had more primary diagnoses of a neurodevelopmental disorder. The most common diagnosis was a mood disorder, followed by anxiety and psychotic disorders. However, most anxiety disorders were ranked as secondary or tertiary in importance. Over one-third of the sample had no formal psychiatric diagnosis while 38% had 2-4 diagnoses.

Table 14. interRAI scale categories among community mental health clients aged 18-25 (N=1,194), 26-30 (N=742), and 31-35 (N=612) receiving care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014).

Clinical scale		**18-25 % (n)**	**26-30 % (n)**	**31-35 % (n)**	**Chi-square test**
Depressive severity index (DSI)	*0*	12.1 (144)	18.0 (132)	19.3 (117)	χ2 (6) = 26.0 p=.0002
	1-3	17.4 (207)	17.0 (125)	15.0 (91)	
	4-7	24.8 (294)	19.6 (144)	19.8 (120)	
	8-15	45.7 (542)	45.4 (333)	45.8 (277)	
Cognitive performance scale (CPS)	*0*	72.2 (859)	71.4 (523)	70.8 (431)	χ2 (4) = 1.5 p=.82
	1-2	26.0 (309)	26.0 (190)	27.1 (165)	
	3-6	1.8 (22)	2.6 (19)	2.13 (13)	
Aggressive behaviour scale (ABS)	*0*	82.0 (967)	80.0 (583)	81.6 (496)	χ2 (6) = 3.1 p=.79
	1-3	15.1 (178)	17.0 (124)	16.4 (100)	
	4-6	2.3 (27)	2.3 (17)	1.6 (10)	
	7-12	0.6 (7)	0.7 (5)	0.3 (2)	
Psychotic symptoms scale (PSS)	*0*	73.3 (859)	71.0 (518)	69.8 (418)	χ2 (6) = 9.7 p=.14
	1-2	13.1 (154)	13.7 (100)	12.5 (75)	
	3-5	9.8 (115)	11.9 (87)	11.7 (70)	
	6-12	3.7 (44)	3.4 (25)	6.0 (36)	
Social withdrawal scale (SWS)	*0*	8.6 (99)	13.2 (95)	14.9 (88)	χ2 (4) = 18.9 p=.0008
	1-2	17.6 (203)	17.9 (129)	16.7 (99)	
	3-6	73.8 (852)	68.9 (496)	68.4 (404)	
Severity of self-harm (SoS)	*0*	37.6 (439)	43.2 (310)	45.3 (273)	χ2 (4) = 11.8 p=.02
	1-3	41.9 (489)	38.9 (279)	36.3 (219)	
	4-6	20.4 (238)	17.8 (128)	18.4 (111)	
Risk of harm to others (RHO)	*0*	50.8 (600)	47.2 (345)	49.4 (297)	χ2 (4) = 2.8 p=.59
	1-3	33.4 (394)	36.2 (265)	33.6 (202)	
	4-6	15.8 (186)	16.5 (121)	17.0 (102)	
Self-care index (SCI)	*0*	28.5 (324)	30.4 (218)	32.3 (191)	χ2 (4) = 5.4 p=.25
	1-3	62.1 (706)	61.7 (442)	60.9 (360)	
	4-6	9.3 (106)	7.8 (56)	6.8 (40)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Overall, the three age groups displayed similar patterns of mental health symptoms. The most extensive symptoms of mental illness across all age groups were depression and social withdrawal. Severe depression was observed in 45% of the sample, while 68-74% of the sample had moderate-to-severe social withdrawal. Cognitive impairment and symptoms of psychosis were both present in roughly 30% of the overall sample, though most cognitive impairments were classified as mild while psychosis was mild-to-moderate in most cases. Aggressive behavior was the most infrequent issue; only one-fifth of the sample demonstrated any such behaviours and among those who did, most scored in the mild range. Despite low levels of aggressive behaviours, risk of harm to others was a concern for half the sample, with roughly 16% at moderate-to-high risk, likely due to the presence of psychotic symptoms. Almost two-thirds of the sample were also at mild-to-moderate risk of being unable to care for themselves.

Table 15. interRAI CAP triggers among community mental health clients aged 18-25 (N=1,194), 26-30 (N=742), and 31-35 (N=612) receiving care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014).

Clinical Assessment Protocol (CAP)		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Substance use	*Not triggered*	26.2 (298)	22.6 (159)	26.4 (152)	$\chi 2$ (4) = 17.9 p=.001
	Triggered for past use	21.1 (240)	28.0 (197)	27.8 (160)	
	Triggered for current use	52.7 (600)	49.4 (348)	45.7 (263)	
Sleep disturbance	*Not triggered*	37.2 (435)	41.7 (303)	43.8 (264)	$\chi 2$ (2) = 8.5 p=.01
	Triggered due to current sleep disturbance	62.8 (735)	58.3 (423)	56.2 (338)	
Social relationships	*Not triggered*	49.1 (545)	50.6 (347)	47.2 (272)	$\chi 2$ (4) = 8.8 p=0.06
	Improve close friendships and family functioning	35.8 (398)	38.0 (261)	35.8 (206)	
	Reduce social isolation and family dysfunction	15.1 (168)	11.4 (78)	17.0 (98)	
Interpersonal conflict	*Not triggered*	38.4 (454)	46.2 (338)	44.4 (268)	$\chi 2$ (4) = 13.7 p=.008
	Reduce conflict within specific relationships	38.5 (455)	34.6 (253)	36.3 (219)	
	Reduce widespread conflict	23.0 (272)	19.3 (141)	19.2 (116)	
Criminal activity	*Not triggered*	76.5 (873)	74.3 (528)	72.3 (426)	$\chi 2$ (2) = 3.8 p=.15
	Reduce risk of violent or nonviolent criminal behaviour	23.5 (268)	25.7 (183)	27.7 (163)	
Traumatic events	*Not triggered*	75.7 (859)	71.8 (501)	72.3 (417)	$\chi 2$ (4) = 7.5 p=.11
	Reduce the impact of prior traumatic life events	14.6 (166)	19.2 (134)	18.2 (105)	
	Address immediate safety concerns	9.6 (109)	9.0 (63)	9.5 (55)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Substance use was the most frequently triggered CAP. Three-quarters of the sample required help with either past or current substance use, with a greater proportion of 26- to 35-year-olds triggering the past use category. Sleep disturbance was another major concern, especially among those aged 18-25, with over half the sample exhibiting problems with sleep. Improving social relationships with family and friends and reducing conflict with them was a consistent need across age groups, and to a lesser extent, assistance with widespread isolation and conflict. One-quarter of the sample had indications of criminal activity at some point in their lives. The same proportion experienced a traumatic event, 10% of whom had immediate safety concerns.

2.3.3 Emergency department patients assessed with the ESP

The proportion of males in each age group were as follows: 18-25 (n=371, 47.5%); 26-30 (n=170, 52.0%), and 31-35 (n=129, 49.6%). There were no statistically significant differences in the gender distribution across age groups (χ^2=1.91, p=.38).

Table 16. Social relationships and presence of stressors among ED patients aged 18-25 (N=781), 26-30 (N=327), and 31-35 (N=260) receiving care in Ontario (2005), Niagara (2013-2014), and Chatham-Kent and Bluewater Health (2018-2019).

<table>
<tr><th colspan="2">Resource/stressor</th><th>18-25
% (n)</th><th>26-30
% (n)</th><th>31-35
% (n)</th><th>Chi-square test</th></tr>
<tr><td>Has a support person who is positive about discharge</td><td>Yes</td><td>79.9 (490)</td><td>76.9 (193)</td><td>80.2 (150)</td><td>χ2 (2) = 1.1 p=.57</td></tr>
<tr><td>Major life stressors</td><td>Yes</td><td>43.2 (265)</td><td>51.0 (128)</td><td>50.3 (94)</td><td>χ2 (2) = 5.7 p=.06</td></tr>
<tr><td rowspan="4">Conflict-laden or severed relationship</td><td><7 days</td><td>10.0 (61)</td><td>10.0 (25)</td><td>14.4 (27)</td><td rowspan="4">χ2 (6) = 15.3 p=.02</td></tr>
<tr><td><1 year</td><td>9.1 (56)</td><td>10.4 (26)</td><td>10.2 (19)</td></tr>
<tr><td>>1 year</td><td>5.7 (35)</td><td>10.4 (26)</td><td>11.8 (22)</td></tr>
<tr><td>Never</td><td>75.2 (461)</td><td>69.3 (174)</td><td>63.6 (119)</td></tr>
</table>

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Most patients had a support person who was positive towards their discharge, but around half were struggling with at least one major life stressor. Fewer of the 18-25 age group had experienced a conflict-laden or severed relationship than older age groups.

Table 17. History of mental health service use among ED patients aged 18-25 (N=781), 26-30 (N=327), and 31-35 (N=260) receiving care in Ontario (2005), Niagara (2013-2014), and Chatham-Kent and Bluewater Health (2018-2019).

Service use history		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Time since last psychiatric admission	*N/A*	66.3 (407)	61.4 (154)	61.4 (116)	$\chi2$ (4) = 7.3 p=.12
	<30 days	18.7 (115)	24.7 (62)	26.5 (50)	
	>31 days	15.0 (92)	13.9 (35)	12.2 (23)	
Lifetime admissions to a psychiatric hospital*	*0*	81.1 (498)	73.7 (185)	74.1 (140)	$\chi2$ (4) = 9.2 p=0.06
	1-3	16.3 (100)	21.5 (54)	20.6 (39)	
	4+	2.6 (16)	4.8 (12)	5.3 (10)	

Note. *23% of data is missing. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Time since the last psychiatric admission was similar across age groups, and although the 18-25 age group had fewer lifetime admissions to a psychiatric hospital, this difference was not statistically significant (p=.06).

Table 18. Substance use among ED patients aged 18-25 (N=781), 26-30 (N=327), and 31-35 (N=260) receiving care in Ontario (2005), Niagara (2013-2014), and Chatham-Kent and Bluewater Health (2018-2019).

Substance		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Number of days in last 30 days consumed alcohol to point of intoxication	*None*	70.3 (548)	77.3 (252)	76.4 (198)	$\chi2$ (8) = 23.9 p=.0002
	1	8.5 (66)	6.1 (20)	4.2 (11)	
	2-8	13.7 (107)	8.6 (28)	8.9 (23)	
	9+ (not daily)	6.4 (50)	5.5 (18)	6.6 (17)	
	Daily	1.0 (8)	2.4 (8)	3.9 (10)	
Hallucinogens	*Never or more than 1 year ago*	87.1 (679)	86.5 (282)	86.4 (223)	$\chi2$ (4) = 2.6 p=.62
	Within the last year	10.0 (78)	11.3 (37)	12.0 (31)	
	Within the last month	2.9 (23)	2.2 (7)	1.6 (4)	
Cocaine	*Never or more than 1 year ago*	79.1 (617)	70.9 (231)	72.1 (186)	$\chi2$ (4) = 13.0 p=.01
	Within the last year	12.0 (94)	19.3 (63)	17.4 (45)	
	Within the last month	8.9 (69)	9.8 (32)	10.5 (27)	
Stimulants	*Never or more than 1 year ago*	84.7 (661)	77.3 (252)	80.2 (207)	$\chi2$ (4) = 12.4 p=.01
	Within the last year	9.2 (72)	11.0 (36)	11.2 (29)	
	Within the last month	6.0 (47)	11.7 (38)	8.5 (22)	
Opiates	*Never or more than 1 year ago*	91.0 (709)	81.3 (265)	87.2 (225)	$\chi2$ (4) = 25.7 p<.0001
	Within the last year	5.9 (46)	8.9 (29)	7.0 (18)	
	Within the last month	3.1 (24)	9.8 (32)	5.8 (15)	
Cannabis	*Never or more than 1 year ago*	39.2 (305)	38.6 (126)	46.5 (120)	$\chi2$ (4) = 14.6 p=.006
	Within the last year	15.1 (118)	22.4 (73)	16.3 (42)	
	Within the last month	45.7 (356)	39.0 (127)	37.2 (96)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Regarding drinking to the point of intoxication, fewer of the 18-25 age group had never done this, but fewer of them also drank to this extent daily than older age groups. Those aged 18-30 consumed cannabis more recently than those aged 31-35, but fewer 18- to 25-year-olds had recently taken stimulants, cocaine and opiates. Cannabis was the most common substance consumed across all ages, ranging from 39-46% of the sample.

Table 19. DSM-IV diagnoses among ED patients aged 18-25 (N=781), 26-30 (N=327), and 31-35 (N=260) receiving care in Ontario (2005), Niagara (2013-2014), and Chatham-Kent and Bluewater Health (2018-2019).

Psychiatric diagnosis		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Neurodevelopmental disorder	*Primary*	7.0 (55)	5.2 (17)	1.9 (5)	χ2 (4) = 10.6 p=.03
	Non-primary	3.6 (28)	3.1 (10)	2.7 (7)	
Substance use disorder	*Primary*	10.9 (85)	16.2 (53)	12.3 (32)	χ2 (4) = 8.8 p=.06
	Non-primary	3.6 (28)	4.6 (15)	5.8 (15)	
Schizophrenia or other psychotic disorder	*Primary*	7.7 (60)	9.8 (32)	11.1 (29)	χ2 (4) = 10.1 p=.04
	Non-primary	0.3 (2)	1.5 (5)	0.4 (1)	
Mood disorder	*Primary*	30.0 (234)	26.0 (84)	30.4 (79)	χ2 (4) = 4.2 p=.38
	Non-primary	6.1 (48)	8.6 (28)	5.8 (15)	
Anxiety disorder	*Primary*	11.6 (91)	14.1 (46)	13.1 (34)	χ2 (4) = 4.0 p=.40
	Non-primary	9.9 (77)	11.6 (38)	7.7 (20)	
Personality disorder	*Primary*	8.4 (66)	11.9 (39)	11.9 (31)	χ2 (4) = 5.7 p=.22
	Non-primary	5.4 (42)	6.7 (22)	6.1 (16)	
Psychiatric comorbidity	*0 disorders*	37.3 (288)	34.9 (111)	36.7 (95)	χ2 (4) = 5.7 p=.22
	1 disorder	28.1 (217)	23.3 (74)	26.6 (69)	
	2-3 disorders	34.5 (266)	41.8 (133)	36.7 (95)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Compared to other age groups, those aged 18-25 had more neurodevelopmental disorders but fewer psychotic disorders. Mood disorders were the most common diagnosis, followed by anxiety, substance use, and personality disorders. While most disorders were ranked more often as the most important presenting diagnosis, both anxiety and personality disorders were ranked as non-primary almost as often as primary.

Table 20. interRAI scale categories among ED patients aged 18-25 (N=781), 26-30 (N=327), and 31-35 (N=260) receiving care in Ontario (2005), Niagara (2013-2014), and Chatham-Kent and Bluewater Health (2018-2019).

Clinical scale		18-25 % (n)	26-30 % (n)	31-35 % (n)	Chi-square test
Depressive severity index (DSI)	*0*	19.9 (155)	21.4 (70)	22.3 (58)	$\chi2$ (6) = 6.9 p=.33
	1	29.2 (228)	25.7 (84)	23.8 (62)	
	2	26.5 (207)	25.4 (83)	23.5 (61)	
	3	24.4 (190)	27.5 (90)	30.4 (79)	
Cognitive performance scale (CPS)	*0*	88.7 (693)	86.8 (284)	83.8 (218)	$\chi2$ (4) = 6.5 p=.17
	1	9.7 (76)	10.1 (33)	13.8 (36)	
	2	1.5 (12)	3.1 (10)	2.3 (6)	
Aggressive behaviour scale (ABS)	*0*	84.1 (657)	86.2 (282)	78.1 (203)	$\chi2$ (4) = 19.3 p=.0007
	1	8.2 (64)	7.3 (24)	16.5 (43)	
	2	7.7 (60)	6.4 (21)	5.4 (14)	
Psychotic symptoms scale (PSS)	*0*	79.0 (617)	74.3 (243)	69.6 (181)	$\chi2$ (6) = 13.1 p=.04
	1	10.2 (80)	11.9 (39)	14.2 (37)	
	2	5.9 (46)	9.5 (31)	10.4 (27)	
	3	4.9 (38)	4.3 (14)	5.8 (15)	
Social withdrawal scale (SWS)	*0*	23.3 (182)	24.2 (79)	26.1 (68)	$\chi2$ (4) = 1.0 p=.91
	1-2	31.0 (242)	30.0 (98)	30.4 (79)	
	3-6	45.7 (357)	45.9 (150)	43.5 (113)	
Severity of self-harm (SoS)	*0*	29.1 (226)	38.1 (124)	39.3 (101)	$\chi2$ (4) = 13.7 p=.008
	1-3	46.6 (362)	40.9 (133)	39.7 (102)	
	4-6	24.2 (188)	20.9 (68)	21.0 (54)	
Risk of harm to others (RHO)	*0*	62.1 (485)	59.0 (193)	48.8 (127)	$\chi2$ (4) = 14.6 p=.006
	1-3	25.6 (200)	26.9 (88)	33.1 (86)	
	4-6	12.3 (96)	14.1 (46)	18.1 (47)	
Self-care index (SCI)	*0*	48.1 (376)	43.1 (141)	38.1 (99)	$\chi2$ (4) = 11.5 p=.02
	1-3	47.8 (373)	50.1 (164)	55.0 (143)	
	4-6	4.1 (32)	6.7 (22)	6.9 (18)	

Note. Percentages are column percentages (e.g., % of those aged 18-25 with the independent variable).

Positive symptoms of psychosis increased slightly with age. The 18-25 age group were at slightly higher risk of self-harm than older age groups, but lower in risk of self-care or harm to others. Depression and social withdrawal were the most common psychiatric needs. Regarding the DSI, only one-fifth of the sample had zero symptoms and around one-quarter scored in the most severe category. Likewise, 45% of the sample were in the moderate-to-severe range of social withdrawal symptoms. Risk of self-harm was notably high across all age groups; between 40-46% were at mild-to-moderate risk, while 21-24% were at moderate-to-severe risk.

2.3.4 Differences across settings

The following section describes the differences in sample characteristics observed across care settings for all age groups combined. Table 21, below, displays the average frequencies for each characteristic, as well as the results of a chi-square test.

Table 21. Average frequencies of select variables among individuals aged 18-35 compared across the inpatient psychiatric (RAI-MH), community mental health (CMH), and ED (ESP) service setting datasets (N=89,678).

Variable		RAI-MH	CMH	ESP	Chi-square test
Has a confidant	*Yes*	85.5 (73,357)	62.1 (1,573)	n/a	χ2 (1) = 1,064.7 p<.0001
Victim of emotional abuse	*Never*	72.2 (61,932)	45.8 (1,167)	n/a	χ2 (1) = 846.3 p<.0001
Cocaine use	*Last month*	11.5 (9,828)	5.2 (132)	9.4 (128)	χ2 (2) = 102.7 p<.0001
Cannabis use	*Last month*	37.2 (31,917)	39.6 (1,008)	42.3 (579)	χ2 (2) = 20.4 p<.0001
Neurodevelopmental disorder	*Primary*	1.3 (1,146)	3.9 (99)	5.6 (77)	χ2 (4) = 351.1 p<.0001
	Non-primary	2.1 (1,785)	4.4 (112)	3.3 (45)	
Substance use disorder	*Primary*	17.2 (14,709)	2.4 (62)	12.4 (170)	χ2 (4) = 773.4 p<.0001
	Non-primary	15.4 (13,188)	7.6 (193)	4.2 (58)	
Schizophrenia or other psychotic disorder	*Primary*	27.2 (23,330)	16.9 (430)	8.8 (121)	χ2 (4) = 440.1 p<.0001
	Non-primary	3.2 (2,736)	1.7 (44)	0.6 (8)	
Anxiety disorder	*Primary*	4.0 (3,432)	9.5 (242)	12.5 (171)	χ2 (4) = 740.2 p<.0001
	Non-primary	10.7 (9,209)	21.5 (548)	9.9 (135)	
Personality disorder	*Primary*	2.5 (2,126)	4.9 (125)	9.9 (136)	χ2 (4) = 352.3 p<.0001
	Non-primary	7.6 (6,506)	5.8 (147)	5.8 (80)	
Number of psychiatric diagnoses	*0*	0.0 (41)	37.1 (494)	36.6 (494)	χ2 (4) = 31,367.9 p<.0001
	1	56.0 (48,020)	24.7 (604)	26.7 (360)	
	2+	44.0 (37,701)	38.2 (936)	36.6 (494)	
Depressive Severity Index	*0*	24.3 (20,820)	15.6 (393)	20.7 (283)	χ2 (6) = 1,463.7 p<.0001
	1-3	32.3 (27,674)	16.7 (423)	27.4 (374)	
	4-7	26.4 (22,661)	22.1 (558)	25.7 (351)	
	8-15	17.0 (14,607)	45.6 (1,152)	26.3 (359)	
Positive Symptoms Scale	*0*	56.5 (48,46)	71.8 (1,795)	76.1 (1,041)	χ2 (6) = 656.1

Variable		RAI-MH	CMH	ESP	Chi-square test
	1-2	10.6 (9,128)	13.1 (329)	11.4 (156)	p<.0001
	3-5	15.4 (13,222)	10.9 (272)	7.6 (104)	
	6-12	17.4 (14,952)	4.2 (105)	4.9 (67)	
Social Withdrawal Scale	*0*	23.9 (20,505)	11.4 (282)	24.0 (329)	χ2 (4) = 704.4 p<.0001
	1-2	31.9 (27,395)	17.5 (431)	30.6 (419)	
	3-6	44.1 (37,862)	71.1 (1,752)	45.3 (620)	
Severity of Self-Harm	*0*	21.9 (18,771)	41.1 (1,022)	33.2 (451)	χ2 (4) = 1,068.3 p<.0001
	1-3	32.7 (28,038)	39.7 (987)	44.0 (597)	
	4-6	45.4 (38,953)	19.2 (477)	22.8 (310)	
Risk of Harm to Others	*0*	29.2 (25,026)	49.4 (1,242)	58.8 (805)	χ2 (4) = 1,018.1 p<.0001
	1-3	49.0 (42,056)	34.3 (861)	27.3 (374)	
	4-6	21.8 (18,680)	16.3 (409)	13.8 (189)	
Self-Care Index	*0*	34.0 (29,148)	30.0 (733)	45.0 (616)	χ2 (4) = 431.7 p<.0001
	1-3	47.4 (40,626)	61.7 (1,508)	49.7 (680)	
	4-6	18.6 (15,988)	8.3 (202)	5.3 (72)	

Note. The 'has a confidant' and 'victim of emotional abuse' variables are not included in the ESP assessment, and so could not be compared in this dataset.

In Table 21, clinical characteristics with significantly different patterns across care settings are displayed. In the community mental health dataset, the following variables were less frequent than in the inpatient sample: having a confidant, never experiencing emotional abuse, cocaine use, substance use disorders, schizophrenia or other psychotic disorders, diagnosis of one or more psychiatric disorders, positive symptoms of psychosis, severe risk of self-harm, and severe risk of harm to others. Conversely, those in the community mental health dataset had more neurodevelopmental disorders, anxiety disorders, personality disorders, depressive symptoms, and symptoms of social withdrawal. The ED dataset had the greatest proportion of primary neurodevelopmental disorders, as well as primary anxiety and personality disorders, which were more often non-primary diagnoses in the inpatient and community settings. Cannabis use was more recently used among those in the ED as well, though fewer substance use disorders were seen than in inpatient settings. Finally, the lowest prevalence of schizophrenia and other psychotic disorders was observed in the ED.

There were few significant differences in mental health trends across settings that were related to age. Cannabis use in the last month was significantly different among only the 31-35 age group, with fewer of those in inpatient psychiatry recently consuming cannabis than in community and ED settings ($\chi 2$ (2) = 25.56, $p<.0001$). Non-primary diagnoses of substance use were higher among 18- to 25-year-olds than older age groups in inpatient and ED settings, with no age differences in community mental health ($\chi 2$ (4) = 27.47, $p<.0001$). The same trend was found for primary diagnoses of schizophrenia and other psychotic disorders ($\chi 2$ (4) = 71.21, $p<.0001$). Otherwise, no other age-related differences across care settings were observed.

2.4 Discussion

2.4.1 Summary and implications of results

To fulfill gaps in knowledge surrounding clinical characteristics and service use patterns of EA receiving treatment in psychiatric settings (MHCC, 2015; MHCC, 2016), data from psychiatric hospitals and units, EDs, and community mental health agencies across Canada were collected and analyzed using descriptive statistical procedures. Additionally, age groups corresponding to different stages of EA and young adulthood were compared to determine if there were age-related differences in mental health needs. The results of this study indicated that because inpatient psychiatric and community mental health care settings are structured to serve specific types of needs, this created distinctive samples with unique characteristics. While each setting differed from each other in terms of clinical characteristics, those distinctions did not vary much by age with some notable exceptions, such as substance use and risk of self-harm. When comparing the results of this study with research on general populations, it becomes apparent that individuals with primary anxiety disorders are not engaging in the mental health care system beyond the ED, pointing to gaps in continuity of care for this population. Using clinical interRAI assessment data, this chapter illustrates how the provincial mental health system can use a measurement-based care model (Aboraya et al., 2018; Connors et al., 2021; Kilbourne et al., 2018; Scott & Lewis, 2015) to identify gaps in coordination of care between service settings and promote better mental health treatment for EA.

Regarding age differences, clinical characteristics were generally similar across age groups, with some notable exceptions that need to be accounted for in research and service planning. For example, the types of substances that are used by different age groups, as well as the resulting effects on diagnosis, require that age be considered as an important factor. Recent cannabis use was greatest among the 18-25 age group, with just over 40% consuming cannabis within the previous month across all care settings. As a result, more 18- to 25-year-olds triggered the ‘current substance use’ CAP, even though they consumed other types of substances less recently than older age groups, such as cocaine and opiates. These trends may explain why 18- to 25-year-olds had fewer primary diagnoses of substance use disorders but more non-primary diagnoses in psychiatric hospital and ED settings, when it was expected that they would have more overall. It could be that primary substance use disorder diagnoses are more strongly associated with illicit substances such as cocaine and opiates, whereas cannabis is more related to a non-primary diagnosis. In addition to substance use, there were some other psychological diagnoses that varied across age groups. For example, a greater proportion of neurodevelopmental disorders was observed among the 18-25 age group in all settings, consistent with research conducted in post-secondary settings that reported ADHD as a prominent diagnosis among students (Auerbach et al., 2019; Healthy Minds Network, 2018). Similarly, consistent with research on the developmental onset for eating disorders (APA, 2013) and personality disorders (APA, 2013; Huang et al., 2009), a higher proportion of these disorders were present in the 18-25 age group. In contrast, there were fewer diagnoses of schizophrenia and other psychotic disorders among those aged 18-25 in community and ED settings. This result may be due to in part to later onset of psychotic disorders, which usually develop between the late teens and mid-30s (APA, 2013), but could also represent a delay between developing the disorder and accessing care in the community. In terms of the risk scale scores, 18- to 25-year-olds had a higher risk of self-harm in inpatient and ED settings, even though mood disorders and depressive symptoms were invariant across age groups, though this is congruent with prior research. For instance, a longitudinal study found that while the incidence of MDD was steady across adolescence, EA, and adulthood, actual suicide attempts declined with age (Rohde et al., 2013). These patterns suggest that a greater emphasis on suicide prevention resources is needed for adolescents and young EA, as well as for substance use, neurodevelopmental, personality, and eating disorders.

Altogether, because there were some differences in clinical characteristics observed across age groups, separating 18- to 25-year-olds from older age groups may be warranted when it comes to research and service planning for these specific conditions. However, clinical characteristics are not the only source of consideration for analysis and care planning – sociodemographic characteristics and service use patterns also demonstrated meaningful variations by age. In each care setting, EA were characterized by unique sociodemographic indicators that may still be relevant for treatment, such as living with others, 'single' marital status, post-secondary enrolment, and non-full-time employment. Beginning around 18, these sociodemographic characteristics often represent major changes in the person's life that can act as sources of elevated psychological distress (Arnett, 2000; Arnett, 2007; et al., 2014; Baggio et al., 2017; Drapeau et al., 2014). At the same time, sociodemographic factors may also provide some benefits for maintaining psychological well-being outside of treatment, such as housing and financial resources, as well as social support from friends and family (O'Connor et al., 2011). For EA who are attending post-secondary school, there may also be on-campus mental health resources that are available for providing follow-up care in the community (CCMH, 2018). Another age-related distinction appeared when examining service use history among EA. In all three care settings examined, individuals first accessed these systems between the ages of 15-24, with many individuals receiving care in more than one setting at some point in their lives, reinforcing that EA is a critical developmental period for introducing consistent and coordinated care. This is especially relevant for EA engaging in mental health treatment before the age of 18 in Ontario, as the transition between the youth and adult mental health systems has been described as a major cause of disruption to ongoing treatment (MHCC, 2015). Overall, sociodemographic factors and service use patterns are an important element of treatment planning, and so along with clinical needs, these variables must be included in measurement-based care strategies for research supporting mental health care of EA.

While clinical characteristics did not vary greatly by age, there were several differences observed across care settings. For example, the psychiatric inpatient sample demonstrated the highest prevalence of psychotic disorders and symptoms, substance use, psychiatric disorder comorbidity, risk of self-harm, and risk of harm to others, corresponding to greater acuity of illness and danger of harm. Given that psychiatric hospitals prioritize admissions involving risk of danger to self and others (MHA, 1990), and that higher hospital admission rates for substance use and schizophrenia disorders have previously been reported (Beckman et al., 2016; CIHI, 2020; Watanabe-Galloway & Zhang, 2007), these results were expected. In contrast, community mental health programs are designed to help individuals who are not in immediate crisis, but who require help managing ongoing mental health needs (CIHI, 2017). Accordingly, risk of harm to self and others was lower in the community mental health sample, though more individuals had mild-to-moderate risk of being unable to care for themselves. There was also a higher proportion of non-primary anxiety disorders, as well as symptoms of severe depression and social withdrawal, indicating serious mental illness. Substance use disorders were less prominent than anticipated, which may be due to the types of community agencies included in the CMH dataset, as well as lower treatment-seeking for substance use in general (Blanco et al., 2008; Catchpole &

Brownlie, 2016; SAMHSA, 2012). Compared to the inpatient dataset, the community mental health sample was characterized by severity of illness and degree of functional impairment rather than by psychiatric diagnoses. While there were unique clinical distinctions between psychiatric hospitals and community mental health agencies, service use patterns revealed that several EA received care in both settings, meaning that they are not completely separate populations. Investigating predictors of service use in both types of settings among EA, as well as time intervals between community mental health treatment and psychiatric hospitalizations, would help to better establish pathways for coordinated care.

Since the ED is the most accessible of the three care settings that were examined (CIHI, 2019b; CMHA, 2008), the mental health needs present in the general population should be stronger drivers of service use in this setting. The results of this study were consistent with this expectation, as clinical needs more closely reflected the trends found in general and post-secondary populations. For instance, compared to inpatient and community settings, the ED had the greatest proportion of primary anxiety disorders, as well as personality and neurodevelopmental disorders. Regarding the number of psychiatric disorders present for each person, an interesting result in the community and ED datasets was that roughly one-third of the sample had no diagnosis. It may be that at the time of the admission assessment, insufficient time had passed to be able to diagnose a disorder, that the resources needed to provide a diagnosis were not available, or that no disorder was truly applicable. Regardless, this result provides further evidence that psychiatric diagnoses alone are insufficient and that assessing symptoms of mental illness is needed to gain a better understanding of clinical needs. Assessing symptoms may also provide additional information when investigating gaps in continuity of care between service settings, which is especially relevant for those disorders that are more common in the ED than other psychiatric service settings.

Disparities between mental health trends observed in general populations versus those in health care settings is most evident when it comes to primary anxiety disorders. Worldwide, depressive and anxiety disorders are the two most prevalent psychiatric diagnoses in the general population (Kessler et al., 2007). Anxiety disorders and symptoms also tend to be the most prominent concern in post-secondary populations (ACHA, 2019; Bayram & Bilgel, 2008; Healthy Minds Network, 2018). While mood disorders were the most common psychiatric disorder in all three care settings examined, anxiety disorders were usually fourth or fifth. Further, anxiety disorders were typically considered to be of secondary or tertiary importance, likely in relation to depressive disorders, which typically involve comorbid anxious symptoms (Ferdinand, de Nijs, van Lier, & Verhulst, 2005). Primary diagnoses of anxiety only exceeded non-primary diagnoses in the ED, consistent with other Canadian research demonstrating disproportionate representation of anxiety in the ED compared to inpatient and community settings (Gandhi et al., 2016; O'Donnell et al., 2017). In hospital settings, a possible explanation is that unlike mood disorders, the evidence surrounding the association between anxiety and self-harm is ambiguous (Cummings, Caporino, & Kendall, 2014; Kessler et al., 2005), which constitutes one of the primary admission criteria for inpatients (MHA, 1990). Within community settings, it is less clear why primary anxiety disorders are disproportionately lower than non-primary disorders. One reason may be that individuals with primary anxiety disorders do not wish to engage in intensive community treatment or prefer to be treated with medication and/or private counselling, which are not services that would be represented in the CMH dataset. Another explanation could be that even when anxiety is normally the primary concern, comorbid symptoms such as depression are targeted as the most important issue in health care settings. Finally, it may also be that there are inadequate resources available that target anxiety. To answer these questions, further exploration into anxiety and help-seeking among EA is required.

In summary, there were few clinical characteristics were associated with the 18-25 age group. However, there is still merit in focusing on mental health trends in the EA population, especially as they transition between the youth and adult mental health systems. It is possible that unique sociodemographic factors play a role in service use, which may be connected to findings of higher rates of disengagement from treatment among EA (Edlund et al., 2002; MHCC, 2015). When performing research with EA in psychiatric settings, age cut-offs for defining EA could extend up to 30, though some characteristics are more strongly associated with younger age groups, such as substance use and self-harm. Most of the clinical variation observed was related to differences across care settings, which typically corresponded with their structural design. For example, the inpatient sample had more indicators of acute crisis, whereas the community sample demonstrated greater severity of mental health symptoms. While many individuals received care in both hospital and community settings, due to the siloed design of mental health care systems (CIHI, 2020; MHCC, 2015), gaps in care still appeared for some clinical conditions such as anxiety. Finally, it is also worth conducting more in-depth research on the relationship between anxiety and mental health service use, as anxiety was under-represented in clinical care settings compared to general and post-secondary populations.

2.4.2 Strengths and limitations

One of the major strengths of this study is its capacity to inform existing literature and policy decision-making for mental health care of EA. In terms of research, while several studies have investigated mental health of EA in general and post-secondary settings, limited information could be located on those receiving care in psychiatric settings, especially in community mental health. By compiling information on clinical characteristics and service use of EA in psychiatric settings, this study contributes new and substantive knowledge to the field. This depth of information further serves to fill some of the gaps described in the MHCC's reports on building mental health care systems for EA (2015) and the mental health strategy: youth perspective (2016). Both documents emphasized using research to build an integrated care system that spans the continuum of services. In this study, three types of mental health care settings were examined simultaneously using a common health assessment instrument, permitting rare cross-sectoral comparisons across a variety of health domains. Targeting multiple systems at once advances the goal of integrating care systems, as it provides a better opportunity to identify trends in service use and potential gaps in coordination. Further, the extensive information included in the interRAI instruments allows for a more holistic understanding of EA and the factors that can influence their mental health, such as life circumstances, functional and cognitive capacity, social resources, and physical health, which is essential for practicing measurement-based care (Aboraya et al., 2018; Connors et al., 2021; Kilbourne et al., 2018; Scott & Lewis, 2015). Through the knowledge generated by this study, mental health care stakeholders are better positioned to effectively structure services that meet the needs of EA.

Evidence-based knowledge requires a foundation of reliable and valid data, which this study accomplished through rigorous study sampling and assessment tools. In particular, representative sampling of the inpatient psychiatric population, large sample sizes, and the use of standardized health care instruments all contributed to novel methodological advancements in mental health care research for EA. A unique advantage of this study is the inpatient sample, which includes every adult who has been admitted to a psychiatric unit or hospital for at least three days in Ontario since 2005. The advantage of a fully representative sample is that it avoids the effects of sampling biases and increases the sample size. Large, representative samples are especially important for disorders that are rare or infrequently admitted for care, such as eating disorders and primary anxiety disorders. Without a fully representative sample, it would be difficult to analyze disorders with small case sizes and draw accurate conclusions. Since this information could be used to influence policies for mental health care of EA, it is essential that interpretations of data are not misled by poor data quality. Data quality is further enhanced using the interRAI mental health tools, which are designed to be compatible with one another. By using common language and scoring methods, indicators are measured consistently across hospital, ED, and community settings, allowing for direct comparisons to be made. Otherwise, the use of independent instruments for each setting could lead to situations in which clinical characteristics are interpreted differently, leading to poorer coordination between systems and moving further away from the goal of integrated care. Therefore, interRAI assessment tools - in combination with the representative samples that use these tools - allows this study to provide a strong foundation for cross-sector research of mental health care for EA.

Whereas the inpatient sample was fully representative, a major disadvantage of the community mental health and ED datasets is that they relied on the use of convenience samples. Consequences of convenience samples include vulnerability to sampling biases and a reduced capacity to address research problems. For instance, data can be biased by the presence of confounding factors, which can be challenging to detect and control for. In the community mental health dataset, a confounding variable that could not be addressed was bias among services that elected to adopt the CMH. To protect client confidentiality, it is unknown which agencies provide data and the types of treatments that they offer (e.g., first episode psychosis, addictions rehabilitation, etc.,). As a result, it could be that some clinical needs were over- or under-represented, based on the comprehensiveness of the services contained in the CMH dataset. Another limitation of a convenience sample is that it is difficult to analyze rare conditions, such as eating disorders. Based on the literature review, it was expected that eating disorders would be associated with the 18-25 age group. While this was true in inpatient settings, there were too few eating disorder diagnoses in the community and ED datasets to be able to compare prevalence across age groups. In light of this limitation, eating disorders were not emphasized as much as substance use, personality, and neurodevelopmental disorders, but policy reports on mental health of EA should also be mindful that eating disorders are also likely to be heightened during the earlier stages of EA. Altogether, since the patterns of clinical characteristics and service use in the community and ED samples were mostly consistent with a priori hypotheses generated through the literature review, it is unlikely that sampling biases led to inaccurate results. Future work will be able to diminish some sampling concerns of the ED and community mental health settings, since the Chatham-Kent health region of Ontario adopted all interRAI mental health instruments and are contributing towards a growing number of assessments.

Finally, a disadvantage of the interRAI mental health assessments is the lack of a scale that measures symptoms of anxiety. Considering that symptoms of anxiety are the most prevalent issue among post-secondary students (ACHA, 2019; Bayram & Bilgel, 2008; Healthy Minds Network, 2018), and that anxiety is tied with mood disorders as the most common psychiatric diagnosis worldwide (Kessler et al., 2007), it is important that general mental health assessments are equipped with the capacity to assess this issue. Further, since there was a discrepancy in the proportion of primary to non-primary anxiety disorders in hospital and community mental health settings in this study, there is evidently a need to further investigate service patterns related to anxiety. However, diagnoses do not provide enough granularity to be able to detect complex interactions between anxiety and other clinical characteristics and service use. To address this problem, as with other mental health conditions, the interRAI instruments would benefit from the inclusion of an anxiety symptoms scale. Overall, the limitations of this study can be resolved by accumulating a greater number of ESP and CMH assessments, which the Chatham-Kent and Bluewater Health regions of Ontario are currently establishing. Once more data is available, studies can be designed that connect interRAI assessments together, strengthening the statistical power and external validity of analyses.

2.4.3 Future research

This study examined clinical characteristics and service use of EA in three health mental care settings, building a foundation for ongoing research into coordinated care for EA. After reviewing the strengths and limitations, two directions for future research were identified: 1) connect interRAI datasets representing various health systems together and, 2) develop an anxiety scale for the interRAI health assessment instruments. Since service use patterns revealed that many individuals received mental health treatment in both hospital and community settings, a natural direction for future research would be to link together the interRAI assessment datasets, permitting longitudinal analyses that span multiple care systems (including home care, long-term care, etc.,). This will not only allow for long-term analysis of individuals as they move between care systems, but also potentially throughout their life course, as more interRAI Child and Youth - Mental Health (ChYMH) assessments are completed in Ontario. The ability to track individuals as they transition between the youth and adult mental health systems will prove incredibly valuable to mental health research for EA, as the disruptions that occur during this process have been identified as a major cause of disengagement in mental health treatment (MHCC, 2015; MHCC, 2016; Moroz et al., 2020). Identifying patterns of disengagement from treatment would be especially beneficial for subgroups that receive disproportionately less community mental health care, such as those with primary anxiety disorders. Whereas connecting interRAI datasets is an intensive project that requires ongoing data collection and integration beyond the scope of this dissertation, the anxiety scale can be developed using existing data. Given the urgency of addressing anxiety in mental health care settings, the next chapter constructs an initial anxiety scale for the interRAI assessment tools, which will then be used in the fourth chapter to examine service use outcomes and clinical treatment patterns among EA.

2.4.4 Conclusions

Building mental health systems that effectively care for EA requires continual adaptation to emerging trends in clinical needs and service use patterns (MHCC, 2015; MHCC, 2016). Using a measurement-based care model (Aboraya et al., 2018; Scott & Lewis, 2015) and interRAI health assessment data, the results of this chapter revealed that there are unique sociodemographic and clinical characteristics associated with early EA in psychiatric settings, corresponding with the age range in which many individuals first engage with the mental health care system. However, most of the variation in clinical needs appeared across care settings, highlighting the impact of service design on service use. An imbalance between the prevalence of primary anxiety disorders in the ED and inpatient and community-based care settings was observed, indicating the need to address anxiety more thoroughly in health care contexts. By using clinical assessment data to review clinical and service use patterns among EA, this chapter demonstrates how measurement-based care can be applied to health system performance evaluation.

Chapter 3

3.1 Introduction

Anxiety is highly complex and heterogeneous, making it difficult to generalize across the population even though it is one of two most prevalent psychiatric diagnoses in the world (Kessler et al., 2007). Broadly speaking, anxiety disorders are characterized by fear and apprehension that are disproportionate to one's circumstances and which interfere with daily living (APA, 2013; WHO, 1992). While it may appear straightforward, relative to other diagnostic categories, there are numerous clinical presentations implicated in anxiety, involving a diverse range of symptoms and a variety of distinctive disorder subtypes (APA, 2013; WHO, 1992). Symptoms of anxiety can manifest in several different forms, such as cognitive, mood, behavioural, and somatic indicators (APA, 2013; Beck, Epstein, Brown, & Steer, 1988; Hamilton, 1959; Spitzer et al., 2006), as well as those that are specific to the person's culture (Reed et al., 2019). While each of these symptom expressions can be present in any given anxiety disorder, different diagnostic subtypes have their own set of defining features. In the DSM-5 and ICD-10, some of the diagnostic anxiety subtypes are phobias, social anxiety disorder, agoraphobia, generalized anxiety disorder (GAD), and panic disorder (APA, 2013; Kogan et al., 2016). Notably, although they were included in previous editions of both manuals, obsessive-compulsive disorder (OCD) and post-traumatic stress disorder (PTSD) are no longer classified as anxiety disorders (APA, 2013; Kogan et al., 2016; Reed et al., 2019). Broadly speaking, phobias represent an intense fear of exposure towards a specific locus, such as fear of leaving one's home in agoraphobia (APA, 2013; Kogan et al., 2016; WHO, 1992). Although social anxiety can be considered a form of phobia, it is categorized as a discrete subtype, with symptoms of fear and distress expressed for both social interactions and situations. Fear is also a feature of panic disorder, acting as a trigger for episodic panic attacks involving acute and simultaneous onset of multiple physical health symptoms, with persistent worrying about recurrence between attacks (APA, 2013; Kogan et al., 2016; WHO, 1992). In contrast to fear-based subtypes, GAD is marked primarily by symptoms of consistent, excessive, and non-localized symptoms of apprehension and worrying, affecting various life domains (APA, 2013; Kogan et al., 2016; WHO, 1992). Altogether, it is challenging to concisely summarize the range of symptoms that are representative of anxiety, though contending with its complexities is necessary when it comes to identification and treatment.

The range in which anxiety disorders can develop extends from childhood through to older adulthood, though average age-of-onset and prevalence varies by subtype. For instance, specific phobias tend to emerge during childhood but are a risk at any age, such as fear related to medical conditions/procedures in older adults (APA, 2013; WHO, 1992). Other disorders, such as panic disorder, agoraphobia, and GAD, have an age-of-onset that coincides with EA. A worldwide research project (Kessler et al., 2007) and a meta-analysis (de Lijster et al., 2017) also reported that most anxiety disorders develop between young- and mid-adulthood. In addition to affecting a wide variety of age groups, anxiety is also highly prevalent worldwide. Globally, the lifetime prevalence of anxiety disorders ranges between 5-31% (Kessler et al., 2007; Somers, Goldner, Waraich, & Hsu, 2006), while 12-month prevalence is estimated around 10% (Somers et al., 2006), making it the most common psychiatric diagnosis along with depressive disorders. Within anxiety disorders, phobias are the most common in the general population, affecting 6-9% of those in the US and Europe, while the estimates for panic disorders and GAD are around 2-3% (APA, 2013). One reason that point prevalence estimates for anxiety disorders are relatively high is because once diagnosed, the prognosis is often chronic and can persist for decades (Essau et al., 2018; Kessler et al., 2009). Panic disorder, agoraphobia, and GAD all demonstrate low rates of full remission over the life course, while social anxiety may take several years to dissipate (APA, 2013). A long-term follow-up of patients admitted to a neuropsychiatric institute in Spain revealed that symptoms of anxiety persisted until the age of 50 and for those diagnosed before the age of 25, the prognosis was especially poor (Rubio & López-Ibor, 2007). Further, anxiety disorders tend to be diagnosed more often in women than men (APA, 2013), suggesting the presence of gender- and sex-based effects on anxiety rates. Given that anxiety has a substantial impact on the population and does not typically subside naturally over time, mental health interventions are needed to reduce the figures.

As well as being highly prevalent in the general population, anxiety disorders are a common psychiatric disorder in the ED (Aratani & Addy, 2014; Brien et al., 2015; CIHI, 2019b; Gandhi et al., 2016; Juhás & Agyapong, 2016), a finding that was replicated in chapter two of this dissertation. The demand for mental health care related to anxiety in the ED is increasing over time (CIHI, 2020; Gandhi et al., 2016; Kalb et al., 2019), and is already outpacing current psychiatric emergency resources (Baia Medeiros et al., 2019), so it is imperative that EDs in Canada are provided with immediate support to meet this growing need. To help reduce the number of psychiatric ED visits, a hospital in Toronto recommended that individuals presenting with heavy substance use be redirected to specialized community settings (Baia Medeiros et al., 2019). A similar proposal could be made for individuals seeking care related to anxiety because, despite its prominence in the general population and ED, primary anxiety disorders are infrequently treated in inpatient and community care settings (O'Donnell et al., 2017; Roberge et al., 2011; Sunderland & Findlay, 2013). However, relying solely on a diagnosis when conducting clinical and policy research on anxiety is insufficient. A better alternative would be to use items contained in an existing assessment to create an anxiety scale. Scales provide more granular information than disorders on levels of severity, changes over time, responses to different treatment modalities, and interactions with other clinical conditions. Greater information on symptoms of anxiety could benefit the treatment process for patients and service providers, as well as help researchers and policy decision-makers identify gaps in care coordination for those with severe anxiety, but a valid and reliable scale needs to be available to facilitate informed care planning.

Currently, service providers working in psychiatric hospital units across Ontario must use the RAI-MH to inform clinical assessment, care planning, treatment, and accountability. Through this mandate, psychiatric hospitals are facilitated to practice measurement-based care, which emphasizes the use of valid and reliable health assessment tools to improve treatment process and outcomes in mental health systems (Aboraya et al., 2018; Connors et al., 2021; Kilbourne et al., 2018; Scott & Lewis, 2015). One example of how the RAI-MH promotes measurement-based care is through the availability of multiple quality indicators, representing various domains of mental health that can be tracked over time and compared across facilities (Perlman et al., 2013). Given that interRAI tools are frequently used in Canadian mental health care settings to enable measurement-based care, a built-in anxiety scale would address the needs of service providers treating a high volume of individuals with anxiety symptoms, without requiring the use of additional assessment tools. Presently, interRAI assessments contain a variety of psychiatric scales that are used as quality indicators, such as depression, positive symptoms of psychosis, and cognitive impairment (Hirdes et al., 2020; Perlman et al., 2013). However, a scale has yet to be designed for anxiety. The delay in creating an anxiety scale is due to the complexity inherent in anxiety disorders (APA, 2013; WHO, 1992), such as the heterogeneity of symptoms and diverse range of diagnostic subtypes. Nevertheless, it is possible to create a scale that can detect anxiety in a reliable and valid manner, as other general anxiety scales have been developed for use in psychiatric populations. These existing anxiety tools can be used to guide the creation of an anxiety scale for the interRAI suite of assessment instruments, by mapping items that already exist within the instrument and by proposing new items, if needed. Two of the most popular scales used in clinical practice and research will be described in the following section to assess standards for reliability and validity and to identify methodological limitations.

Where reliability covers the precision and stability of a tool, validity is a signal of how accurately an underlying construct is captured (Aday & Cornelius, 2006). In general, reliability is needed to ensure validity, as a large amount of random error means that it is unclear what the tool is measuring. However, even when a tool does reliably detect patterns, that does not necessarily mean it reflects the desired construct, so various validity tests are required to address this problem. These tests fall under two types of conditions: controlled study environments (internal) and real-world applications (external) (Aday & Cornelius, 2006). As it applies to anxiety scales, there are several sub-types of internal validity that have been commonly tested. One type is construct validity, which represents the degree to which the scale captures all elements of anxiety (Porter, 2017). Another is criterion validity, which can be separated into concurrent, predictive, and discriminant forms. An anxiety scale has concurrent validity when it is correlated with other measures of anxiety that are completed around the same time, such as other anxiety scales (Beck et al., 1988). Predictive validity operates in a similar manner, though the anxiety scale is used to predict other measures of anxiety that are completed in the future. In contrast, discriminant validity ensures that the anxiety scale is not capturing constructs other than anxiety, such as other psychiatric symptoms (Beck et al., 1988). Even when internal validity tests are promising, the tool may still fail to perform when it is used in actual practice, so it is also necessary to examine external validity. This can only be tested by comparing the tool across different populations, establishing its utility in multiple settings. If not, the tool requires adjustments that are appropriate to the context in which it is being used. For example, symptoms of anxiety can differ by culture and may require that a scale be re-structured (Reed et al., 2019). By reviewing each type of validity, the strengths and limitations of existing anxiety scales can be assessed and used to inform development of an interRAI scale.

3.1.1 Anxiety scales

3.1.1.1 Hamilton Anxiety Rating Scale (HARS) or (HAM-A)

One of the first tools for measuring clinical anxiety that is still used today is the Hamilton Anxiety Rating Scale (HARS or HAM-A) (Hamilton, 1959). The HARS is a clinician-administered scale containing 14 items and two subscales: ‘psychic anxiety’ and ‘somatic.’ Items belonging to each subscale are listed in Figure 3.

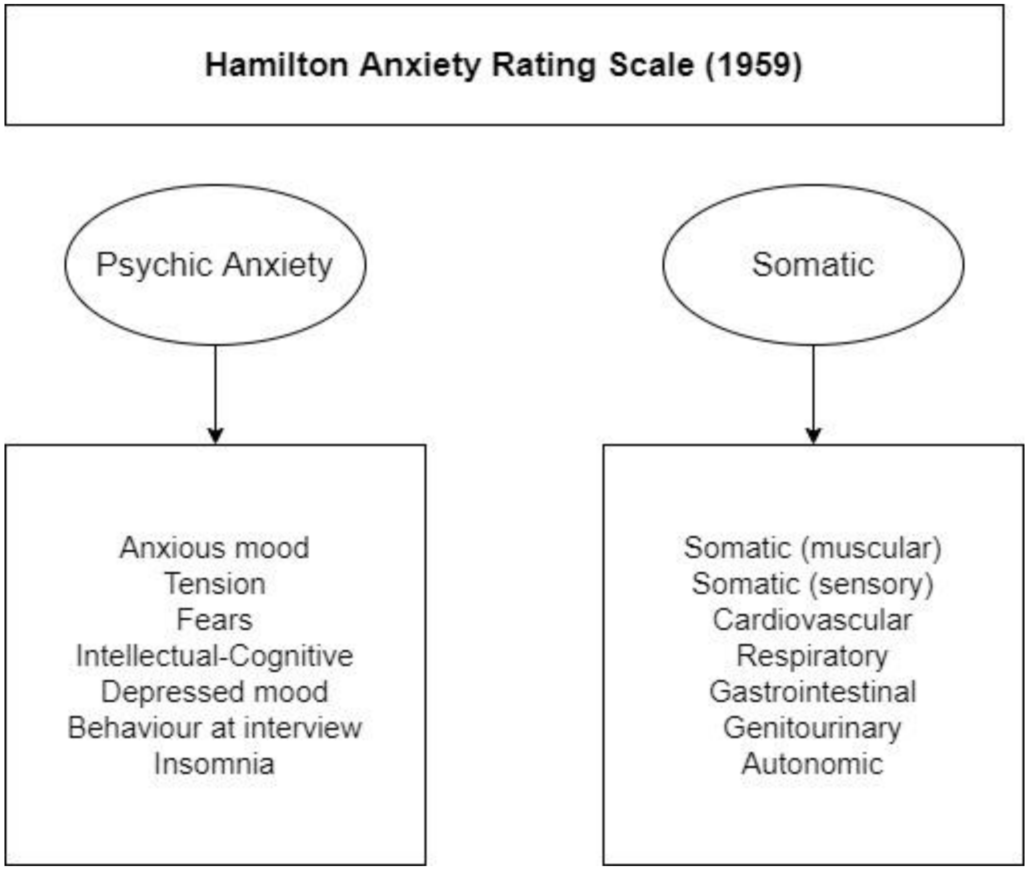

Figure 3. Depiction of the two-factor model of psychic anxiety and somatic symptoms of anxiety, adapted from the Hamilton Anxiety Rating Scale (HARS) (Hamilton, 1959).

3.1.1.1.1 Reliability

Beginning with reliability, inter-rater tests are frequently performed because the HARS is administered using rater observations. During initial development, the weighted mean correlation between two independent raters assessing patients with primary anxiety disorders was r=0.89 (Hamilton, 1959), concluding that inter-rater reliability was excellent. Significant inter-rater reliability for the global scale and the two subscales were achieved in a subsequent study of two clinical samples (Maier, Buller, Philipp, & Heuser, 1988). However, certain items produced low intraclass correlation coefficients (ICC) across raters, such as tension (.37), respiratory symptoms (.28), autonomic symptoms (.23), and behaviour-at-interview (.24). The absence of standards for administration, interviewing, and scoring may lead to inconsistencies in how items are interpreted, leading to lower reliability scores. For this reason, interview guides for the HARS have been developed to enhance reliability by clarifying interview procedures and scoring (Bruss, Gruenberg, Goldstein, & Barber, 1994; Shear et al., 2001).

Two interview guides were reviewed for the HARS: the HARS-Interview Guide (HARS-IG) (Bruss et al., 1994) and the Structured Interview Guide for the Hamilton Anxiety Scale (SIGH-A) (Shear et al., 2001). The first study included 30 psychiatric inpatients with various types of psychiatric disorders, assessed by two psychologists and three pre-doctoral psychologists (Bruss et al., 1994). Regarding inter-rater scores, the global mean ICC for the HARS-IG was .99, though behaviour-at-interview retained a low score (.32). The same metric was calculated for test-retest reliability of the HARS-IG, but because the original HARS was only used once at the beginning of the study, test-retest scores could not be computed for the regular version. Between day one and day two, the ICC was .79 for the global scale of the HARS-IG; behaviour-at-interview once again produced the lowest score (.31). Similar findings were reported for the SIGH-A, where paired raters assessed 32 videotaped interviews of psychiatric inpatients with anxiety disorders (Shear et al., 2001). The inter-rater ICC of the original HARS and the SIGH-A were .98 and .99, respectively, whereas behaviour-at-interview was once again the least reliable item in both versions (.76 and .81). ICCs for test-retest reliability, performed on day one and day two, was .86 for the original HARS and .89 for the SIGH-A (Shear et al., 2001). These results demonstrate that using interview guides, the HARS is a more reliable tool across raters and possibly across time, though the behaviour-at-interview item is consistently unstable.

Where interview guides have been created to improve inter-rater and test-retest reliability, revised factor structures serve a similar purpose for internal consistency. Internal consistency represents the degree of variance between the relationships of observed items and is calculated using the Cronbach's alpha statistic (Schmidt, 1996; Henson, 2019). Across three clinical studies, the Cronbach's alpha was above .70 (Beck & Steer, 1991; Porter et al., 2017; Riskind, Beck, Brown, & Steer, 1987), which is considered acceptable by conventional standards (Henson, 2019). However, in two of the studies (Porter et al., 2017; Riskind et al., 1987), the two subscales were revised to produce the Reconstructed Hamilton Scale for Anxiety (HARS-R-II), which led to greater alpha coefficients in both cases. Further, while internal consistency tests were good in university-based clinics, Cronbach's alpha scores were lower among those with a diagnosis of GAD (Shear et al., 2001). If the relationships between items are less reliable among samples with different types of anxiety disorders, it may be that the items are too specific to one subtype of anxiety, rather than general anxiety. Altogether, the reliability of the HARS is generally good when interview guides and revised scale structures are used, but there are still limitations in internal consistency that appear across different samples.

3.1.1.1.2 Validity

Given that the reliability of the HARS is generally acceptable, the next step is to verify its validity. Construct validity of the HARS is mixed due to possible model misspecification and items that are either inappropriate or potentially absent. To determine if the scale structure fits the observed data, structural equation modeling (SEM) techniques such as factor analysis, latent structure analysis, and principal components analysis (PCA) are commonly used. The original HARS was derived using PCA, which supported either a model with a general and two sub-factors, or an orthogonal two-factor model (Hamilton, 1959). A general anxiety factor was extracted that explained 27% of the variance, while 18% of the variance was attributed to the two sub-factors, consisting of somatic and psychic anxiety symptoms. Since both solutions resulted in orthogonal factors, Hamilton (1959) suggested either model could be used. To help clarify the structure, PCA was performed on the HARS among 367 outpatients with DSM-III primary disorders of anxiety (Beck & Steer, 1991). Two components were extracted from the scree test, corresponding with the somatic and psychic anxiety factors proposed in the two-factor orthogonal model. The only item that loaded onto a different component than in the original HARS model was insomnia, which belonged to the somatic factor instead of the psychic one. The somatic component explained a greater portion of variance than did psychic anxiety, meaning that somatic symptoms shared more in common than psychic symptoms. Altogether, both components explained 43% of the total variance in the dataset, providing support for a two-factor model of somatic and psychic symptoms. In contrast to the previous two studies, a latent structure analysis of the HARS among in- and out-patients diagnosed with panic disorders demonstrated insufficient model fit ($p<0.01$), though the two subscales were adequate when examined separately ($p>0.01$) (Maier et al., 1988). Varying statistical techniques, as well as samples, could be one reason that construct validity of the HARS is inconsistent across studies.

In addition to testing the overall model, factor or principal component loadings of individual items can also be used to assess construct validity. Factor or principal component loadings describe how much of the item variance can be attributed to a common factor and are analogous to the correlation coefficient when standardized. Low factor loadings signal that an item is not well explained by the latent factor(s), which may mean that they should be removed from the scale. Items that produced the lowest principal component loadings among psychiatric outpatients with primary anxiety disorders were fears (.31), insomnia (.41), genitourinary (.42), and behavior-at-interview (.45) (Beck & Steer, 1991). In another study, depressed mood, gastrointestinal symptoms, and behaviour-at-interview were the least homogenous items in a latent structure analysis ($p < 0.05$) (Maier et al., 1988). In both studies, behaviour-at-interview had one of the lowest factor loadings and as such, is not a good candidate for inclusion in a new anxiety scale. Another problem that can arise when creating a scale is the absence of important items. Since there is no direct test for revealing which items need to be added in, addressing this issue relies on ongoing literature reviews and research. Regarding the HARS, it has been argued that it does not adequately capture cognitive processes believed to be essential to anxiety, such as worrying and apprehension (Porter et al., 2017; WHO, 1992), which are in turn related to overall psychological well-being (Stones & Kozma, 1985). While the construct validity of the two-factor model has generally received support, the item composition of the HARS has been debated, informing the variable selection process for the development of the interRAI anxiety scale.

Even if a scale has construct validity, criterion validity still needs to be tested to ensure that the scale is both consistent with other measures of anxiety and distinct from measures of other psychological indicators. If a scale accurately represents anxiety, it should have concurrent validity by sharing a relationship with other indicators of anxiety. However, an important consideration is that correlations between instruments are calculated using both of their unique data distributions. Since different shapes of data cannot be perfectly correlated, the interval for a possible correlation between instruments is less than -1 to 1 (Ratner, 2009). As a result, the range of correlation coefficients reported in psychological assessment studies is typically between .02 to .78 (Hemphill, 2003). Concurrent validity of the HARS has been tested using different methods, one of which is through correlation analysis with other anxiety scales. For example, in a psychiatric outpatient sample of individuals diagnosed with panic disorders, as well as one with depressive disorders, there was a significant relationship between the HARS and the Covi Anxiety Scale (r_s = 0.63). Another example is a strong correlation between the HARS and the DSM-5 anxious distress specifier for mood disorders (r=0.60) (Zimmerman et al., 2017). While it is standard practice to investigate the correlation between two scales, examining relationships with different types of indicators can strengthen the case for concurrent validity even further. A relevant example with the HARS is its association with neurological structures, as demonstrated in a neuroimaging study using a general community sample (Donzuso, Cerasa, Gioia, Caracciolo, & Quattrone, 2014). Higher scores on the HARS were associated with greater cortical thickness of the anterior cingulate cortex, which is a brain region linked to emotional processing capabilities. By establishing that the HARS is related to neurological indicators of anxiety, there is greater evidence supporting its capacity to measure anxiety.

While associations with other anxiety scales and brain regions have yielded positive findings, the HARS did not perform as well when diagnoses were used in a test of concurrent validity. In a study of patients with either pure panic disorder or MDD, the association between the HARS, HARS-R-II, and psychiatric diagnosis was explored (Porter et al., 2017). The HARS-R-II showed a positive correlation with panic disorders, but the effect size of this association was modest (r_{pb}=-.19, p<.001). Compared to the Reconstructed Hamilton Depression Rating Scale (HRSD-R-II), which was strongly correlated with MDD (r_{pb}=.83, p<.001), the relationship between the HRSD-R-II and panic disorders is underwhelming. However, a larger problem was discovered for the original HARS. Unlike the HARS-R-II, outpatients with MDD had higher scores on the HARS than those with panic disorder, contrary to the study hypothesis and the intended function of an anxiety scale. Further, while the HARS-R-II was a significant predictor of panic disorder diagnoses (AUC=.61, p=.001), the original HARS performed worse than chance (AUC=.39, p<.001), indicating a unique problem with the HARS regarding its diagnostic criterion validity.

A possible explanation for the discrepancy in diagnostic criterion validity between the HARS and HRSD-R-II is that the HARS contains items directly relevant to depression, which weakens the power of the scale by reducing discriminant validity. In general, due to the high degree of comorbidity between anxiety and depression (APA, 2013; WHO, 1992), it is expected that an anxiety scale will be positively correlated with measures of depression. However, when an anxiety scale contains items that explicitly describe depression, it becomes difficult to differentiate between the two psychiatric diagnoses. In this regard, the HARS has been criticized for insufficiently discriminating depression from anxiety (Maier et al., 1988; Porter et al., 2017; Riskind et al., 1987). This problem can be isolated to select items contained in the HARS: the "depressed mood" variable and certain somatic symptoms. Obviously, 'depressed mood' is an indicator of depression, rather than anxiety. In terms of somatic items, discriminant ambiguity may stem from the interpretation of broader physical health conditions. For example, while "muscular symptoms" can include backaches - which are more commonly associated with anxiety - heaviness in the body can also be interpreted as a muscular symptom and is related more to depression (Riskind et al., 1987). Therefore, these items do not belong in a scale intended for measuring anxiety.

A similar problem with discriminant validity arises in the HRSD, which contains items that are specific to anxiety rather than depression, such as psychic anxiety, somatic anxiety, obsessive-compulsive, and agitation symptoms (Riskind et al., 1987). Using factor analysis, items from the HARS and the HRSD were restructured to produce scales that were specific to either anxiety or depression, respectively. These new structures are referred to as the

Reconstructed Hamilton Scale for anxiety (HARS-R-II) and depression (HRSD-II-R), both of which demonstrated improvements in reliability and validity estimates (Riskind et al., 1987). The HARS-R-II was replicated successfully in a study of 50 older adults with GAD and 93 community controls (Beck, Stanley, & Zebb, 1999), as well as another study of 215 patients with MDD and 149 patients with panic disorder (Porter et al., 2017). However, as described earlier in the same study, while the HRSD and HRSD-R-II were associated with MDD, the HARS-R-II had only a small correlation with panic disorder (Porter et al., 2017). These results suggest once again that even when discriminant validity is addressed, construct validity remains an issue. Regardless, the reconstructed scales address discriminant validity by refining the items to more purely address either anxiety or depression.

3.1.1.1.3 Summary

Through an in-depth examination of the reliability and validity of the HARS, several limitations were revealed that are helpful for constructing a new anxiety scale in the interRAI assessments. One area of concern is related to content validity, which is one of the weaker aspects of the HARS (Beck & Steer, 1991; Maier et al., 1988; Shear et al., 2001). The primary issues noted were the absence of items representing cognitive symptoms of anxiety (Porter et al., 2017), as well as certain variables that achieved lower reliability and validity estimates, such as behaviour-at-interview (Beck & Steer, 1991; Maier et al., 1988; Shear et al., 2001). While concurrent validity of the HARS has been supported through comparisons with other anxiety-related measures (Maier et al., 1988; Porter et al., 2017; Vaccarino et al., 2008; Zimmerman et al., 2017), another area of concern is the insufficient discriminant validity between anxiety and depression (Beck & Steer, 1991; Maier et al., 1988; Porter et al., 2017; Riskind et al., 1987). The reason for poor discriminant validity is the inclusion of items pertaining to depression, so they must be avoided in an anxiety scale to improve accuracy. Finally, while test-retest reliability scores were decent in studies using interview guides (Bruss et al., 1994; Shear et al., 2001), broader conclusions about this form of reliability cannot be made. Only two studies evaluated test-retest scores, and, in both cases, a two-day period was used. Despite these limitations, there are also benefits to using the HARS. For instance, it has demonstrated excellent inter-rater reliability (Bruss et al., 1994; Shear et al., 2001), decent internal consistency (Beck & Steer, 1991; Porter et al., 2017; Riskind et al., 1987), and concurrent validity (Donzuso et al., 2014; Maier et al., 1988; Zimmerman et al., 2017). Therefore, the HARS is a valuable tool to consider when creating a new anxiety scale.

3.1.1.2 Beck Anxiety Inventory (BAI)

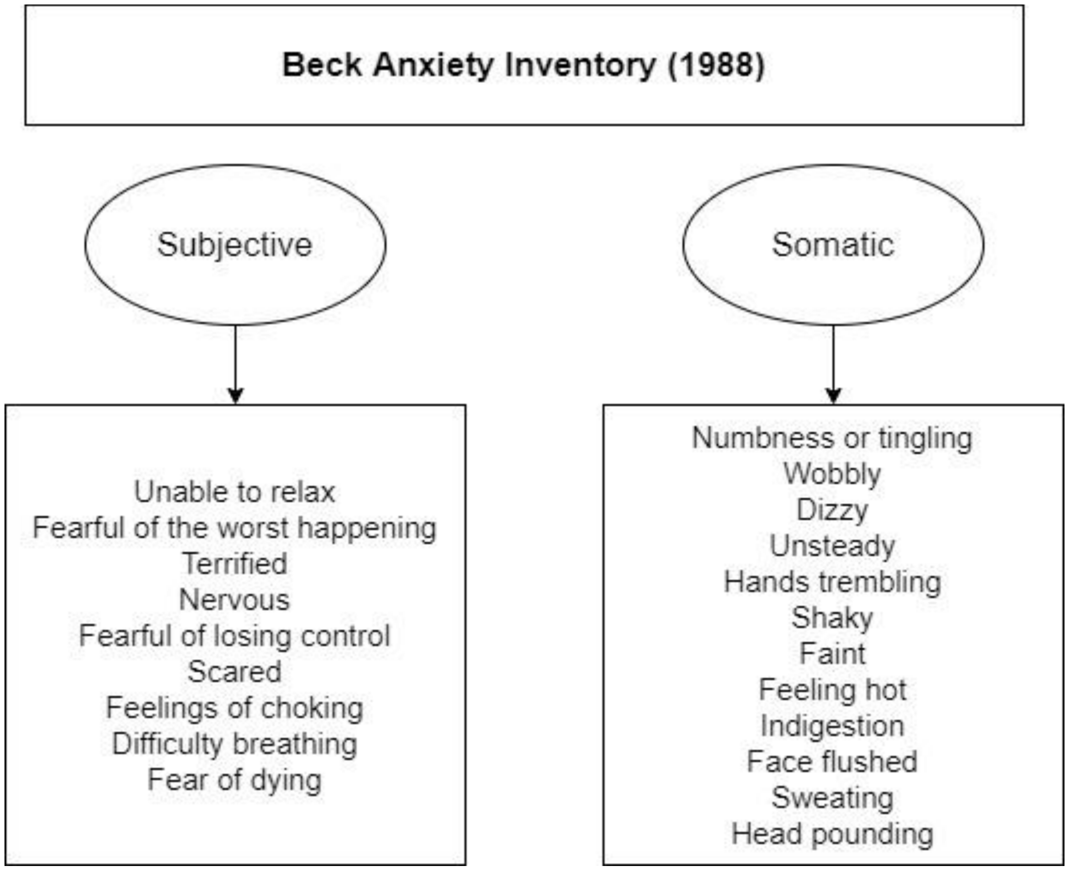

Figure 4. Depiction of the two-factor model of subjective and somatic symptoms of anxiety, adapted from the Beck Anxiety Inventory (Beck et al., 1988).

3.1.1.2.1 Reliability

The Beck Anxiety Inventory (BAI) is a self-report instrument containing 21 questions on symptoms of anxiety (Beck, Epstein, Brown, & Steer, 1988), and is the most used general anxiety scale in clinical practice (Rush Jr., First, & Blacker, 2009). Since items are self-reported, unlike the HARS, inter-rater reliability is not a property that requires testing. Instead, greater emphasis is placed on internal consistency and test-retest reliability. During development of the BAI, internal consistency of the two-factor model was evaluated using a sample of 160 psychiatric outpatients (Beck et al., 1988). The final model yielded an excellent Cronbach's alpha (α=.92), while the range for item-total correlations of individual items was between .30 and .71. The item with the lowest correlation was numbness or tingling (*r*=.30), followed by indigestion or discomfort in abdomen (*r*=.42). The Cronbach's alpha was also above .90 in two other studies involving outpatients with a primary anxiety diagnosis (Fydrich, Dowdall, & Chambless, 1992; Ulusoy; Sahin, & Erkmen, 1998). In one of the studies, psychometric properties of the Turkish version of the BAI were examined (Ulusoy et al., 1998). The range of item-total correlations was between .46 and .72, similar to those reported in the pilot study (Beck et al., 1988), supporting internal consistency of the BAI in different settings. Since the BAI is a widely used tool in research, a systematic review of its reliability estimates was able to be performed using data from 47 studies (de Ayala, Vonderharr-Carlson, & Kim, 2005). The average value for Cronbach's alpha was .91, ranging from .83 to .95. Further, scores were consistent across outpatient, inpatient, and college populations, supporting the BAI as an internally consistent measure. However, while estimates of internal consistency are excellent, some caution is still warranted. Research has demonstrated that scales containing 18 items can produce acceptable alpha coefficients in one- and two-dimensional models, even when the average inter-item correlation is only *r*=.30 (Cortina, 1993). Since the BAI contains 21 items, there is a possibility the Cronbach's alpha scores are inflated (Cortina, 1993; Henson, 2019). Further, Cronbach's alpha is not an appropriate test of reliability when scales contain more than one factor (Cortina, 1993; Henson, 2019). Finally, certain items in the BAI share a strong descriptive similarity, such as 'scared' and 'terrified,' which can also cause the alpha coefficient to increase artificially. As a result, other reliability tests are needed to better establish the reliability of the BAI.

Test-retest is another form of reliability that can determine the accuracy of the BAI. In a subsample of 83 patients in the original study, the correlation between ratings at intake and after one week was r=.75 (Beck et al., 1988). The correlation coefficient was lower in a subsequent study of outpatients diagnosed with anxiety (r=.67), though the reassessment timeframe was longer at 11 days (Fydrich et al., 1992). Differences in the time intervals used across studies was posited as the reason for substantial variation in test-retest scores in the systematic review of the BAI, with correlation coefficients ranging from r=.35 to r=.83, and a mean of r=.66 (de Ayala et al., 2005). On average, the number of days between administration of the BAI across studies was 32, though it extended anywhere from 7 to 112 days, making equitable comparisons difficult. Additionally, only four studies examined test-retest reliability using psychiatric populations, for which the BAI was originally intended (Beck et al., 1988). Restricting to the four psychiatric population studies, the average correlation for test-retest increased to .71 (de Ayala et al., 2005). Overall, compared to internal consistency, there was a greater degree of variation in test-retest reliability estimates, which can be attributed to the difference in reassessment timeframes. While this makes it difficult to generalize the test-retest reliability of the BAI across studies, estimates retrieved in psychiatric populations tend to fall within a "good" range (Cicchetti, 1994).

3.1.1.2.2 Validity

While reliability of the BAI is strong, evaluation of its construct validity is complicated, as SEM analyses have supported a different number of model factors across studies. Originally, a two-factor model was proposed for the BAI (Beck et al., 1988), which is the model most often used in research (de Ayala et al., 2005), and the structure that has garnered the most research support (Bardhoshi, Duncan, & Erford, 2016). However, other studies have favoured models with three-, four-, and even five-factors (Osman, Kopper, Barrios, Osman, & Wade, 1997). In the BAI pilot study, two factors emerged from PCA: 1) subjective anxiety/panic and 2) somatic (Beck et al., 1988). Factor loadings for items in both factors ranged from .24 to .87, with the lowest scores belonging to numbness/tingling (.24), indigestion (.29), and feelings of choking (.32), making these the weakest items in the scale. The two subscales were distinct, with all cross-loadings below .30 and an inter-factor correlation of r=.56. Conversely, in a subsequent study by Beck and Steer (1991), PCA revealed four correlated subscales: neurophysiological, subjective anxiety, autonomic, and panic. The total proportion of variance explained was 58.7% and primary factor loadings ranged from .41 to .78. With four factors modeled instead of two, numbness/tingling, indigestion, and feelings of choking no longer had factor loadings less than .30, though each of them belonged to a different subscale, indicating that they did not constitute a distinctive shared factor. Despite moderate-to-high primary factor loadings, several items had cross-loadings greater than .30 and the correlation between the subjective and neurophysiological subscales was r=.65, suggesting that four factors may be excessive. Nonetheless, a four-factor oblique model produced the best model fit statistics in factor analyses among adults residing in the community (Osman, Barrios, Aukes, Osman, & Markway, 1993), as well as undergraduate students (CFI=.93, RMSR=.04) (Osman et al., 1997). Since the number of factor structures fluctuates across studies (Beck et al., 1988; Beck & Steer,1991; Osman et al., 1993), the exact components of anxiety that are being measured by the BAI are not entirely clear. Specifically, subjective anxiety is consistently a distinct factor, but the somatic factors tend to diverge across models. The difference in somatic factors illustrates that evaluating physical health conditions as a primary component of anxiety is a complex process. Despite the instability in factor structures, the majority of individual items still demonstrate good primary factor loadings.

Although consistently high factor loadings are necessary for good construct validity, a problem with the BAI is its overrepresentation of physiological conditions. For example, in the two-factor model, the subjective anxiety scale contains two items that are arguably physical health conditions: “difficulty breathing” and “feelings of choking” (Beck et al., 1988). Due to this large emphasis on somatic symptoms, it has been argued that the BAI may be better described as a screener for panic disorder rather than a general anxiety scale (de Ayala et al., 2005; Fydrich et al., 1992). Consistent with this assertion, studies have found that mean BAI scores were higher among individuals diagnosed with panic disorder relative to other types of anxiety disorders (Beck & Steer, 1991; Fydrich et al., 1992). Like the HARS, the BAI may benefit from incorporating items that reflect cognitive and behavioural aspects of anxiety, such as persistent worrying, avoidance behaviour, and social distress. For the purposes of an interRAI scale, selecting items that resemble those contained in the BAI is a good first step, though a greater array of items is needed to capture the range of diagnostic subtypes within anxiety.

In contrast to construct validity, the evidence for criterion validity of the BAI is more apparent. Like the HARS, concurrent validity of the BAI has been assessed through its relationship to other measures of anxiety. During development, the association between the BAI and two instruments - the revised HARS and the Cognition Checklist – Anxiety (CCL-A) – was examined (Beck et al., 1988). For both instruments, the correlation with the BAI was r=.51. Another instrument that has been used to test concurrent validity of the BAI is the Weekly Record of Anxiety and Depression, which asks individuals to rate their level of anxiety and depression along a Likert scale every day over the course of a week (Fydrich et al., 1992). In this study, 71 outpatients with a primary diagnosis of anxiety submitted weekly records and completed both the BAI and Beck Depressive Inventory (BDI). Similar to the HARS-R and

CCL-A (Beck et al., 1988), the correlation coefficient between the Weekly Record Anxiety and the BAI was r=.54 (Fydrich et al., 1992). When interpreting the strength of correlation coefficients, it is necessary to consider the context of psychological research more broadly. As mentioned previously, the range of correlations between psychological assessments is commonly between .02 to .78 (Hemphill, 2003), and so moderate correlations are still positive indicators of concurrent validity for the BAI.

Another consideration when testing associations between psychological instruments is the possibility that the comparison tool has poor reliability or validity. For example, in a sample of community-dwelling adults, the association between the BAI and the Brief Symptom Inventory (BSI) was explored (Osman et al., 1993). While the BAI was positively correlated with the anxiety subscale (r=.63), correlation coefficients were the same across all nine subscales of the BSI. Although this result appears to suggest that the BAI does not have strong criterion validity, the authors noted that the BSI may be the problem. Since the BSI subscales are all highly inter-related, anxiety cannot be isolated as a distinct construct, diminishing its utility as a comparison tool for anxiety. To address this problem, a subsequent study with undergraduate students examined the BAI in relation to other self-reported anxiety scales, such as the CCL-A and State Trait Anxiety Inventory (STAI) (Osman et al., 1997). The range of correlation values between the BAI and other anxiety measures was .35 to .69, which remained significant after accounting for depression. Altogether, mindful of the limitations to concurrent validity in psychological assessment research, the relationship between the BAI and other measures of anxiety tends to be positive and relatively strong.

Finally, like the HARS, concurrent validity of the BAI has been tested using diagnoses of anxiety. For example, the pilot study (Beck et al., 1988) and the Turkish validation (Ulusoy et al., 1998) contrasted the mean BAI scores of outpatients with various psychiatric diagnoses. Given that BAI scores were highest among those with an anxiety disorder, it was concluded that the BAI had appropriate concurrent validity. A subsequent study with psychiatric inpatients at a general hospital sought to replicate concurrent validity in this setting, but only eight patients (3% of the sample) had an anxiety diagnosis (Steer, Rissmiller, Ranieri, & Beck, 1993). Nonetheless, the distribution of BAI scores was similar to that found in the pilot study with outpatients (Beck et al., 1988), suggesting that the BAI should perform equivalently in an inpatient context. The relationship between the BAI and anxiety disorders can also be used to inform predictive validity, with the difference being that the diagnosis is made after the BAI is completed. In a Canadian study with 217 older adult outpatients diagnosed with a variety of psychiatric disorders, the BAI was administered at intake along with the Structured Clinical Interview for DSM-III-R (SCID) (Kabacoff, Segal, Hersen, & Van Hasselt, 1997). The total score on the BAI, as well as the subjective anxiety subscale, were significant predictors of anxiety disorders in a logistic regression ($p<.0001$), providing support for predictive validity. Evidence of concurrent and predictive validity using anxiety diagnoses, along with tests of concurrent validity with other anxiety scales, demonstrates that the BAI is a good representation of clinical anxiety.

Given that the HARS demonstrated difficulty distinguishing between anxiety and depression, the BAI explicitly addressed this problem during its creation (Beck et al., 1988). Since the researchers had already developed the BDI - a similar self-reported tool measuring clinical depression - this instrument was used to inform construction of the BAI and ensure that symptoms of depression were not being captured (Beck et al., 1988). After inputting all items from both the BAI and BDI into a single PCA, the subjective anxiety, somatic, and depressive symptoms subscales all emerged as distinct factors, with each one retaining their original item composition. Since symptoms of anxiety and depression were clearly delineated between the BAI and BDI, discriminant validity of both scales was deemed suitable. The Turkish version of the BAI replicated the results from the pilot study, though anxiety symptoms loaded onto one factor rather than separate subjective anxiety and somatic factors (Ulusoy et al., 1998). In both studies, discriminant validity of the BAI was further supported after demonstrating that individuals with primary anxiety disorders had higher mean scores on the BAI than those with primary depressive disorders (Beck et al., 1988; Ulusoy et al., 1998).

Despite observable differences between anxiety and depression, the correlation between the BAI and BDI was r=.48 (Beck et al., 1988) and r=.46 (Ulusoy et al., 1998), representing a moderate correlation. Other than the possibility of poor discriminant validity, an explanation for the association between the two scales is its shared constructive test design. To determine if this hypothesis was correct, measures of depression other than the BDI were analyzed in relation to the BAI. In the pilot study, correlation analyses were computed between the BAI and the HRSD-R, Cognition Checklist – Depression (CCL-D) and the Hopelessness Scale (HS) (Beck et al., 1988). In each case, the correlation with the BAI was weak (HRSD: r=.25; CCL-D: r=.22; HS: r=.15). The HS was also analyzed as a discriminant indicator for the Turkish version of the BAI, producing a weak correlation coefficient (r=.34) (Ulusoy et al., 1998). Finally, the correlation coefficient between the BAI and a daily depression diary was also weak among psychiatric outpatients (r=.38) (Fydrich et al., 1992). Altogether, though the BAI and BDI share a moderate correlation, evidence demonstrating weak associations with other depression measures, as well as comparisons with diagnostic groups and factor structure, all indicate that the BAI can distinguish between anxiety and depression.

3.1.1.2.3 Summary

Summarizing the reliability and validity of the BAI reveals that it is generally a well-constructed tool. Reliability estimates are excellent (Beck et al., 1988; de Ayala et al., 2005; Fydrich et al., 1992; Ulusoy et al., 1998), though internal consistency may be elevated due to the number of items contained in the scale (Cortina, 1993). Concurrent validity and discriminant validity have both been established using various instruments, as well as diagnostic categories (Beck et al., 1988; Fydrich et al., 1992; Ulusoy et al., 1998). However, construct validity has been criticized for two major reasons. One is that the factor structure of the BAI varies across studies, with the number of factors ranging from 2-5 (Osman et al., 1993; Osman et al., 1997). The other issue with construct validity is that the BAI contains a high proportion of somatic items, resulting in a greater sensitivity to panic disorders than other anxiety subtypes (de Ayala et al., 2005; Fydrich et al., 1992). By including a large number of somatic items, the consistency of the scale will increase, but will also negatively affect the ability to detect other anxiety domains (e.g., cognitive). Therefore, when constructing the interRAI scale, the number of somatic items needs to be balanced against other types of indicators, such as cognitive and behavioural symptoms. Not only will this allow the scale to better identify a range of anxiety disorders but will also potentially limit the number of factors related purely to somatic conditions. Taken together, the BAI is a useful tool for informing the development of an anxiety scale.

3.1.1.3 Other Anxiety Scales

3.1.1.3.1 Social anxiety disorder

In addition to general anxiety scales, there are several assessment tools that target specific types of anxiety. Although they are not designed to assess broader clinical symptoms, specialized anxiety tools can still provide guidance on item selection for a general scale, as incorporating items that cover a range of diagnostic subtypes can improve overall detection of anxiety. A notable diagnostic subtype is social anxiety disorder, which is distinct from general phobias due to its emphasis on fear and distress during social situations and interactions (APA, 2013; WHO, 1992). While various social anxiety scales exist, three instruments were chosen for a brief review because of their established psychometric properties. First, the Liebowitz Social Anxiety Scale (LSAS) is a clinician-administered tool consisting of 24 social situations that are scored for both level of fear/anxiety and level of avoidance (Heimberg et al., 1999). Internal consistency of the scale is excellent (α=.96), though this may be inflated due to a large number of items and high inter-factor correlations (*r*=.68-.94). Concurrent validity was determined through associations with six other social anxiety instruments, with pre-treatment correlation coefficients ranging from *r*=.46-.68 for the total LSAS score. Further, pre-treatment discriminant validity from depression was examined using the HRSD (*r*=.39) and BDI (*r*=.52) (Heimberg et al., 1999), providing additional evidence for the criterion validity of the scale.

The other two social anxiety scales reviewed are both self-reported tools, each containing 20 Likert-scale items: The Social Phobia Scale (SPS) and Social Interaction Anxiety Scale (SIAS) (Heimberg, Mueller, Holt, Hope, & Liebowitz, 1992). The SPS and SIAS were created simultaneously to examine two major components of social anxiety: 1) situations in which an individual is having their performance observed (SPS) and 2) direct interactions with others (SIAS). Like the LSAS, internal consistency estimates for both instruments are good-to-excellent, depending on the sample used. Cronbach's alpha coefficients for the SPS and SIAS in a sample of individuals with social anxiety disorder were α=.86 and α=.90, respectively, compared to α=.90 and α=.93 in a community sample, and α=.85 and α=.87 in undergraduates (Heimberg et al., 1992). Concurrent validity estimates for the SPS and SIAS also tended to be higher in community samples than undergraduates and those with social anxiety disorder. For example, the correlation between the SIAS and SPS with the Fear of Negative Evaluation Scale (FNE) was r=.82 and r=.79, respectively, in the community sample. In contrast, the same set of correlations among individuals with social anxiety disorder was r=.44 and r=.28, and r=.82 and r=.48 for undergraduates. Further, the SPS and SIAS shared a strong correlation in the community sample (r=.89), but a medium correlation among undergraduates (r=.52) and individuals with social anxiety disorder (r=.41) (Heimberg et al., 1992). It is possible that the reason for this difference is that community samples demonstrate consistently lower scores on social anxiety instruments than undergraduate and clinical samples, enhancing the correlation by reducing overall variation. Although internal consistency and concurrent validity of the SPS and SIAS varies by setting, based on results for all three social anxiety scales, there is a compelling case for including symptoms in the interRAI anxiety scale that represent social anxiety disorder.

3.1.1.3.2 Generalized anxiety disorder (GAD)

GAD is characterized by patterns of excessive and pervasive worrying (APA, 2013; WHO, 1992), and while these symptoms are not included in the HARS or BAI, worrying has been shown to be an important component of overall psychological well-being (Stones & Kozma, 1985). A relevant specialized anxiety scale designed to screen for GAD is the GAD-7, which is a brief tool consisting of seven items (Spitzer et al., 2006). Items are scored from 0-3 based on self-reported frequency of the symptom - encompassing cognitive, emotional, and physical indicators – with a maximum score of 21. Three of the seven items correspond with the DSM-IV core criteria for GAD, such as feeling nervous/anxious, persistent worrying, and indiscriminate worrying. In primary care settings across the US, internal consistency of the scale was excellent (α=.92), and test-retest reliability was good (intraclass coefficient=.83), though the exact retest timeframe was not specified. Convergent validity was supported through associations with functional status scores, such as the mental health subscale of the Medical Outcomes Study Short-Form General Health Survey (SF-20) (*r*=.75), and other anxiety tools such as the BAI (*r*=.72) and the Symptom Checklist - Anxiety Subscale (*r*=.74). However, evidence is less encouraging for discriminant validity related to depression, as there was a strong correlation between the GAD-7 and the Patient Health Questionnaire depression scale (PHQ-8) (*r*=.75). Diagnostic concurrent validity of the GAD-7 was strongest when using a score cut-point of 10, with sensitivity and specificity values over 0.80. Overall, the GAD-7 is a useful tool for detecting possible GAD. Given that the HARS (Porter et al., 2017) and BAI (de Ayala et al., 2005; Fydrich et al., 1992) have each been criticized for a lack of indicators pertaining to cognitive elements of anxiety - particularly excessive worrying and generalized apprehension - drawing upon items from the GAD-7 can address this gap.

3.1.1.3.3 interRAI scales

While there is no scale currently available for anxiety in the interRAI suite of instruments, an internalizing subscale has been proposed for the Children and Youth Mental Health (ChYMH) assessment (Lau, Stewart, Saklofske, & Hirdes, 2019). Using a combination of factor analysis and multidimensional item response theory (IRT), several model structures were tested to explain the relationship between symptoms of depression, anhedonia, and anxiety. The anxiety subscale consisted of four items: repetitive anxious complaints/concerns, hypervigilance, unrealistic fears, and episodes of panic. Ultimately, a bifactor model produced the best fit to the data, with three distinct subscales and a general internalizing factor. Compared to the depression and anhedonia subscales, the anxiety scale had the lowest factor loadings on the internalizing factor. This suggests that while anxiety is part of a larger internalizing domain, it is separate from depression and anhedonia. Additionally, a factor analysis of various mental state indicators contained in the RAI-MH was performed during the development of the interRAI Social Withdrawal Scale (SWS) (Rios & Perlman, 2018). In the CFA, items representing depressive and anxious symptoms loaded together onto one of four subscales. Since anxiety and depression are more strongly correlated with one another than other types of psychological domains (APA, 2013; WHO, 1992), it is expected that they would load onto a common factor, similar to the internalizing subscale proposed for the ChYMH. However, consistent with the ChYMH study results, factor loadings for items in the anxious-depressive subscale were lower on average than items in other factors, demonstrating that some distinctions can be made between anxiety and depression. Based on the results of these studies, there is evidence supporting the creation of a scale measuring anxiety within interRAI instruments.

3.1.1.4 Summary

In summary, various scales have been created to measure clinical symptoms of anxiety, each with its own advantages and disadvantages. The benefit of the HARS is that it has good inter-rater reliability, especially when accompanied by a structured interview guide (Bruss et al., 1994; Shear et al., 2001), as well as concurrent validity (Donzuso et al., 2014; Maier et al., 1988; Zimmerman et al., 2007). However, there is mixed evidence surrounding its internal consistency (Maier et al., 1988; Shear et al., 2001), content validity (Porter et al., 2017), and discriminant validity specific to depression (Beck & Steer, 1991; Maier et al., 1988; Porter et al., 2017; Riskind et al., 1987). Conversely, the BAI has demonstrated strong internal consistency (de Ayala et al., 2015; Fydrich et al., 1992; Ulusoy et al., 1998) and discrimination of anxiety from depression (Beck et al., 1988; Fydrich et al., 1992; Ulusoy et al., 1998). Despite promising results, content validity of the BAI is questionable due to over-representation of somatic symptoms (de Ayala et al., 2005; Fydrich et al., 1992). To enhance the coverage of the interRAI anxiety scale, anxiety scales that are tailored to specific disorders were also briefly examined. The LSAS (Heimberg et al., 1999), as well as SPS and SIAS (Heimberg et al., 1992), are reliable and valid instruments that can be used as a reference for social anxiety items. Similarly, there are indicators in the GAD-7 that accurately reflect essential characteristics of GAD (Spitzer et al., 2006), such as persistent worrying and apprehension. Finally, previous interRAI research was consulted to determine the feasibility of creating an interRAI anxiety scale. The interRAI ChYMH assessment was used to construct a bifactor model of internalizing symptoms with anhedonia, depression, and anxiety subscales (Lau et al., 2019), while anxiety items appeared to constitute half of an anxious-depressive subscale of broader mood indicators (Rios & Perlman, 2018). With a variety of well-constructed anxiety scales to draw from, as well as preliminary anxiety scale research using the interRAI ChYMH, there is a compelling basis for creating an anxiety scale for the interRAI suite of assessment instruments.

3.1.2 Methodological strengths and considerations

Having reviewed research conducted with other anxiety scales, compiling the strengths and limitations to inform a pathway for scale construction is the next step in designing the interRAI anxiety scale. Beginning with internal consistency reliability, it is important to be mindful of the impact that the number of items and subscales can have on the Cronbach's alpha. While the BAI demonstrates consistently excellent alpha coefficients (de Ayala et al., 2005), it also contains 21 items and at least two factors (Beck & Steer, 1991), as well as some items that are synonyms for each other, which can artificially increase the alpha estimate (Cortina, 1993; Henson, 2019). In the event that the interRAI anxiety scale contains multiple items, an additional check for internal consistency is to ensure that items are at least moderately correlated with each other (Cortina, 1993; Henson, 2019). Inter-rater reliability is another potential problem for scales that use observer assessments. For instance, interview guides were constructed for the HARS to increase inter-rater scores (Bruss et al., 1994; Shear et al., 2001). In a reliability study of interRAI assessment tools across 12 countries, the mean Fleiss-Cohen weighted kappa coefficient for mental health variables was 0.64 (Hirdes et al., 2008), indicating that an anxiety scale based on interRAI items should have decent inter-rater reliability. Similarly, in a Chinese validation study of the interRAI Mental Health (MH), test-retest reliability of three mental health symptoms scales over a 3-week period yielded excellent ICCs (.76-.97) (Chan, Lai, & Chi, 2014), exceeding the mean correlation value of r=.66 for studies examining test-retest of the BAI (de Ayala et al., 2005). Altogether, while the capacity of this dissertation to test reliability is limited to internal consistency, prior interRAI reliability research suggests that the MH instrument can be used to create a scale that is consistent with existing general anxiety scales.

Validity is another psychometric property that needs to be planned for prior to constructing the interRAI anxiety scale. Construct validity is typically assessed through two components: factor structure and factor loadings. Although the factor structure of the BAI is more variable across studies (Beck & Steer,1991; Osman et al., 1993), both the BAI and the HARS are typically represented in their original two-factor solutions consisting of psychological and somatic indicators of anxiety (Beck et al., 1988; Hamilton, 1959). Given that factor loadings for both psychological and somatic symptoms of anxiety are generally good, a similar two-factor structure should be tested for the interRAI anxiety scale. However, the scale should also incorporate other types of psychological symptoms not included in the HARS and BAI, as those pertaining to social anxiety (Heimberg et al., 1992; Heimberg et al., 1999) and GAD (Spitzer et al., 2006), to avoid over-emphasizing somatic health conditions (de Ayala et al., 2005; Fydrich et al., 1992; Porter, 2017). Concurrent validity with other anxiety scales and anxiety disorders is a strong point for both the HARS (Donzuso et al., 2014; Maier et al., 1988; Zimmerman et al., 2007) and the BAI (Beck et al., 1988; Fydrich et al., 1992; Kabacoff et al., 1997; Osman et al., 1997; Ulusoy et al., 1998). Likewise, the BAI has shown great discriminant validity between anxiety and measures of depression, such as assessment scales and depressive disorders (Beck et al., 1988; Fydrich et al., 1992; Ulusoy et al., 1998). Since this project was limited to data obtained through interRAI instruments, criterion validity with other assessment tools was not able to be examined. Instead, diagnoses of anxiety and depression disorders were chosen as the main tests of concurrent and discriminant validity, respectively.

A limitation of the inclusion of somatic health conditions in an anxiety scale is their lack of specificity. For example, many somatic symptoms listed in the BAI overlap with those observed in several medical conditions, such as ‘racing heart’ and ‘dizziness’ (Julian, 2011). For older adults especially, various medical comorbidities may be present that are unrelated to anxiety, but which share common health symptoms, reducing the effectiveness of somatic items at measuring anxiety in this population. Further, somatic indicators like sweating and restlessness can also be a side effect of substance and medication use, which are both associated with anxiety (APA, 2013). In settings that do not specialize in treating anxiety, such as general psychiatric hospitals and units, it is possible that somatic health conditions will be present for a variety of reasons that are not due to anxiety. As a result, there is the potential that somatic health conditions in the interRAI assessment instruments will not perform as well as psychological indicators in the anxiety scale and may reduce diagnostic validity. In this event, it may not be desirable to include somatic symptoms, despite their use in other clinical anxiety scales.

Since the interRAI scale is intended to assess general anxiety levels in clinical populations, it should be able to detect the full range of anxiety disorders. A problem arises when considering how to handle symptoms related to OCD and PTSD, which were considered anxiety disorders until they were separated into their own diagnostic categories in the ICD-10 (Kogan et al., 2016) and DSM 5 (APA, 2013). The reason for recategorizing OCD as its own 'obsessive' category was because of research findings that demonstrated biological and clinical divergence between it and anxiety disorders (Kogan et al., 2016). In contrast, stress-related disorders – including PTSD – were separated from anxiety disorders to denote the presence of a causal factor (Kogan et al., 2016). Since the interRAI mental health instruments were created prior to diagnostic changes to anxiety, half of the items listed under the 'anxiety' section of mood indicators include symptoms related to OCD and PTSD. Due to the reclassification of OCD and PTSD, there is ambiguity surrounding whether or not the associated symptoms belong in a general anxiety scale. The approach taken by this project was to retain the OCD and PTSD symptoms for analysis to provide an empirical argument for their role in the scale.

In most studies that were reviewed, the sample sizes were relatively small. In the pilot studies for developing the HARS (Hamilton, 1959) and the BAI (Beck et al., 1988), there were 35 and 1,086 participants, respectively. In the remaining original research studies described earlier, sample sizes ranged from 22 participants (Bruss et al., 1994) to 834 participants (Vaccarino et al., 2008), with most under 300. This finding is consistent with a systematic review of BAI reliability studies, which found a mean sample size of n=259 for coefficient alpha tests and n=121 for test-retest (de Ayala et al., 2005). Additionally, a meta-analysis was conducted on the English version of the BAI, encompassing 192 studies and 203 participant samples (Bardhoshi et al., 2016). To calculate internal consistency, 117 studies were combined to produce a total sample of n=43,932, which is smaller than annual number of interRAI mental health assessments in Ontario. Further, the authors reported that the sample sizes in exploratory factor analyses did not provide sufficient statistical power in 4/18 studies, while for confirmatory analyses, 3/8 were underpowered. Consequences of small sample sizes include adverse effects on statistical accuracy and generalizability, which is likely one reason why the factor structure of the BAI is inconsistent across studies (Bardhoshi et al., 2016; de Ayala et al., 2005). A major advantage of using the interRAI sample for psychiatric inpatients in Ontario is that it has been mandated since 2005, resulting in a large sample, as observed in chapter two of this dissertation. While the Canadian interRAI community and ED samples are comparatively small, the number of participants in each setting is still larger than most of the studies reviewed.

Another consideration related to sampling are the effects of sociodemographic characteristics such as age, ethnicity, sex, and gender on anxiety scores. Most of the studies reviewed did not compare anxiety scores across sociodemographic groups, despite that anxiety disorders are diagnosed differentially across gender and culture (APA, 2013). One potential explanation is that studies did not have sufficient sample sizes to stratify their analyses into distinct groups, as was often the case with ethnicity (de Ayala et al., 2005). However, reviews of the BAI did report some information relevant to gender and age. In the meta-analytic and systematic review studies of the BAI, women typically had higher raw scores than men (Bardhoshi et al., 2016; de Ayala et al., 2005). Further, scores on the BAI also tended to be higher among younger age groups (de Ayala et al., 2005). In both cases, neither age nor gender appeared to affect the reliability of the BAI (de Ayala et al., 2005), though differences in scores may have implications for severity thresholds and diagnostic evaluations of anxiety (Bardhoshi et al., 2016). Based on the information available, it was anticipated that younger age groups and women would score higher on the interRAI anxiety scale.

Given that the HARS and BAI were developed for clinical settings, it follows that many of the studies reviewed validated the scales using in- and out-patient psychiatric samples. Despite clinical intentions, both the BAI and HARS have been examined in college and general populations as well, though scale performance might be more variable. For example, in the systematic review of the reliability of the BAI, the lower ranges for internal consistency and test-retest coefficients were more pronounced in nonclinical than in psychiatric populations (e.g., α=.83-.94 in noncollege community samples versus α=.91-.94 in inpatient psychiatry) (de Ayala et al., 2005). In contrast, the meta-analysis of the BAI did not find differences in internal consistency and test-retest scores between clinical and nonclinical samples (Bardhoshi et al., 2016). One reason for the inconsistency in reliability across settings may be due to differences in the statistical techniques used in the systematic review versus the meta-analysis. Regardless, higher average scores and standard deviations on the BAI are typically observed in clinical settings, which has implications for factor structure and scale performance (Bardhoshi et al., 2016; de Ayala et al., 2005). Since the interRAI instruments are primarily designed for health care settings, the anxiety scale should be tailored towards identifying clinical levels of severity, rather than a broader spectrum that would prove more useful in general populations.

3.1.3 Rationale and hypotheses

The purpose of this chapter is to develop an anxiety scale for the interRAI health assessment instruments. To guide item selection for initial testing, the BAI (Beck et al., 1988) and HARS (Hamilton, 1959) were the primary sources of influence. Where they could be matched to interRAI items, the LSAS (Heimberg et al., 1999), SPS and SIAS (Heimberg et al., 1992), and GAD-7 (Spitzer et al., 2006) were also consulted. The desired result is an anxiety scale covering cognitive, mood, behaviour, and somatic symptoms that are general to anxiety disorders overall, as well as symptoms representing the range of diagnostic subtypes within anxiety. The anxiety scale should also demonstrate appropriate validity, as detailed in the review for the HARS and BAI. Finally, to improve clinical utility and account for the possibility of a non-normal distribution, categories representing severity levels are also a necessary property for the scale. Prior to beginning scale construction, two sets of hypotheses were generated corresponding to structure and construct validity, and criterion validity and responsiveness to change over time.

3.1.3.1 Research question 1: Structure and construct validity.

Based on the scale structure of the BAI and HARS, it was hypothesized that a two-factor model comprised of psychological and somatic subscales would be the best candidate for the anxiety scale. Although it is expected that there will be two factors, it is also acknowledged that somatic symptoms might be less psychometrically rigorous than psychological symptoms, given concerns noted in the literature review (de Ayala et al., 2005; Julian, 2011). Other potential scale configurations include: 1) a bifactor model with a general anxiety factor alongside psychological and somatic factors, such as the interRAI ChYMH internalizing scale (Lau et al., 2019), 2) a class-based structure with distinctive subgroups of anxiety, and 3) decision tree algorithms incorporating psychological and somatic scales and individual items. To determine whether the two-factor scale is the best configuration, each scale candidate will be tested on their predictive power for primary and any anxiety disorder diagnoses, which are considered the gold standard criterion. Once chosen, severity levels for the anxiety scale will also be determined, with the expectation of the following categories: none, mild, moderate, and severe.

3.1.3.2 Research question 2: Criterion validity and responsiveness

After the final anxiety scale is chosen, the next step is to establish its criterion validity and ability to detect changes over time. For concurrent validity, traumatic life events were identified as a convergent indicator, as responses to traumatic experiences frequently involve symptoms of anxiety (APA, 2013; Kogan et al., 2016). Additionally, based on previous research demonstrating greater anxiety among women and younger age groups (APA, 2013; Bardhoshi et al., 2016; WHO, 1992), it was also anticipated that these groups would show higher scores on the anxiety scale. In terms of discriminant validity, depression was the predominant criterion used for testing in other anxiety scales (Beck et al., 1988). Consistent with previous research, the anxiety scale should not be an equally significant predictor of mood disorders as anxiety disorders, nor should it be strongly correlated with a depressive symptoms scale. Finally, it was hypothesized that the anxiety scale would demonstrate a moderate-to-strong ability to detect changes in anxiety over the course of treatment.

3.2 Methods

3.2.1 Resident Assessment Instrument – Mental Health

3.2.1.1 Study sample and design

The OMHRS dataset that was described in chapter two of this dissertation was also used for this chapter, except that age restrictions were lifted. The justification for expanding the study sample is that anxiety disorders are diagnosed across the life course (APA, 2013; de Lijster et al., 2017; Kessler et al., 2007), and so an anxiety scale should be functional across all age groups. Further, the validity, reliability and clinical utility of the scale is enhanced if all adults are included in its development. After removing forensic patients and assessments that were flagged as potentially inaccurate, the total number of assessments totaled N=1,266,847. From that subset, the first index episode recorded in the system was selected for each individual - with discharge DSM-IV-TR diagnoses appended to the admission assessment - resulting in a final sample size of n=237,862.

For the latent class analysis (LCA) only, a different sample of RAI-MH assessments was used as the source dataset because it was performed in a separate context from the rest of the analyses. As such, it was considered an alternative validation dataset for arriving at a class-based solution for anxiety symptoms. However, after reviewing the results of the LCA, the resulting class-based structure was developed and tested using the same dataset that was used for the rest of the analyses, permitting model comparisons. For the LCA sample, the last episode of care was selected for each individual between 2005-2019, rather than the first episode. The total sample size was n=190,034.

Given that the RAI-MH has been mandated across the province of Ontario since 2005, OMHRS contains a larger and more representative sample than the datasets holding CMH and ESP assessments. For this reason, despite the lower proportion of anxiety disorders observed in psychiatric hospital units, OMHRS was selected as the primary dataset for creating and validating the anxiety scale. However, to aid in the process of choosing a final anxiety scale, each of the candidate scale structures were compared in a series of logistic regression models using both the RAI-MH and CMH datasets. Further, to establish diagnostic validity of the scale in multiple types of care settings, the final scale derived from the RAI-MH was also tested for its association with anxiety disorders in the CMH and ESP datasets.

3.2.1.2 Dependent variables

To determine the concurrent validity of the anxiety scale, DSM-IV anxiety disorders were selected as the main criterion and grouped by diagnostic ranking. As in chapter two, DSM 5 categories from 2016 onwards were re-coded to match DSM-IV disorders, affording a larger sample size. This means that OCD and PTSD were included as anxiety disorders, despite that they are no longer considered as such in the DSM 5 (APA, 2013) or ICD-10 (Kogan et al., 2016). "Primary anxiety disorders" were coded as a '1' if they were ranked as the most important diagnostic disorder and '0' if they were not. "Any anxiety disorders" were coded as a '1' if an anxiety disorder was included in the list of top three most important diagnostic disorders and as a '0' if they were not.

Concurrent validity was also tested through the use of the interRAI Traumatic Life Events CAP, since experiences of trauma should be positively related to anxiety (Kogan et al., 2016). The Traumatic Life Events CAP is categorized into three levels: '0' if the CAP was not triggered, '1' if there is a need to reduce the impact of prior traumatic life events, and '2' if there are immediate safety concerns. The following items from the interRAI assessments instruments are used to determine trigger levels for the Traumatic Life Events CAP: intense fear, serious accident, death of a family member, lived in war zone, witnessed severe accident, victim of crime, victim of sexual assault, victim of physical assault, victim of emotional abuse, fearful of family member, concerns for safety, and family history of abuse.

Based on the literature review, it is common practice to investigate discriminant validity between anxiety and depression. To test whether the anxiety scale was distinct from measures of depression, DSM-IV mood disorders were selected as one dependent variable. As with anxiety disorders, the same process for establishing 'primary mood disorder' and 'any mood disorder' groups were followed. In addition, the interRAI Depressive Severity Index (DSI) was also selected as another check for discriminant validity. The DSI is a scale that measures the severity of depressive symptoms based on their frequency of occurrence and ranges from 0-15, including the following items: sad/pained facial expression, negative statements, self-deprecation, guilt/shame, and hopelessness.

3.2.1.3 Independent variables

Based on the literature review of other anxiety scales, a series of variables from the RAI-MH were selected for inclusion in scale creation. Corresponding with the psychological factor of anxiety present in the HARS (Hamilton, 1959) and BAI (Beck et al., 1988), all items grouped under 'mental state indicators: indicators of anxiety' were included for testing, as well as items pertaining to health complaints and sleep disturbance. The response set for observations of all mental state indicators is based on a three-day look back period that is coded as follows: '0' if the indicator was not exhibited in the last three days; '1' if the indicator was not exhibited in the last three days but is reported to be present; '2' if the indicator was exhibited on one or two of the last three days; and '3' if the indicator was exhibited daily in the last three days. The list of psychological items and their descriptions are included in Table 22.

Table 22. Description of selected mental state indicators listed in the RAI-MH assessment.

Indicator (section of assessment)	Indicator description
Anxious complaints (mental state indicators - anxiety)	Repetitive anxious complaints (non-health-related) (e.g. persistently seeks attention/reassurance).
Fears/phobias (mental state indicators - anxiety)	Expression (including non-verbal) of what appear to be unrealistic fears (e.g. fear of being abandoned, of being left alone, of being with others) or intense fear of specific objects or situations
Obsessive thoughts (mental state indicators - anxiety)	Unwanted ideas or thoughts that cannot be eliminated
Compulsive behavior (mental state indicators – anxiety)	Handwashing, repetitive checking of room, counting, etc.
Intrusive thoughts/flashbacks (mental state indicators - anxiety)	Disturbing memories, nightmares or images that intrude into patient's thoughts; unwanted recall of adverse events.
Episodes of panic (mental state indicators - anxiety)	Patient unexpectedly overwhelmed by sense of panic
Health complaints (mental state indicators - other)	Repetitive health complaints (e.g. persistently seeks medical attention, excessive concern with bodily functions)
Sleep problems (mental state indicators - other)	Any sleep problems present: difficulty falling asleep, restless or non-restful sleep, interrupted sleep (including awakening earlier than desired), too much sleep

In addition to the psychological factor, a somatic health factor was also included for testing, represented by several physical health conditions that were mapped to the HARS (Hamilton, 1959) and BAI (Beck et al., 1988). Similar to mental state indicators, the RAI-MH contains a section on health conditions with an observed frequency period that is recorded over three days: '0' if the indicator was not exhibited in the last 3 days, '1' if the indicator was exhibited on one to two days of the last three days, and '2' if the indicator was exhibited on each of the last three days. The health conditions selected were headache, dizziness/vertigo or light-headedness, shortness of breath, chest pain/pressure, nausea, constipation, and fatigue/weakness.

3.2.2 Community Mental Health

The CMH dataset used to validate the anxiety scale was the same dataset that was used in chapter two, but with age restrictions lifted. The full number of assessments was N=9,566. After restricting to the first assessment for each individual, the final sample size was n=7,386.

3.2.2.1 Dependent and independent variables

While the RAI-MH allows up to three psychological disorder categories to be ranked for their importance, the CMH permits up to four. Further, because discharge assessments could not be appended to all of the initial assessments in the CMH dataset, the provisional DSM-IV anxiety disorder category was used. Despite these differences, the 'primary' and 'any' anxiety disorder dependent variables were coded in the same manner as in the RAI-MH dataset. The independent variables used to construct the anxiety scale were also the same, except that the 'fatigue/weakness' variable was not available. Additionally, the observed look back period for health conditions is coded slightly differently in the CMH assessment than in the RAI-MH. For the CMH, health conditions are coded as follows: '0' if the indicator was not present in the last 3 days, '1' if the indicator was present but not exhibited in the last three days, '2' if exhibited on 1 of last 3 days, '3' if exhibited on 2 of last 3 days, or '4' if exhibited daily in last 3 days.

3.2.3 Emergency Screener for Psychiatry

As with the RAI-MH and CMH datasets, the ESP dataset remained the same as in chapter two, except for age restrictions being removed. The initial sample was N=7,706. After selecting the first assessment for each individual, the final sample size was n=5,862.

3.2.3.1 Dependent and independent variables

Like the CMH, the 'primary' and 'any' anxiety disorder dependent variables were coded using the DSM-IV provisional anxiety disorder category, which could be ranked from first to fourth most important. There were fewer independent variables available to use in constructing the anxiety scale in the ESP dataset, as this assessment is intended to be shorter in length and assess urgent, acute psychological needs. Given the acuity of assessing and treating patient in emergency settings, the look back period is 24 hours with the following response codes: '0' if not present, '1' if present but not exhibited in last 24 hours, and '2' if exhibited in last 24 hours. The anxiety mood indicators that were available were repetitive anxious complaints/concerns (non-health related); expressions, including non-verbal, of what appear to be unrealistic fears; intrusive thoughts or flashbacks; and episodes of panic. No health conditions are included in the ESP, so a somatic factor could not be replicated in this dataset.

3.2.4 Statistical Analysis

There are multiple statistical methods that can inform the development of a clinical scale. Five major statistical analyses were conducted: factor analysis, item response theory (IRT), latent class analysis, decision tree algorithms, and logistic regression. Each of these tests were conducted sequentially using data obtained through the RAI-MH dataset, resulting in a final proposed model. For the CMH and ESP datasets, only the final model was tested for validation purposes. Except for the decision tree algorithm analysis, all statistical tests were conducted using SAS 9.4 for Windows. SAS Enterprise Miner Workstation 15.1 was used to create the decision tree algorithm.

3.2.4.1 Bivariate analysis

The first step in creating the anxiety scale was to examine the frequency distribution and significance of the independent variables in relation to primary and any anxiety disorders. By performing bivariate analysis first, the number of items to be entered into the subsequent factor analytic stage could be refined, enabling a more efficient model. The p-values of the chi-square tests were consulted but due to the large sample size and multiple comparisons, it was acknowledged that Type 1 errors were a risk. To account for the possibility of false positive significance values, greater emphasis was placed on the OR and 95% CI to guide variable selection. Specifically, an OR value of at least 1.50 was selected as the cut-off for variable inclusion in the anxiety scale.

3.2.4.2 Factor analysis

A popular method for scale creation is factor analysis. Exploratory factor analysis (EFA) is used to identify latent factors from a set of measured items by examining patterns of inter-item relationships (Osborne & Banjanovic, 2016). In a factor analytic model, the variances of measured items are predicted by two latent variables: the 'true score' – represented by the factors derived from the correlation matrix and referred to as 'communalities'– and the error variance (Osborne & Banjanovic, 2016; Raykov, 2004). The true score is divided by the error variance to provide an estimate for the reliability of the model, with scores closer to '1' indicating greater reliability (Raykov, 2004). This is referred to as the coefficient alpha and is a measure of internal consistency. However, the coefficient alpha is susceptible to inflation when many items are included and is not an appropriate test for scales containing multiple factors (Cortina, 1993). As part of the EFA procedure, numerous models with varying numbers of factors are extracted, allowing for identification of the factor structure that best explains inter-item relationships. There are various extraction methods available, but one that is recommended for data that is not normally distributed is unweighted least squares (Osborne & Banjanovic, 2016). An additional step towards testing factor structures is rotation selection. When more than one factor is retained in a model, rotation methods position the factors so that their relationship to each other can be interpreted (O'Rourke & Hatcher, 2014; Osborne & Banjanovic, 2016). Orthogonal rotations are the most popular in social science research (O'Rourke & Hatcher, 2014), and assumes that factors are uncorrelated with one another. However, it is unrealistic in many research applications for factors to have no association with one another (Osborne & Banjanovic, 2016). To account for at least some degree of association, oblique rotations - which permit factors to be correlated - are commonly used in many disciplines as an alternative to orthogonal rotations (Osborne & Banjanovic, 2016).

Various test statistics are available to aid in specification of factor structures. Eigenvalues indicate the amount of variance that a factor contributes towards the total variance score (O'Rourke & Hatcher, 2014; Osborne & Banjanovic, 2016). Generally, factors with an eigenvalue of 1 or greater are retained for analysis. However, the limitation of using a cut-off of 1 or greater is that it can lead to over-factoring, particularly when several items are being analyzed or the communalities of items are small (O'Rourke & Hatcher, 2014). Alongside eigenvalues, the scree plot can provide additional guidance for selecting the number of factors to retain, though it is a more subjective measure and should not be used on its own (O'Rourke & Hatcher, 2014; Osborne & Banjanovic, 2016). By plotting the eigenvalues along a line, the scree plot can reveal where there is a 'break' in the number of factors, where more meaningful factors are located above the break. Using both the eigenvalues and the scree plot, a hypothesis about the number of factors present in the data can be reached and then tested in a series of models, using rotation methods where more than one factor is specified. In each model, the communalities of the factor structure, as well as the factor loadings of measured items, guides model selection (Osborne & Banjanovic, 2016). Communality estimates indicate how much of the total variance is accounted for by each factor; if a factor has a relatively small communality, it may not be worth retaining. As for individual items, factor loadings represent the degree to which the item is correlated with the proposed factor. Generally, it is desirable for items to have factor loadings of at least 0.40 on one factor, and small cross-loadings onto other factors (O'Rourke & Hatcher, 2014). Items that have either small primary factor loadings or high cross-loadings may require revision or deletion, as they otherwise diminish the construct validity of the scale.

Once a hypothesis is reached about the number of factors that should be specified and how the measured items should be configured, confirmatory factor analysis (CFA) can be used to test the proposed structure against alternative models (Worthington & Whittaker, 2006). Using this method, one can evaluate how well a model fits the observed data using several different metrics. The chi-square statistic indicates how much the observed and expected covariance matrices differ. An insignificant p-value provides evidence in support of the proposed model, since it would suggest that it aligns with the observed data. However, a major limitation is that chi-square tests are unreliable in samples larger than 200, since even small deviations can result in a significant p-value (Kenny & McCoach, 2003). In addition to assessing the model with chi-square, there are several other metrics used for evaluating model fit. The comparative fit index (CFI) ranges from 0-1, with higher values indicating a better model fit; values over .90 are considered acceptable (Hu & Bentler, 1999). Finally, the root mean square error of approximation (RMSEA) evaluates the residual error contained in the model. It also ranges from 0-1 but in this case, a value close to 0 is better. Acceptable models should have a value equal to or less than .06 (Hu & Bentler, 1999). Another way that tests statistics are used is to inform the constraints that should be placed on a model, if any. In a congeneric model, all variable slopes and error variances are independent, while a tau-equivalent model fixes variable slopes but permits error variances to vary (SAS, 2013). Constraints affect the Cronbach's alpha estimates for the model, so testing which constraints best fit the data is important for constructing a reliable scale.

One of the advantages of CFA is that it allows competing models to be compared against one another. For example, EFA may have suggested that data can be explained by three factors. However, using CFA, one might discover that a model with one factor may fit the data just as well and have the advantage of being more parsimonious. This can be determined by using information criteria metrics, such as the Akaike information criterion (AIC) or the Bayesian information criterion (BIC). The AIC calculates the discrepancy between an estimated true model and the candidate models, though it has been criticized for endorsing too many factors (Kuha, 2004). The BIC assess the probability that each candidate model is the true model and in contrast to the AIC, accuracy improves with increasing sample sizes (Kuha, 2004). In both cases, a smaller value is preferable, suggesting that the candidate model is closer to the true model.

The BAI (Beck & Steer, 1988) and HARS (Hamilton, 1959) were both derived using PCA, which is similar to factor analysis, except that measured items predict the latent factor rather than the other way around. However, attempts to replicate their structure in other studies, as described in the introduction, have been performed using factor analytic methods. In most cases, EFA is conducted first and is then followed by CFA, even when a hypothesis exists for an existing factor structure. Given that anxiety can be manifested as physiological, cognitive, behavioural, and emotional symptoms (APA, 2013; WHO, 1992), EFA is useful for deciding how such an array of different indicators can be arranged to represent anxiety. However, since various competing models of anxiety were endorsed across different studies, CFA is necessary for determining which one best fits the observed data. Factor analysis has also been used to develop interRAI scales, such as the internalizing scale in the ChYMH (Lau et al., 2019). Through a combination of EFA and CFA techniques, items with low factor loadings were removed and multiple factor structures were examined, including one-, two-, three-, and bi-factor models. A similar factor analytic approach was used in this dissertation to create a scale for anxiety symptoms.

To begin, variables for EFA were selected based on the results from the bivariate analysis and analyzed using the PROC FACTOR command in SAS. Each variable was entered in its un-collapsed, ordinal format. Since the distribution of data was not normal across variables, an unweighted least squares method was used to extract factors. In the first model iteration, only one factor was specified. If the evidence suggested that more than one factor was present, another set of models with an unspecified number of factors would be explored. Rotation options can be selected for multi-factor models in which case, the orthogonal varimax option was tested along with promax and oblique varimax options. Based on the results of the EFA, subsequent CFA tests were run to confirm the model structures using the PROC CALIS command in SAS. To compare the fit statistics of the models while accounting for the non-normal distribution of the data, the estimation method chosen was maximum likelihood using least squares as the starting point (LSML) (SAS, 2013). Firstly, a unidimensional model was generated with the variables selected from the EFA. If there was evidence from the EFA of multiple factors, then variations on the constraints of the model structure were examined first. Starting with a correlated factors model, tau-equivalent and congeneric models were compared using the CFI and RMSEA test statistics. Depending on which variation produced the superior fit, those constraints would be carried forward to subsequent models.

In addition to unidimensional and two-factor models, two other structures were investigated based on factor analyses of anxiety scales in the literature review: a higher order model and a bifactor model. In both cases, the general factor being tested was purported to be anxiety. To successfully run the LINEQS language within PROC CALIS - a requirement for testing higher order and bifactor models - a correlation matrix needs to be input as the dataset (SAS, 2013). As well as inputting the default correlation matrix obtained from the EFA, a polychoric correlation matrix was tested as an alternative dataset, since asymptotic covariances provide better estimates of standard errors for ordinal variables (Yang-Wallentin, Jöreskog, & Luo, 2010). The results for the higher order and bifactor models are available upon request.

3.2.4.3 Item response theory

Initially developed to construct test questions in the field of education, IRT analyzes the extent to which individual test items differentiate between varying levels of a latent ability (Baker, 2001; Yang & Kao, 2014). The assumption underlying each question is that the probability of answering correctly – or endorsing a specific response - is a function of how much of the latent ability is possessed. Consequently, an 'easy' question has a higher probability of being endorsed given a lower level of ability, while a 'difficult' question poses the inverse. In terms of a clinical symptoms scale, the probability of having a symptom should be related to the latent health condition being assessed. Only one latent ability can be tested at a time in IRT and as a result, scales are assumed to be unidimensional (Yang & Kao, 2014). Individual items are also presumed to be independent of each other, meaning that only the level of the latent ability should influence the score on an item. Prior to IRT, factor analysis is typically used to test assumptions related to unidimensionality and inter-item correlations.

Item properties are analyzed via item characteristic curves (ICC). ICC graphically illustrates the probability of endorsing a 'correct' response at a given level of the latent ability. The graphs depict items in an 's' shaped distribution involving two properties: difficulty/location and discrimination. Item discrimination, calculated as the slope estimate, is a measure of how well the item differentiates between ability levels (Baker, 2001; Yang & Kao, 2014). Like factor loadings, the slope represents the strength of the relationship between the item and latent factor (Toland, 2013). Steeper slopes indicate greater item discrimination and strength of relationship (Baker, 2001; Toland, 2013; Yang & Kao, 2014). While the range of slope parameters is theoretically infinite, after standardizing ability scores to have a mean of 0 and SD units of 1, a range of 0.5 to 3.0 is common in practice (Toland, 2013). Item difficulty indicates the level of ability needed for a 0.5 probability of endorsing a 'correct' response (Yang & Kao, 2014). For items that are easily endorsed, the curve will be located more to the left of the distribution, while difficult items will have curves located to the right (Baker, 2001). In terms of numerical estimates, a typical range for item difficulty is between -3.0 and 3.0 (Baker, 2001; Toland, 2013).

While the ICC are used to examine individual items, the test information curve (TIC) describes the performance of the total scale. The TIC is plotted with the standardized ability score on the x-axis and test information on the y-axis, which is calculated as a summary score of both item discrimination and difficulty (Yang & Kao, 2014). Using the TIC as a guide, the range of ability scores that can be differentiated using the test can be evaluated. For instance, a scale with a wide TIC performs well at screening individuals in a setting where there is a broader range of ability (e.g., general population), whereas a narrow TIC provides greater discrimination for a specific part of the population (e.g., clinical populations). The extent to which a scale should have a wide or narrow TIC depends on its intended purpose. An anxiety scale that is intended to measure symptoms in the general population will benefit from items with lower difficulty and discrimination, while higher values are more appropriate for scales that are meant to distinguish clinical anxiety.

The purpose of using IRT in this project was simply to permit a descriptive examination of how each individual item functions as a test of anxiety, as well as how the scale performs overall at identifying clinical anxiety. Although IRT can be used to test factor structures for categorical variables, factor analysis was chosen instead because it was the most common method used to construct anxiety scales in previous studies, allowing other structures to be directly replicated. IRT was used for a similar purpose to create the interRAI Social Withdrawal Scale (SWS) (Rios & Perlman, 2018), in which discrimination and difficulty parameters for individual items were examined following CFA to refine item selection. For the IRT analysis, the PROC IRT command was used in SAS, with options specified for scree, ICC, and TIC plots. Since binary response categories are preferred in IRT (Baker, 2001; Yang & Kao, 2014), all variables were collapsed into binary response categories, with symptoms either present or absent. If a unidimensional model was selected as the best candidate in the factor analysis, the default options provided by the SAS program were enabled (two-parameter logistic model, logistic link function, marginal likelihood estimation method, and quasi-Newton optimization method).

3.2.4.4 Latent class analysis

As described in factor analysis, latent constructs are those phenomena that cannot be directly measured, and so they require that observable indicators be used to represent them. Whereas factor analysis is concerned with detecting underlying latent dimensions that explain relationships in a dataset, latent class analysis (LCA) separates cases into discrete classes based on their shared patterns of the latent construct (Lanza, Bray, & Collins, 2013). To determine class membership status, LCA relies on the use of categorical indicators (Lanza, Collins, Lemmon, & Schafer, 2007). Since distributions and error variances of categorical variables are not estimated, it can be assumed that indicators within each class are independent of one another, except for their shared status on the latent construct. To arrange categorical variables into classes, two parameters are computed in LCA: 1) latent class probabilities and, 2) item-response probabilities for observed variables. Class probability is similar to a factor score in factor analysis (Lanza & Collins, 2008), though in this case it is calculated using the prevalence of cases assigned to each class (Lanza et al., 2013). Since each case can only be assigned to one class, class probabilities are summed together to equal one, with higher scores indicating a greater prevalence. Conversely, item-response probabilities are like factor loadings (Lanza & Collins, 2008), or item discrimination in IRT. This parameter represents the probability that cases in a latent class will have a certain response on a categorical variable. Probability scores range between 0 and 1, with a score of 0.5 signaling random chance (Lanza et al., 2013). Further, LCA assumes that all cases in a class have the same item-response probabilities, since variables are presumed to be independent except for the latent construct.

To calculate the probability parameters and arrive at class solutions, a starting set of parameter values can be input with the dataset, otherwise a seed statement will be used to generate random starting values (Lanza et al., 2015). From the starting parameter values, a series of model iterations are run to calculate and estimate new parameter values across classes, until either an optimal solution is reached, or the maximum number of iterations has run. The most common estimation method for LCA is the EM algorithm, which is analogous to the maximum likelihood function (Lanza et al., 2013). After the model iteration process has been completed for each number of latent classes being tested, various model fit statistics are provided to aid in model selection. Like factor analysis, the AIC and BIC test statistics are used to determine model fit and guide decisions on the number of latent classes to select. LCA also computes a deviance statistic – G^2 – which compares the difference between the observed dataset and model predictions (Lanza et al., 2015). With all three fit statistics, smaller values indicate better model fit. Since parsimonious models are generally preferred over complicated ones, it is recommended that the least number of latent classes that still provide optimal fit statistics are selected.

Like IRT, LCA was primarily used for the exploratory purpose of better understanding the nature of the relationship between items in the scale. In previous anxiety research, LCA has been used to examine the relationship between depressive/affective and anxiety symptoms among adolescent outpatients in The Netherlands (Ferdinand et al., 2005). Based on responses to the Youth Self-Report (YSR) instrument, three classes were discovered for anxiety and four for affective problems. The three anxiety classes were characterized primarily by the frequency/severity of symptoms rather than combinations of specific symptoms, though certain symptoms were more common than others across all classes (e.g., 'nervous' and 'worries'). Through LCA, class structures of anxiety can reveal patterns of symptoms that are not readily detected in factor analysis. For instance, if symptom frequency is established as an important distinction for classes of anxiety, then a continuous, additive version of an anxiety scale would benefit from keeping variables in an ordinal format. The item-response probabilities provided by LCA were also expected to corroborate the findings from IRT. Depending on the results, a class-based alternative to an additive, continuous anxiety scale would be also be tested.

3.2.4.5 Decision tree models

The final statistical method used to derive a potential anxiety scale was an interactive decision tree algorithm. Decision trees can be used to classify and predict a dependent variable (root node) by splitting independent variables into a hierarchy of branching categories (internal nodes) – the result is a diagram that looks like an inverted tree (de Ville & Padraic, 2013; Song & Lu, 2015). The goal of this process is to identify a series of rules that when followed, will be able to predict which class of the dependent variable that a person belongs to. This process enables complex interactions between predictor variables to be detected and modeled in a relatively straightforward manner, compared to regression models and factor analysis. There are two types of approaches that can be used to generate decision tree models: automatic and interactive. Automatic models are determined by the statistical software, while an interactive decision tree method permits variables to be selected manually by the researcher, which is preferable when theoretical relevance and clinical utility are desired considerations of the scale. Beginning with the root node, the entire sample is included and classified by their score on the dependent variable (e.g. 'condition absent' vs. 'condition present'). From there, an internal node is selected that best distinguishes between the classes in the root node when split (e.g. a score of '1' on the internal node is associated with being in class '1' in the root node). Importance values may be used to guide the selection of internal nodes (de Ville & Padraic, 2013). The degree to which the internal node – and the splitting procedure selected – accurately predicts the classes in the root node is calculated using the training dataset. Relative importance values are determined by the reduction in the sum of squared errors of the prediction value. Each node is derived using a training dataset and then tested recursively with a separate validation dataset.

An internal node is split into branching pathways following ‘if/then’ rules. The sample is divided accordingly so that every branch emanating from an internal node has a mutually exclusive sample. There are several criteria that can be applied to splitting rules. For interval variables, node variance can be analyzed using an f-test and split on the size of the f-statistic and significance of the p-value (de Ville & Padraic, 2013). Alternatively, the means of the node can be used to find splits that decrease the sum of squared errors. For ordinal variables, a reduction in entropy or the Gini index can be specified, both of which represent the degree of random error associated with the prediction of a split (de Ville & Padraic, 2013). The splitting process continues until the model ends in ‘leaf’ nodes, where no further branches are drawn. This process is referred to as ‘stopping,’ which is necessary for building a model that is not over-fitted or too complex. In an interactive decision tree model, stopping procedures are at the discretion of the researcher. Otherwise, there are some guidelines for stopping, such as setting a minimum number of observations in each node and/or the maximum number of nodes permitted (de Ville & Padraic, 2013; Song & Lu, 2015).

Decision tree modeling was used to construct an alternative anxiety scale to the one created through factor analysis. As such, in addition to the independent variables used in the preceding analyses, the anxiety scale resulting from the factor analysis was also input as a predictor variable in the decision tree dataset. By including the full anxiety scale as an independent variable, the decision tree algorithm can potentially refine it further by detecting unique associations between the scale and anxiety diagnoses. Two sets of decision tree models were created: one where the target variable was a primary diagnosis of anxiety, and one where the target was any diagnosis of anxiety. For each target, a tree was created manually using the interactive decision tree option, while a second tree was generated entirely by the SAS Enterprise

Miner program. An interactive decision tree allows for variables to be selected and split by the user, forming a decision tree that is guided by researcher judgment. The automatic tree is created entirely by statistical software, following the input criteria for splitting described above (de Ville & Padraic, 2013; Song & Lu, 2015). Regarding splitting, the maximum number of branches was set at four, while the maximum depth was set at 10. Further, the significance level for splitting criteria was set at $p=0.05$.

3.2.4.6 Logistic regression

Logistic regression is used to predict nominal or ordinal outcomes, including dichotomous and polytomous measures, based on a combination of independent variables at any level of measurement (Anderson, Jin, & Grunkemeier, 2003; Sperandei, 2014). Odds of the outcome occurring are calculated using the natural logarithm of an odds ratio (OR) and can be interpreted using regression coefficients and ORs (Anderson et al., 2003; Peng, Lee, & Ingersoll, 2002). Regression coefficients denote the change in the log-odds of an outcome occurring given a one-unit increase in the independent variable and are calculated using the logit function of the OR. The OR represents the odds of the outcome given one level of an independent variable relative to another, which can be converted to the log odds using the exponential function (Anderson et al., 2003; Peng et al., 2002; Sperandei, 2014).

There are various means of evaluating the appropriateness of a regression model. In terms of the independent variables, the p-value may be used to determine if they have better odds of predicting the outcome than random chance (Peng et al., 2002; Sperandei, 2014). The confidence intervals (CI) surrounding the OR can also be used to make judgments about significance, ruling out those variables with CIs overlapping a value of 1.00 (indicating no difference in odds from the reference group). In cases where the sample size is large and type 1 errors resulting from multiple comparisons are a higher risk, minimum thresholds for the OR values might be used to identify variables with an adequate strength of association for inclusion in the model. Regarding the adequacy of the entire model, one method is to compare the proposed model against a null model where only the intercept is included. Three tests are available for determining whether the proposed model is a significant improvement: the likelihood ratio test, score test, and Wald test (Peng et al., 2002). Goodness-of-fit statistics are also available, such as the Hosmer-Lemeshow (H-L) test, to evaluate whether the model fits the observed outcomes in the dataset. In this instance, an insignificant p-value is desirable (Anderson et al., 2003; Peng et al., 2002). Finally, the degree to which the predicted probabilities match with actual observed outcomes can be evaluated using different metrics. One is the c-statistic, which uses pairs of observations with differing outcomes and evaluates the degree to which each was correctly identified in the model (Anderson et al., 2003; Peng et al., 2002). Values range from 0.5-1.0, with higher values reflecting better probability measurements.

Logistic regression can aid in the development of an anxiety scale by testing the performance of candidate scale relationships with concurrent and discriminant measures. For instance, if a scale is intended to measure clinical anxiety, it should be predictive of anxiety disorders. Similarly, the scale should not be highly predictive of mood disorders or other measures of depression. Logistic regression has previously been used to assess the power of the BAI and STAI in predicting anxiety disorders among older adult outpatients (Kabacoff et al., 1997). There were two ways in which logistic regression models were used in this study. The first was to compare the ability of candidate scale structures in predicting anxiety disorder outcomes through the c-statistic. The scales were input separately as predictors of primary and any anxiety disorders, with an additional specification for an ROC plot and analysis. The second way logistic regression was used was to determine the criterion validity of the scale. Based on the literature review, it was expected that anxiety would demonstrate concurrent validity for issues related to sleep disturbance and trauma, both of which have their own CAPs in the interRAI assessments. For discriminant validity, depression was examined as an outcome using the mood disorders diagnosis and the DSI.

3.2.4.7 Change scores

After constructing the final anxiety scale, differences in anxiety scores between admission and discharge were evaluated to determine if the scale is able to detect change over time. Various methods exist for assessing change over time using health-related tools, depending on the study design. Since this study did not involve randomized sampling, comparisons of treatment groups, or consistent assessment timeframes, simpler analytical methods were selected. The most straightforward approach is to analyze change between two points in time by calculating the effect size and standardized response mean (SRM) (Stratford, Binkley, & Riddle, 1996). To calculate the effect size, the mean change score is divided by the standard deviation of the initial score. Interpreting effect sizes for health assessment tools generally follow the recommendations posited by Cohen, where scores less than .20 are considered weak, .50 moderate, and .80 or greater are strong (Kazis, Anderson, & Meenan, 1989). The formula is similar for the standardized response mean (SRM), except that the denominator is the standard deviation of the change scores (Stratford et al., 1996). While the effect size and SRM can indicate the ability of a tool to detect an overall difference in scores, a limitation of these methods is that they are incapable of accounting for the degree of change over time. One method that can help to address this problem is to calculate the correlation between scores at admission and change scores (Stratford et al., 1996). Since individuals with higher anxiety scores at admission should demonstrate greater improvement over time after receiving treatment, a strong, positive correlation would be expected.

3.3 Results

The percentage of inpatients with a primary diagnosis of anxiety was 4.0% (n=9,582), while the percentage of any diagnosis of anxiety was 14.5% (n=34,565). Among inpatients with primary and any mood disorder diagnoses, the percentage of comorbid anxiety disorders were 42.1% (n=100,246) and 52.7% (n=125,325), respectively. Conversely, the percentage of a comorbid mood disorder diagnosis among those with a primary disorder of anxiety was 35.8% (n=3,428), and 63.4% (n=21,919) for those with any anxiety disorder. These results suggest that while anxiety and mood disorders share some association, they are distinct diagnoses that should be predicted differentially by the anxiety scale. Table 23, provided below, breaks down the proportion of various diagnostic subtypes within the primary and any anxiety disorder samples.

Table 23. Distribution of anxiety disorder subtypes among inpatients with primary and any anxiety disorders receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Anxiety disorder subtype	Primary diagnosis (n=9,582)	Any diagnosis (n=34,565)
Panic disorder	26.7 (2,561)	21.9 (7,557)
GAD	22.2 (2,123)	19.5 (6,750)
PTSD	22.7 (2,174)	15.4 (5,322)
Unspecified or other anxious state	14.3 (1,369)	14.3 (4,930)
OCD	8.4 (804)	5.9 (2,030)
Social anxiety	3.0 (284)	4.1 (1,431)
Agoraphobia	2.5 (237)	2.0 (700)
Other anxiety subtypes	0.2 (30)	16.9 (5,845)

Note. 'Other anxiety subtypes' include diagnoses that were not categorized separately due to small sample sizes. Examples include specified and unspecified phobias, alcohol- and drug-induced anxiety disorders, acute stress disorder, and so on.

As observed in Table 23, the most common subtype of anxiety disorder in the inpatient sample was panic disorder, followed by GAD and PTSD. OCD was less commonly diagnosed, though it still constituted a higher proportion of primary than any anxiety disorders. Social anxiety disorder and agoraphobia were relatively rare, though social anxiety more commonly appeared as non-primary disorders. Another important finding is that 14% of both groups were given an unspecified or other anxious state diagnosis, suggesting that their symptoms could not be differentiated into clear categories.

3.3.1 Bivariate analysis

The bivariate analysis was used to address two questions: 1) what is the prevalence of each indicator within the dependent variable groups and, 2) is the indicator prevalence different between those with and without a diagnosis of anxiety? To answer the first question, the percentage of mental state and somatic indicators present among those with a primary anxiety diagnosis, other primary diagnosis, any anxiety diagnosis, and no anxiety diagnosis were charted. After a cursory examination of the indicators in their original format, it was decided that they would be collapsed into 'absent' or 'present' binary categories for bivariate analyses. The results are illustrated below in Figures 5-6.

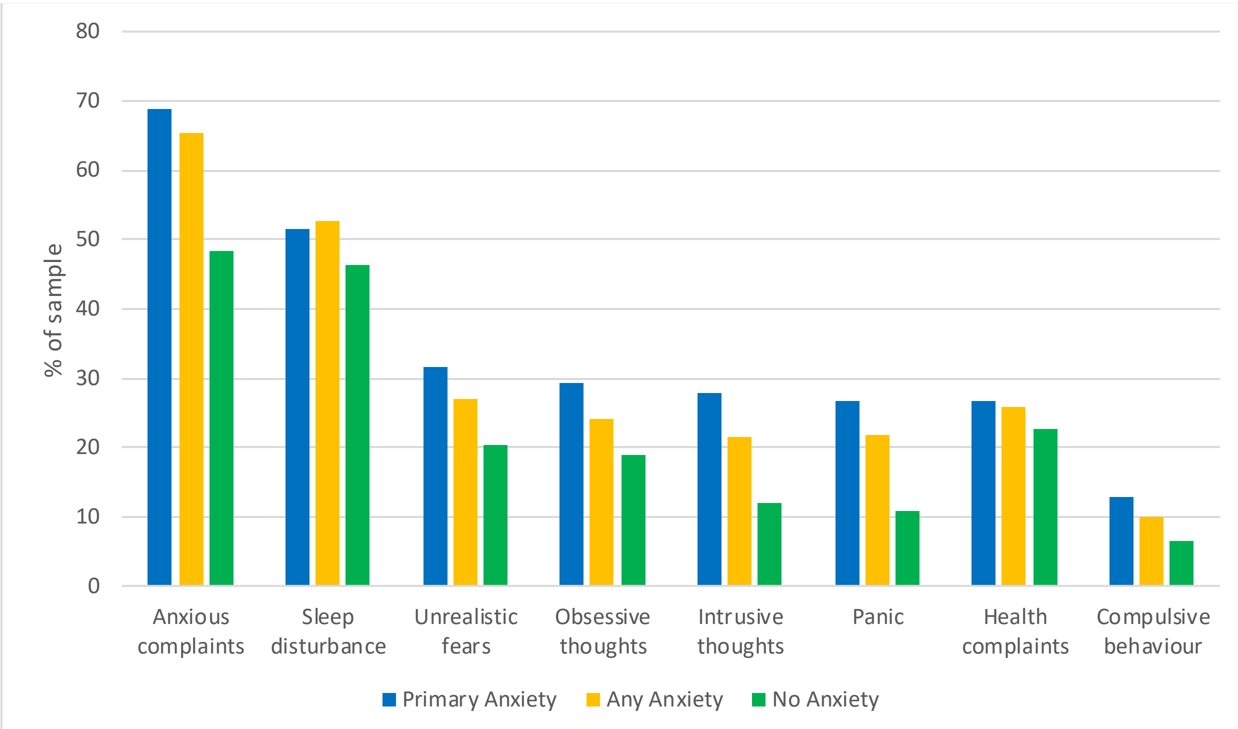

Figure 5. Prevalence of psychological indicators among inpatients with a primary diagnosis of anxiety, any diagnosis of anxiety, and no diagnosis of anxiety, receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

As observed in Figure 5, the most common mental state indicator across all groups was anxious complaints, which occurred in over 60% of those with an anxiety disorder and half of all other inpatients. Sleep disturbance – the second most frequent symptom - was also present in half the overall sample. Unrealistic fears, obsessive thoughts, intrusive thoughts/flashbacks, and episodes of panic were present in roughly one-third of those with a primary anxiety disorder, and over 20% in those with any anxiety disorder. Conversely, for those with no anxiety disorder, unrealistic fears and obsessive thoughts occurred in one-fifth of the sample, while intrusive thoughts and panic were present in one-tenth. Compulsive behavior – the remaining anxiety-specified indicator – was the least common symptom across all groups. The prevalence among those with a primary diagnosis of anxiety and any anxiety disorder was 13% and 10%, respectively. For those with no anxiety disorder, the prevalence was 6%.

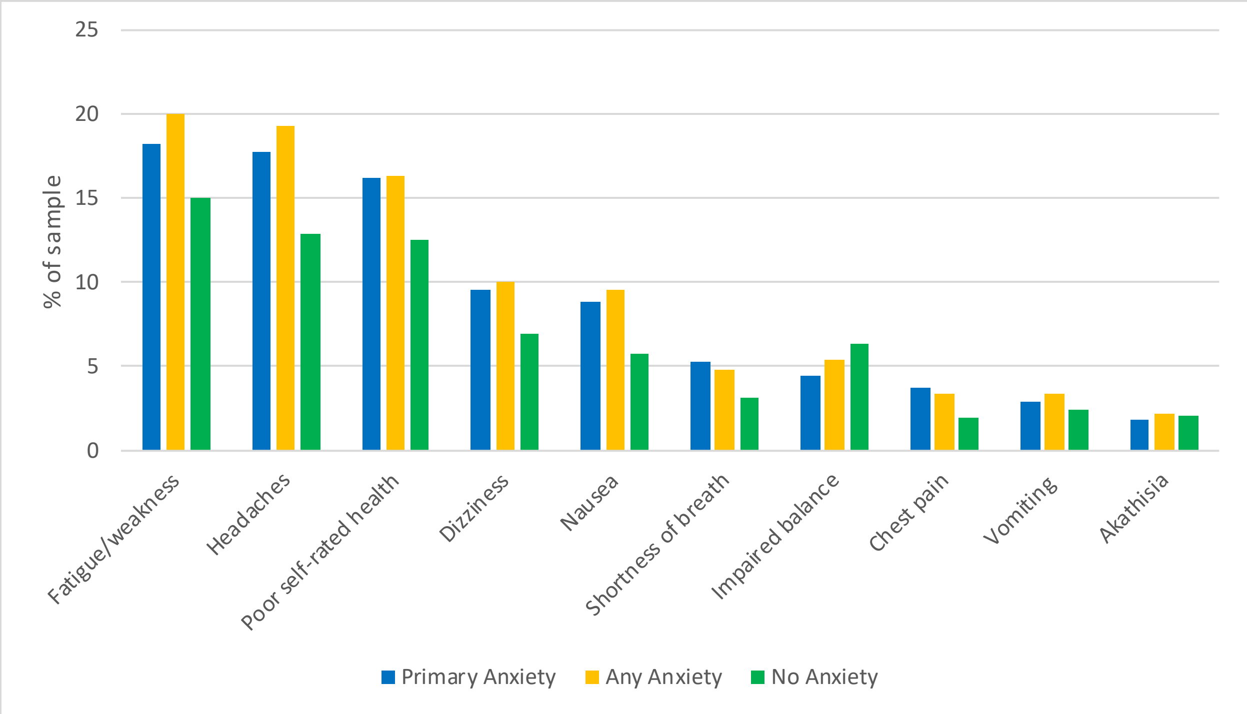

Figure 6. Prevalence of somatic indicators among inpatients with a primary diagnosis of anxiety, any diagnosis of anxiety, and no diagnosis of anxiety, receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Compared to the psychological indicators, the prevalence of somatic indicators in Figure 6 is substantially lower. Fatigue/weakness and headaches were the most frequent health problems across all diagnostic groups. For individuals with anxiety disorders, approximately 20% experienced fatigue/weakness and 19% had headaches. The corresponding prevalence for those without an anxiety disorder was 15% and 13%, respectively. Dizziness and nausea were present in one-tenth of the anxiety disorder sample, and 7% and 6% of those with no anxiety disorder. The remaining somatic indicators were present in 5% or less of the overall sample.

The second question involved comparing the proportion of indicators between groups with and without anxiety disorders. For each indicator, chi-square tests were performed to determine whether a significant difference existed between groups, along with the unadjusted OR value. Both primary anxiety disorders and any anxiety disorders were examined separately. The results are displayed below in Table 24.

Table 24. Odds ratio and chi-square tests for psychological and somatic indicators in predicting primary anxiety disorders among inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Variable	% (n)	Unadjusted OR (95% CI)	Chi-square test
Anxious complaints			
Primary Anxiety Disorder	5.4 (6,584)	2.19 (2.10-2.29)	$\chi 2$ (1) = 1,281.62
Other Primary Disorder	2.6 (2,998)		p<.0001
Unrealistic fears			
Primary Anxiety Disorder	6.0 (3,025)	1.76 (1.68-1.84)	$\chi 2$ (1) = 643.07
Other Primary Disorder	3.5 (6,557)		p<.0001
Obsessive thoughts			
Primary Anxiety Disorder	6.0 (2,814)	1.72 (1.65-1.81)	$\chi 2$ (1) = 575.89
Other Primary Disorder	3.6 (6,768)		p<.0001
Compulsive behavior			
Primary Anxiety Disorder	7.4 (1,227)	2.04 (1.92-2.18)	$\chi 2$ (1) = 530.40
Other Primary Disorder	3.8 (8,355)		p<.0001
Intrusive thoughts			
Primary Anxiety Disorder	8.4 (2,656)	2.63 (2.51-2.75)	$\chi 2$ (1) = 1,786.29
Other Primary Disorder	3.4 (6,926)		p<.0001
Episodes of panic			
Primary Anxiety Disorder	8.7 (2,561)	2.75 (2.63-2.89)	$\chi 2$ (1) = 1,925.51
Other Primary Disorder	3.4 (7,021)		p<.0001
Health complaints			
Primary Anxiety Disorder	4.6 (2,547)	1.21 (1.15-1.27)	$\chi 2$ (1) = 64.32
Other Primary Disorder	3.8 (7,035)		p<.0001
Sleep disturbance			
Primary Anxiety Disorder	4.4 (4,938)	1.20 (1.15-1.25)	$\chi 2$ (1) = 74.10
Other Primary Disorder	3.7 (4,644)		p<.0001
Headaches			
Primary Anxiety Disorder	5.2 (1,703)	1.37 (1.29-1.44)	$\chi 2$ (1) = 130.22
Other Primary Disorder	3.8 (7,879)		p<.0001
Dizziness			
Primary Anxiety Disorder	5.2 (922)	1.35 (1.26-1.45)	$\chi 2$ (1) = 73.38
Other Primary Disorder	3.9 (8,660)		p<.0001

Variable	% (n)	Unadjusted OR (95% CI)	Chi-square test
Shortness of breath			
Primary Anxiety Disorder	6.2 (508)	1.62 (1.48-1.77)	$\chi2$ (1) = 106.65
Other Primary Disorder	4.0 (9,074)		p<.0001
Chest pain			
Primary Anxiety Disorder	6.8 (353)	1.76 (1.57-1.96)	$\chi2$ (1) = 103.58
Other Primary Disorder	4.0 (9,229)		p<.0001
Nausea			
Primary Anxiety Disorder	5.6 (838)	1.45 (1.35-1.56)	$\chi2$ (1) = 100.35
Other Primary Disorder	3.9 (8,744)		p<.0001
Vomiting			
Primary Anxiety Disorder	4.6 (276)	1.15 (1.01-1.30)	$\chi2$ (1) = 4.8
Other Primary Disorder	4.0 (9,306)		p=0.03
Fatigue/weakness			
Primary Anxiety Disorder	4.7 (1,754)	1.21 (1.14-1.27)	$\chi2$ (1) = 48.1
Other Primary Disorder	3.9 (7,828)		p<.0001
Impaired balance			
Primary Anxiety Disorder	2.9 (435)	0.70 (0.64-0.78)	$\chi2$ (1) = 49.53
Other Primary Disorder	4.1 (9,147)		p<.0001
Akathisia			
Primary Anxiety Disorder	3.5 (175)	0.85 (0.73-0.99)	$\chi2$ (1) = 4.17
Other Primary Disorder	4.0 (9,407)		p=.04

Note. Percentages are row percentages for disorder by independent variable (e.g., % of those with a primary anxiety disorder who had the independent variable).

Nearly all the indicators in Table 24 were higher among those with anxiety, with the exception of impaired balance (OR=0.70) and akathisia (OR=0.85). The following variables did not meet the significance criteria of OR=1.50 or higher: health complaints (OR=1.21), sleep disturbance (OR=1.20), headaches (OR=1.37), dizziness (OR=1.35), nausea (OR=1.45), vomiting (OR=1.15), and fatigue/weakness (OR=1.21). The anxiety-specified psychological indicators had greater OR values than health complaints or sleep disturbance. In terms of the somatic indicators, shortness of breath and chest pain had the highest OR values.

Table 25. Odds ratio and chi-square tests for psychological and somatic indicators in predicting any anxiety disorders among inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Variable	% (n)	Unadjusted OR (95% CI)	Chi-square test
Anxious complaints			
Any Anxiety Disorder	18.7 (22,583)	2.01 (1.97-2.06)	$\chi2$ (1) = 3,418.20
No Anxiety Disorder	10.2 (11,982)		p<.0001
Unrealistic fears			
Any Anxiety Disorder	18.6 (9,356)	1.47 (1.43-1.50)	$\chi2$ (1) = 834.42
No Anxiety Disorder	13.4 (25,209)		p<.0001
Obsessive thoughts			
Any Anxiety Disorder	17.8 (8,362)	1.36 (1.32-1.39)	$\chi2$ (1) = 491.87
No Anxiety Disorder	13.7 (26,203)		p<.0001
Compulsive behavior			
Any Anxiety Disorder	20.7 (3,421)	1.59 (1.53-1.66)	$\chi2$ (1) = 545.15
No Anxiety Disorder	14.1 (31,144)		p<.0001
Intrusive thoughts			
Any Anxiety Disorder	23.3 (7,407)	2.01 (1.95-2.07)	$\chi2$ (1) = 2,290.54
No Anxiety Disorder	13.2 (27,158)		p<.0001
Episodes of panic			
Any Anxiety Disorder	25.8 (7,557)	2.34 (2.27-2.41)	$\chi2$ (1) = 3,426.29
No Anxiety Disorder	13.0 (27,008)		p<.0001
Health complaints			
Any Anxiety Disorder	16.2 (8,950)	1.19 (1.16-1.22)	$\chi2$ (1) = 165.49
No Anxiety Disorder	14.0 (25,615)		p<.0001
Sleep disturbance			
Any Anxiety Disorder	16.2 (18,240)	1.30 (1.27-1.33)	$\chi2$ (1) = 497.45
No Anxiety Disorder	13.0 (16,325)		p<.0001
Headaches			
Any Anxiety Disorder	20.3 (6,672)	1.61 (1.57-1.67)	$\chi2$ (1) = 1,016.28
No Anxiety Disorder	13.6 (27,893)		p<.0001
Dizziness			
Any Anxiety Disorder	20.0 (3,508)	1.52 (1.47-1.58)	$\chi2$ (1) = 453.35
No Anxiety Disorder	14.1 (31,057)		p<.0001

Variable	% (n)	Unadjusted OR (95% CI)	Chi-square test
Shortness of breath			
Any Anxiety Disorder	20.6 (1,677)	1.55 (1.47-1.64)	$\chi2$ (1) = 249.90
No Anxiety Disorder	14.3 (32,888)		p<.0001
Chest pain			
Any Anxiety Disorder	22.6 (1,179)	1.74 (1.63-1.86)	$\chi2$ (1) = 280.02
No Anxiety Disorder	14.3 (33,386)		p<.0001
Vomiting			
Any Anxiety Disorder	19.6 (1,185)	1.45 (1.36-1.55)	$\chi2$ (1) = 130.31
No Anxiety Disorder	14.4 (33,380)		p<.0001
Nausea			
Any Anxiety Disorder	22.2 (3,325)	1.75 (1.68-1.82)	$\chi2$ (1) = 750.26
No Anxiety Disorder	14.0 (31,240)		p<.0001
Fatigue/weakness			
Any Anxiety Disorder	18.4 (6,915)	1.41 (1.37-1.45)	$\chi2$ (1) = 545.04
No Anxiety Disorder	13.8 (27,650)		p<.0001
Impaired balance			
Any Anxiety Disorder	12.6 (1,877)	0.84 (0.80-0.88)	$\chi2$ (1) = 45.73
No Anxiety Disorder	14.7 (32,688)		p<.0001
Akathisia			
Any Anxiety Disorder	14.8 (749)	1.03 (0.95-1.11)	$\chi2$ (1) = 0.41
No Anxiety Disorder	14.5 (33,816)		p=0.52

Note. Percentages are row percentages for disorder by independent variable (e.g., % of those with any anxiety disorder who had the independent variable).

In Table 25, the only variable that was not higher among those with anxiety was impaired balance (OR=0.84). In terms of the clinical significance criterion of OR=1.50, the following variables were deemed inadequate: unrealistic fears (OR=1.47), obsessive thoughts (OR=1.36), health complaints (OR=1.19), sleep disturbance (OR=1.30), vomiting (OR=1.45), fatigue/weakness (OR=1.41), and akathisia (OR=1.03). In contrast to the bivariate analysis of primary anxiety disorders, two of the anxiety-specified indicators were considered insignificant in the any anxiety disorder group (unrealistic fears and obsessive thoughts).

Variables were selected for the factor analytic stage if they met the significance criteria of OR=1.50 in either the primary anxiety or any anxiety groups. Based on that, the following variables were dropped from further analysis: health complaints, sleep disturbance, vomiting, fatigue/weakness, impaired balance, and akathisia.

3.3.2 Exploratory factor analysis

Prior to running factor analytic models, sample size requirements were addressed first. Guidelines for sample size in EFA are at least 300 participants, or a participant-to-item ratio of at least 3:1 (Worthington & Whittaker, 2006). The sample size for the psychiatric hospital dataset is N=237,862 individuals and 11 items were included for testing, which is a ratio of roughly 21,623:1 participants-to-items. The Kaiser-Meyer-Olkin measure of sampling adequacy was also tested for the full 11-item model. A good value for sampling adequacy is above 0.80, but the 0.75 estimate achieved in this sample is still considered sufficient (SAS, 2013). Since the sample size far exceeded the recommended guidelines, returned an appropriate Kaiser-Meyer-Olkin sampling adequacy estimate, and is representative of all adults admitted to psychiatric hospitals in Ontario, the sample was deemed appropriate for factor analysis.

The first exploratory model examined was a unidimensional test of the variables selected from the bivariate analyses. The correlation matrix is provided below in Table 26. A polychoric correlation matrix was also created for hierarchical and second-order factor models to account for the ordinal structure of variables, and those results are available by request.

Table 26. Pearson's correlation matrix of items entered in a unidimensional EFA for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Variables	Complaints	Fears	Obsessive	Compulsive	Intrusive	Panic	Headaches	Dizziness	Short breath	Chest pain	Nausea
Complaints	**1.00**	0.31	0.23	0.12	0.16	0.23	0.08	0.06	0.04	0.05	0.07
Fears	0.31	**1.00**	0.42	0.20	0.28	0.32	0.04	0.07	0.04	0.05	0.03
Obsessive	0.23	0.42	**1.00**	0.34	0.32	0.27	0.03	0.06	0.03	0.04	0.02
Compulsive	0.12	0.20	0.34	**1.00**	0.20	0.19	0.01	0.02	0.02	0.02	0.01
Intrusive	0.16	0.28	0.32	0.20	**1.00**	0.31	0.08	0.08	0.04	0.05	0.05
Panic	0.23	0.32	0.27	0.19	0.31	**1.00**	0.08	0.10	0.08	0.08	0.07
Headaches	0.08	0.04	0.03	0.01	0.08	0.08	**1.00**	0.29	0.14	0.15	0.26
Dizziness	0.06	0.07	0.06	0.02	0.08	0.10	0.29	**1.00**	0.22	0.22	0.27
Short breath	0.04	0.04	0.03	0.02	0.04	0.08	0.14	0.22	**1.00**	0.33	0.13
Chest pain	0.05	0.05	0.04	0.02	0.05	0.08	0.15	0.22	0.33	**1.00**	0.15
Nausea	0.07	0.03	0.02	0.01	0.05	0.07	0.26	0.27	0.13	0.15	**1.00**

Note. Since response codes varies between mental state indicators (0-3) and health conditions (0-2), the correlation matrix is preferred to the covariance matrix.

The Cronbach's alpha for the full 11-item correlation matrix in Table 26 was α=0.63. Given the minimum convention of α=0.70 (Schmitt, 1996), the 11-item scale does not have appropriate internal consistency reliability. The greatest inter-item correlation in Table 26 was observed between fears/phobias and obsessive thoughts (*r*=0.42). In general, items that were categorized as psychological symptoms of anxiety tended to be more highly correlated with one another, while the same was true for the somatic health items. The range of correlation values for psychological symptoms was *r*=0.12-0.42, while for somatic symptoms, it was *r*=0.13-0.33. Overall, the range of correlation values are small-to-medium in size (Cohen, 1988), though small correlations are not unusual in psychological assessment research (Hemphill, 2003).

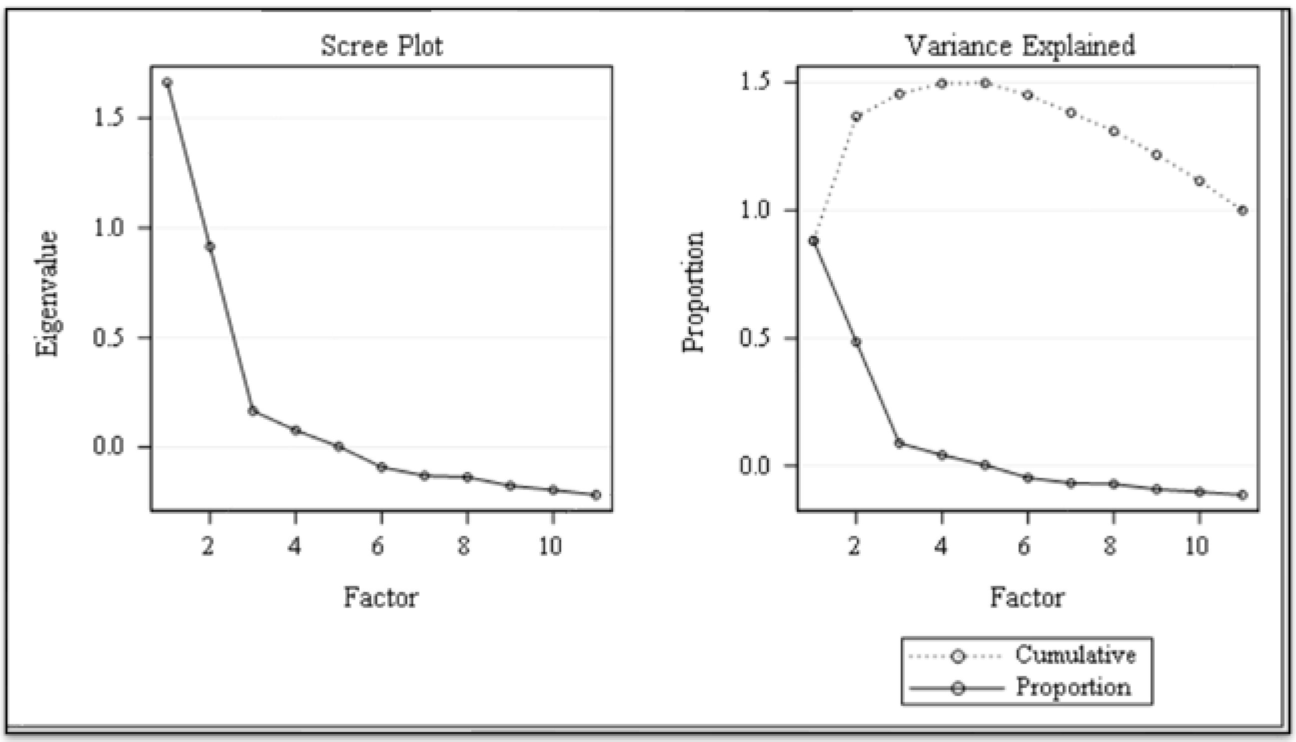

Figure 7. Scree plot of the number of factors in a unidimensional EFA of anxious symptoms for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

To determine how many factors to retain, the eigenvalues were consulted. The eigenvalue for the first factor was 1.66 and for the second, 0.91. Given that only one factor had an eigenvalue above 1.00, this supports a unidimensional model structure. However, the scree plot, illustrated in Figure 7, demonstrates potential for a second factor. Although the second factor does not have an eigenvalue above 1.00, the curve of the scree plot does not begin to break off until the third factor, suggesting that a second factor may account for a substantial amount of remaining measurement variance.

Table 27. Factor loadings and final communality estimates for a unidimensional EFA of psychological and somatic symptoms for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Psychological/Somatic Indicator	Factor Loading	Final Communality Estimate
Anxious complaints	0.41	0.17
Fears/phobias	0.59	0.35
Obsessive thoughts	0.60	0.35
Compulsive behaviours	0.37	0.14
Intrusive thoughts/flashbacks	0.49	0.24
Episodes of panic	0.52	0.27
Headaches	0.19	0.04
Dizziness	0.23	0.05
Shortness of breath	0.17	0.03
Chest pain/pressure	0.18	0.03
Nausea	0.17	0.03

Note. Unweighted least squares estimation method was used to derive factor loadings.

The factor loadings and final communality estimates for the 11-item, unidimensional model are provided above in Table 27. The final total communality estimate was 1.70, with higher estimates among the psychological versus the somatic items. Since the somatic items had low factor loadings (≤ 0.23), a unidimensional scale containing only the psychological items may be a better representation of the data. Regardless, since the scree plot suggested that there may be two factors, a set of two-factor EFA models were tested in addition to a unidimensional factor.

Three two-factor EFA models were run with different types of rotations: orthogonal varimax, oblique varimax, and oblique promax. The results of the orthogonal and oblique varimax solutions are presented below. Since the results of the oblique promax did not differ substantially from the oblique varimax they are not reported here; however, those results are available upon request.

Table 28. Factor structure of a rotated orthogonal varimax with two factors representing psychological and somatic symptoms for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Psychological/Somatic Indicator	Factor 1 (Psychological symptoms)	Factor 2 (Somatic symptoms)	Final communality estimates
Anxious complaints	0.40	0.09	0.16
Fears/phobias	0.62	0.04	0.39
Obsessive thoughts	0.66	0.00	0.43
Compulsive behaviours	0.40	-0.01	0.16
Intrusive thoughts/flashbacks	0.48	0.08	0.24
Episodes of panic	0.50	0.13	0.26
Headaches	0.05	0.46	0.21
Dizziness	0.07	0.56	0.32
Shortness of breath	0.04	0.42	0.18
Chest pain/pressure	0.05	0.43	0.19
Nausea	0.03	0.44	0.19

Note. Unweighted least squares (ULS) estimation method with an orthogonal rotation.

The orthogonal factor structure shows that psychological symptoms loaded highly onto the first factor, whereas somatic symptoms loaded highly onto the second factor. The Cronbach's alpha for the psychological symptom subscale was α=0.68, while the coefficient for the somatic symptom subscale was α=0.58. Since the psychological symptom subscale approaches the Cronbach's alpha minimum standard of 0.70 (Schmitt, 1996), this further supports a unidimensional model of psychological symptoms alone. The factor loadings for all items were above 0.40 on their respective factors and had cross-loadings $\leq$ 0.13, indicating good construct validity (O'Rourke & Hatcher, 2014). The final communality estimate was 2.76. The first factor explained 1.64 of the total variance (59%), whereas the second factor explained 1.12 (41%).

Table 29. Factor structure of the rotated oblique varimax with two factors representing psychological and somatic symptoms for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Psychological/Somatic indicator	Factor 1 (Psychological symptoms)	Factor 2 (somatic symptoms)	Final communality estimates
Anxious complaints	0.40	0.12	0.16
Fears/phobias	0.62	0.09	0.39
Obsessive thoughts	0.66	0.05	0.43
Compulsive behaviours	0.40	0.02	0.16
Intrusive thoughts/flashbacks	0.49	0.12	0.24
Episodes of panic	0.51	0.17	0.26
Headaches	0.08	0.46	0.21
Dizziness	0.10	0.57	0.32
Shortness of breath	0.06	0.42	0.18
Chest pain/pressure	0.08	0.44	0.19
Nausea	0.06	0.44	0.19

Note. Priors estimated using SMC. Factor loadings based on the rotated correlation matrix.

Like the orthogonal varimax factor structure, the oblique varimax clearly separated psychological symptoms (Factor 1) from somatic symptoms (Factor 2). Primary factor loadings were above 0.40 for all items and cross-loadings were $\leq$ 0.17, indicating good construct validity. The final total communality estimate was 2.76. The first factor explained 1.67 of that variance (60%) and the second factor explained 1.17 (40%). The inter-factor correlation between the psychological and somatic factors was 0.14, which is a small correlation (Cohen, 1988).

After reviewing the EFA models, it was hypothesized that a unidimensional factor comprised only of psychological items would provide the best model fit for the data. Given that the factor loadings for all psychological items were at least 0.40 across all models, except for compulsive behaviour in the unidimensional EFA with all items (0.37), all items were retained for the CFA phase. Similarly, for alternative CFA models containing somatic items, all items were retained from the EFA.

3.3.3 Confirmatory factor analysis

To test the theory that a unidimensional factor of psychological items would provide the best model fit, the following CFA models were conducted: unidimensional (psychological items only), unidimensional (all items), uncorrelated factors, and correlated factors. To be consistent with CFA models tested on other anxiety scales in the literature review, higher order and bifactor models were also examined. Since the results of these models did not provide substantial contributions to the anxiety scale in this study, the data for them are available on request.

Beginning with the unidimensional model containing only psychological symptoms, the unstandardized path diagram is provided below in Figure 8.

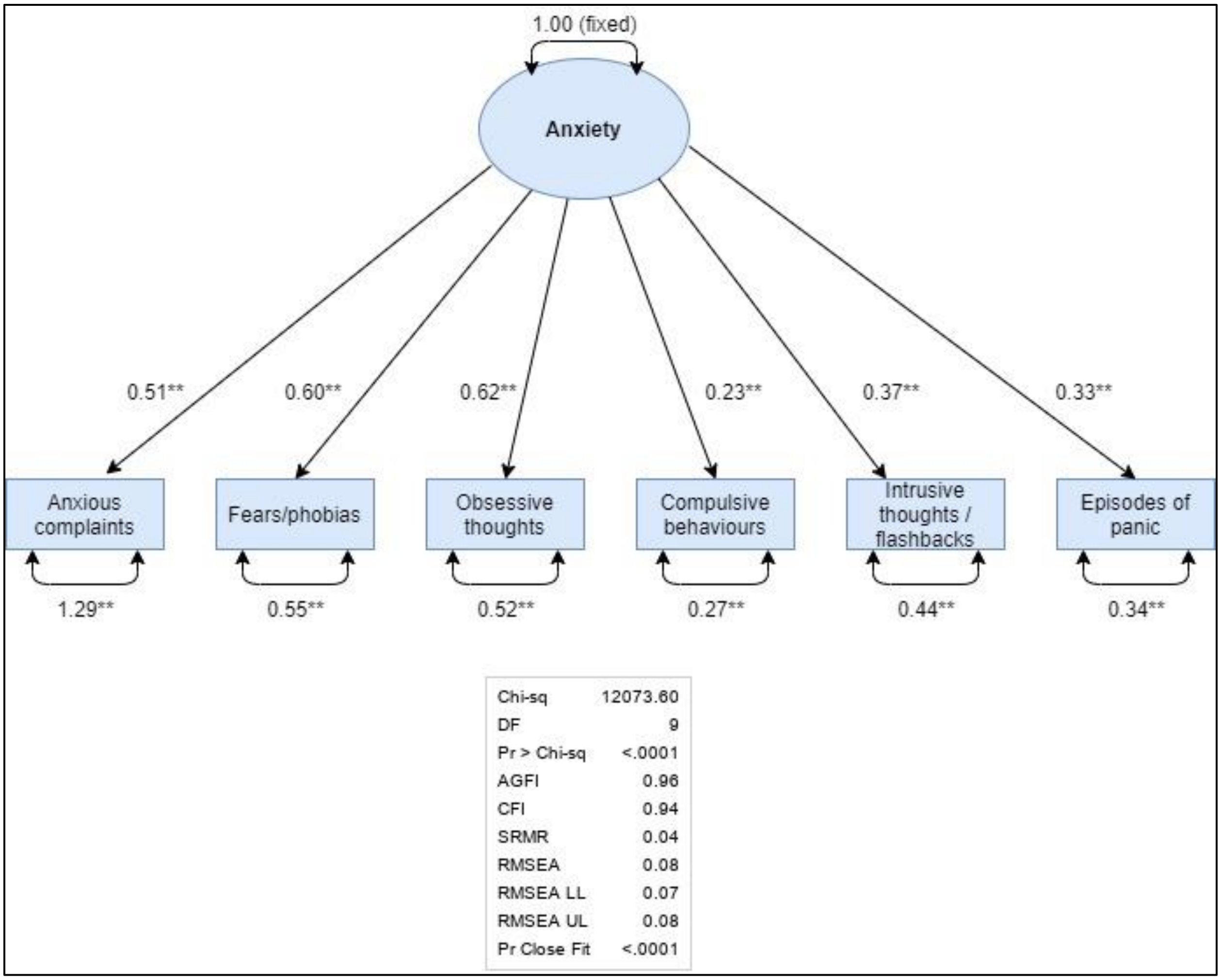

Figure 8. Unidimensional CFA with least-squares maximum likelihood estimation of psychological symptoms for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The unstandardized factor loadings are provided on the pathways leading from the latent anxiety factor to the measured items, while the error variance is written below the measured items. By standardizing the estimates - accomplished by subtracting each individual score on a variable from the mean score and then dividing by the standard deviation - the scaling of each item becomes comparable, and the covariance matrix is transformed into the correlation matrix. As a result, the factor loadings represent the degree of correlation between the measured item and the latent factor. The standardized factor loadings and the corresponding proportion of variance accounted for by the latent factor for each variable are as follows: anxious complaints (0.41, 17%), fears/phobias (0.63, 39%), obsessive thoughts (0.65, 42%), compulsive behaviour (0.41, 17%), intrusive thoughts/flashbacks (0.49, 24%), and episodes of panic (0.50, 25%).

Model fit statistics are also displayed in Figure 8. The chi-square value is statistically significant (χ^2=12,073.60, p<.0001), indicating that the expected covariance matrix deviates from the observed matrix. However, because the sample size is large (n=237,862), it is possible that statistical significance is the result of a Type 1 error and that all models tested will return a p-value less than 0.0001. The CFI value exceeds the convention of 0.90 (CFI=0.94), though the RMSEA is above the recommended value of 0.06 (RMSEA=0.08).

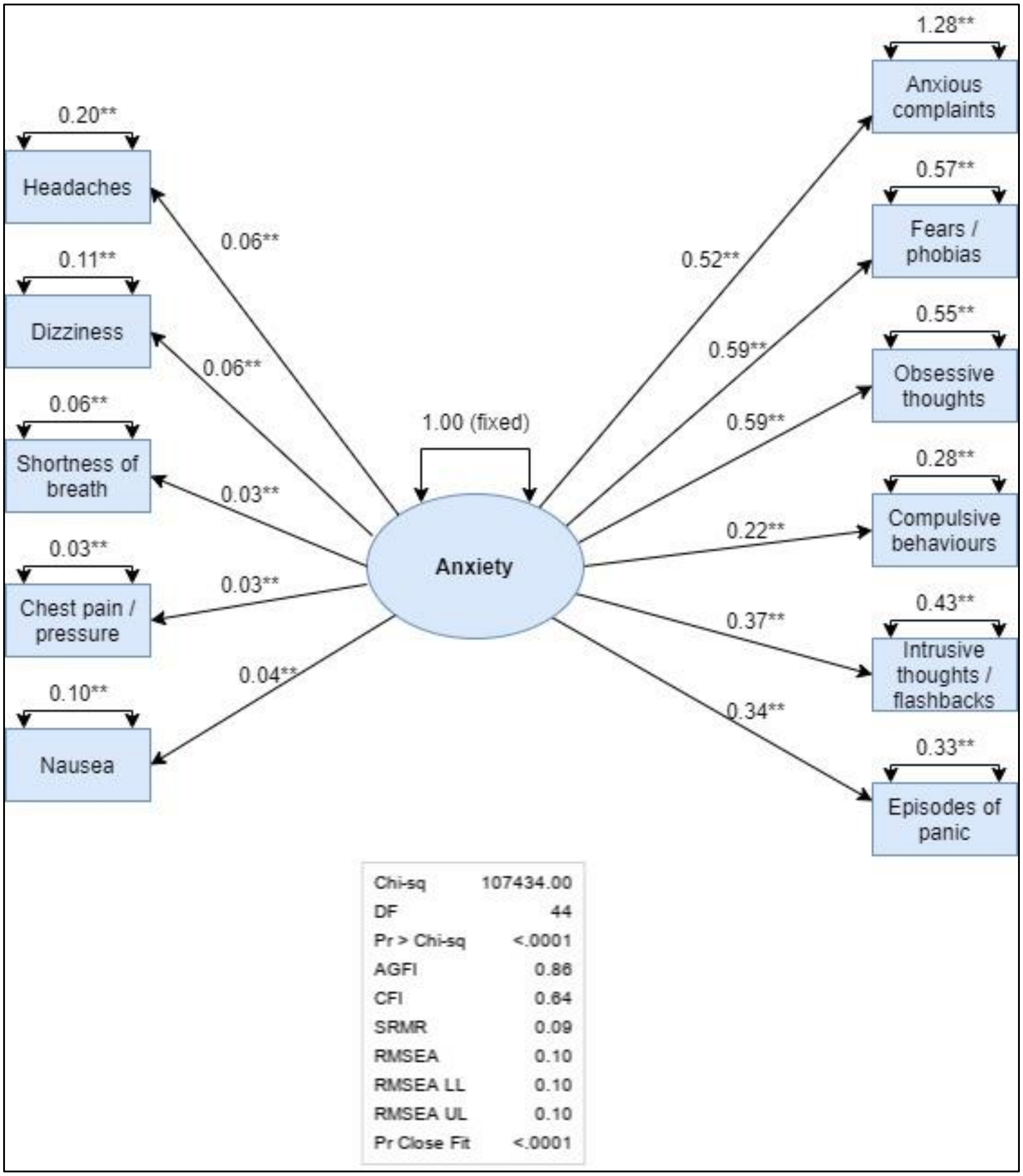

Figure 9. Unstandardized unidimensional factor model containing psychological and somatic symptoms for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The unidimensional model containing psychological and somatic items is presented above in Figure 9. The standardized factor loadings and proportion of variance explained for each variable are: anxious complaints (0.41, 17%), fears/phobias (0.62, 38%), obsessive thoughts

(0.63, 39%), compulsive behaviours (0.39, 15%), intrusive thoughts/flashbacks (0.49, 24%), episodes of panic (0.51, 26%), headaches (0.14, 2%), dizziness (0.18, 3%), shortness of breath (0.12, 2%), chest pain/pressure (0.14, 2%), and nausea (0.12, 2%). The model fit statistics are inadequate for this model. The chi-square test is once again significant (χ^2=107,434.00, p<.0001). The CFI is 0.64 and the RMSEA is 0.10, both of which fail to meet conventional standards of acceptability.

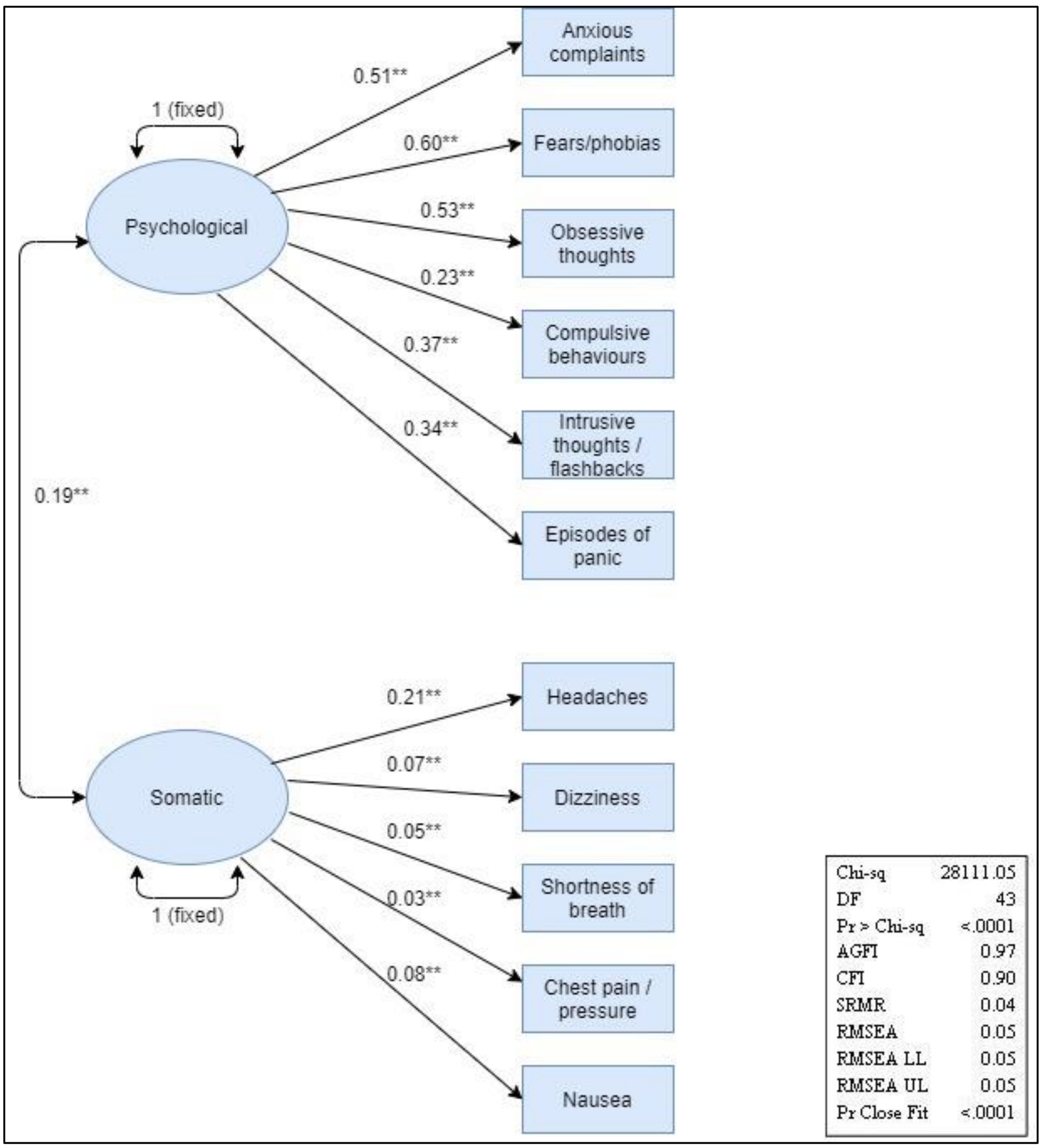

Figure 10. Unstandardized correlated factors model with psychological and somatic factors for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

As shown above in Figure 10, the correlated factors model separates psychological from somatic items while allowing the two latent factors to share a correlation (*r*=.19). The standardized factor loadings and proportion of variance explained for the psychological items were as follows: anxious complaints (0.41, 17%), fears/phobias (0.63, 39%), obsessive thoughts (0.65, 42%), compulsive behaviours (0.40, 16%), intrusive thoughts/flashbacks (0.49, 24%), episodes of panic (0.50, 26%). For somatic items, the same metrics were as follows: headaches (0.47, 22%), dizziness (0.58, 33%), shortness of breath (0.42, 17%), chest pain/pressure (0.43, 18%), and nausea (0.44, 19%). Like previous models, the chi-square test of the correlated models is significant (χ^2=28,111.05, p<.0001). The CFI=0.90 and the RMSEA=0.05, which are the conventional standards for acceptability.

An uncorrelated factors model was also tested, which yielded similar factor loadings to those obtained in the correlated factors model. In terms of fit statistics, the CFI=0.89 and the RMSEA=0.06, which is slightly less optimal than the correlated factors model.

Table 30. Model fit statistics for competing CFA models containing psychological and/or somatic symptoms for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Model	CFI	RMSEA	AIC	BIC
Unidimensional (psychological items only)	**0.94**	0.08	**12,099.60**	**12,234.53**
Unidimensional (psychological and somatic items)	0.64	0.10	107,480.0	107,718.72
Uncorrelated factors	0.89	0.06	31,911.53	32,139.88
Correlated factors	0.90	**0.05**	28,157.05	28,395.78

Note. For the CFI, values $\geq$ 0.90 are better. For the RMSEA, values $\leq$ 0.06 are better. For the AIC and BIC, lower values are better. Values that are in bold are the best compared to other models.

Comparing the model fit statistics in Table 30, the unidimensional model containing only psychological items provided the best overall fit for the data. Given that the results from the EFA initially supported a unidimensional model of psychological items, this was selected as the best model candidate for further testing.

3.3.4 Item response theory

After reviewing the results from the EFA and CFA, a unidimensional model of psychological items was the best candidate. To further investigate how each item functioned as part of the overall scale, descriptive IRT analysis was performed. Since a one-factor model was being tested, the default options provided by SAS for an IRT model with binary variables were used.

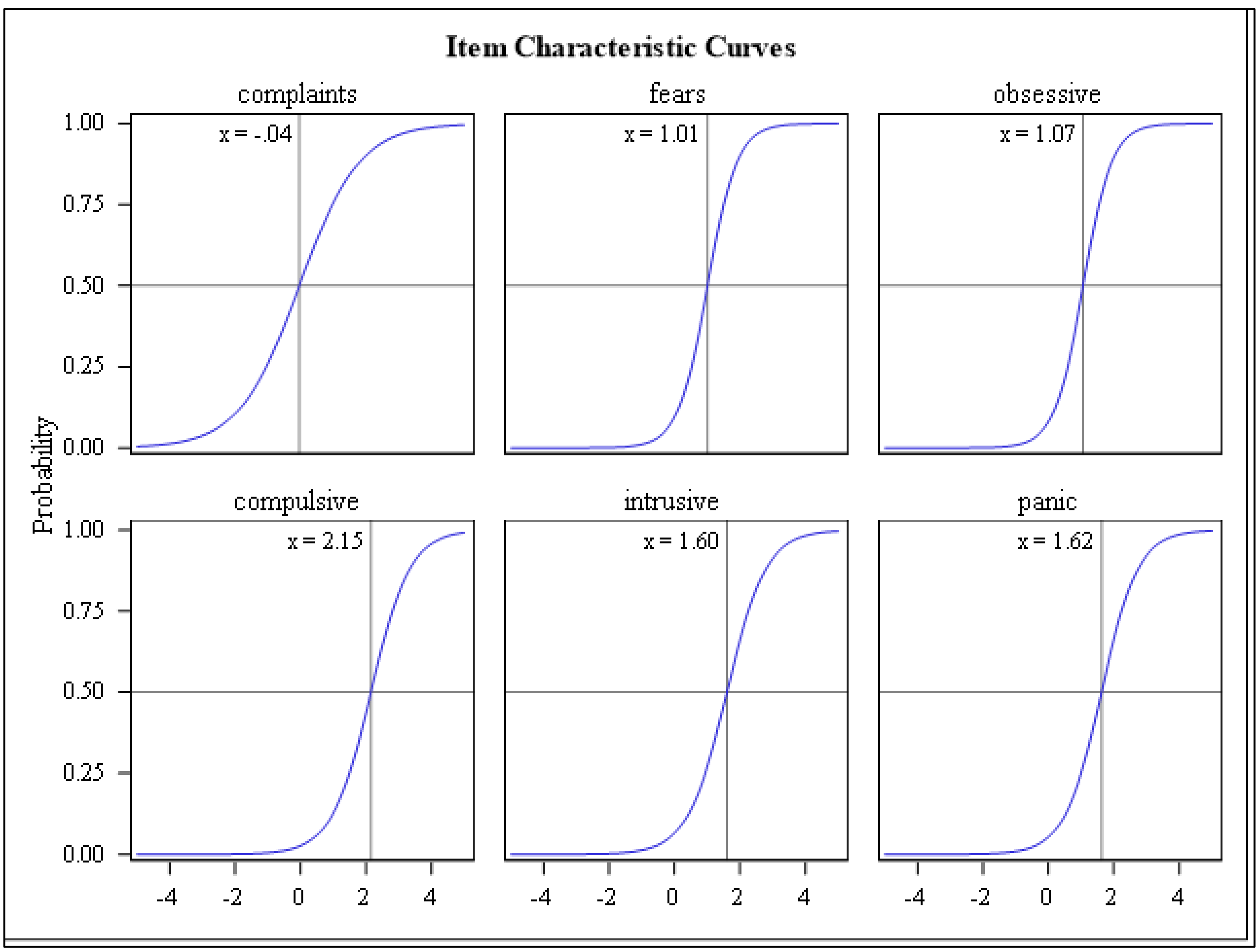

Figure 11. Item characteristic curves for psychological symptoms of anxiety for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The ICCs for psychological symptoms of anxiety are illustrated above in Figure 11, with 'x' denoting the item difficulty parameter. Difficulty parameters are given at the top of the chart for each item and range from x=-0.04 to x=2.15, which falls within the conventional range of -3.0 to 3.0 (Toland, 2013). Anxious complaints were the easiest item to endorse, with a 50% probability of having the symptom at the mean level of the anxiety trait. This finding corresponds to the relatively high frequency of anxious complaints found in the bivariate analysis, which were common even among those without an anxiety disorder. Conversely, the most difficult item was compulsive behaviour, which had a 50% chance of occurring at 2 SDs above the mean level of anxiety. Compulsive behaviour was also the rarest symptom observed in the bivariate analysis. Fears/phobias and obsessive thoughts had a difficulty level of around 1 SD above the mean, while intrusive thoughts and episodes of panic were around 1.5 SDs, representing intermediate difficulty. These results are similar to those obtained from the CFA, where the lowest factor loadings belonged to compulsive behaviour and anxious complaints.

In addition to difficulty estimates, the slope parameters for each item are as follows: anxious complaints (1.09), fears/phobias (2.23), obsessive thoughts (2.30), compulsive behaviour (1.68), intrusive thoughts (1.67), and episodes of panic (1.78). The values of all items are within the common range of 0.5 to 3.0 (Baker, 2001; Toland, 2013), indicating that none of the items are problematic or should be deleted to enhance discrimination (SAS, 2019). The items with the steepest slopes were fears/phobias and obsessive thoughts, meaning that they are better at differentiating between different levels of the underlying anxiety trait. The item with the lowest slope parameter was anxious complaints, suggesting it shares the weakest association with latent anxiety.

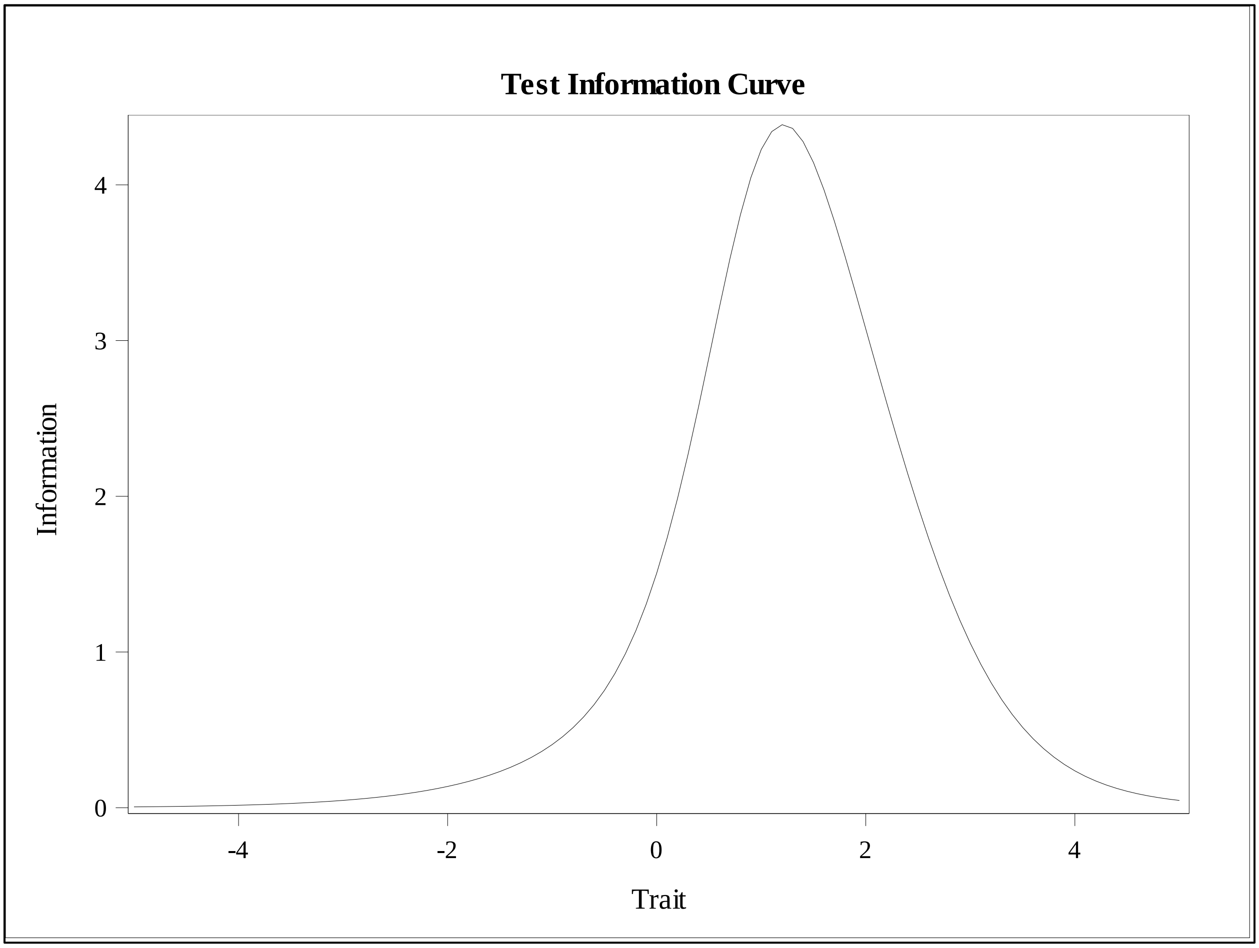

Figure 12. Test information curve for psychological symptoms of anxiety for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The test information curve for the scale as a whole is presented in Figure 12. The results of this curve indicate that the anxiety scale is skewed towards discriminating those with a higher level of the anxiety trait and does not function as well at identifying those with average or lower levels of anxiety. For use in a clinical population, a narrow TIC on the right-hand side of the distribution is an appropriate reflection of its intended purpose.

3.3.5 Latent class analysis

Since the IRT analysis revealed that discrimination and difficulty parameters varied across the six psychological indicators of anxiety, they were entered into an LCA analysis to investigate how they might be organized to form distinct classes of anxiety subgroups. As explained in the methods section, a different derivation sample was used only to arrive at class solutions for anxiety symptoms, not to test the resulting scale. The number of latent classes to be tested was set at 1-8, and for each model, 100 iterations were run to obtain the best likelihood ratio estimate. Model fit statistics for the number of classes are plotted below in Figure 13.

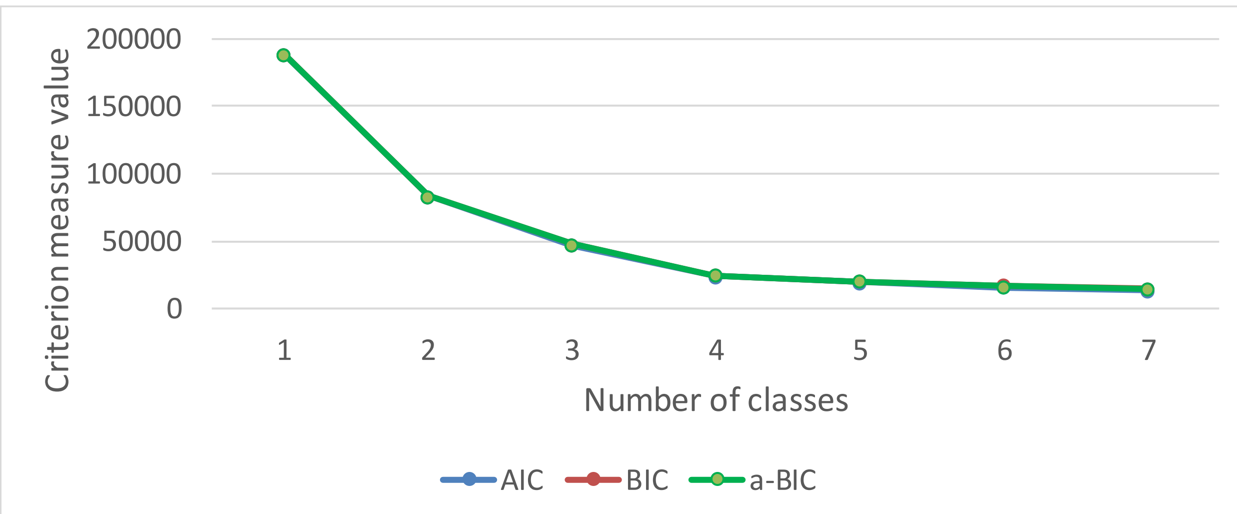

Figure 13. AIC, BIC, and a-BIC values for each of 1-7 latent classes containing psychological symptoms of anxiety for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=190,034).

A visual inspection of Figure 13, which operates similarly to a scree plot in factor analysis, revealed that fit statistics were noticeably smaller for 4 classes compared to 3, without substantial improvement afterwards. Therefore, the optimal number of latent classes for the dataset was 4 and so this number was selected for the remaining LCA tests. The latent class and item-response probabilities of variables in each class are provided below in Figure 14.

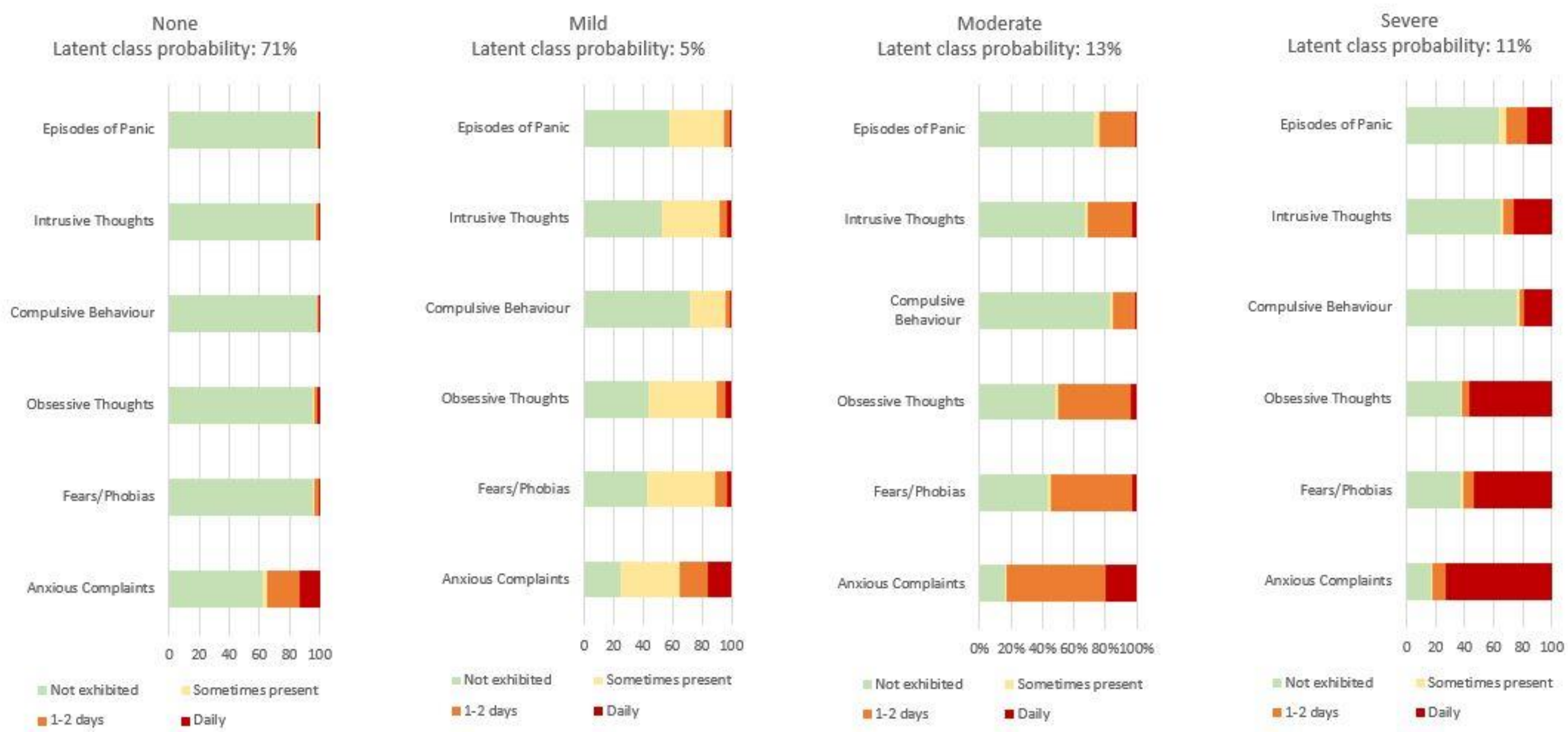

Figure 14. Latent class and item-response probabilities for the observed frequency of psychological symptoms of anxiety across four latent classes for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=190,034).

Overall, the pattern of symptom probabilities – irrespective of their frequency – was the same across all classes. For instance, anxious complaints always had the highest probability of being present while compulsive behaviour had the lowest, which is consistent with the results from the bivariate and IRT analyses. Since classes were not formulated based on combinations of different symptoms, this suggests that an anxiety scale is applicable across diagnostic subtypes. Instead, the primary difference detected by the item-response probabilities across classes was related to symptom frequency. Beginning with class 4 (none) – the most prevalent latent class – this group appeared to be characterized by an absence of most anxiety symptoms. The exception was repetitive anxious complaints, which still occurred 38% of the time, suggesting an alternative class where no anxiety symptoms are present aside from complaints. The class with the second highest prevalence was class 1 (moderate). The characterizing pattern for this class was a symptom frequency of 1-2 days during the 3-day observation period. The third most prevalent was class 2 (severe), with a higher probability of symptoms occurring daily relative to other groups. Lastly, class 3 (mild) had the lowest prevalence, with symptoms present but not exhibited during the period of observation. Altogether, these results suggest that an alternative anxiety scale is a class-based structure corresponding to severity levels.

3.3.6 Decision tree models

Based on the results of the factor analysis, it was decided that three types of additive scales would be input into the decision tree dataset as predictor variables, each with two versions: one where variables in the scale were kept in their original ordinal format and one where variables were collapsed into binary 'present/absent' categories. One type of scale was a combination of the six psychological indicators of anxiety, which was the best candidate model in the factor analysis. Another scale containing only the five somatic indicators was also entered, to determine if certain combinations of psychological and somatic indicators were related to anxiety diagnoses. The final type of scale was a combination of both psychological and somatic indicators. The remaining predictor variables in the decision tree dataset were the individual psychological and somatic indicators, each in their original ordinal format.

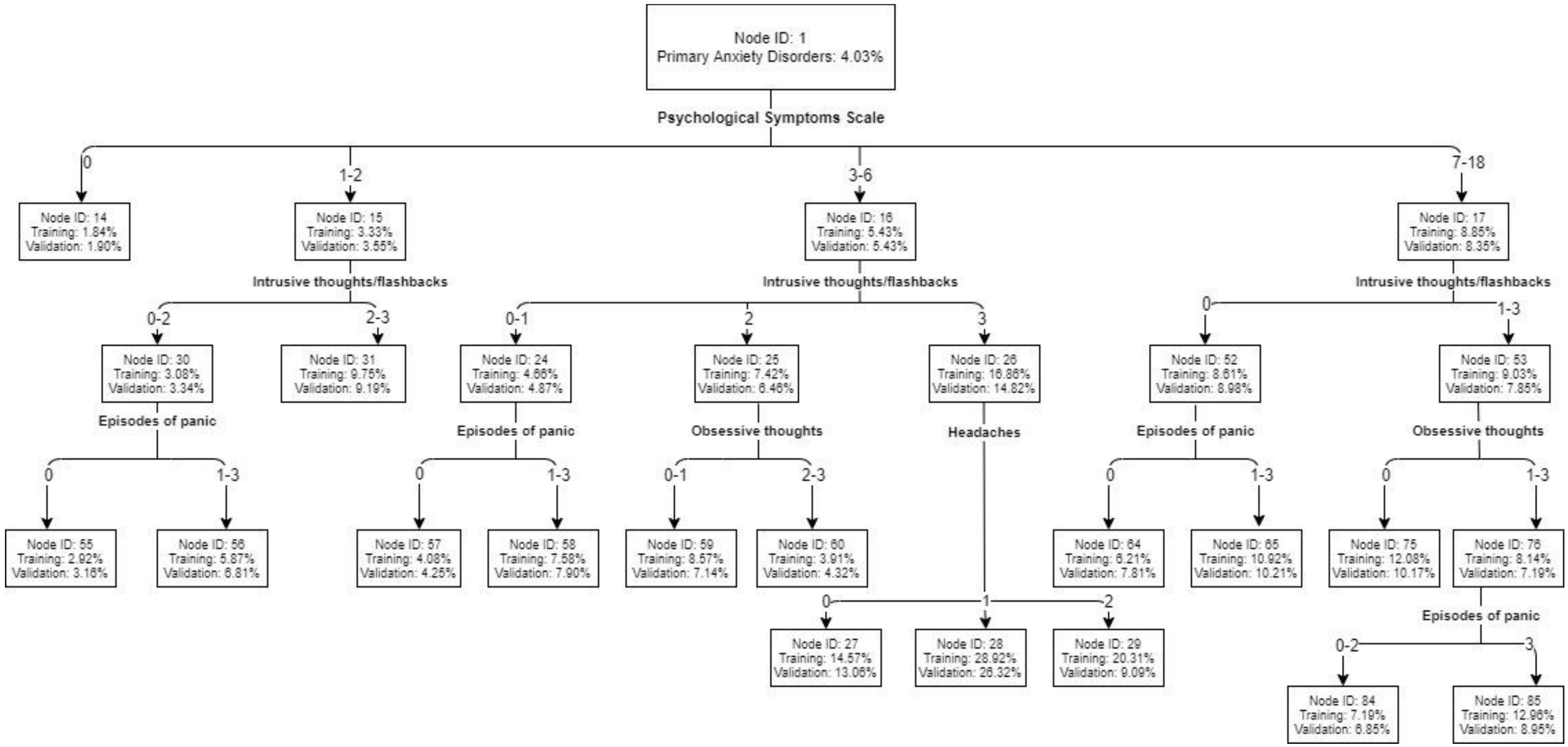

Figure 15. Interactive decision tree model predicting primary diagnoses of anxiety for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The first target variable that was tested was a primary diagnosis of anxiety. The interactive-designed algorithm is depicted in Figure 15, and the automatic decision tree generated by the SAS program is available upon request. The most important variable in predicting primary anxiety disorders was the continuous anxiety scale consisting of psychological indicators. A four-way split on the scale was chosen, corresponding with scores of 0, 1-2, 3-6, and 7-18. Since the ‘0’ score category contained a small percentage of those with a primary anxiety disorder (1.9% of the validation sample), no further splits were chosen. For the remaining nodes, the next most important variable was intrusive thoughts/flashbacks. Beyond that, three more variables appeared as important branching points: obsessive thoughts, episodes of panic, and - in one instance - headaches. Where intrusive thoughts/flashbacks occurred less often, greater frequency of episodes of panic led to an increase in primary anxiety disorders, probably reflecting panic disorder. Similarly, the proportion of primary anxiety disorders were greater when intrusive thoughts/flashbacks were present without any obsessive thoughts, likely differentiating PTSD.

In most cases, the training and validation percentages were similar to each other, indicating a stable algorithm. A notable exception is node 29, where the training percentage was 20.3% and the validation was 9.1%. The range of validation percentages for predicting primary anxiety disorders was between 1.9% to 14.8%. This means that in the lowest scoring branch, as few as 1.9% of the subsample still had a primary anxiety diagnosis, whereas in the higher scoring branches, as many as 14.8% of the subsample had the diagnosis. Considering the primary anxiety disorder prevalence was 4.0%, the scale demonstrates a good ability to differentiate between those with and without primary anxiety disorders.

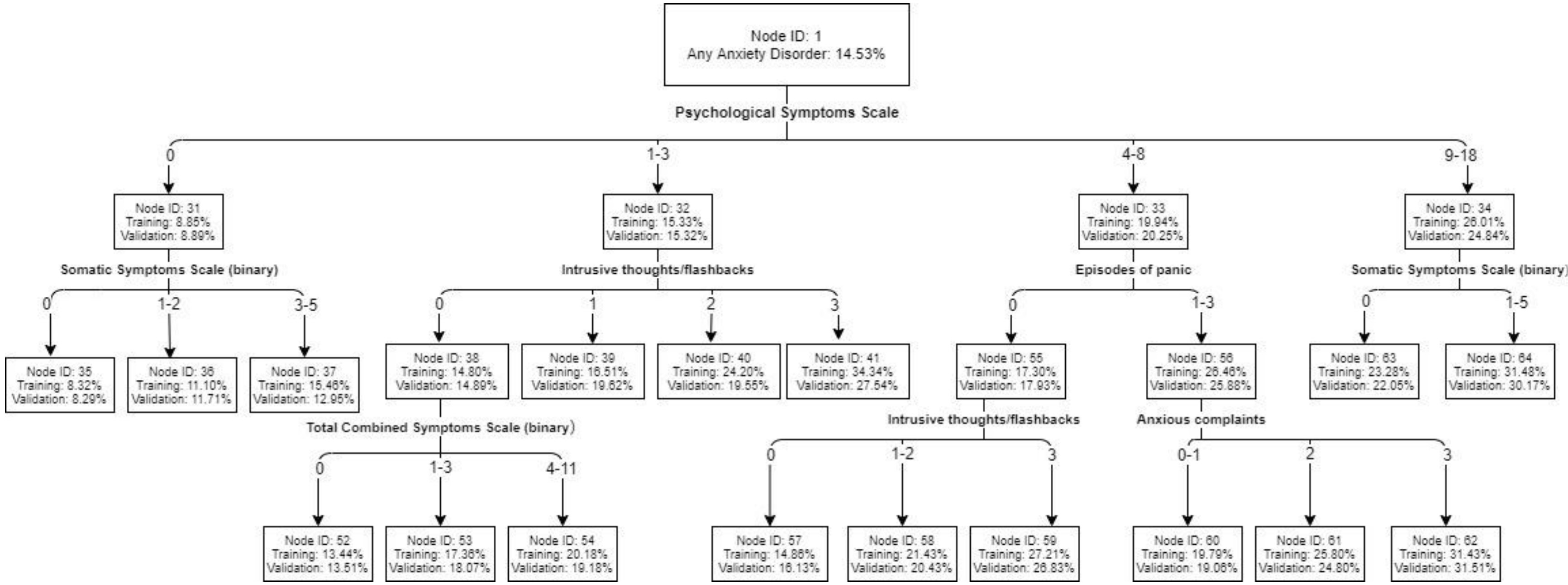

Figure 16. Interactive decision tree algorithm predicting any diagnosis of anxiety for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The second target variable was any diagnosis of anxiety. The interactive-designed model is presented above in Figure 16. The automatic decision tree generated by the SAS program is available upon request. Once again, the most important variable was the continuous anxiety scale of psychological indicators, which was split into four categories: 0, 1-3, 4-8, and 9+. Intrusive thoughts/flashbacks and episodes of panic once again appeared as important branching points, but unlike the algorithm for primary anxiety disorders, the following variables were also included: anxious complaints, a continuous scale of binary somatic symptoms, and the combined continuous scale of binary somatic and psychological symptoms. The binary somatic scale was selected as a branching point for those who scored at the extreme ends of the psychological scale (0 or 9+). In both cases, the presence of somatic symptoms was associated with more diagnoses of anxiety. For those who scored between 1-3 on the psychological scale, the next branching point was intrusive thoughts/flashbacks, with each increase in frequency associated with more anxiety disorders. If there were no intrusive/thoughts flashbacks present, the next branch was the combined total binary scale, with higher scores demonstrating more diagnoses of anxiety. In this case, the presence of somatic symptoms - in addition to some psychological symptoms (not intrusive thoughts/flashbacks) - contributed to greater numbers of anxiety disorders.

Finally, among those with a score of 4-8 on the psychological scale, episodes of panic constituted the next branching point. If those were not present, then increasing frequency of intrusive thoughts/flashbacks demonstrated an increase in anxiety disorders, potentially pointing to PTSD. If episodes of panic were present, greater frequency of anxious complaints led to greater numbers of anxiety disorders. Altogether, this algorithm demonstrates that somatic symptoms are positively associated with anxiety disorders and reiterates the relative importance of intrusive thoughts/flashbacks and episodes of panic.

The training and validation percentages were generally similar to one another across nodes. The two nodes with a disparity between training and validation percentages greater than 2% were 40 and 41. Node 41 had the biggest difference of approximately 7%, demonstrating that the algorithm is stable overall. The range of validation percentages across nodes was between 8.3% and 31.5%, with 14.5% of the total sample having any anxiety disorder. Unlike the tree for primary anxiety disorders, the subsample with the lowest percentage of anxiety disorders was not close to 0. This demonstrates that even after ruling out a variety of psychological and somatic symptoms, there were still several individuals who had been diagnosed with an anxiety disorder, suggesting that some important indicators of anxiety may be missing. On the other end of the spectrum, the highest validation percentage was double that of the total sample prevalence, indicating that the algorithm can predict the presence of anxiety disorders fairly well.

3.3.7 Final anxiety scale derivation

After performing factor analysis, IRT, LCA, and decision tree modeling, various types of anxiety scales were constructed. Based on the results of the factor analysis, the first option was a continuous, additive scale containing psychological indicators. Since previous analyses revealed that compulsive behaviour was a rare and specific symptom – and OCD is no longer considered an anxiety disorder - two versions of the continuous scale were tested: one with all six psychological indicators, and one with five indicators where compulsive behaviour was removed. The Cronbach's alpha of the 5-item scale was α=0.67, similar to α=0.68 for the 6-item scale. The second option was created using results from the IRT and LCA, which pointed to a class-based scale in which the six psychological symptoms were grouped together based on their frequency of occurrence. The final four anxiety scale options represented the various decision tree algorithms that were generated.

The continuous, additive scale of psychological symptoms was a straightforward sum of each indicator. Since each indicator could be scored from 0-3, the range on the 6-item scale was 0-18, and 0-15 for the 5-item scale. The class-based scale was more complicated to construct and is depicted below in Figure 17.

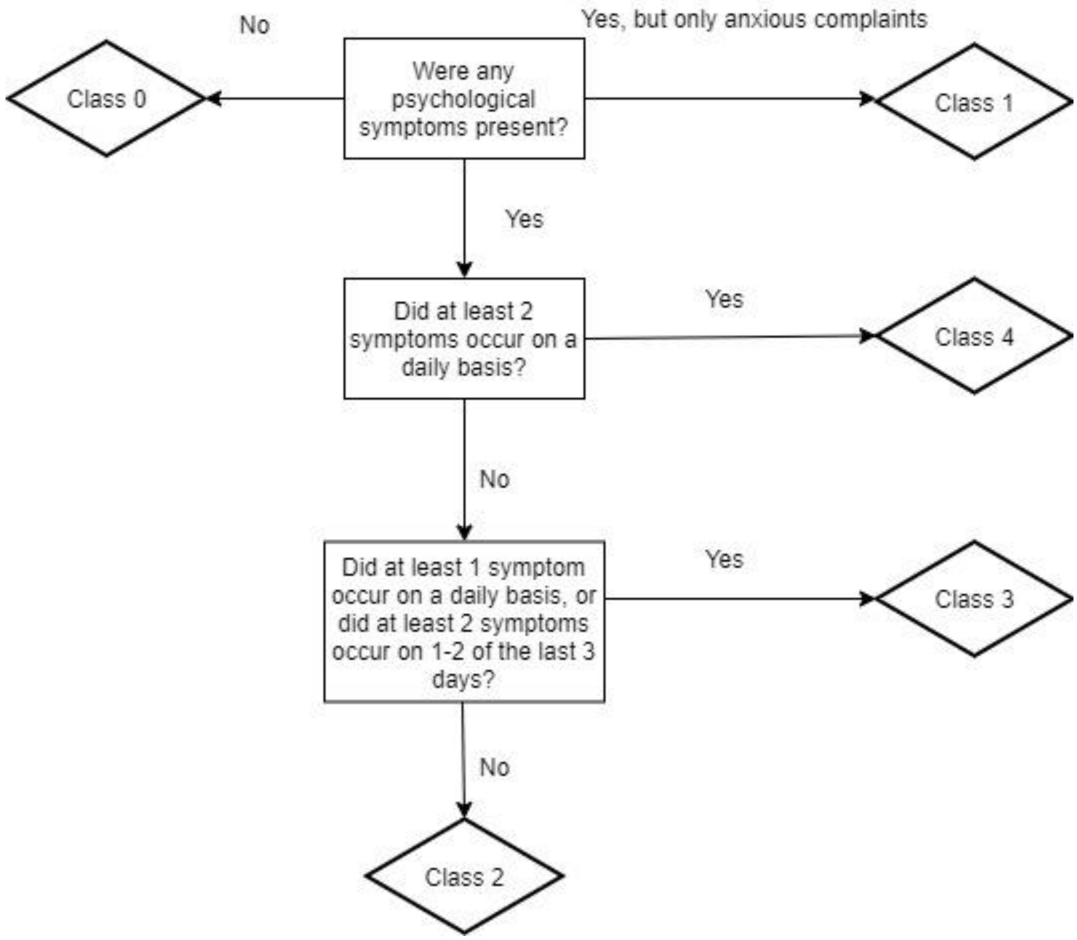

Figure 17. Flowchart representing the coding process of the class-based anxiety scale for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

As can be seen in Figure 17, a true 0 class was created, wherein an individual had no psychological symptoms of anxiety present. In addition, class 1 was created as a near-0 option, where the only psychological symptom present was anxious complaints. Since the bivariate, IRT, and LCA tests all demonstrated that anxious complaints were a pervasive symptom across the whole sample, it was reasonable to differentiate this group from a ‘true 0’ group. The next step was to determine whether or not at least two psychological symptoms occurred on a daily basis. If ‘yes,’ they were grouped into class 4, representing the most severe anxious class. If ‘no,’ the next decision point was whether at least one symptom occurred on a daily basis, or if at least two occurred on 1-2 of the last 3 days. If ‘yes’, they were placed into class 3, the moderate anxiety group. If ‘no,’ they were automatically grouped into class 2, which is a mild anxiety group. An alternative version of the scale was tested, wherein the symptom frequency cutpoints for determining class membership were increased by one (e.g., at least three daily symptoms instead of two for class 4). Since few differences were observed in logistic models between the two versions, the more lenient class structure was retained.

To create a scale from the decision tree models, nodes were grouped into categories based on the percentage of anxiety disorders in the training sample. The variable width bar chart was used as a visual guide to aid in the grouping process, which is a bar chart that organizes nodes by the training sample percentage of anxiety disorders. Nodes with similar percentages were grouped together, generally remaining within a range of 5%. For both interactive decision tree models, as well as the automatic model predicting primary disorders, there were four categories. The automatic model predicting any anxiety disorder contained six categories. Table 31, below, lists the nodes that were included in the interaction decision tree models.

Table 31. Categorical classes created for the interactive decision tree models predicting primary and any anxiety disorders among inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Primary anxiety disorders Node IDs *(training sample % range)*	**Any anxiety disorders** Node IDs *(training sample % range)*
14, 55, 57, 60 *(2-4)*	35, 36, 52 *(8-13)*
31, 56, 58, 59, 64, 84 *(6-10)*	37, 39, 53, 54, 57, 60 *(15-20)*
27, 65, 75, 85 *(11-15)*	40, 58, 59, 61, 63 *(21-27)*
28, 29 *(20-29)**	41, 62, 64 *(31-34)*

Note. * indicates that the nodes in this group shared a large discrepancy between training and validation sample percentages as well as small sample sizes, indicating an unstable group.

The exact categorization of nodes for the automatic decision tree models are available upon request. For nodes that had a difference greater than 5% between the training and validation samples, additional versions of the scale were tested that excluded them. No statistical differences in the c-statistics for the logistic models were found between scales with and without the unstable nodes, so the versions where they are included are reported below.

Table 32. Binary logistic regression models for five anxiety scales predicting primary and any anxiety disorders for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Scale Version	**Primary anxiety disorder (n=9,582)**		**Any anxiety disorder (n=34,565)**	
	OR (95% CI)	*C stat*	*OR (95% CI)*	*C stat*
Additive, continuous scale of six psychological indicators (0-18)	1.14 (1.14-1.15)	0.66	1.11 (1.10-1.11)	0.61
Additive, continuous scale of five psychological indicators (0-15)	1.16 (1.15-1.16)	0.66	1.12 (1.12-1.12)	0.61
Class-based scale of six psychological indicators (5 classes)	1.45 (1.43-1.47)	0.65	1.29 (1.28-1.30)	0.61
Interactive decision tree model (4 classes)	2.20 (2.14-2.26)	0.63	1.69 (1.67-1.71)	0.62
Automatic decision tree model (4 classes)	2.61 (2.53-2.69)	0.63	1.47 (1.46-1.49)	0.63

Note. Regression coefficients for all anxiety scale versions are statistically significant at p<.0001.

Table 33. Binary logistic regression models for five anxiety scales predicting primary and any anxiety disorders for individuals receiving community mental health care in Ontario (2005-2006), Chatham-Kent and Bluewater Health (2017-2019), and Newfoundland and Labrador (2012-2014) (n=7,386).

Scale Version	Primary anxiety disorder (n=535)		Any anxiety disorder (n=1,888)	
	OR (95% CI)	*C stat*	*OR (95% CI)*	*C stat*
Additive, continuous scale of six psychological indicators (0-18)	1.14 (1.12-1.16)	0.70	1.15 (1.14-1.17)	0.70
Additive, continuous scale of five psychological indicators (0-5)	1.17 (1.14-1.19)	0.70	1.18 (1.16-1.19)	0.70
Class-based scale of six psychological indicators (5 classes)	1.70 (1.59-1.83)	0.69	1.63 (1.57-1.70)	0.69
Interactive decision tree model (4 classes)	2.45 (2.19-2.74)	0.70	1.78 (1.69-1.87)	0.68

Note. 157 cases were missing data for one of the psychological indicators needed to construct the anxiety scale. Missing data was evenly distributed across indicators, location, and time of assessment, so they were deleted from the analysis. Regression coefficients for all anxiety scale versions are statistically significant at p<.0001.

As observed in Tables 32 and 33, the c-statistics were similar across scale variations. Both of the additive, continuous scales with psychological indicators produced the best c-statistics for predicting primary anxiety disorders in the inpatient sample and were tied with the interactive decision tree model in the community sample. The continuous scales also had the highest c-statistics for predicting any anxiety disorder in the community sample. Since none of the alternate anxiety scale models had considerably better fit statistics than the five-item additive, continuous scale, this version was chosen as the best candidate due to its simplicity. As an additional check, even though the ESP assessment only contains four anxiety indicators, they were added together to create a shorter version of the continuous anxiety scale (0-12). The ESP anxiety scale was significantly predictive of both primary anxiety disorders (OR=1.25, 95% CI=1.20-1.30, c=0.63) and any anxiety disorder (OR=1.27, 95% CI=1.23-1.32, c=0.63), suggesting the scale still functions in the expected direction.

The ROC curve and area under the curve (AUC) statistic for predicting primary anxiety disorders using the final anxiety scale in the inpatient sample is displayed below in Figure 18.

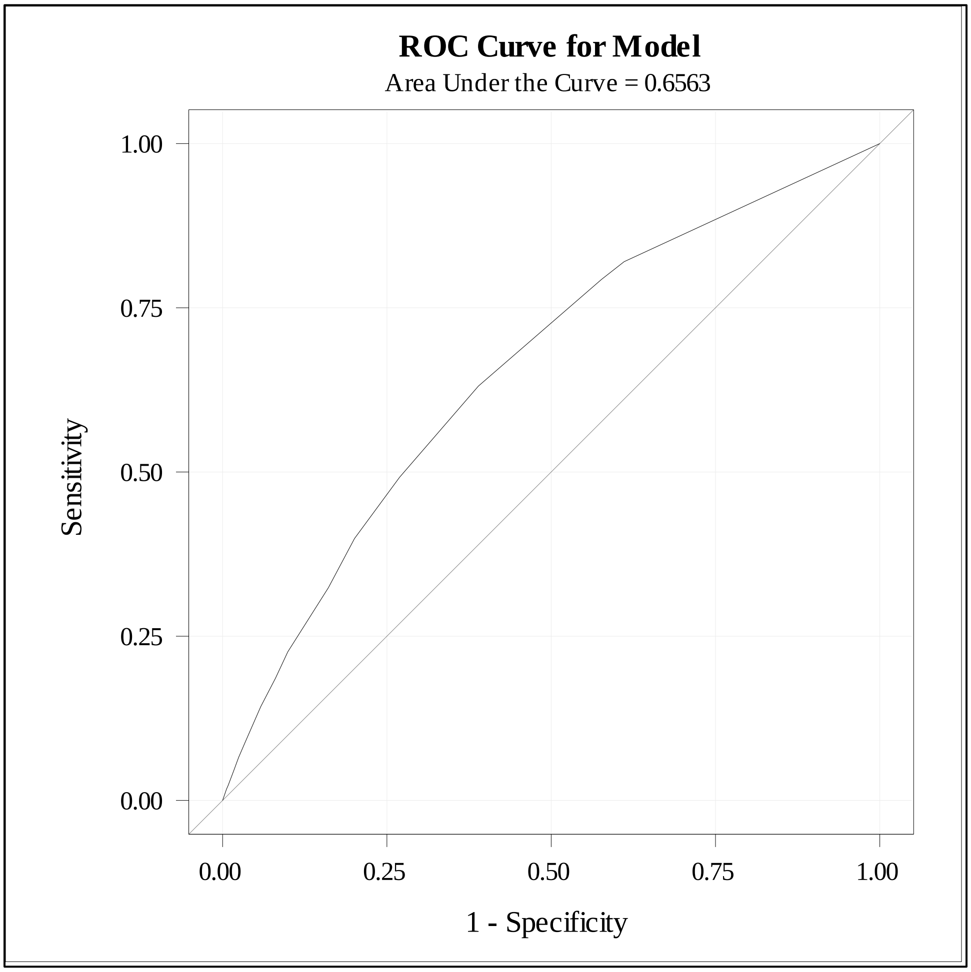

Figure 18. ROC curve of the anxiety scale in predicting primary anxiety disorders for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The area under the curve (AUC) is 0.66, indicating that there is a 66% chance that the anxiety scale can identify who has an anxiety disorder and who does not. The ROC curve also shows that the false positive rate (1-specificity) increases gradually with the true positive rate (sensitivity). Considering that in the bivariate analyses, some anxious symptoms still occurred among those who were not diagnosed with anxiety, this result is expected.

The distribution of anxiety scale scores across the inpatient sample are displayed below in Figure 19.

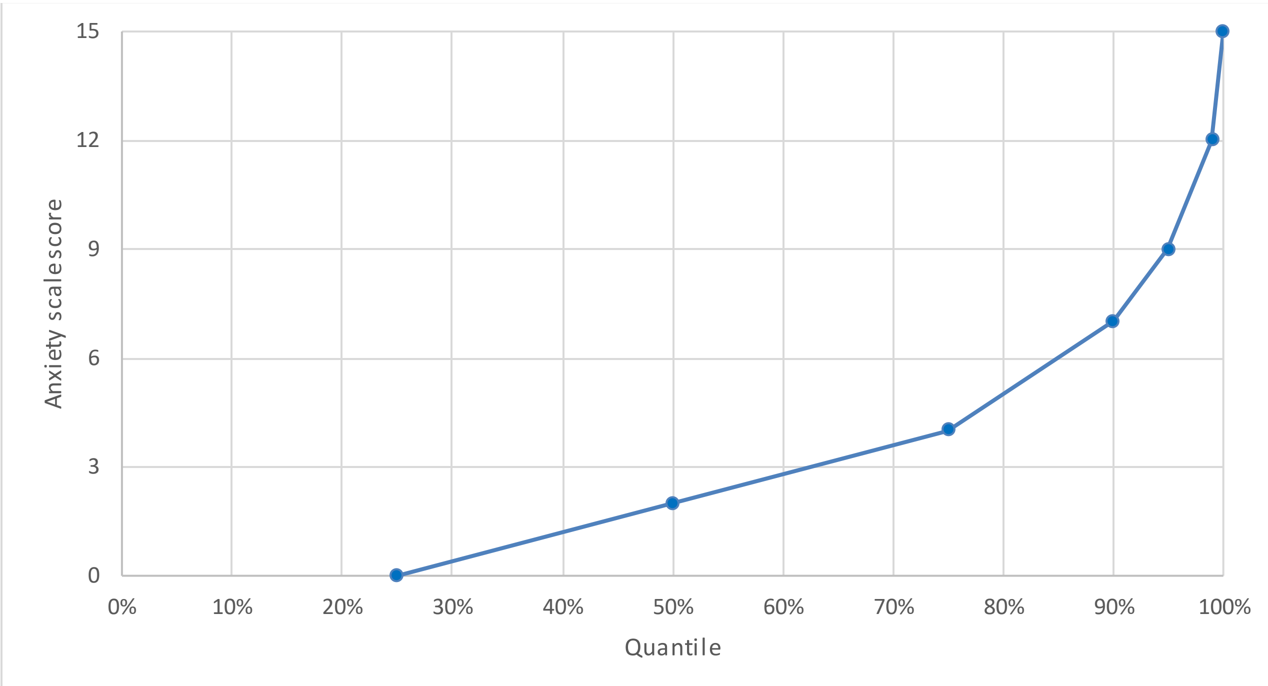

Figure 19. Distribution of anxiety scale scores across various quantiles for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

The median score (50% quantile) on the anxiety scale was 2.0, indicating low levels of anxiety on average across the sample. There was a gradual increase in anxiety symptoms until the 90th quantile, where steeper increases were seen for the most severe 10% of the sample. At the most extreme end, the maximum score of 15 on the scale was rare, considering that the 99% quantile contained a score of 12. Overall, Figure 19 illustrates that the distribution of scores on the anxiety scale is not normal and that mid- to high-scores are less common.

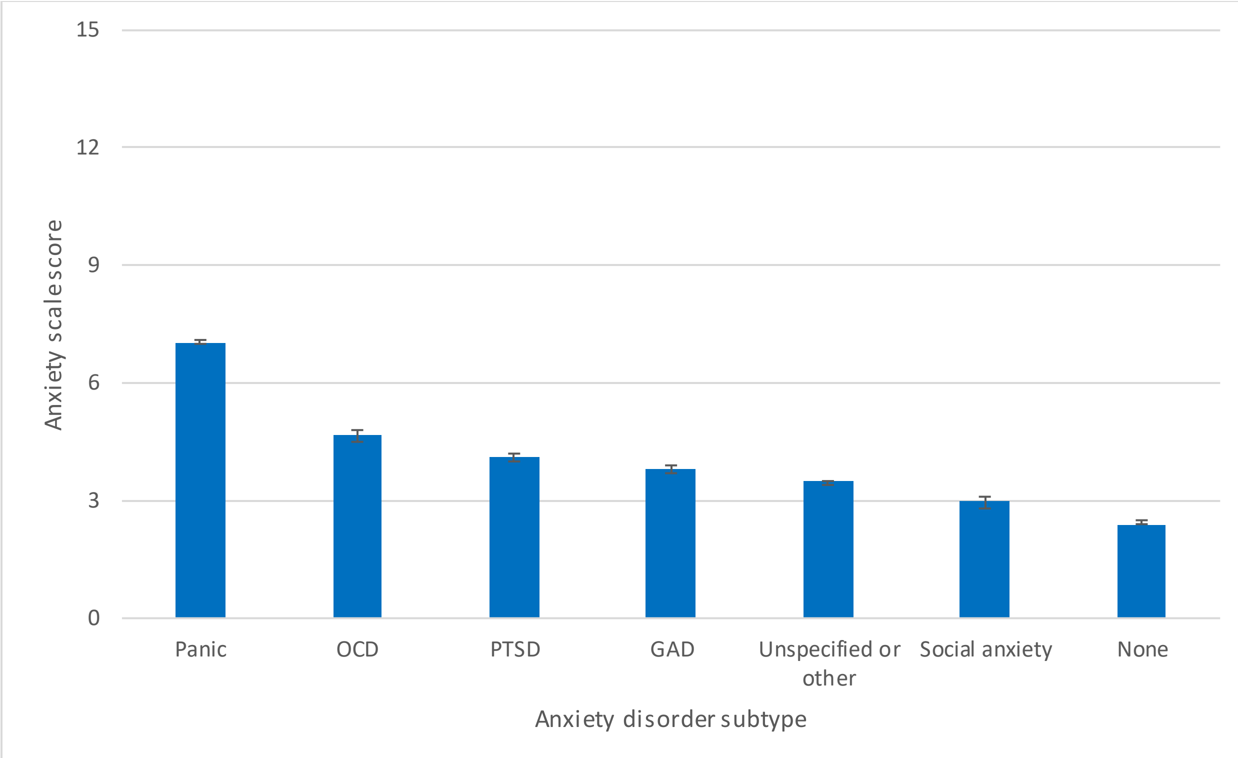

Figure 20. Mean and the 95% confidence limit for means (CLM) of anxiety scale scores across various anxiety disorder subtypes for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

In addition to investigating the distribution across the whole sample, mean anxiety scale scores were also calculated for anxiety disorder subtypes, as illustrated above in Figure 20. It is important to note that across disorders, only one indicator at most corresponded directly with diagnostic criteria, meaning that scores above three involve symptoms that are not specific to the disorder. The highest average score was observed for panic disorders, followed by OCD. Among all the anxiety disorders, mean scores were $\geq$3.0, indicating that scores were not influenced solely by diagnostic relevancy of indicators. Lastly, in all cases, anxiety scale scores were higher than those with no anxiety disorder, providing further support for concurrent validity of the scale.

3.3.8 Criterion validity

The first set of tests with the new anxiety scale were comparisons of mean scores across two types of demographic characteristics. Sex (male and female) and age (18-25, 26-30, 31-64, and 65+) were initially compared using a t-test and ANOVA, respectively. However, while the results were statistically significant ($p<.0001$), due to the non-normal distribution of the anxiety scale, these tests were deemed inappropriate. Instead, to permit a more effective comparison of anxiety levels, the scale was collapsed into four classes based on a combination of the splits chosen in the interactive decision tree for primary anxiety disorders and the distribution of anxiety scale scores. The cut-points selected for the anxiety scale were: 0 (none), 1-3 (mild), 4-6 (mild-moderate), and 7-18 (moderate-severe). The results of the comparisons across age and sex are displayed below.

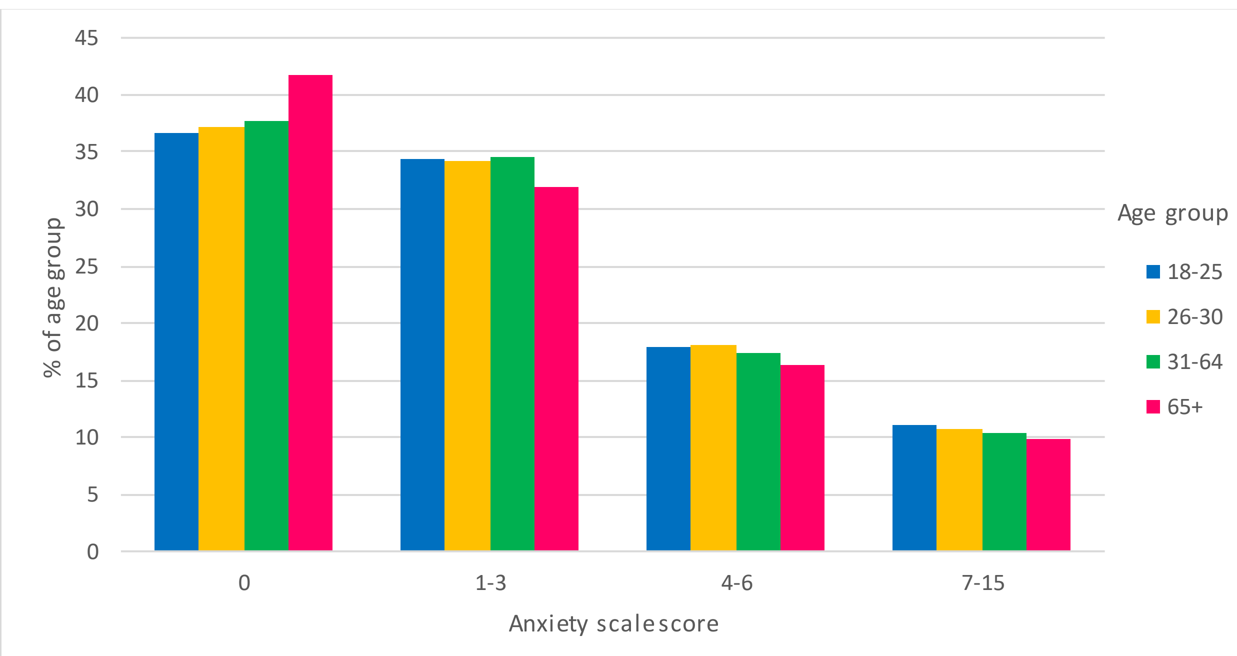

Figure 21. Percentage of individuals in the 18-25, 26-30, 31-64, and 65+ age groups for each severity category of the anxiety scale in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Figure 21 illustrates a significant difference in anxiety scores across age groups (χ^2=270.3, p<.0001), with a slight decline in severity with older age. After reviewing the degree to which each cell contributed to the chi-square value, it was evident that the 65+ age group was the most irregular group, especially at the level of 0 anxiety symptoms.

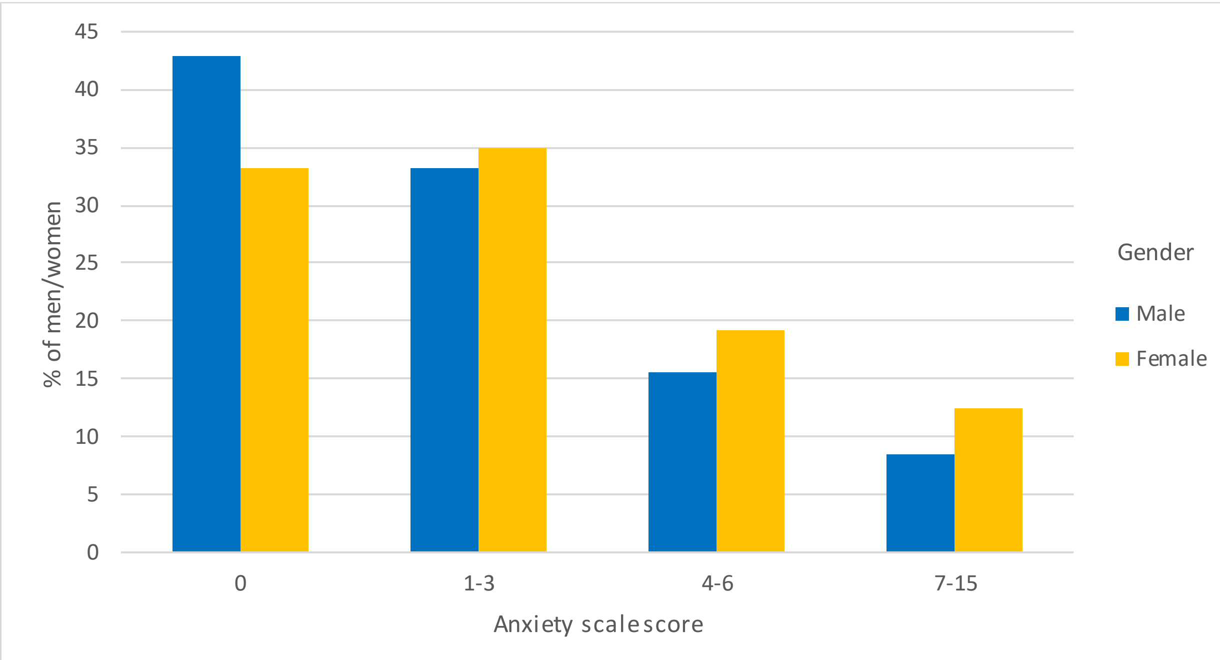

Figure 22. Percentage of men and women represented in each severity category of the anxiety scale in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

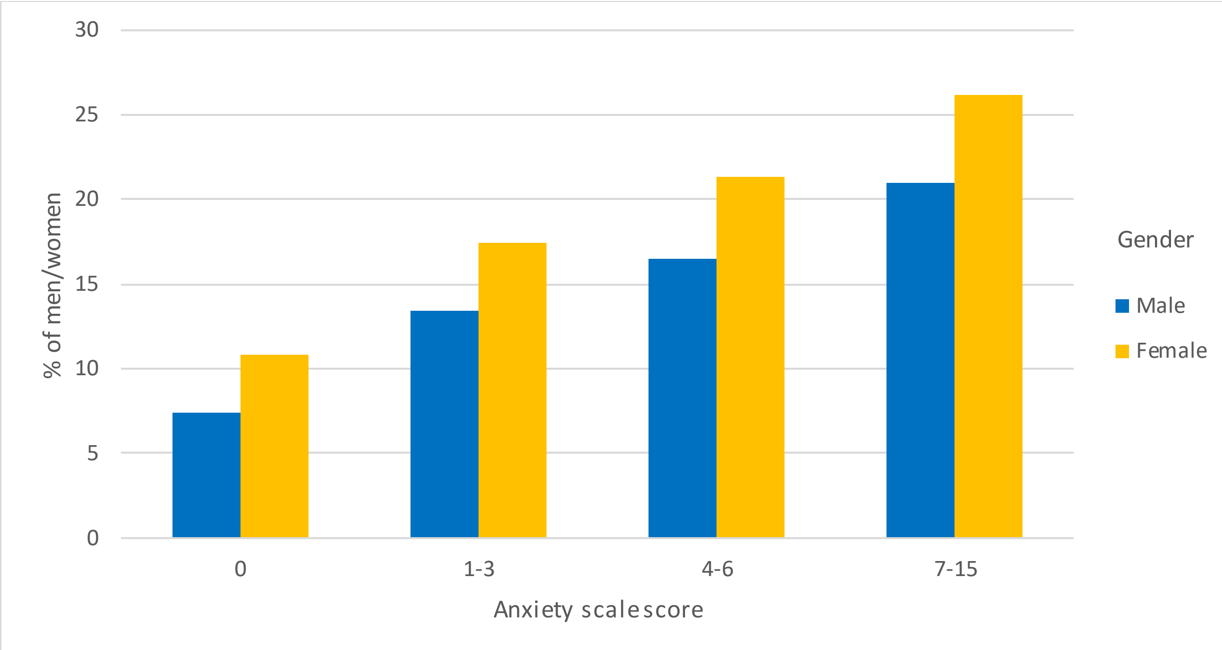

Figure 23. Percentage of men and women with any anxiety disorder represented in each severity category in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=237,862).

Beginning with Figure 22, there was a significant difference in the distribution of anxiety scores between men and women (χ^2=2,918.7, p<.0001), with more women represented in the higher severity groups. To determine if anxiety scale severity scores shared a similar pattern with anxiety disorder diagnoses between men and women, a three-way chi-square test was conducted, as seen in Figure 23. At each severity level of the anxiety scale, there were significantly more women with an anxiety disorder diagnosis than men (p<.0001), indicating that men who are diagnosed with anxiety disorders exhibit fewer symptoms.

The next set of tests focused on investigating concurrent validity indicators other than anxiety diagnoses, which were already examined as part of the scale derivation process. In addition to the Traumatic Life Events CAP, sleep disturbance - a binary-coded variable that was initially selected as a potential component for the anxiety scale - was chosen as a concurrent indicator given its presence in other anxiety scales. In a binary logistic regression model, the anxiety scale significantly predicted problems with sleep disturbance (OR=1.16, 95% CI=1.16-1.16, c=0.62). A proportional-odds ordinal logistic regression model also showed that the anxiety scale was a significant predictor of triggering the traumatic life events CAP (OR=1.12, 95% CI=1.12-1.13, c=0.60), supporting the concurrent validity of the scale.

Discriminant validity from depression was also tested to determine criterion validity of the anxiety scale. Similar to the logistic regression models for primary and any anxiety disorders, the anxiety scale was entered as the sole predictor of primary and any mood disorders. While the anxiety scale was a significant predictor of both primary mood disorders (OR=1.01, 95% CI=1.00-1.01, c=0.52) and any mood disorder (OR=1.02, 95% CI=1.02-1.02, c=0.53), c-statistics of 0.50 indicate that the scale is not substantially better at identifying mood disorders than random chance (Peng et al., 2002; Sperandei, 2014). Further, the ORs and c-statistics were greater for anxiety disorders than mood disorders, providing evidence of discriminant validity. Similarly, the correlation between the anxiety scale and the Depressive Severity Index (DSI) was significant (r=0.37, $p<.0001$), but the size of the correlation was moderate. In contrast, there was a strong correlation between the interRAI Depression Rating Scale (DRS) and the anxiety scale (r=0.66, $p<.0001$). However, the DRS contains two of the same indicators included in the anxiety scale (anxious complaints and fears/phobias), and so the correlation is artificially inflated. Overall, the results of the discriminant validity tests demonstrate that the anxiety scale can adequately distinguish between anxiety and depression.

3.3.9 Responsiveness

The last test that was performed with the anxiety scale was assessing its responsiveness through change scores between admission and discharge. To calculate a change score, an anxiety scale at the time of discharge was first created using the variables from the discharge assessment, then subtracted from the anxiety scale at admission. During this step, it was discovered that n=8,444 cases were missing anxiety indicators in the discharge assessment, all of which occurred during the early implementation years between 2005-2009. Since the missing cases were not systematically related to other factors (e.g., age, geographic location, etc.,) missing data was deleted from the change score analyses. The quantile distribution of change scores is presented below in Figure 24, with positive scores indicating improvement in anxiety over time, and negative scores indicating worsening of symptoms over time.

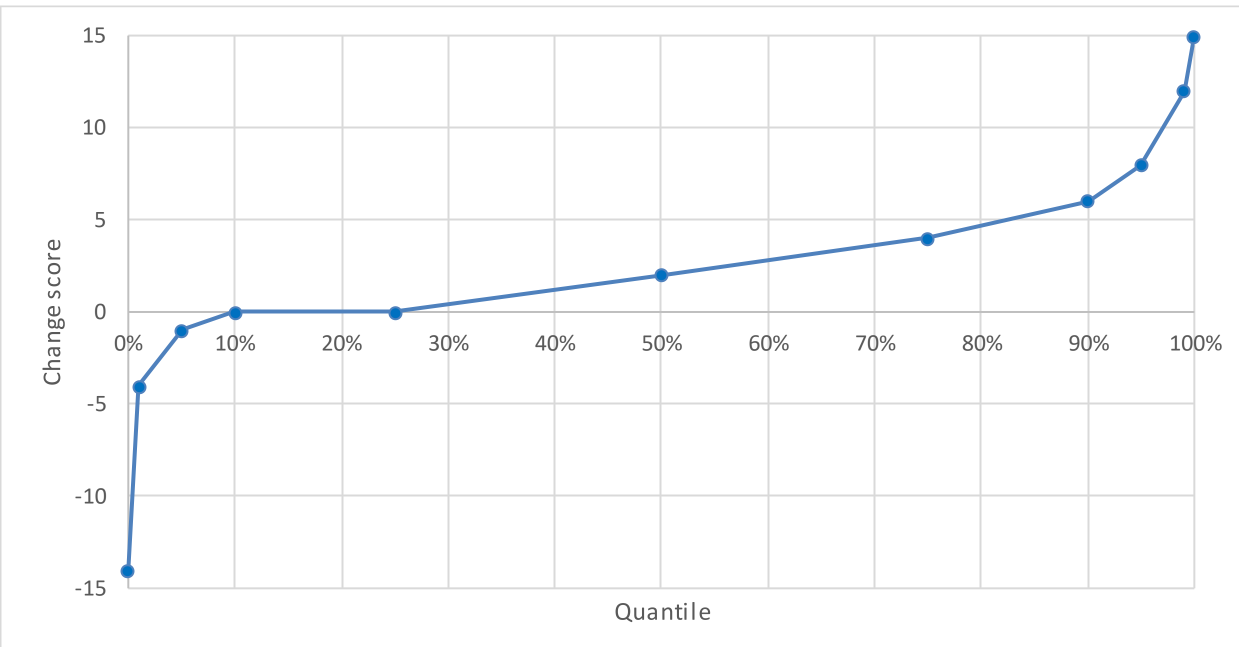

Figure 24. Quantile distribution of change scores in the anxiety scale between admission and discharge among those with a score >0 at admission, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=229,418).

For those who had an anxiety scale score greater than zero at admission, the mean change was 2.4 points, indicating that anxiety symptoms generally improve over time. As illustrated in Figure 24, 25% of the inpatient sample did not demonstrate improvement in their anxiety symptoms between admission and discharge, with fewer than 10% experiencing worsening symptoms. To establish the power of the anxiety scale to detect change, the SMR and effect sizes were calculated. The SMR=0.78 and ES=0.79, indicating a strong power to detect change (Kazis et al., 1989). Since the scale is continuous, the correlation was also calculated between the admission anxiety scale and the change scores. The scatterplot is presented below in Figure 25.

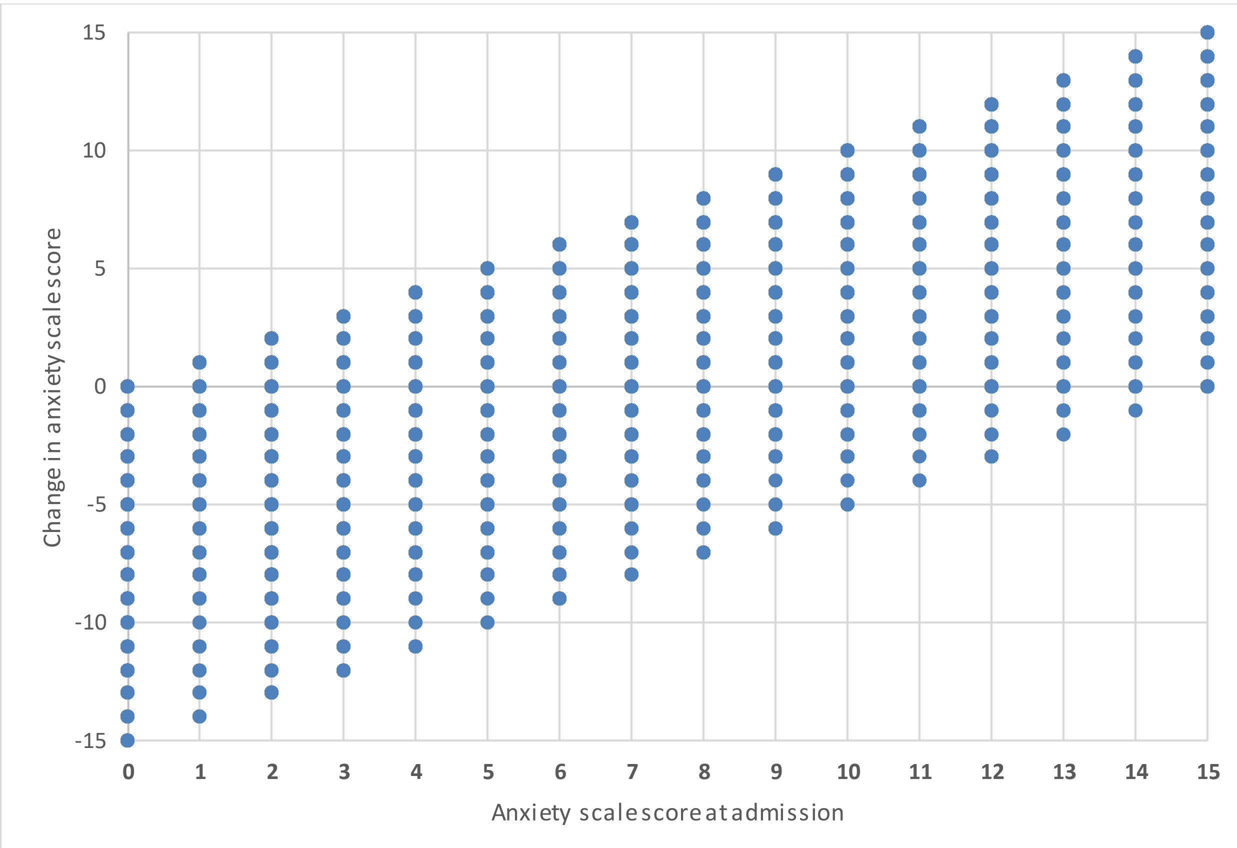

Figure 25. Scatterplot of the anxiety scale score at admission on the x-axis and change in anxiety scale scores between admission and discharge on the y-axis for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=229,418).

There was a strong, positive correlation (r=0.73) between the admission and change scores, further illustrating that the anxiety scale is able to detect changes of varying magnitudes over time. Finally, since severity levels were created for the anxiety scale, movement across categories between admission and discharge was also assessed. The results are shown below in Figures 26 and 27.

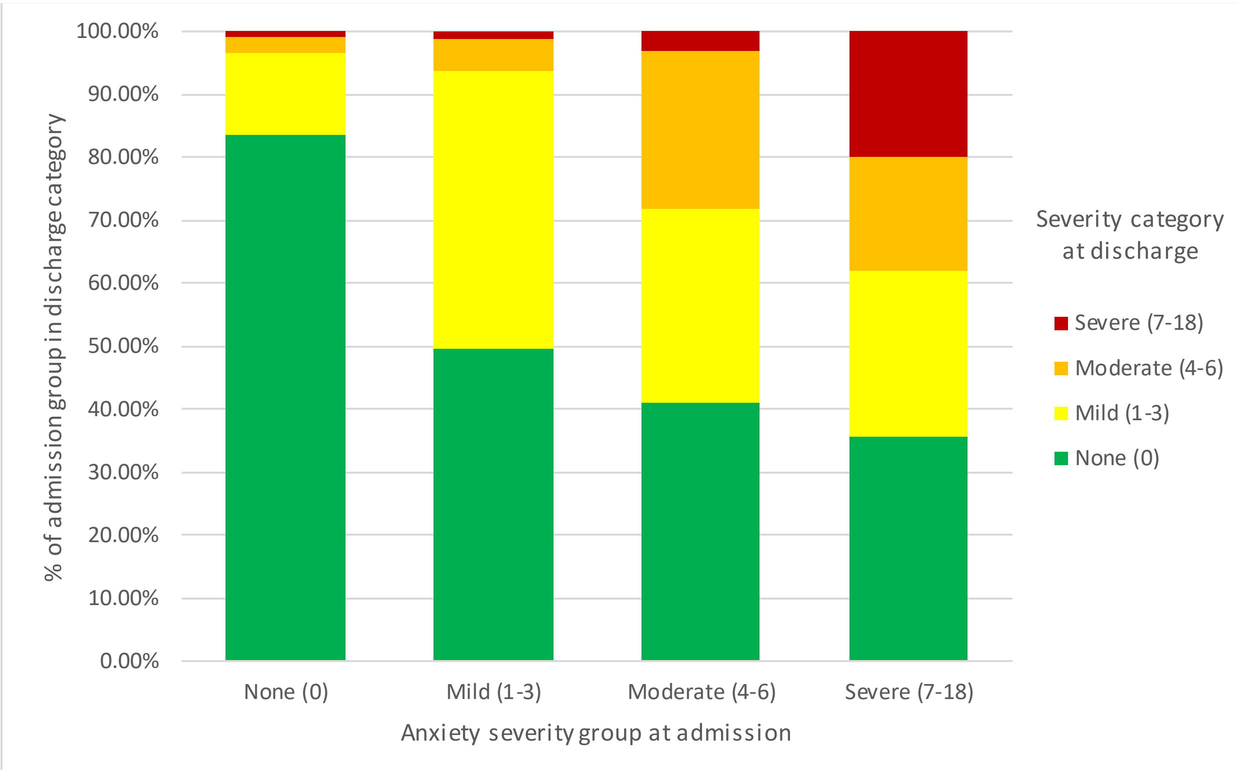

Figure 26. Movement between anxiety scale severity categories at admission and discharge for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=229,418).

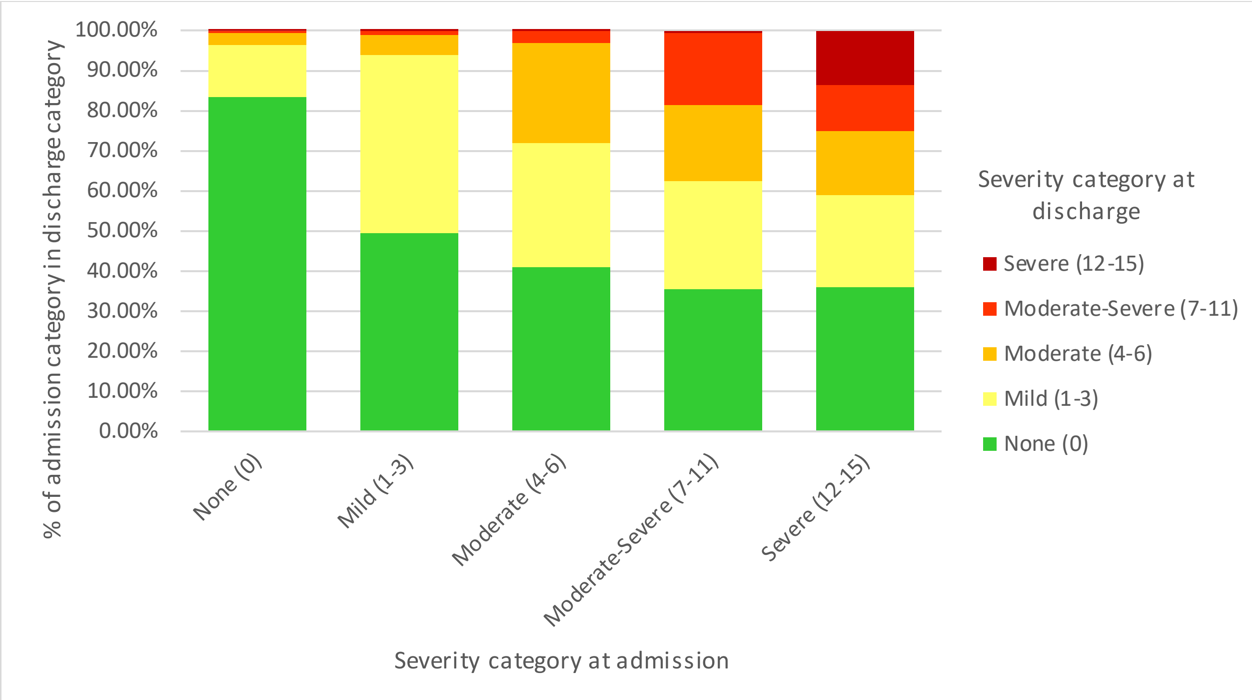

Figure 27. Alternate version of movement between anxiety scale severity categories between admission and discharge, where the 'severe' category has been divided into two groups, for inpatients receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=229,418).

As seen in Figure 26, over 80% of those who had no anxiety symptoms at admission still had no symptoms at discharge. This means that 13% of individuals admitted with no anxious symptoms developed mild anxiety over the course of their stay. For those with mild anxiety at the time of admission, approximately half moved into the 'none' category at discharge. Over 70% of those with moderate anxiety at admission had either mild or no anxiety by discharge, while almost 80% of those with severe anxiety moved into one of the lower severity categories at discharge. The remaining 20% still had severe anxiety by the time they were discharged, representing a concerning outcome. To determine whether lack of improvement among the 20% subgroup in the severe category was being masked by a wide range of scores, an alternate version was tested (Figure 27) where the category was divided into two groups: moderate-severe

(7-11) and severe (12-15). In the moderate-severe group, 17% of individuals were still in the same category by discharge, indicating minimal difference from the previous categorization. This finding was replicated in the most severe category, where even though 12% dropped down to the moderate-severe category, 14% were still considered severe at the end of their stay. Altogether, Figures 26-27 illustrate that increasing levels of anxiety severity at admission demonstrate greater improvement by discharge, though poor outcomes occurred as well.

3.4 Discussion

3.4.1 Summary and implications of results

After identifying gaps in mental health care for individuals with anxiety disorders in chapter two of this dissertation, as well as the absence of an anxiety scale in the interRAI health assessment instruments, the goal of this chapter was to construct an anxiety scale that could be used to inform measurement-based care planning and policy research. As a starting point, two of the most popular general anxiety scales – the HARS (Hamilton, 1959) and BAI (Beck et al., 1988) – were examined to establish conventional psychometric properties and guide item selection. Based on this review, it was hypothesized that a two-factor scale containing psychological and somatic indicators of anxiety would be the optimal structure for the anxiety scale. However, this hypothesis turned out to be incorrect after multiple statistical analyses supported a continuous scale with five psychological indicators as the best candidate. This initial version offers insight into individual symptoms form together to represent anxiety, showing that an anxiety scale within the interRAI instruments is possible.

To arrive at the final anxiety scale, multiple statistical procedures were conducted, providing substantial insight into item performance. First, bivariate analyses were performed on the initial set of variables selected, revealing their prevalence across the inpatient sample and association with anxiety disorders. After narrowing down to the final item pool, relationships among selected items were tested using EFA and CFA, which suggested that the optimal model structure for the data was a single scale consisting of only psychological anxiety indicators. While somatic items did constitute a separate second factor, factor loadings were small and the somatic factor did not result in better model fit, and so a unidimensional scale of psychological indicators was preferred. Following the factor analyses, IRT and LCA were used to investigate individual performance of the psychological indicators and determine whether a class-based scale structure was viable. The results indicated that frequency of symptoms was the distinguishing feature of anxiety subclasses, leading to a five-class scale based on anxious symptom severity. During this process, it was discovered that compulsive behaviour did not perform well as a general indicator of anxiety, and so a five-item version of the continuous scale from the factor analyses was created that excluded this item. Finally, decision tree models were created in the event that complex interactions needed to be represented in the scale, including somatic items once again. The continuous scale of psychological indicators was consistently identified as the most important variable for predicting anxiety disorders, though pathways emerged that reflected the unique influence of panic disorders and PTSD. By the end of all these analyses, five scale candidates were created: two continuous and three categorical. To decide which scale would be the chosen one, each was entered into separate logistic regression models predicting primary and any anxiety disorders. Model fit statistics were comparable across the various scale structures, and so the 5-item continuous scale was selected as the final model since it best represented the underlying data and was also the most parsimonious.

After deciding on the final structure for the anxiety scale, a series of criterion validity and responsiveness tests were performed to better establish its psychometric properties. The first criterion test was technically performed during the scale derivation process, where predictive validity of the scale was examined in relation to anxiety diagnoses. The scale generally produced adequate fit statistics in all three health care settings examined, except for predicting any anxiety disorder in the inpatient and ED datasets, both of which had c-statistics in the lower .60 range. Predictive validity for any anxiety disorder diagnosis could potentially be enhanced by adding new variables to the scale, which can be addressed in future research. Further evidence for criterion validity of the scale was obtained using concurrent indicators associated with anxiety, including traumatic life events and sleep disturbance, both of which were positively predicted by the scale. Anxiety scale scores were also greater among women and younger age groups, consistent with previous research with the BAI (Bardhoshi et al., 2016; de Ayala et al., 2005). In terms of discriminant validity, the anxiety scale was examined in relation to measures of depression, including mood disorders and depressive symptoms. The anxiety scale did not produce adequate fit indices for predicting mood disorders, and the correlation between the interRAI DSI and anxiety scale was weak-to-moderate, consistent with estimates achieved between the BAI and BDI (Beck et al., 1988; Ulusoy et al., 1998). In addition to criterion validity, responsiveness of the scale to change over time was investigated between admission and discharge. The effect size and SMR of change scores, as well as the correlation between admission and change scores, all demonstrated that the scale has a strong responsiveness to changes in anxiety. Overall, the psychometric properties of the first version of the interRAI anxiety scale are encouraging, with several implications for discourse on general anxiety scales, research, and clinical practice.

3.4.1.1 Construct validity

Throughout the process of creating an anxiety scale for the interRAI assessment instruments, three major implications for construct validity of general anxiety scales were discovered: 1) exclusion of somatic health items, 2) balancing common versus disorder-specific variables to ensure that general anxiety is measured and, 3) inclusion and exclusion of symptoms belonging to OCD and PTSD. Although somatic indicators feature prominently in both the HARS and BAI, concerns were revealed during the literature review that they may not function well as measures of general anxiety. One problem is that over-emphasis of health conditions can cause the scale to be overly biased towards identifying panic disorder, as this diagnostic subtype has a greater focus on physical health symptoms than others (de Ayala et al., 2005; Fydrich et al., 1992; Porter, 2017). Since individuals with panic disorders demonstrated the highest mean score on the interRAI anxiety scale, and somatic health items were not correlated with the episodes of panic variable, there is no concern that excluding somatic items adversely affects the ability of the scale to detect panic, and so there is little value in retaining them. While the review indicated that somatic indicators were too specific to panic disorder, it also noted that health conditions are not specific enough to general anxiety (Julian, 2011). Given that several psychiatric and physical health conditions present in inpatient psychiatric settings involve similar somatic symptoms (i.e., difficulty breathing) - especially older adults - this is likely a major reason that somatic items performed poorly in the anxiety scale. By excluding a somatic component, the interRAI anxiety scale diverges from the structure of other general anxiety scales. However, because the continuous scale performed better when somatic items were excluded, there is no empirical justification for keeping it. Further, by excluding somatic indicators altogether, there is less ambiguity in the factor structure of the model, which has been identified as a problem of the BAI

(Beck & Steer, 1991; Osman et al., 1993; Osman et al., 1997). Consequently, this study suggests that physical health items are not necessary for measuring general anxiety in clinical populations.

In addition to uncertainty about somatic items, another concern prior to constructing the anxiety scale was that each of the psychological indicators would strongly correspond with one diagnostic subtype, resulting in a scale that does not measure general anxiety. While there are numerous anxiety disorders that each contain unique features (APA, 2013; WHO, 1992), and representing various anxiety disorders is a desirable property, it is essential that the anxiety scale also contains common elements of anxiety that are applicable to the broader clinical population. The correlation matrix used in the factor analyses displayed weak-to-moderate correlations among the psychological indicators, indicating that scale is less cohesive than ideal, which may explain why the scores on the anxiety scale were relatively low across the sample. Nonetheless, factor loadings for psychological items - as well the difficulty and discriminatory estimates from the IRT analysis - pointed in a positive starting direction. Unrealistic fears/phobias and obsessive thoughts were indicative of anxiety without being restrictive to diagnosis, and while intrusive thoughts/flashbacks and episodes of panic were slightly more specific to anxiety disorders, they were still within reasonable parameters. Repetitive anxious complaints were pervasive across the sample, including those with no anxiety disorder, making it a less discriminate variable. However, the scale is intended to contain some items that are observable across the broader clinical population, especially since anxiety is so prominent in general populations (ACHA, 2019; Gustavson et al., 2018; Kessler et al., 2007) and can be elevated during stressful circumstances such as hospitalization. Further, as shown in the bivariate analysis, anxious complaints were still substantially higher among those with anxiety disorders, increasing its capability as a diagnostic predictor. For these reasons, even though repetitive anxious complaints had low difficulty and slope parameters, it was considered a useful item. In contrast, compulsive behaviour demonstrated the highest difficulty estimate and a low slope parameter and factor loading, implying that it is highly specific to OCD. Since OCD is no longer considered an anxiety disorder (APA, 2013; Kogan et al., 2016), it was concluded that compulsive behaviour did not belong in a general anxiety scale. After removing the compulsive behaviour item, a better balance between general and disorder-specific symptoms in the scale was achieved. However, the correlations between items in the scale are still weaker than what is considered optimal (Osborne & Banjanovic, 2016), and so any future revisions incorporating disorder-specific variables will need to be mindful of any potential negative impact on the correlation matrix.

Since compulsive behaviour was removed from the anxiety scale because OCD is no longer an anxiety disorder, a similar argument could be made for obsessive thoughts, since it is the other main component of OCD. However, unlike compulsive behaviour, obsessive thoughts were generalizable to the broader inpatient sample. A possible explanation for this discrepancy can be found in the correlation matrix between psychological indicators, which showed that obsessive thoughts were most strongly related to unrealistic fears/phobias. This finding suggests that obsessive thoughts are coded not only as a criterion of OCD, but as a cognitive element associated with fear. Given the ambiguity surrounding obsessive thoughts as a symptom of anxiety, there are three options for handling it: a) remove it from the scale along with compulsive behaviour, b) retain it as is or, c) edit it to represent a more general cognitive symptom. Regarding the first option, the anxiety scale constructed for the ESP dataset did not contain obsessive thoughts or compulsive behaviour and it produced similar fit statistics as those obtained in the inpatient sample. As such, it is possible that obsessive thoughts could be removed along with compulsive behaviour without affecting the predictive strength of the scale. However, the value of obsessive thoughts was not its association with an anxiety disorder, but as a more general symptom of anxiety. Since the ideal version of the anxiety scale contains both disorder-specific and broader symptoms of anxiety, option two is preferred over option one. By retaining obsessive thoughts in the anxiety scale, the third option of editing the variable description to reflect a more general cognitive symptom becomes a possibility. The disadvantage of this option is that it would require further research and extensive consultation with clinical staff to determine how obsessive thoughts are evaluated, as well as alterations to numerous interRAI instruments. As a result, the second option is recommended, though consulting clinical stakeholders on the anxiety scale is still advisable as a direction for future research.

If compulsive behaviour is excluded from the interRAI anxiety scale because OCD is no longer categorized as an anxiety disorder, then symptoms related to PTSD must also be considered for the same reason (APA, 2013; Kogan et al., 2016). In the interRAI anxiety scale, intrusive thoughts/flashbacks are associated with trauma, which is a criterion of PTSD. This relationship is reflected in the bivariate analysis and IRT, which illustrated that intrusive thoughts/flashbacks have a greater difficulty estimate and a stronger association with disorders. Intrusive thoughts/flashbacks also consistently appeared as an important variable for predicting anxiety disorders in the decision tree models, likely due to the high prevalence of PTSD diagnoses. While OCD was removed from anxiety disorders following evidence from psychological, neurological, and genetic studies suggesting that it is structurally and clinically distinctive (Kogan et al., 2016), PTSD was removed to create a section for stress-related disorders with identifiable causes (APA, 2013; Kogan et al., 2016), representing a more conceptual reorganization. In the ICD-11, it is acknowledged that stress-related disorders such as

PTSD do commonly involve symptoms of fear and anxiety, and so they are referred to as ‘adjacent’ to anxiety disorders (Kogan et al., 2016). Thus, unlike compulsive behaviour, intrusive thoughts/flashbacks are still strongly linked to anxious emotional responses, and so there is an empirical justification to retain it as a symptom in the anxiety scale.

As well as removing variables from the anxiety scale, it is also worth contemplating whether new variables should be added, particularly those related to social anxiety and GAD. The decision tree predicting any anxiety disorder revealed that 8% of those with a score of ‘0’ on the anxiety scale still had a diagnosis, suggesting that some important items may be missing from the scale. One possibility is a variable related to social anxiety disorder, which is distinctive and prevalent enough in the general population to be considered its own separate disorder (APA, 2013; Kogan et al., 2016). Although social anxiety disorder was uncommon in the inpatient sample, including a social symptom in the scale may still reduce the percentage of anxiety disorders that were represented in the ‘0’ score group. Further, social anxiety disorder could be more relevant in the community mental health and ED populations, which observed more cases of anxiety disorders than inpatient settings, as well as among youth, as social anxiety disorder typically emerges during adolescence and early EA (Cummings et al., 2014; de Graaf et al., 2003; Kessler et al., 2009). Another potential benefit of a social anxiety item could be a moderate relationship with other cognitive- and fear-based items in the scale (APA, 2013; Kessler et al., 2009; Kogan et al., 2016), which would enhance the correlation matrix and the performance of the scale at measuring general anxiety levels across the clinical population. Likewise, another anxiety disorder that lacks coverage in the HARS and BAI is GAD (de Ayala et al., 2005; Fydrich et al., 1992; Porter, 2017), represented by symptoms of persistent, non-specific, and excessive worrying (APA, 2013). The lack of an indicator for GAD in the interRAI anxiety scale is evident when examining average scores across diagnostic subtypes, as it was lower for GAD than others. Given that GAD is tied with PTSD as the second most prevalent disorder in the inpatient sample, it is possible that boosting detection of GAD would improve the c-statistic in the regression models, enhancing its predictive power. Additionally, early detection of GAD among EA could be highly beneficial for improving long-term mental health outcomes, as clinical prognosis is often worse among those who are diagnosed before the age of 25 (Rubio & López-Ibor, 2007). Finally, because worrying has been shown to be an element of psychological well-being (Stones & Kozma, 1985), including this variable in the anxiety scale may enhance its overall clinical utility. Altogether, it is recommended that symptoms of social anxiety and GAD are explored with the intent of improving construct validity, as well as address existing gaps of other general anxiety scales.

3.4.1.2 Scale structure: continuous versus categorical

An additional consideration related to scale construction is how the data is structured to configure the anxiety scale. Although the scale was created to be continuous, with scores ranging from 0-15, five categories representing different severity levels were also developed. Depending on the context in which the anxiety scale is being used, there are different statistical and practical implications for continuous and categorical organizations. Statistically, it is usually more advantageous to use continuous rather than categorical data to represent psychological constructs, as it confers more statistical power and improves the reliability and validity of the scale (Markon, Chmielewski, & Miller, 2011). Unlike categorical structures, continuous scales provide a greater depth of information, which increases the capability to accurately detect significant variations in data. Enhanced precision also helps to better establish patterns of relationships between variables, which are used in the calculations for several statistical procedures that are common in psychological research (Markon et al., 2011), including the factor analysis performed in this study (O'Rourke & Hatcher, 2014; Osborne & Banjanovic, 2016). In terms of tracking individual progress throughout the course of treatment, it is also beneficial for clients and care providers to have access to more granular information. For these reasons, it is important to preserve the continuous structure of the anxiety scale.

While continuous data offers several advantages, there are times where categorical data can provide more insight into a problem. One example is when the distribution of data is not normal, which is a common assumption for many statistical procedures that use continuous data (O'Rourke & Hatcher, 2014). In clinical populations, non-normal data distributions often correspond with differences in severity levels (Markon et al., 2011), which was the case in this study. Through the use of statistical tests designed for categorical data, group comparisons of anxiety levels with nonnormal distributions can be facilitated in a more straightforward manner. Whenever continuous data is transformed into discrete categories, it is imperative that an empirical approach is taken towards establishing appropriate thresholds, otherwise the reliability and validity of the scale may become compromised (Markon et al., 2011). In this study, a combination of the univariate distribution and decision tree algorithms were used to set cut-points for the anxiety severity categories, which is an effective method for deriving statistically significant splits in data (Song & Lu, 2015). Overall, whether the continuous or categorical structure of the anxiety scale is used depends on the research question or clinical purpose in question, and so both continuous and categorical configurations for the interRAI anxiety scale should be available.

3.4.1.3 Change over time and measurement-based care

One of the main clinical uses for the interRAI anxiety scale is to track changes in anxiety symptoms over the course of treatment, aligning with the principles of measurement-based care to improve health outcomes (Aboraya et al., 2018). Since the anxiety scale demonstrated a good ability to detect change over time, the results from the analysis can be used to interpret care trends for anxious symptoms in psychiatric hospital units across Ontario. Among those who had at score of at least one on the anxiety scale at admission, most individuals demonstrated improvement by the time of discharge. However, 25% of the sample displayed either no change in anxiety or worse symptoms by discharge, pointing to a substantial group with poor health outcomes. To investigate this group further, movement between severity categories of anxiety were also examined. The most static group were those with mild anxiety symptoms at admission, as 44% of the sample still had mild symptoms by discharge. While retaining mild symptoms of anxiety by the end of the hospital stay is not ideal, it is likely that these individuals were admitted for other psychiatric concerns, and that comorbid anxious symptoms were too mild to warrant staying in hospital. In contrast, a concerning trend was that 20% of individuals admitted with severe symptoms of anxiety were still in the severe category by the time of discharge. To ensure that the range of scores constituting the 'severe' category was not too wide to detect clinically meaningful improvement, alternate cut-points were tested (7-11 and 12-15). Even after breaking down the severe category further, it was evident that clinical recovery was still an issue for more than 10% of those with moderate-severe anxiety. It is unclear why individuals with serious anxiety would be discharged from hospital, especially since community treatment for primary anxiety disorders is low (O'Donnell et al., 2017). To ensure that individuals with anxiety are receiving appropriate quality of care for their symptoms, it is recommended that the anxiety scale be explored as a potential quality indicator for psychiatric hospitals.

3.4.2 Strengths and limitations

The primary advantage of this study was the comprehensiveness of the inpatient psychiatric sample that was used to derive the interRAI anxiety scale, enabling extensive testing for internal validity. As described earlier in this chapter, beginning in 2005 in Ontario, all adults admitted to a psychiatric hospital or unit for at least three days must be assessed with the RAI-MH at admission, discharge, and – if applicable - every three months. This provincial mandate ensures the availability of a fully representative adult psychiatric inpatient population, averting the effects of sampling bias and increasing the sample size substantially. In contrast to the anxiety scale studies reviewed in the introduction, which typically included fewer than 300 individuals and a limited number of treatment sites, the RAI-MH dataset contained 237,862 unique individuals across 64 participating hospitals. As a result, the statistical power to detect relationships between variables in the anxiety scale far exceeded that of any other study identified. The capacity to accurately draw conclusions about which variables belong in the anxiety scale was vital, since it allowed this study to empirically address contentions surrounding the role of somatic items and symptoms related to OCD and PTSD. Likewise, the comprehensiveness of the inpatient sample provided a unique opportunity to compare scores on the anxiety scale across various diagnostic subtypes of anxiety, including disorders that are infrequently admitted for hospital care such as social anxiety disorder. The benefit of disorder-specific analyses is that it allows for a more thorough investigation of construct validity, such as revealing which types of anxiety symptoms may be missing. Further, since there is heterogeneity in the onset, symptom profiles, and treatment of anxiety disorders (APA, 2013; WHO, 1992), research on anxiety needs to account for both diagnostic subtype as well as general anxiety severity. Due to the exceptional strength of the inpatient sample, this study was capable of analyzing the internal validity of the anxiety scale through increased statistical power and diagnostic comparisons, beyond what is typically found in other anxiety scale research.

Given the national priority on building a coordinated mental health care system with access to shared data sources and research mechanisms (MHCC, 2015; MHCC, 2016), it is essential that the interRAI anxiety scale not only has good internal validity, but also external validity in multiple settings. To promote cross-sector utility, the diagnostic validity of the interRAI anxiety scale was tested in hospital, ED, and community mental health samples, comprising a unique advantage compared to other anxiety scale derivation studies. Both the BAI (Beck et al., 1988) and the HARS (Hamilton, 1959) were initially developed using outpatient samples of individuals being treated primarily for anxiety disorders, and while samples with a high proportion of anxiety disorders by design can help with enhancing the internal validity of the scale, they also reduce external validity and introduce sampling bias into the analyses. Although a subsequent study attempted to validate the BAI in inpatient psychiatry, there were too few cases of anxiety disorders to analyze (Steer et al.,1993), highlighting the strength of the RAI-MH dataset yet again. By including three different types of health care settings, this study was able to determine that the anxiety scale functioned best in the community setting, demonstrating the viability of the tool for outpatient contexts. Model fit statistics for predicting anxiety disorders in the ED sample were similar to those in the inpatient dataset, despite a higher proportion of disorders being present in the ED. The probable reason for this is that the scale contained four items instead of five (obsessive thoughts is not included in the ESP instrument), and several cases were missing data for the mood indicators section. Given these setbacks, it is possible that the performance of the anxiety scale in ED settings was under-estimated in this study, though future research will be required to determine whether this theory is correct. Regardless, predictive validity tests of the anxiety scale were positive in all three health care settings, increasing its value as a tool to support integrated mental health care.

Despite the benefits of including multiple mental health care settings, analyses in the ED and community datasets were limited to tests of diagnostic validity because both consisted of convenience samples. As a result, the inpatient sample had to be used as the primary data source for creating the anxiety scale instead, despite being the setting with the lowest proportion of anxiety disorders. Of all three health care settings, the ED has the greatest proportion of primary anxiety disorders and the most urgent need for an anxiety scale (CIHI, 2019b; CIHI, 2020; Gandhi et al., 2016). However, only four of the five items in the interRAI anxiety scale were available in the ESP assessment, and several cases were missing data for variables needed to construct the scale. Further, DSM codes are not collected in the CMH and ESP datasets, and so subtypes of anxiety disorders cannot be identified. Finally, although the sample sizes for the CMH and ESP datasets are still larger than the average of 300 participants in other anxiety scale studies, the inpatient sample was substantially larger and more representative of its population. For these reasons, although anxiety has a stronger presence in the community and ED samples, neither could be used as the derivation sample for the scale. Although more extensive analyses were not performed, the predictive validity of the anxiety scale was encouraging in the ED and community samples, suggesting that it can be viably used in clinical practice and research focused on anxiety disorders. Further, as the number of CMH and ESP assessments grow in the Chatham-Kent region, more extensive research on the anxiety scale with these datasets can be performed.

Similarly, another limitation that should be addressed in future studies is a comparison between the interRAI anxiety scale and other anxiety tools. When testing concurrent validity, it is common practice for anxiety scales to be evaluated against 'gold standard' tools that have demonstrated good reliability and validity (Julian, 2011), such as the HARS (Hamilton, 1959) and BAI (Beck et al., 1988). However, this study was restricted to choosing concurrent indicators available in the interRAI assessment instruments. While trauma and sleep disturbance are associated with anxiety (APA, 2013; WHO, 1992) and thus valid concurrent indicators, the validity of the anxiety scale would benefit further from testing its association with other measures of general anxiety. However, due to the exclusion of somatic items from the interRAI anxiety scale, it is possible that it will have a weaker relationship with the HARS and BAI than they do with each other. As a result, while a positive association is still be expected, it is not necessarily a failure of the interRAI anxiety scale if it is weakly related to the HARS and BAI. Overall, there were many methodological strengths of this study that allowed a promising first version of an anxiety scale to be created, while future studies can be planned that account for the limitations that do exist.

3.4.3 Future research

One avenue for future research involves addressing the limitations that arose from unavailability of certain types of data, such as concurrent tests with other anxiety scales and adding in new anxiety variables to the interRAI tools. General anxiety scales that could be used to further test concurrent validity of the anxiety scale are the HARS (Hamilton, 1959) and BAI (Beck et al., 1988), though treatment sites would have to be recruited that either already use these tools, or that would be willing to adopt them to participate in research. Another consequence of being restricted to available data was the inability to include certain types of anxiety variables. In particular, gaps in coverage were noted for social anxiety disorder and GAD, reducing the construct validity of the scale. Three scales were reviewed in the introduction that measure social anxiety: the LSAS (Heimberg et al., 1999), SPS (Heimberg et al., 1992), and SIAS (Heimberg et al., 1992). Since all three tools demonstrated good reliability and validity, they can be used as a guide for evaluating items that depict social anxiety, much like the HARS and BAI were used to inform the anxiety scale in this study. A good starting point for creating social anxiety variables would be to adapt items from the interRAI Long-term Care Facilities (LTCF) assessment, which contains a section on 'sense of involvement' with the following variables: a) at ease interacting with others, b) at ease doing planned or structured activities, c) accepts invitations into most group activities. The advantage of using the LTCF as a basis for introducing a social anxiety variable into the mental health instruments is that it would be cross-compatible within the suite of interRAI instruments, permitting cross-sectoral comparisons of anxiety, and it also follows the same 3-day look back period as the mental health indicators.

Unfortunately, a comparable item representing GAD could not be located in the interRAI instruments. To cover the core criteria involved in GAD, a variable is needed that emphasizes pervasive and excessive worrying/apprehension, representing a persistent problem that is not merely a response to stressful circumstances (APA, 2013; WHO, 1992). If a new variable is created to reflect GAD, the GAD-7 could be used as one source of assistance (Spitzer et al., 2016). With these resources available, future studies should make use of them to explore adding social anxiety and GAD variables to the mental health suite of interRAI assessment tools. However, as previously mentioned, future research will need to ensure that when adding disorder-specific items to the anxiety scale, the correlation matrix for items is not weakened as a result. If adding symptoms of social anxiety and GAD do diminish the ability of the scale to measure general anxiety, one solution would be to include another variable that is common to anxiety disorders broadly, some examples of which are available in the GAD-7 (Spitzer et al., 2016). Additionally, consultation with clinical experts could be conducted to determine whether there are shared features of anxiety that are missing from the current interRAI instruments. However, the disadvantage of this approach is that the interRAI MH and CMH assessment instruments already contain over 300 items, and so there may be some reluctance towards adding in several new items. In any case, the current study was unable to address these concerns, but it is recommended that future studies investigate additional anxiety items.

Another research opportunity that arises from the creation of an anxiety scale is its potential to be used as a quality indicator for mental health care settings. A previous research study examined how the interRAI depressive severity index (DSI) and cognitive performance scale (CPS) functioned as quality indicators for psychiatric hospitals in Ontario (Perlman et al., 2013). Both scales were examined in relation to provisional DSM diagnosis and change scores across facilities, with the latter analysis including adjustments for the RAI-MH System for Classification of Inpatient Psychiatry (SCIPP), which is an algorithm used to describe resource intensity within inpatient psychiatry units across Ontario. This study has already established the ability of the anxiety scale to predict anxiety disorders and detect changes in symptoms over time, providing a solid foundation for further research into its use as a quality indicator. Other examples of quality-related research questions that can be addressed using the anxiety scale include treatment processes and outcomes that are specific to subgroups of individuals with anxiety who are receiving mental health care, which will be the focus of the fourth chapter in this dissertation. In addition to examining individual care settings, the anxiety scale can also be used to examine outcomes following transitions between health sectors, which is another quality-related concern that has been identified as a priority for mental health systems across Canada (MHCC, 2015; MHCC, 2016). Altogether, there are multiple potential uses for the interRAI anxiety scale, providing a rich foundation for ongoing research initiatives.

3.4.4 Conclusions

There is a growing demand for mental health care of anxiety in Canada (Aratani & Addy, 2014; Brien et al., 2015; CIHI, 2019b; CIHI, 2020; Gandhi et al., 2016; Juhás & Agyapong, 2016), though systems are already struggling to meet this need (Baia Medeiros et al., 2019). To facilitate evidence-based strategies that effectively target anxiety in mental health care systems, evaluation tools are needed that assess symptoms of anxiety. While the interRAI mental health assessment instruments are widely used in Canada, an anxiety symptoms scale was not available, due to the complexity involved in cohesively capturing various anxiety disorder subtypes (APA, 2013; WHO, 1992). Using other general anxiety scales as a guide, including the HARS (Hamilton, 1959) and BAI (Beck et al., 1988), this study sought to create an anxiety scale for the interRAI assessment tools. Factor analysis was the primary method used to identify the structure of the anxiety scale, though LCA, IRT, and decision trees were also utilized to create alternative scale structures. The final model chosen for the anxiety scale was a 5-item continuous scale, excluding somatic items and compulsive behaviour. The scale demonstrated good criterion validity and responsiveness to change over time, providing strong support for the official creation of an interRAI anxiety scale. Ongoing research is needed to explore the potential addition of new variables representing features belonging to social anxiety and GAD, as well as to determine its viability as a quality indicator for multiple mental health care systems. As the scale undergoes further refinement, it can start being used as a tool to support research on anxiety in mental health care settings, which is the focus of the next chapter in this dissertation.

Chapter 4

4.1 Introduction

Recent trends in mental health care among EA illustrate a growing demand for services (Brien et al., 2015; CIHI, 2020), but several systemic barriers exist that hinder coordinated care, leading to high rates of disengagement from treatment (Edlund et al., 2002; MHCC, 2015; Roche et al., 2020) and inappropriate utilization of emergency services (CMHA, 2008). Acknowledging barriers to accessibility of mental health care among EA, the Mental Health Commission of Canada (MHCC) has identified integration of health care systems as a key priority. While holistic care systems are needed to improve treatment for all types of mental health concerns, there are certain psychological conditions for which gaps in care are especially prominent. For example, the rising prevalence of anxiety disorders in emergency department (ED) settings across Canada are becoming an urgent concern (Aratani & Addy, 2014; Brien et al., 2015; Juhás & Agyapong, 2016), especially among youth and EA (CIHI, 2020; Gandhi et al., 2016). With more EA accessing the ED for treatment related to anxiety, it is possible that the prevalence will also increase in inpatient psychiatry, in which rates of primary anxiety have historically been very low. In the second chapter of this dissertation, primary anxiety disorders were present in only 4% of the inpatient population between 2005-2019, while 10% had a non-primary anxiety disorder. Further, while the average score on the anxiety scale was relatively low (*M*=2), mild anxiety was still present in a large portion of the population. The wider prevalence of non-primary anxiety disorders and mild symptoms may be due to comorbidity with depression, which shares a strong relationship with anxiety (APA, 2013; WHO, 1992), and is the leading psychological disorder implicated in psychiatric hospitalizations among youth (Brien et al., 2015). If rates of anxiety also begin to increase in inpatient psychiatry, it is important to understand the treatment patterns associated with diagnostic status and severity of symptoms to identify best practices, as well as any potential gaps in care.

To improve quality of care for specific mental health needs, regular data reporting on performance and outcome measurements for these conditions is needed (Aboraya et al., 2018; MHCC, 2015). To streamline this process, interRAI has developed several measurement scales, which summarize variables contained in the assessment to provide an overview of a specific domain, such as depression and positive symptoms of psychosis (Hirdes, et al., 2020; Perlman et al., 2013). The scales are then used to evaluate factors related to quality of mental health care, such as resource utilization, responsiveness to treatment over time, and variations in outcomes across facilities. Scales are also useful for predicting trends and outcomes at a more granular level than diagnoses, providing a deeper depth of information for service and policy planning. In some cases, disorders and symptoms may even produce conflicting results, which must be incorporated into research focused on advising mental health system design. For example, research with older adults living in long-term care facilities found that symptoms and diagnoses of depression were differentially related to rates of anti-depressant medication prescriptions (Hirdes et al., 2000), indicating that service providers may overlook symptoms in the absence of a diagnosis when administering treatment. Now that an initial anxiety scale is available, not only can this study investigate treatment patterns and social resources related to primary anxiety diagnoses among EA in psychiatric hospital units, but also determine how severity of anxious symptoms further influences these outcomes.

4.1.1 Mental health care service use

To establish what is presently known about health care use for anxiety, research studies derived from community populations were reviewed, which demonstrated that although collaborative mental health care results in better outcomes, treatment rates were low. In general, individuals with anxiety disorders typically access medical care agencies for treatment of symptoms, rather than mental health services (Horenstein & Heimberg, 2020; Kessler et al., 2007; O'Donnell et al., 2017; Somers et al., 2006). For example, using data obtained from the Canadian Community Health Survey – Mental Health (Roberge et al., 2011), treatment adequacy for anxiety disorders was examined over the past 12 months in both general medical and specialized mental health settings. Sufficient access to pharmacological treatment was defined as receiving at least four outpatient visits with the same provider in either setting, as well as the use of a prescribed anxiolytic or antidepressant medication. For psychotherapy, the criteria for treatment adequacy involved seven outpatient visits with the same provider in a specialized mental health setting. Overall, only 36.9% of respondents with a diagnosed anxiety disorder reported accessing any mental health treatment over the past year. Among those who did, fewer received specialized mental health services than general medical care (20.2% versus 29.9%, respectively), though the proportion who received adequate treatment in the former setting was greater (51.5% versus 36.8%). However, treatment adequacy was highest among individuals who received care from both general medical and specialized mental health centres (79.5%), indicating that collaborative care promotes better engagement in treatment among individuals with anxiety disorders.

Despite the positive effects of continuity of care on long-term engagement in treatment for individuals with anxiety disorders, mental health care utilization remains low (O'Donnell et al., 2017; Roberge et al., 2011; Somers et al., 2006), especially among EA, who experience more disruptions to mental health treatment than other age groups (Edlund et al., 2002; MHCC, 2015). A major reason for low uptake of community mental health treatment across Canada is due to systemic barriers in accessibility of these services, including financial costs, long wait lists, limited availability by location, and complications in navigating the system (Moroz et al., 2020). Considering the numerous obstacles involved in accessing community mental health treatment, individuals may be more inclined to seek care from emergency health settings instead, which are covered under the Canada Health Act (Health Canada, 2021). Consistent with this theory, psychiatric emergency departments (EDs) observe relatively high proportions of anxiety disorders compared to other health care settings (Aratani & Addy, 2014; Brien et al., 2015; CIHI, 2020; Gandhi et al., 2016; Horenstein & Heimberg, 2020; Juhás & Agyapong, 2016). Not only is anxiety comparatively higher in the ED than other settings, but a study of mental health service use among youth in Ontario found that anxiety disorders were the most common diagnosis implicated in psychiatric ED visits (CIHI, 2020; Gandhi et al., 2016), highlighting a strong need for treatment of anxiety. Further, as reported in the second chapter of this dissertation, the ratio of primary to non-primary anxiety disorders was greater only in the ED dataset, meaning that treatment specifically for anxiety is disproportionately low in community and psychiatric hospital settings. A repercussion resulting from this lack of accessibility is over-crowding and long wait times in the ED (CMHA, 2008), which is heightened among youth presenting with mental health concerns (CIHI, 2019b). Further, because most individuals receiving care in general psychiatric hospital units are admitted through the ED (CIHI, 2019b), it is likely that the prevalence of anxiety will begin to rise in psychiatric hospitals as well, requiring evidence-based care guidelines for treating individuals with these symptoms and diagnoses.

Although EA frequently seek mental health care for anxiety in the ED, relatively few individuals with anxiety disorders are subsequently admitted for inpatient psychiatric care (Horenstein & Heimberg, 2020), due in part to the admission criteria outlined in the Mental Health Act (MHA, 1990). As described in the Act, admissions into inpatient psychiatry are determined based on urgency of risk of harm to self and others. Unlike depression, which is a known risk factor for self-harm and suicidality, the evidence for risk of danger resulting from symptoms of anxiety is unclear (Bandelow & Michaelis, 2015; Cummings et al., 2014). As a result, even when youth with primary depression or anxiety disorders sought the same level of care from school psychologists, only those with primary depression received inpatient psychiatric care (Essau, 2005). While anxiety disorders are rarely observed in psychiatric hospitals and units, it is possible that symptoms of anxiety predict hospitalization more strongly, but these are often omitted in studies of health care use among individuals with anxiety disorders. For instance, it may be that individuals who present with severe symptoms of anxiety are more frequently admitted into psychiatric hospitals, regardless of their diagnosis. Assessing symptoms of anxiety may be especially informative among EA who recently developed anxiety and are only accessing mental health services for the first time, as they may not have had the opportunity to receive a diagnosis yet. Ensuring that anxiety is thoroughly assessed at intake and incorporated into treatment is necessary for efficient service planning in psychiatric hospitals, as rates of anxiety may begin to increase as more youth and EA present to the ED for anxiety-related care (Aratani & Addy, 2014; Brien et al., 2015; Juhás & Agyapong, 2016). To prepare for growth in anxiety symptoms and disorders, it is necessary to establish current care practices for EA presenting with anxiety and identify potential gaps in treatment resources.

4.1.2 Psychiatric hospital care for anxiety

Evidence-based care practices for anxiety within inpatient psychiatry are unknown, since admittance into these settings are rare for individuals with primary anxiety disorders, meaning that there have not been any large-scale opportunities to conduct research with this population (Bandelow & Michaelis, 2015). To ensure that optimal quality of care is provided, it necessary for studies to comprehensively investigate and report on treatment patterns and outcomes for individuals with anxiety. In the meantime, recommendations for treating anxiety disorders in inpatient settings have been made using evidence-based research derived from outpatient sources. For example, the Royal Australia and New Zealand College of Psychiatrists developed a clinical practice guideline for treating panic disorder, social anxiety disorder, and generalized anxiety disorder (GAD), detailing best practices for outpatient and inpatient care (Andrews et al., 2018). While treatment options should ultimately be selected with input from the patient, the recommended interventions for anxiety were cognitive-behavioural therapy (CBT), pharmacology, or ideally, a combination of both. While group-therapy formats for CBT interventions have shown some efficacy in improving clinical outcomes, because individual-therapies have produced greater effect sizes, individual sessions are the preferred mode of delivery (Andrews et al., 2018; Bandelow et al., 2015). Although individual CBT has been shown to be beneficial in treating anxiety, pharmacology treatments are associated with greater short-term improvement in anxiety symptoms and are more easily accessible to most patients (Bandelow et al., 2015), suggesting that medication options should also be explored with the patient, depending on their personal preferences and underlying health conditions.

Given the opportunity, it is better to offer both psychotherapy and pharmacotherapy than either alone, as research has shown that a combination of medication and CBT have the strongest impact on improving symptoms of anxiety (Andrews et al., 2018; Bandelow et al., 2015). Further, as described earlier, treatment adequacy for anxiety disorders was greatest when individuals received resources from both specialized mental health and general medical services (Roberge et al., 2011), reiterating the benefits of a combined medical and psychological approach. Consequently, both psychotherapy and pharmacotherapy should be offered to individuals who are admitted to hospital with anxiety, with input from a medical doctor or nurse practitioner when medical conditions may be a concern. Currently, it is unknown what the treatment patterns are for EA with anxiety in psychiatric hospital care (Bandelow & Michaelis, 2015), or how those trends may differ based on diagnostic status (primary versus non-primary) and severity of symptoms.

While the type of intervention provided and the way it is delivered are essential components to inpatient care, another important element of treatment in hospital settings involves interpersonal interactions with staff members, which can enhance clinical outcomes by establishing a therapeutic alliance with the individual (Andrews et al., 2018). In two inpatient psychiatric units in Australia, psychiatric nurses participated in interviews about their experiences with treating patients who had symptoms of anxiety (Webster et al., 2012). Nurses emphasized the importance of being able to properly assess and monitor symptoms of anxiety, as well maintaining positive communication with their patients. Fostering communication and social relationship-building skills among patients was also identified as a crucial aspect of treatment, such as encouraging the patient to share their thoughts and feelings with a support person and teaching them therapeutic interpersonal skills. In the guideline for treating anxiety disorders in Australia and New Zealand, the clinical value of cultivating a strong therapeutic alliance with patients was also referenced, as well as incorporating the patient's social life into their care plan (Andrews et al., 2018). Finally, in the "Mental Health Strategy for Canada: A Youth Perspective" (2016) report, youth contributors highlighted positive interpersonal interactions with service providers and inclusion of social relationship-building skills as necessary components of excellent care, affirming the need to examine interpersonal factors involved in mental health treatment.

Altogether, little is known about patterns of care for individuals experiencing anxiety in psychiatric hospitals, particularly when it is their primary concern. Further, no studies could be located that used both diagnosis and symptoms of anxiety to examine treatment processes and outcomes in inpatient settings, which is needed to account for degree of symptom severity and disorder status (primary versus non-primary). Understanding how diagnosis and symptoms of anxiety are currently treated in psychiatric hospitals is necessary for adopting a measurement-based care approach, which is of immediate concern given that anxiety disorders are on the rise in ED settings (Baia Medeiros et a., 2019; Gandhi et al., 2016). This chapter will address gaps in knowledge surrounding the types of treatments that individuals with anxiety receive in inpatient settings, as well as interpersonal experiences of care.

4.1.3 Comorbidity between anxiety and depression

Prior to investigating patterns of care for anxiety in hospital, a factor that needs to be accounted for is comorbidity with depression. In general, depression and anxiety are highly comorbid psychological disorders (APA, 2013; WHO, 1992), though evidence suggests that depression involves comorbid anxiety more often than vice versa (Cummings et al., 2014; Garber & Weersing, 2010). For example, a study in The Netherlands examined latent classes of anxiety and depression among adolescents referred to outpatient mental health services between 1988-2003 (Ferdinand et al., 2005). While most adolescents with symptoms of anxiety or depression had an equal combination of both, there was a small class (5%) consisting of individuals with severe anxiety and moderate depressive symptoms. However, there was no class where adolescents had severe depression and non-severe anxiety. A potential explanation for the imbalance in comorbidity between anxiety and depression is the difference in developmental trajectories of symptom onset between the two conditions. Two other studies based in The

Netherlands examined comorbidity between diagnoses of anxiety and depression using data obtained from the Netherlands Mental Health Survey and Incidence Study (NEMESIS) (de Graaf, Bijl, Spijker, Beekman, & Vollebergh, 2003) and the Netherlands Study of Depression and Anxiety (NESDA) (Lamers et al., 2011). Among respondents with comorbid anxiety and depression in the NEMESIS survey, most reported anxiety as the primary diagnosis, which emerged prior to the secondary depression diagnosis (de Graaf et al., 2003). Similarly, in the NESDA dataset, 57% of individuals with comorbid diagnoses developed anxiety before depression, whereas depression appeared first in 18% of cases (the remaining 25% had simultaneous onset) (Lamers et al., 2011). As a result, symptoms of anxiety may appear more prevalent than depression among youth, though there is still a risk of developing subsequent depression as time goes on.

Although most anxiety disorders have an average age-of-onset in the mid-20s (de Lijster et al., 2017; Kessler et al., 2007), and anxiety frequently appears prior to depression (de Graaf et al., 2003; Lamers et al., 2011), it is unlikely that EA receiving care in psychiatric hospitals have symptoms of anxiety without a similar degree of depressive symptoms. Research has shown that most individuals receiving treatment for anxiety also have comorbid depression by the time they seek care (Bandelow & Michaelis, 2015; Essau, 2005; Mackenzie, Reynolds, Cairney, Streiner, & Sareen, 2012; Preisig, Merikangas, & Angst, 2001), and that individuals with singular anxiety disorders receive less treatment than those with singular or comorbid depressive disorders (Mackenzie et al., 2012; Preisig et al., 2001). As a result, while comorbid depressive symptoms predict health care utilization among individuals with anxiety disorders, the same is not necessarily true when anxiety symptoms are comorbid to depression (Essau, 2005; Roberge et al., 2011). This pattern is likely exaggerated in psychiatric hospitals, since depressive disorders are the most prevalent diagnosis treated, while anxiety disorders are relatively uncommon (Brien et al., 2015; Gandhi et al., 2016). In this case, anxiety should frequently accompany depression among EA in psychiatric hospital settings, despite opposite findings in the general population (Cummings et al., 2014; Ferdinand et al., 2005; Garber & Weersing, 2010). Consequently, while non-primary anxiety disorders should positively predict full admissions into psychiatric hospitals, primary anxiety disorders should not.

4.1.4 Rationale and hypotheses

To better support EA who access mental health care services, it is essential that research is used to identify gaps in care corresponding to specific clinical needs (Aboraya et al., 2018; MHCC, 2015). Considering that anxiety disorders are a growing cause of psychiatric ED visits among EA in Canada (Baia Medeiros et al., 2019; CIHI, 2020; Gandhi et al., 2016), but are infrequently observed in community mental health and inpatient psychiatry, it is crucial to investigate how anxiety is currently being treated in these settings to establish possibilities for improving continuity of care. Based on the results from chapters two and three, it is known that there are few cases of primary anxiety disorders in psychiatric hospitals across Ontario. However, while it is probable that diagnosis is a negative predictor of admission into inpatient psychiatry, it is unclear what role different severity levels of anxious symptoms plays. It is possible that severe symptoms of anxiety are positively associated with admissions into hospital and may be the reason that some primary anxiety disorders are observed in these settings.

Since cases of primary anxiety disorders in psychiatric hospitals are rare, it is unknown how diagnoses and symptoms of anxiety are related to treatment patterns in these settings. Based on a national guideline (Andrews et al., 2018) and a meta-analysis (Bandelow et al., 2015) of effective interventions for clinical anxiety, individual CBT therapy sessions and pharmacotherapy are recommended, and so they should be resources that are offered to individuals with anxious symptoms and disorders. Further, positive interactions with staff members and other social relations in the person's life are influential components of effective care (Andrews et al., 2018; MHCC, 2016; Webster et al., 2012), and so it is crucial to examine these factors as part of inpatient treatment for EA experiencing anxiety. Finally, it is well known that anxiety and depression frequently co-occur (APA, 2013; WHO, 1992). Given developmental trajectories for developing comorbid anxiety and depression (Cummings et al., 2014), there may be a unique subgroup of EA with severe anxiety and mild depression in psychiatric hospitals. At the same time, unlike general population research, it is probable that anxiety symptoms overall are more frequently connected to depression in psychiatric hospitals (Bandelow & Michaelis, 2015; Essau, 2005; Mackenzie et al., 2012; Preisig et al., 2001). This chapter seeks to address each of these gaps in knowledge by answering three research questions:

1) What is the nature of comorbidity between anxiety and depression among EA in psychiatric hospitals?

2) How do diagnoses of anxiety disorders and the interRAI anxiety scale predict admissions into psychiatric hospitals, as well as depressive disorders and symptoms? Is there a difference between primary and non-primary diagnoses of anxiety?

3) How do the types of treatment interventions and informal social supports differ across anxiety disorder status and severity of anxious symptoms?

4.2 Methods

4.2.1 Study sample and design

As previously described in chapters two and three in this dissertation, the interRAI Resident Assessment Instrument – Mental Health (RAI-MH) dataset from 2005-2019, available through the Ontario Mental Health Reporting System (OMHRS), was used as the data source for this study. The study sample was restricted to EA, who were defined as those between the ages of 18-30, based on the results from chapter two demonstrating similarities in the prevalence of anxiety and depression within this age range. The first episode of care contained in the system was selected as the unit of analysis, with only one episode retained per individual. Exclusion criteria included cases flagged as containing possible data quality issues (CIHI, 2021), forensic patients, and short-stay patients. The final sample size was n=65,528.

To examine outcomes related to admissions into inpatient psychiatry, a separate dataset was created that included short-stay assessments, which are defined as visits that are 72 hours or less in length. Unlike full admission assessments, not all information contained in the RAI-MH is required to be filled in for short-stay assessments, meaning that some admission data may be missing. For this reason, the dataset including short-stay assessments was only used for analyses predicting this outcome. Using the same coding process for the full admission dataset, the final sample size for the short-stay admission dataset was n=98,607.

4.2.2 Dependent variables

To analyze short-stay versus full admissions into inpatient psychiatry, a dataset retaining 'short-stay' assessments was created. In the OMHRS dataset, CIHI added a variable that identifies the 'assessment type' for each record in the system (CIHI, 2021). A full admission assessment is defined as a net length of stay greater than 72 hours and contains the full RAI-MH admission assessment. In contrast, a short-stay assessment is a net length of stay less than or equal to 72 hours, with some information pertaining to both admission and discharge. For the purposes of analysis, a binary category was created called ‘short stays,’ where short-stay assessments were coded as ‘1,’ and as ‘0’ if it was a full admission assessment.

Various indicators on service utilization/treatment are included in the RAI-MH, which were used to examine care patterns among EA. The ‘formal care’ section lists various types of professional roles and asks the assessor to record the number of days in which the individual received at least 15 minutes of contact with someone of that profession, either within the past seven days or since admission. The roles examined in this study included psychiatrist, nurse practitioner or MD (non-psychiatrist), and psychologist or psychometrist, as these are the professions that would primarily be responsible for administering pharmacology (psychiatrist or MD) and CBT (psychologist) interventions. Since full admission assessments are set at three days, the number of days in which the individual received at least 15 minutes of contact with each profession was collapsed into the following categories: ‘0’ if there were 0 days of contact, ‘1’ if there was 1-2 days, and ‘3’ if there were 3 or more days. Although the exact type of intervention is not recorded (e.g., CBT), treatment modalities for delivering psychotherapy are included in the RAI-MH, including individual therapy, group therapy, family/couple therapy, and self-help group. Each of these treatment modalities were selected for examination, though it was expected that individual therapy would be the most relevant, given the recommendations for providing individual CBT among those with anxiety disorders (Andrews et al., 2018; Bandelow et al., 2015). Treatment modalities are coded as follows: ‘0’ if not offered and not received, ‘1’ if offered but refused, ‘2’ if received in the last 7 days, and ‘3’ if not received but scheduled to start within the next 7 days.

The final set of dependent variables focused on social relations and interpersonal conflict, all of which are coded as either “no” or “yes.” The following variables were included for analysis: reports having no confidant, family/close friends report feeling overwhelmed by person’s illness, family/friends are persistently hostile towards or critical of person, and staff reports persistent frustration in dealing with person.

4.2.3 Independent variables

The independent variables used in this study were anxiety disorders, depressive disorders, the anxiety scale, and the Depressive Severity Index (DSI). The anxiety disorder category from the list of DSM-IV psychological disorders was used to create a variable for anxiety diagnosis, including OCD and PTSD from the updated DSM 5 list. Since assessors can choose up to three psychological diagnoses and rank them in order of their importance, an ordinal variable with three levels was created for anxiety disorders. If an anxiety disorder was ranked as the most important, it was considered a primary anxiety diagnosis and was coded as ‘2.’ If an anxiety disorder was ranked as second or third most important, it was a non-primary anxiety diagnosis and was coded as ‘1.’ Otherwise, if no anxiety disorder was recorded, it was coded as ‘0.’ The same procedure was used to define depressive disorders, except that rather than using the list of DSM psychological disorder categories, the individual DSM codes were compiled instead. The reason for using the DSM codes is because prior to the DSM 5, depression was grouped together with bipolar disorders to form a general mood disorder category, which would have confounded the results. Since the codes are also entered in order of their importance, distinctions between primary and non-primary depressive disorders were still able to be made.

To represent symptoms of anxiety and depression, the anxiety scale created in chapter three of this dissertation was used, as well as the DSI (Perlman et al., 2013). Both scales are derived from items contained in the 'mental state indicators' section of the RAI-MH. Each of the items is observed over a three-day lookback period and is coded as follows: '0' if the indicator was not exhibited in the last three days, '1' if the indicator was not exhibited in the last three days but is reported to be present, '2' if the indicator was exhibited on one to two of the last three days, and '3' if the indicator was exhibited daily in the last three days. The anxiety scale, which ranges from 0-15, is a sum of repetitive anxious complaints, unrealistic fears/phobias, obsessive thoughts, intrusive thoughts/flashbacks, and episodes of panic. However, since the distribution of the scale is non-normal, the severity categories created in chapter three were used for the analyses in this chapter. The severity categories for the anxiety scale were coded as follows: 0 (none), 1-3 (mild), 4-6 (moderate), and 7-15 (severe). The DSI, which also ranges from 0-15, adds the scores from the following items: sad/pained facial expression, negative statements, self-deprecation, guilt/shame, and hopelessness. The corresponding severity categories for the DSI were: 0 (none), 1-3 (mild), 4-7 (moderate), and 8-15 (severe).

4.2.4 Statistical analysis

4.2.4.1 Distribution comparisons

Patterns of comorbidity between severity levels of anxiety and depression were examined through a cross-tabulated frequency distribution and tested using the weighted kappa coefficient. The weighted kappa coefficient can be used to analyze inter-rater agreement for scales with ordinal data structures, as the equation assigns greater penalties the further that scores are apart (Cichetti & Allison, 1971; Fleiss & Cohen, 1973). The default procedure used by SAS 9.4 for calculating the weighted kappa statistic is the Cicchetti-Allison method of linear weighting, though quadratic Fleiss-Cohen weights were specified instead (Fleiss & Cohen, 1973). Like the intraclass correlation coefficient (ICC) for continuous measures, the Fleiss-Cohen weighted kappa statistic is based on inverse-square spacing of the data table, which assigns weights to each cell by calculating the squared distance between ordinal categories. So, in a data table representing two scales that each contain four severity categories (none, mild, moderate, and severe), categories that are only one space away from each other (e.g., mild - moderate) will have a greater weight assigned to them than those that are two spaces away (e.g., mild - severe). Unlike linear weights, quadratic weights are more lenient when categories are close together and harsher when they are further apart. For psychological diagnoses, weighted kappa values typically range between 0.40-0.60 (Fleiss & Cohen, 1973). By analyzing the weighted kappa coefficient, the consistency in severity scores between the anxiety scale and the DSI can be determined, accounting for the distance between ordinal levels.

To determine how treatment patterns varied by the level of anxious severity and primary anxiety disorder status, three-way chi-square tests were performed using the psychiatrist, psychologist, and nurse/MD dependent variables, as well as the individual and group therapy variables. The same procedure was also used to examine patterns of social resource dependent variables. Chi-square tests of independence are used to determine whether significant differences exist between observed and expected data patterns for nominal or ordinal categories, and because it is a non-parametric test, it does not require that data be normally distributed (McHugh, 2013). Significance of the chi-square test is determined using probability values (p-values), which represent the degree to which the observed data differs from expected values due to random chance. For the three-way chi-square tests between anxiety disorders, the anxiety scale, and the dependent variables, chi-square tests were used to determine whether patterns on the dependent variable differed across anxious symptom severity categories at each level of anxiety disorder status. To establish whether there was also a main effect of anxiety disorders on dependent variables, separate two-way chi-square tests were performed omitting the anxiety scale.

4.2.4.2 Logistic regression

An advantage of logistic regression is that it can estimate the probability of an outcome while accounting for several independent variables at once. However, in small samples, the inclusion of too many variables may produce a saturated model that has insufficient statistical power to explain the relationship between independent variables and the outcome of interest (Bursac, Gauss, Williams, & Hosmer, 2008; Sperandei, 2014). The process of entering independent variables into a regression model also has consequences for standard error estimates, reliability, confounding effects, and interactions between sets of variables (Bursac et al., 2008). Variable selection is generally done in one of three ways: forward selection, backward elimination, or stepwise selection. Forward selection methods begin with an intercept-only model and adds in variables sequentially based on their chi-square statistic, stopping when there are no further variables that meet the statistical requirements (Bursac et al., 2008). Conversely, backward elimination starts with all variables in the model and removes the one with the least significant Wald test statistic, repeating the process until only significant variables remain. Stepwise selection is a combination of forward selection and backward elimination processes, adding in variables and removing them in stages until the optimal model is reached (Bursac et al., 2008). Notably, backward elimination and stepwise selection processes are more accurate methods than forward selection when the sample size is larger (Bursac et al., 2008). While these methods can be handled automatically by statistical software programs, the researcher can also manually control the process using empirical evidence, which was the approach taken in this study.

Short-stay hospitalizations were predicted using logistic regression models, which calculate the odds of an outcome occurring for each independent variable through odds ratios (ORs) and regression coefficients (Sperandei, 2014). Additionally, if it appeared that anxiety disorders and severity of anxious symptoms had different patterns of association with the treatment and social resource dependent variables in the distribution analyses, logistic regression was also used to better establish the direction of effects. To determine whether anxiety disorders and symptoms had a significant effect on dependent variables, the ORs and 95% confidence intervals (CIs) were consulted, as well as the p-values associated with the regression coefficients. Since the intention was to investigate how the anxiety variables are related to outcomes, rather than trying to fully identify all covariates that explain variation in the dependent variables, the c-statistic is reported but is not the primary metric of interest.

For all logistic regression models, a stepwise selection process was followed. The first set of variables that were entered into the model were anxiety disorders, the categorical version of the anxiety scale, gender, and age (continuous from 18-30). Following this step, a second model was conducted that included depressive disorders and the categorical version of the DSI. If anxiety disorders and anxiety symptoms were both statistically significant in the second model, a third model was performed that included an interaction term between the two variables to determine whether there were significant interaction effects. However, none of these interaction terms were statistically significant in the models tested, and so these results are available upon request only.

4.3 Results

4.3.1 Descriptive statistics

In the short-stay dataset, 39% of the sample had a short-stay assessment, meaning that several EA aged 18-30 were not admitted into inpatient psychiatric care for more than 72 hours during their first index episode in the OMHRS dataset. Further, if the full admission dataset is subtracted from the short-stay dataset, the result is a reduction of the sample size to n=33,079. However, the actual number of short-stay assessments was n=38,890, meaning that 5,811 individuals with a full admission assessment had a prior short stay episode recorded in the system. Sociodemographic characteristics and DSM diagnoses of anxiety and depression for individuals with either a full admission or short-stay assessment are shown in Table 34.

Table 34. Sociodemographic characteristics and DSM psychological diagnoses of inpatients aged 18-30 with either a full admission (n=59,717) or short-stay assessment (n=38,890) in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019.

Sociodemographic and diagnostic variables		Full admission (n=59,717)	Short-stay (n=38,890)	Chi-square test
		% (n)	*% (n)*	*χ2 (df) p-value*
Gender	*Female*	45.1 (26,935)	48.9 (19,020)	137.71 (1) p<.0001
Education*	*Less than high school*	23.2 (13,867)	23.2 (4,142)	45.63 (3) p<.0001
	High school	29.5 (17,640)	31.7 (5,531)	
	Some post-secondary	41.1 (24,508)	38.7 (6,736)	
Marital status	*Married or significant other*	10.2 (6,106)	7.3 (2,836)	245.62 (1) p<.0001
Employment	*Employed*	31.1 (18,602)	27.2 (10,572)	8,143.12 (2) p<.0001
	Unemployed	52.6 (31,422)	31.5 (12,267)	
	Other/Unknown	16.2 (9,693)	41.3 (16,051)	
Lives alone*	*Yes*	18.8 (11,236)	20.3 (4,242)	22.76 (1) p<.0001
Anxiety disorder	*Primary*	4.3 (2,574)	5.6 (2,184)	498.26 (2) p<.0001
	Non-primary	10.8 (6,478)	6.9 (2,682)	
Depressive disorder	*Primary*	14.9 (8,894)	8.5 (3,302)	1,171.05 (2) p<.0001
	Non-primary	3.00 (1,786)	1.5 (583)	

Note. *The education variable was missing for n=21,467 (22%) cases in the short-stay dataset, and n=18,021 (18%) cases were missing for lives alone.

Across both samples, several markers of EA were present across the sample, such as: ~40% of individuals had some degree of post-secondary education, ~10% were married or had a significant other, ~19% lived alone, and ~30% were employed. Sociodemographic characteristics between EA with a full admission assessment and a short-stay assessment were significantly different, though the greatest difference was observed for the employment variable. Consistent with the amount of missing information for the education (22%) and living arrangement (18%) variables, those with a short-stay had a greater proportion of 'other/unknown' response codes for employment (41.3%). In terms of psychological disorders, 4.3% of EA with a full admission had a primary anxiety disorder diagnosis and 10.8% had a non-primary anxiety diagnosis. In contrast, 5.6% of EA with a short-stay assessment had a primary anxiety diagnosis and 6.9% had a non-primary disorder, indicating that anxiety disorders are associated with short-stay admissions into inpatient psychiatry. Conversely, primary depressive disorders were consistently higher than non-primary depressive disorders among EA with full- and short-stay assessments, signalling that primary anxiety disorders are uniquely related to short hospital stays.

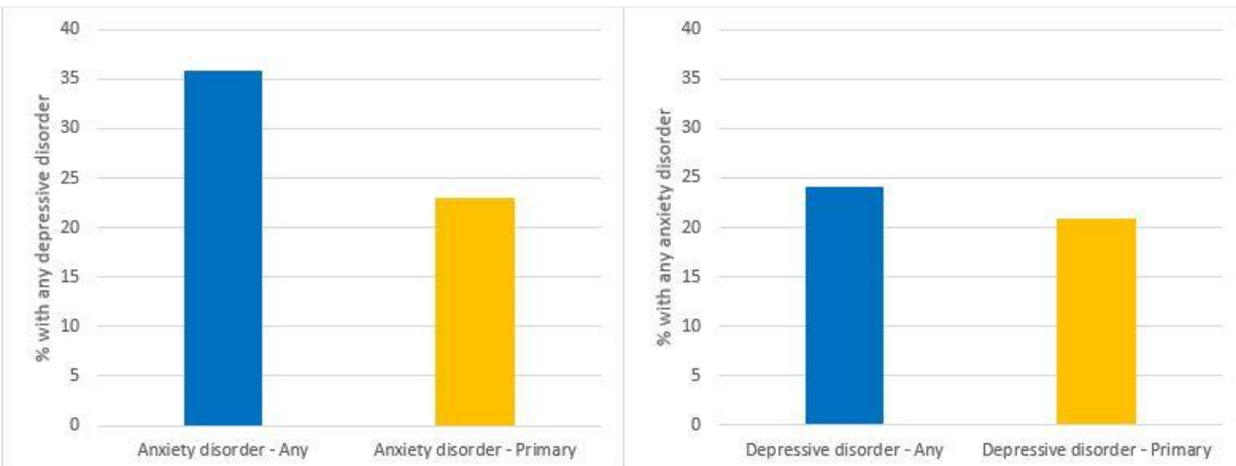

Figure 28. Percentage of inpatients with primary and any anxiety disorders who have a comorbid depressive disorder, and vice versa, among individuals aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Figure 28 illustrates the comorbidity between anxiety and depressive disorders among EA. Among individuals with a primary anxiety disorder, 22.9% had a comorbid depressive disorder, though this was not statistically significant ($\chi^2[1]=0.10$, $p=0.75$). Although a similar percentage of EA with primary depressive disorders had a comorbid anxiety disorder (21%), this difference was significant within that group ($\chi^2[1]=375.37$, $p<.0001$). Regarding non-primary diagnoses, while 24.2% of individuals with any depressive disorder also had a comorbid anxiety disorder, 35.8% of individuals with any anxiety disorder had a comorbid depressive disorder

($\chi^2[1]=1{,}164.03$, $p<.0001$). This result indicates that anxiety disorders more frequently accompany depressive disorders than vice versa. To determine whether the same pattern was true for symptoms of anxiety and depression, the quantile scores on both the anxiety scale and DSI for individuals diagnosed with any depressive disorder diagnosis and any anxiety disorder are displayed below in Figure 29.

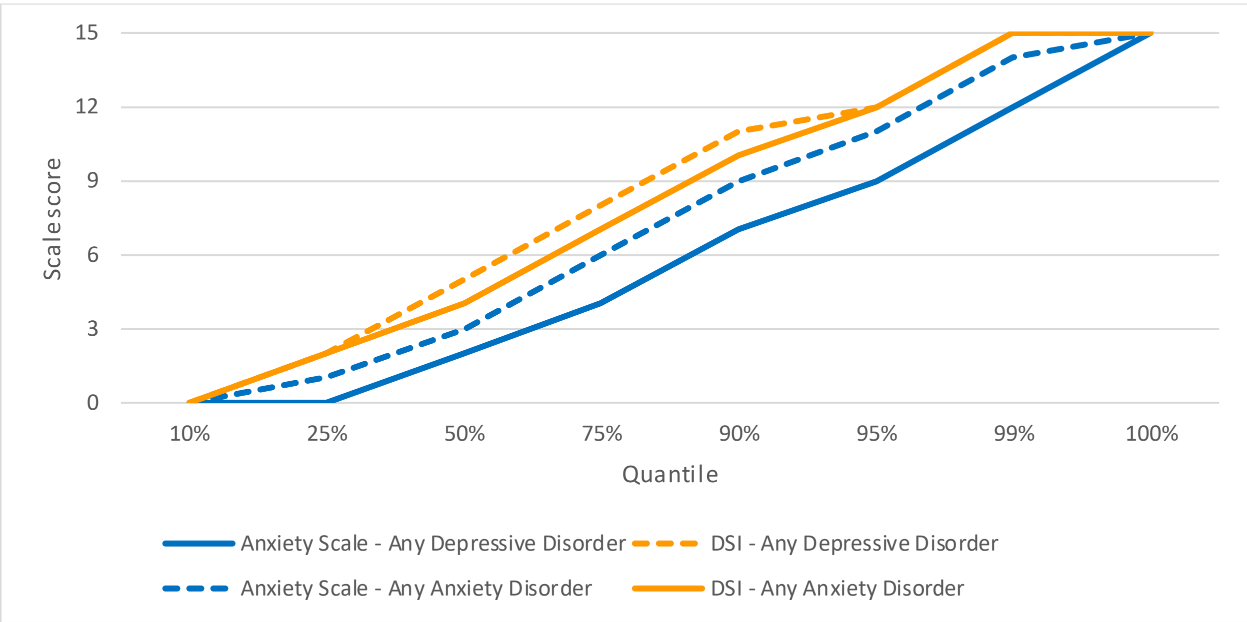

Figure 29. Quantile distribution of anxiety scale and DSI scores among inpatients aged 18-30, with any depressive or anxiety disorder, receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Scores on the DSI were higher than they were on the anxiety scale for EA with either depressive or anxiety disorders, suggesting a slightly higher prevalence of depressive symptoms in general. However, the anxiety scale still demonstrated higher scores among individuals with an anxiety disorder than those with a depressive disorder, as expected.

4.3.2 Distribution comparisons

4.3.2.1 Comorbid anxiety and depression

The weighted Fleiss-Cohen kappa statistic for agreement between severity categories of anxiety scale and DSI was k=0.33. Though the kappa statistic was significantly different from zero (p<.0001), it was evident that severity of depression and anxiety did not follow the same pattern. To determine where deviations in comorbid severity of anxious and depressive symptoms occurred, the cross-tabulated distribution of severity categories for each scale was graphically illustrated – one with the DSI on the x-axis and another with the anxiety scale on the x-axis. These graphs are displayed below in Figures 30 and 31.

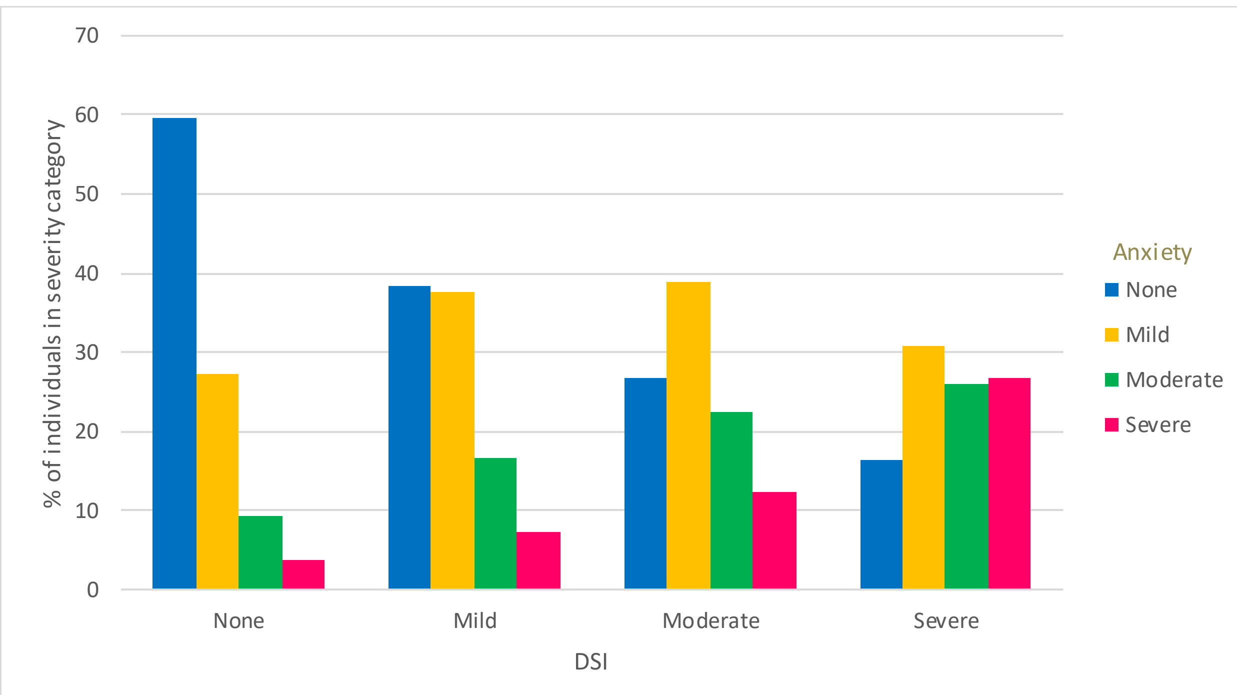

Figure 30. Distribution of anxiety scale severity categories across severity categories for the DSI among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

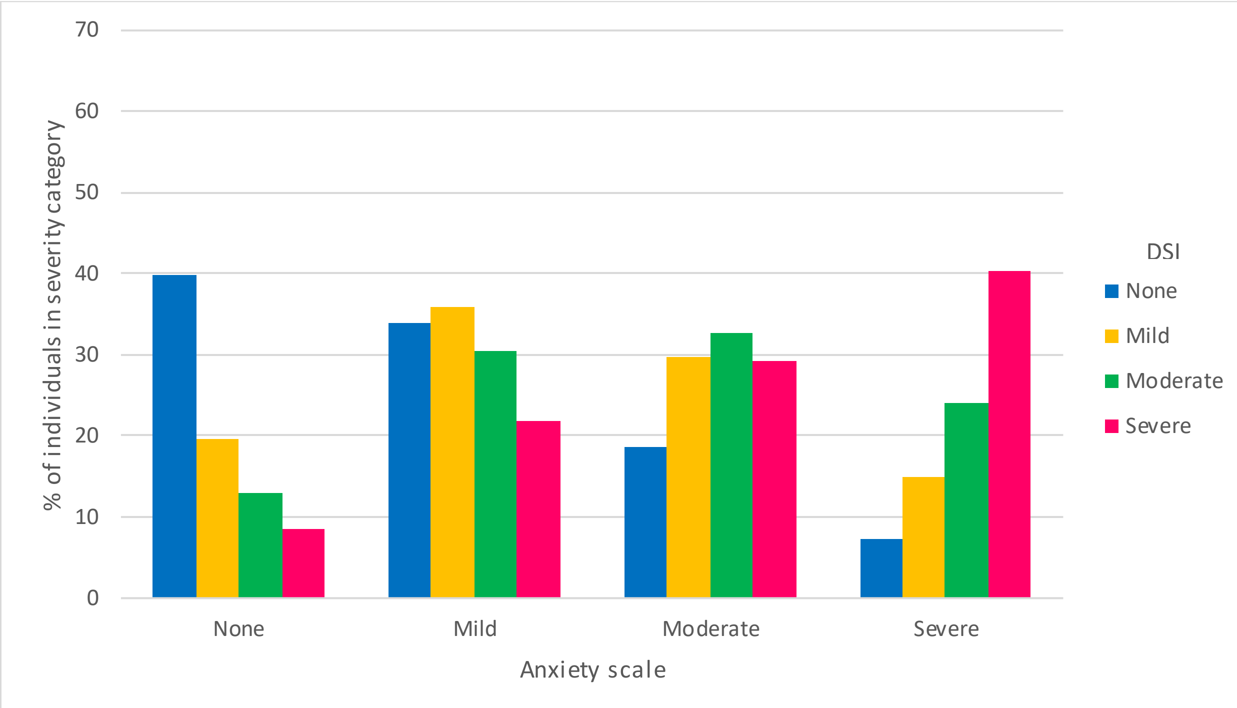

Figure 31. Distribution of DSI severity categories across severity categories for the anxiety scale among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Through a visual comparison of Figures 30 and 31, it is evident that EA with symptoms of anxiety generally have a similar level of depressive symptoms as well. However, individuals with depressive symptoms do not always have a corresponding degree of anxious symptoms, reiterating that depression is a more pervasive condition within inpatient psychiatry. Combined with the descriptive results demonstrating that depressive disorders are more prevalent in psychiatric hospitals, and that symptoms of depression were greater than symptoms of anxiety even among those with an anxiety disorder, it appears that anxiety is often treated as a comorbid condition to depression in these settings.

4.3.2.2 Short-stay hospitalizations

The relationship between short-stay hospitalizations and symptoms of anxiety were investigated among individuals with and without primary anxiety disorders, which are illustrated below in Figure 32.

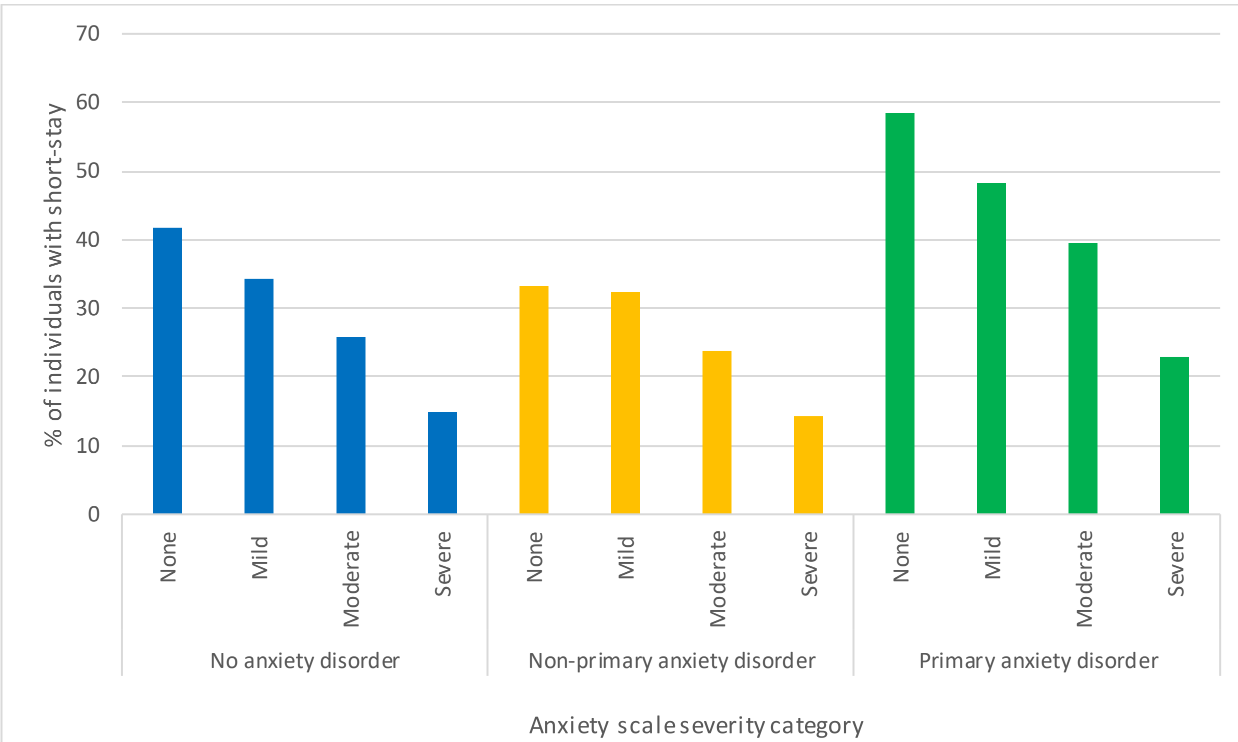

Figure 32. Short-stay hospitalizations among inpatients aged 18-30, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=98,607).

There was a significant relationship between severity of anxiety symptoms and short-stay hospitalizations in the primary anxiety disorder group ($\chi^2[3]=260.55$, $p<.0001$), non-primary anxiety disorder group ($\chi^2[3]=196.11$, $p<.0001$), and no anxiety disorder group ($\chi^2[3]=2{,}155.78$, $p<.0001$). Increasing severity of anxious symptoms was associated with fewer short-stay hospitalizations, though the effect was more pronounced among individuals with non-primary anxiety diagnoses.

4.3.2.3 Treatment patterns

The number of days over the past week in which an individual received at least 15 minutes of contact with a psychiatrist, psychologist, and nurse or MD is plotted below in Figures 33-35.

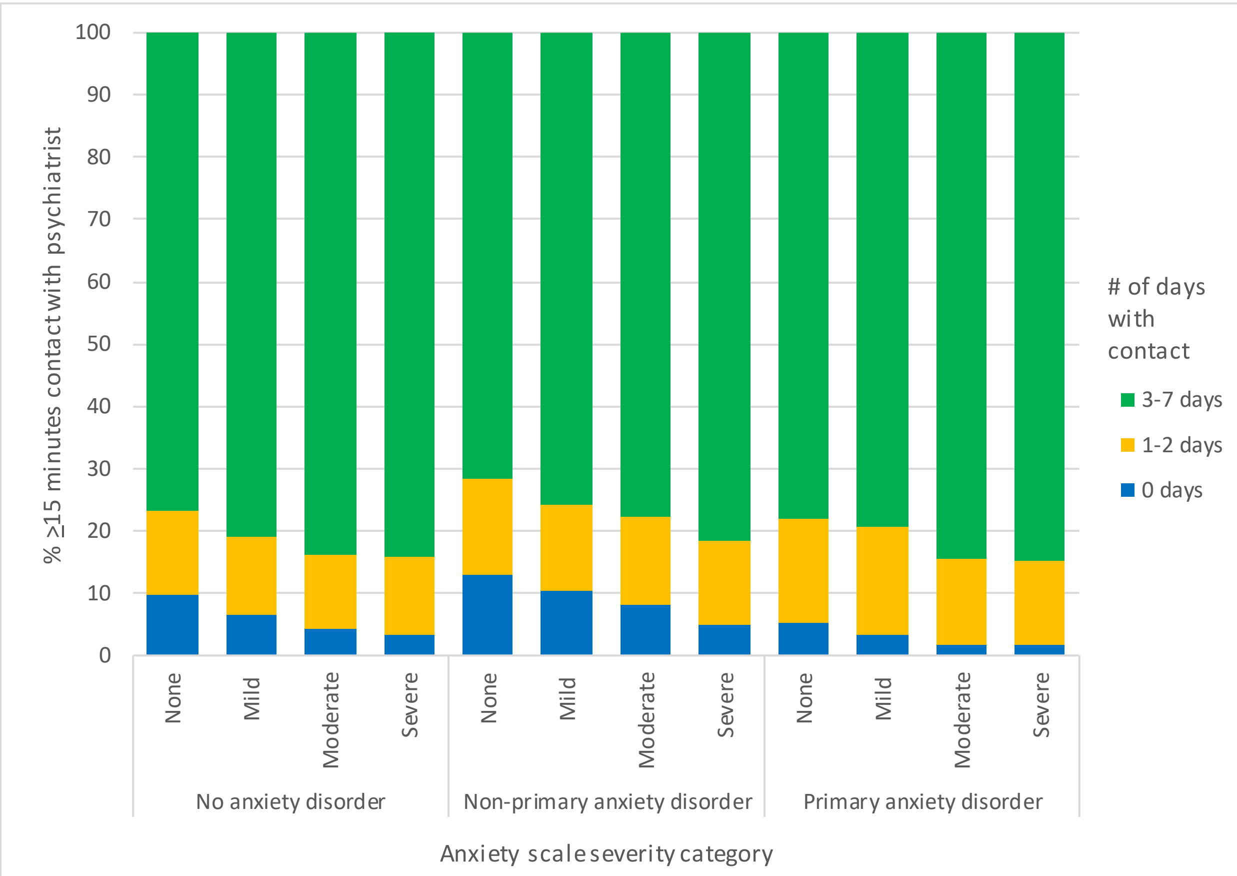

Figure 33. Number of days over the past week in which inpatients aged 18-30 received at least 15 minutes of contact with a psychiatrist, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

There was a significant difference in the number of days with contact from a psychiatrist by anxious symptom severity among individuals with no anxiety disorder ($\chi^2[6]=525.03$, $p<.0001$), non-primary anxiety disorders ($\chi^2[6]=59.73$, $p<.0001$), and primary anxiety disorders ($\chi^2[6]=25.87$, $p=.0002$). If no symptoms of anxiety were present, there were fewer days of contact with a psychiatrist in all groups, especially in the non-primary anxiety disorder group.

There was a significant main effect of anxiety disorder diagnosis ($\chi^2[4]=164.04$, $p<.0001$). Individuals with a primary diagnosis of anxiety more frequently received care from a psychiatrist, while those with a non-primary anxiety disorder had the least amount of contact. Overall, contact with a psychiatrist was common for most individuals.

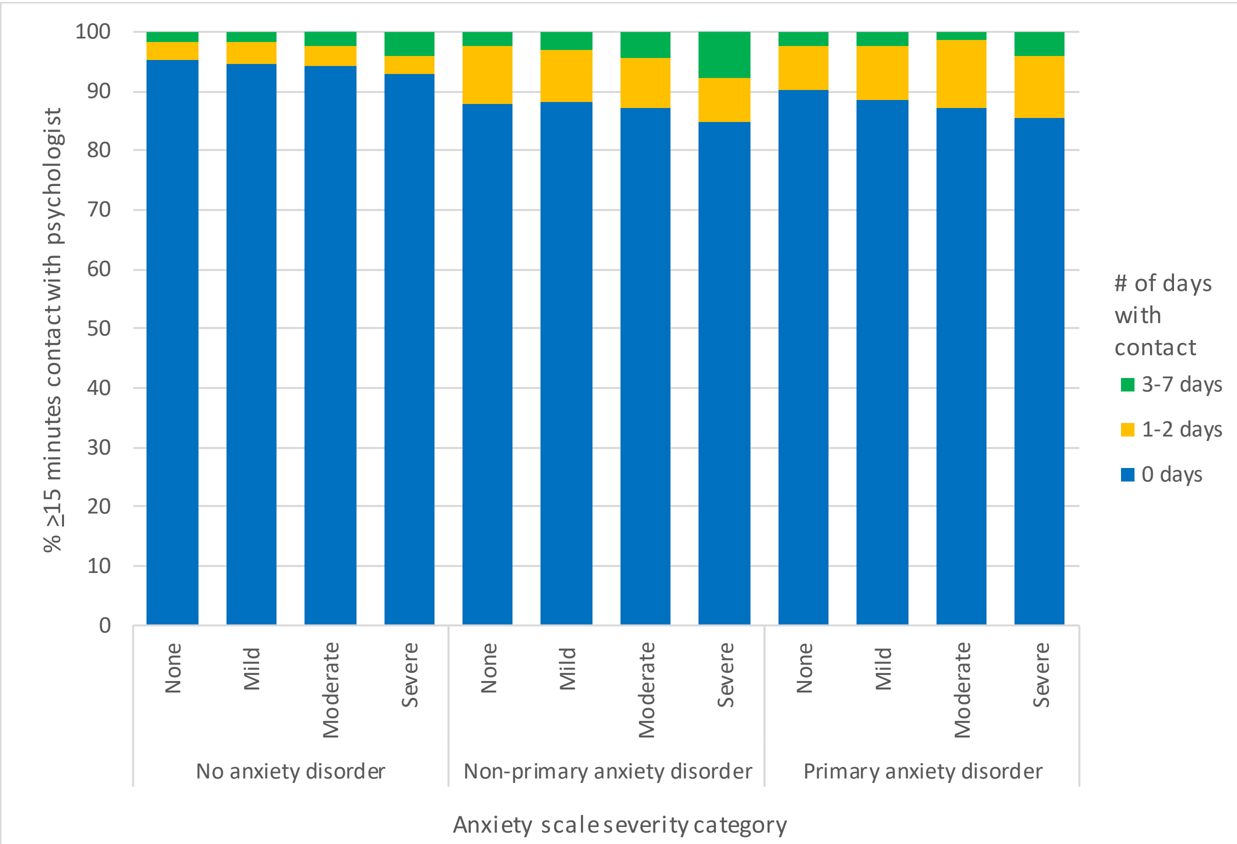

Figure 34. Number of days over the past week in which inpatients aged 18-30 received at least 15 minutes of contact with a psychologist, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Anxious symptom severity was significantly related to the number of days with contact from a psychologist among individuals with no anxiety disorder ($\chi^2[6]=135.60$, $p<.0001$), non-primary anxiety disorders ($\chi^2[6]=66.33$, $p<.0001$), and primary anxiety disorders ($\chi^2[6]=16.81$, $p=.01$). There was also a significant main effect of anxiety disorder diagnosis ($\chi^2[4]=765.48$, $p<.0001$). Contact with a psychologist was the least frequent for individuals with no anxiety disorder, with only 7% of those with severe symptoms receiving at least 15 minutes of care. In comparison, individuals with anxiety disorders received more frequent contact with a psychologist, typically over 1-2 days prior to the admission assessment. Unlike psychiatrists, most of the sample did not receive any contact with a psychologist by the time their admission assessment had been completed.

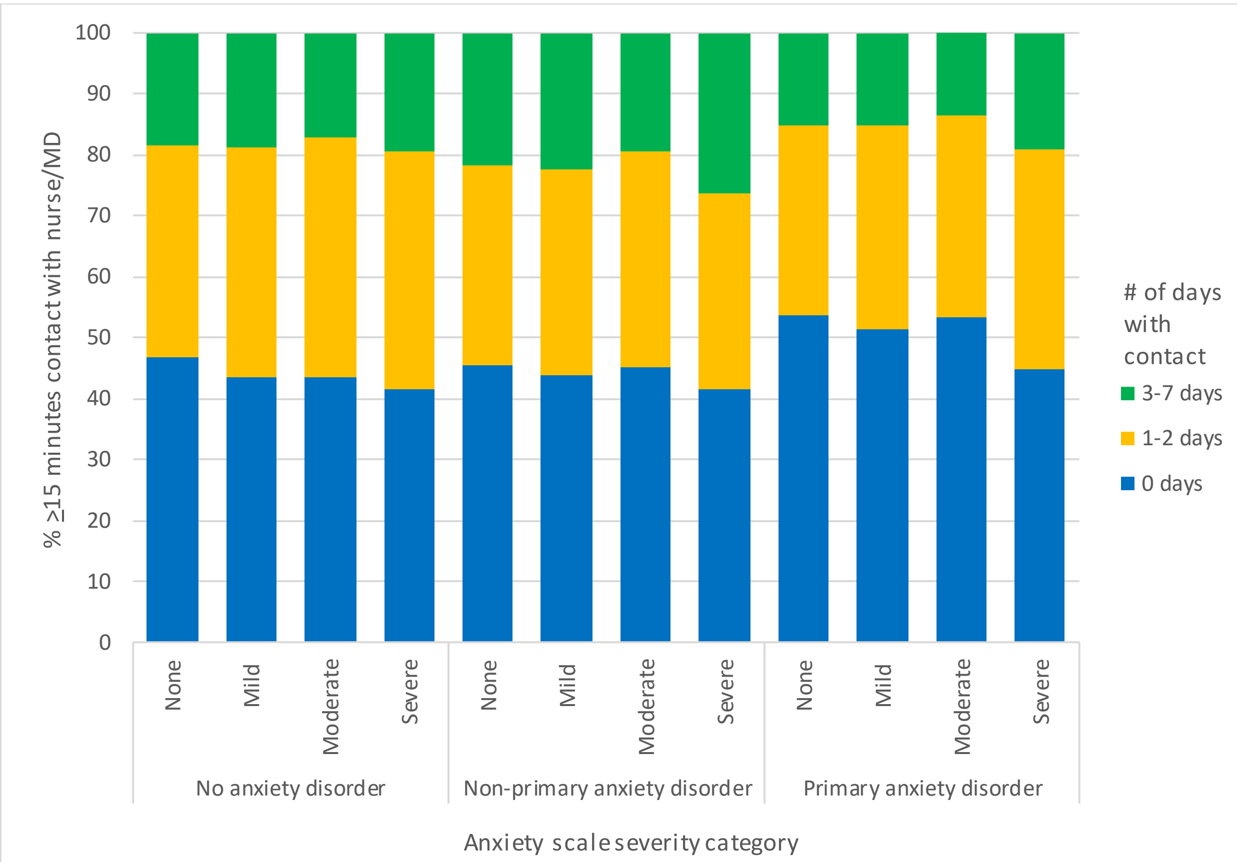

Figure 35. Number of days over the past week in which inpatients aged 18-30 received at least 15 minutes of contact with a nurse practitioner or MD, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

The number of days with contact from a nurse practitioner or MD was significantly different across categories of symptom severity among individuals with no anxiety disorders (χ^2[6]=109.47, p<.0001), non-primary anxiety disorders (χ^2[6]=20.79, p=.002), as well as primary anxiety disorders ($\chi^2[6]=15.38$, $p=.02$). While there was not a linear pattern between days of contact and symptom severity in any diagnostic group, individuals with severe symptoms of anxiety consistently received more days of formal care from a nurse or MD, though the absolute difference was less than 5% in the 'no anxiety' and 'non-primary anxiety' disorder groups. Compared to the other two diagnostic groups, individuals with primary anxiety disorders received significantly fewer days of contact with a nurse or MD ($\chi^2[4]=111.50$, $p<.0001$). In general, around half of the sample received formal care from a nurse or MD during the week prior to their assessment.

In addition to looking at contact with different types of health professionals, patterns of therapy modalities were also examined and are plotted below in Figures 36-39.

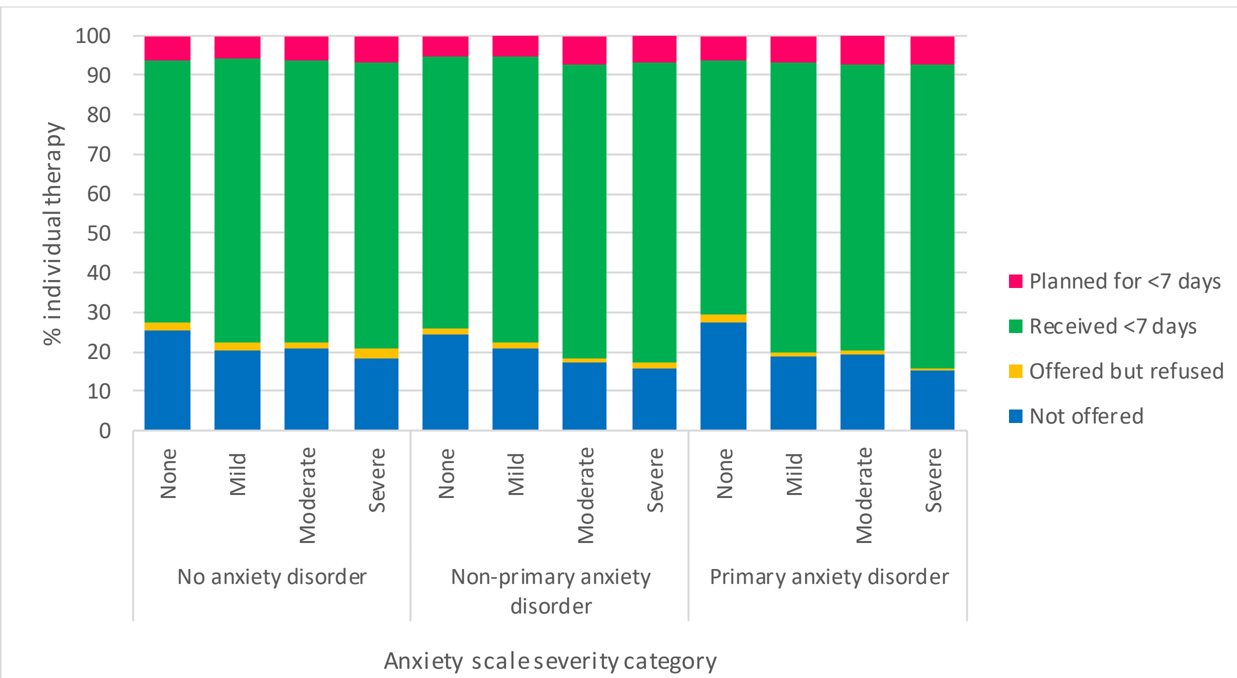

Figure 36. Prevalence of individual therapy among inpatients aged 18-30, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Beginning with individual therapy, there was a significant difference across anxious symptom severity categories among individuals with no anxiety disorder (χ^2[9]=261.94, p<.0001), non-primary anxiety disorders (χ^2[9]=45.81, p<.0001), and primary anxiety disorders (χ^2[9]=35.29, p<.0001). Across all diagnostic groups, individuals presenting with any symptoms of anxiety were offered individual therapy more often. Further, there was a significant main effect of anxiety disorder diagnosis on individual therapy patterns (χ^2[6]=58.08, p<.0001), though the absolute difference across groups was small ($\leq$3%). Overall, individual therapy was commonly received by most individuals in the sample.

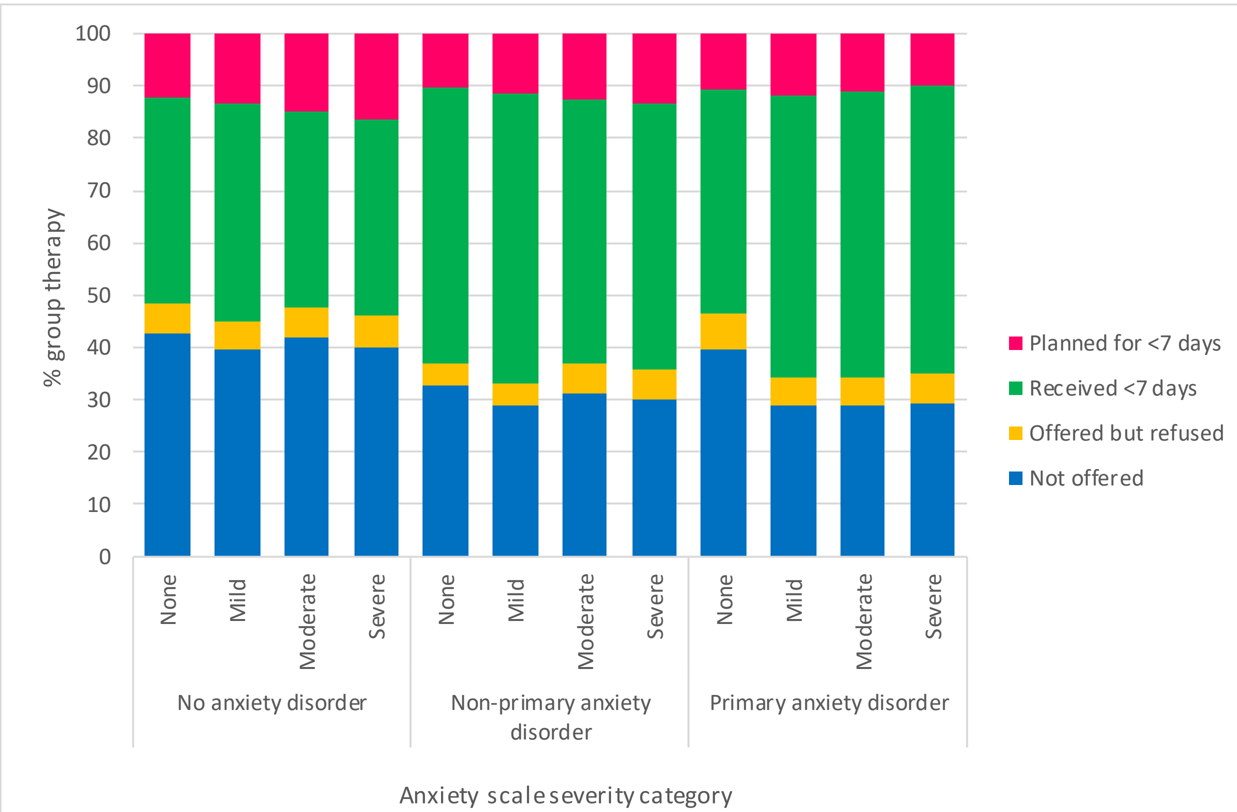

Figure 37. Prevalence of group therapy among inpatients aged 18-30, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

The prevalence of group therapy was significantly different across anxious symptom severity categories among individuals with no anxiety disorders ($\chi^2[9]=140.57$, $p<.0001$), non-primary anxiety disorders ($\chi^2[9]=27.95$, $p=.001$), and primary anxiety disorders ($\chi^2[9]=28.22$, $p=.0009$). Within the primary anxiety disorder group, individuals with no symptoms of anxiety were less frequently offered group therapy, otherwise the pattern was the same when any symptoms of anxiety were present. There was also a significant main effect of anxiety disorder diagnosis ($\chi^2[6]=624.97$, $p<.0001$), wherein individuals without an anxiety disorder were offered group therapy the least often. Compared to individual therapy, group therapy was less frequently offered to the whole sample.

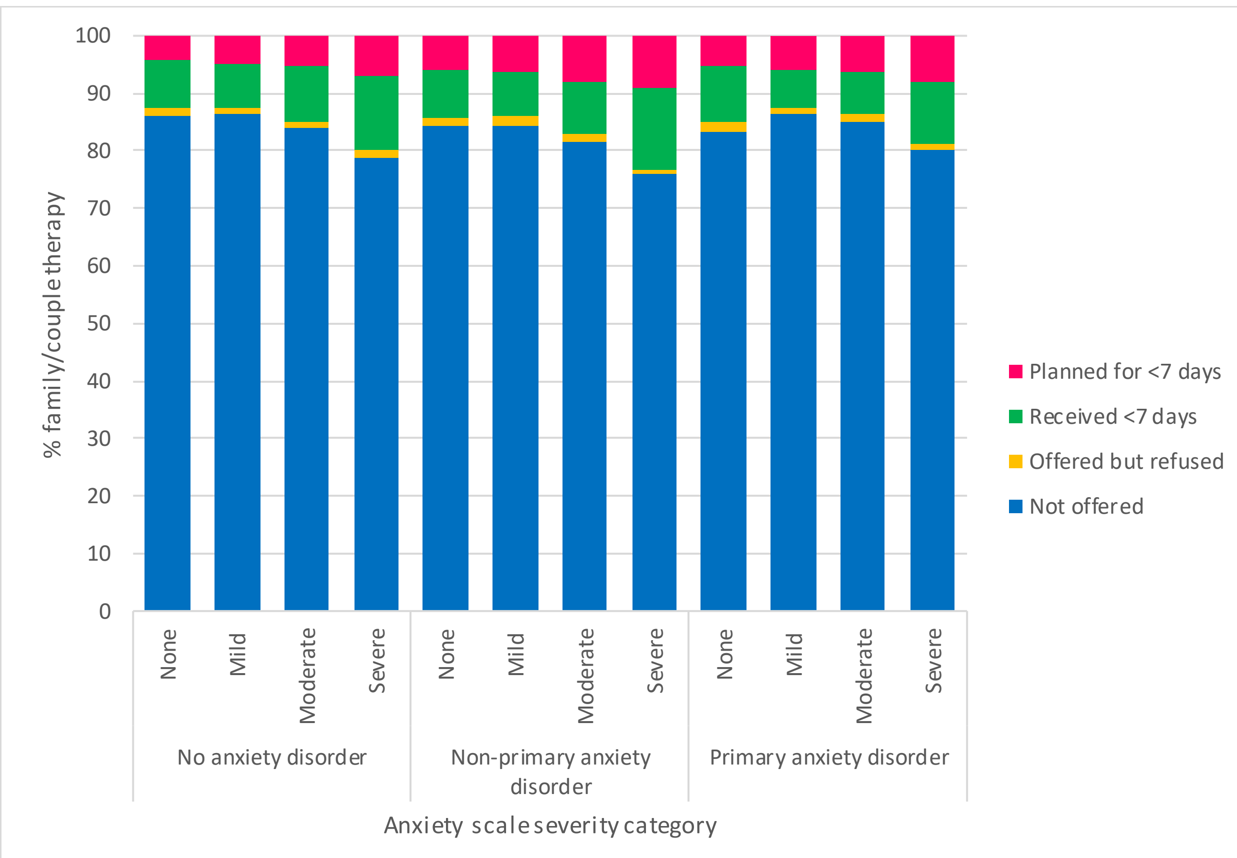

Figure 38. Prevalence of family/couple therapy among inpatients aged 18-30, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

For the primary anxiety disorder group ($\chi^2[9]=17.55$, $p=.04$), non-primary anxiety disorder group ($\chi^2[9]=62.04$, $p<.0001$), and no anxiety disorder group ($\chi^2[9]=250.50$, $p<.0001$), there was a significant difference in family/couple therapy patterns across anxious symptom severity categories. For all diagnostic groups, individuals with severe symptoms of anxiety most often received family/couple therapy within the week prior to assessment. There was a significant main effect of anxiety disorder diagnosis ($\chi^2[6]=70.84$, $p<.0001$), but like individual therapy, the absolute difference in family/couple therapy patterns was small ($\leq$3%). In most cases, family/couple therapy was not offered.

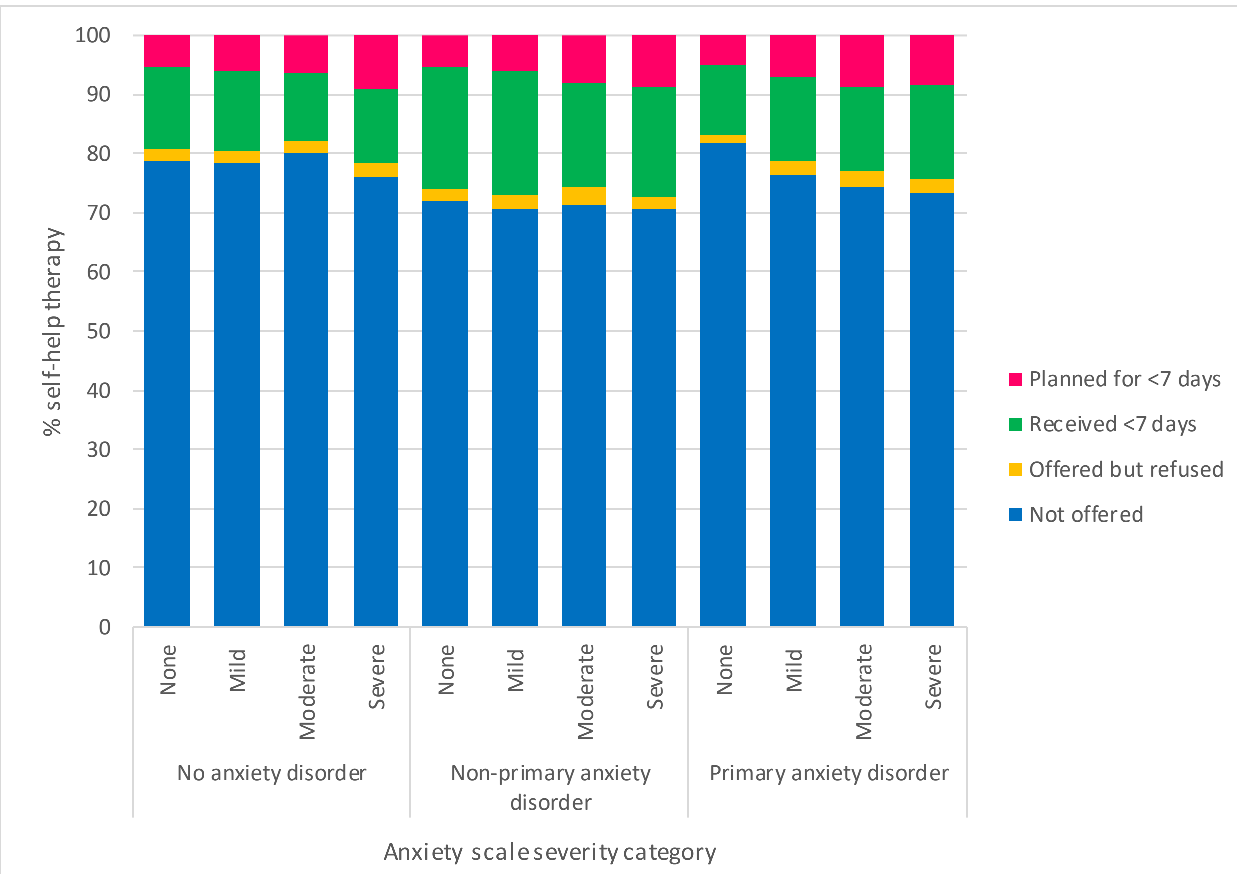

Figure 39. Prevalence of self-help therapy among inpatients aged 18-30, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

There was a significant difference in the prevalence of self-help therapy across anxious symptom severity categories among those with no anxiety disorder ($\chi^2[9]=148.62$, $p<.0001$) and non-primary anxiety disorders ($\chi^2[9]=25.16$, $p=.003$), but not those with primary anxiety disorders ($\chi^2[9]=15.01$, $p=.09$). Despite statistical significance, the absolute difference in self-help therapy across severity categories was less than 5% in both the non-primary and no anxiety groups. Overall, individuals with non-primary anxiety disorders received significantly more self-help therapy over the previous week than the other two groups ($\chi^2[6]=241.81$, $p<.0001$).

4.3.2.4 Social resources

The differences in social resource variables between anxiety disorders and severity of anxious symptoms are plotted below in Figures 40-43.

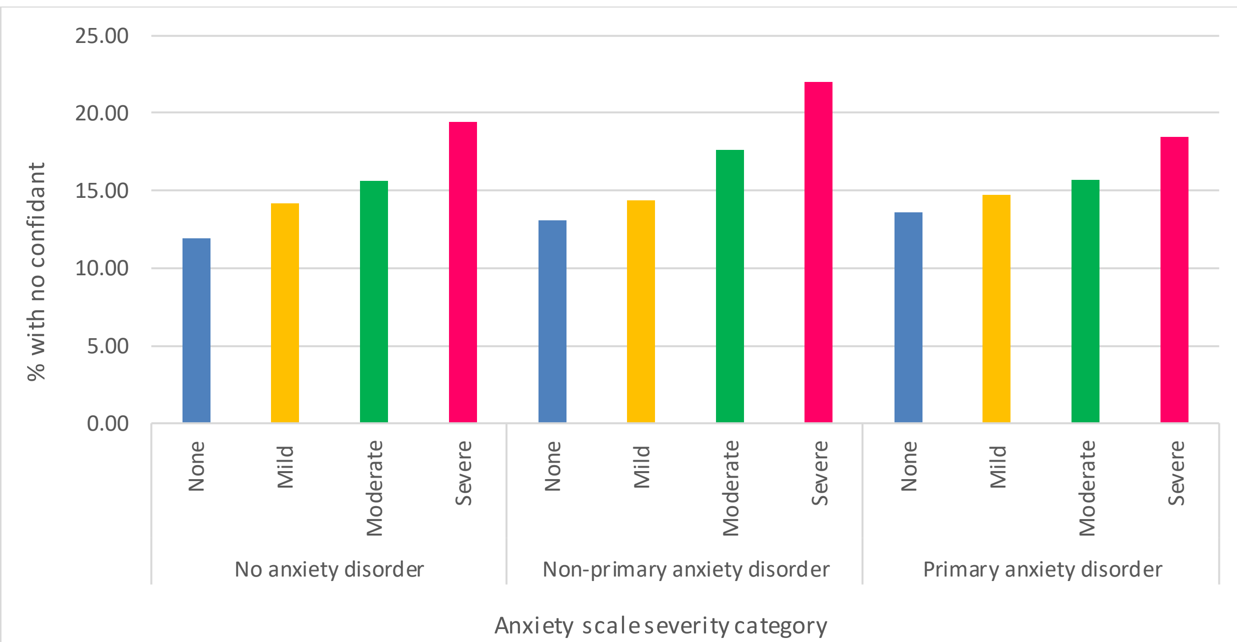

Figure 40. Prevalence of inpatients aged 18-30 who report having no confidant, by anxious symptom severity and anxiety disorder, in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Reports of not having a confidant were significantly different across categories of anxious symptom severity among individuals with no anxiety disorder ($\chi^2[3]=226.62$, $p<.0001$) and non-primary anxiety disorders ($\chi^2[3]=49.39$, $p=.003$), but not primary anxiety disorders ($\chi^2[3]=6.03$, $p=.11$). In the non-primary and no anxiety disorder groups, not having a confidant increased with severity of anxious symptoms.

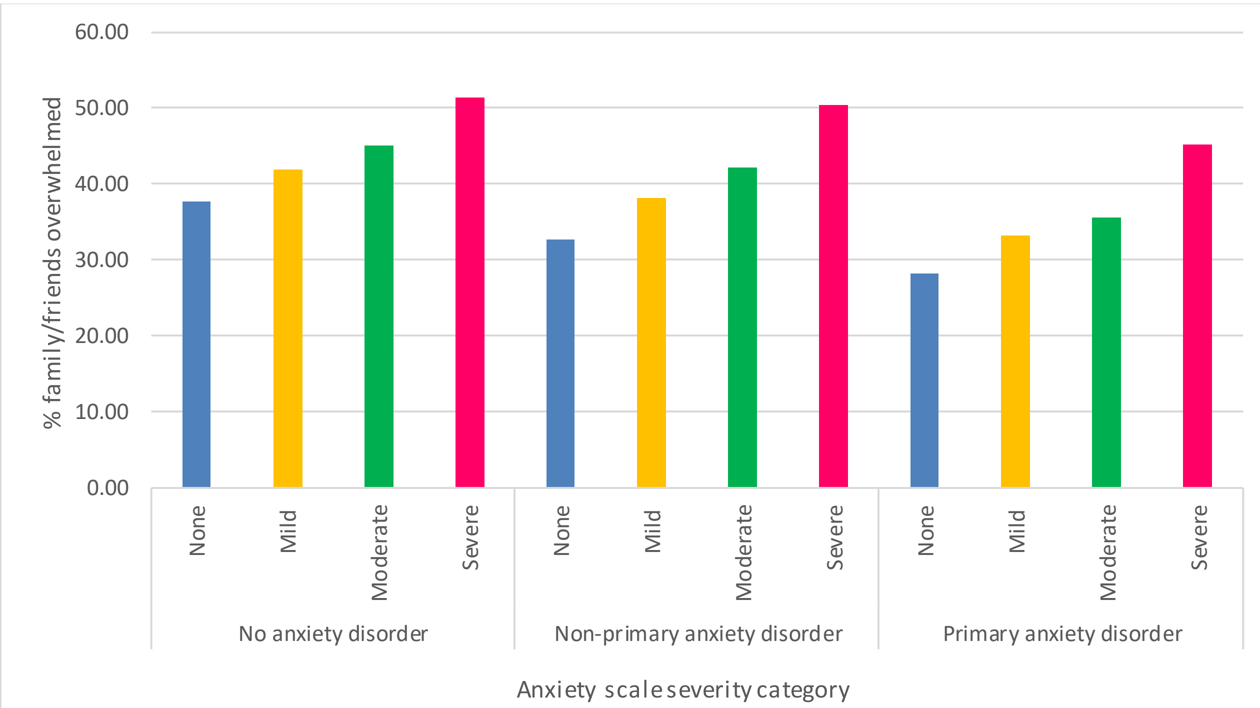

Figure 41. Prevalence of family/friends who report feeling overwhelmed by the person's illness, by anxious symptom severity and anxiety disorder, among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Severity of anxious symptoms was significantly associated with family and friends feeling overwhelmed in the group with no anxiety disorders ($\chi^2[3]=391.68$, $p<.0001$), non-primary anxiety disorders ($\chi^2[3]=95.15$, $p<.0001$), and primary anxiety disorders ($\chi^2[3]=39.76$, $p<.0001$). Across all diagnostic groups, family and friends reported feeling overwhelmed more often with each increase in anxious symptom severity. Further, there was a significant main effect of anxiety disorder diagnosis (χ^2[2]=46.88, p<.0001), wherein fewer family and friends reported feeling overwhelmed when the person had a diagnosis of anxiety.

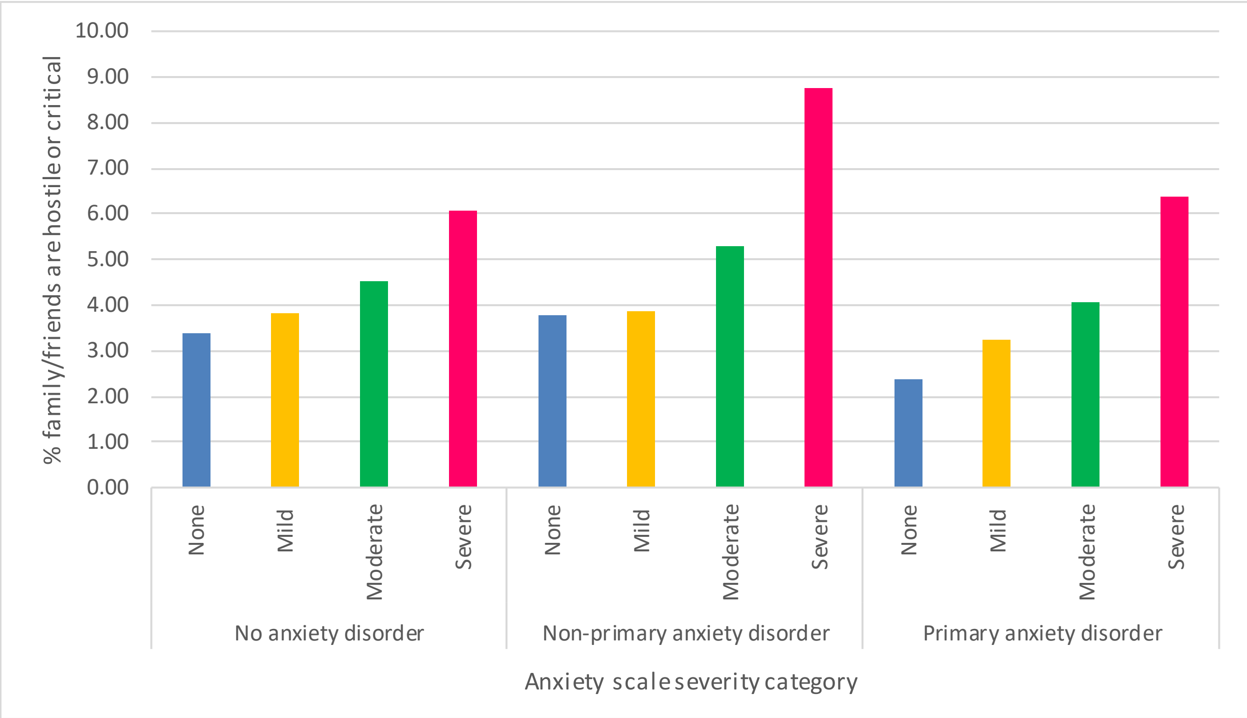

Figure 42. Prevalence of family/friends who are persistently hostile or critical towards the person, by anxious symptom severity and anxiety disorder, among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Although it rarely occurred in the sample, there was a significant difference in persistent hostility or criticism towards the person by categories of anxious symptom severity among those with no anxiety disorder (χ^2[3]=90.74, p<.0001), non-primary anxiety disorders (χ^2[3]=47.30, p<.0001), and primary anxiety disorders (χ^2[3]=14.18, p=.003). In general, hostility or criticism from friends and family tended to increase as symptoms of anxiety increased.

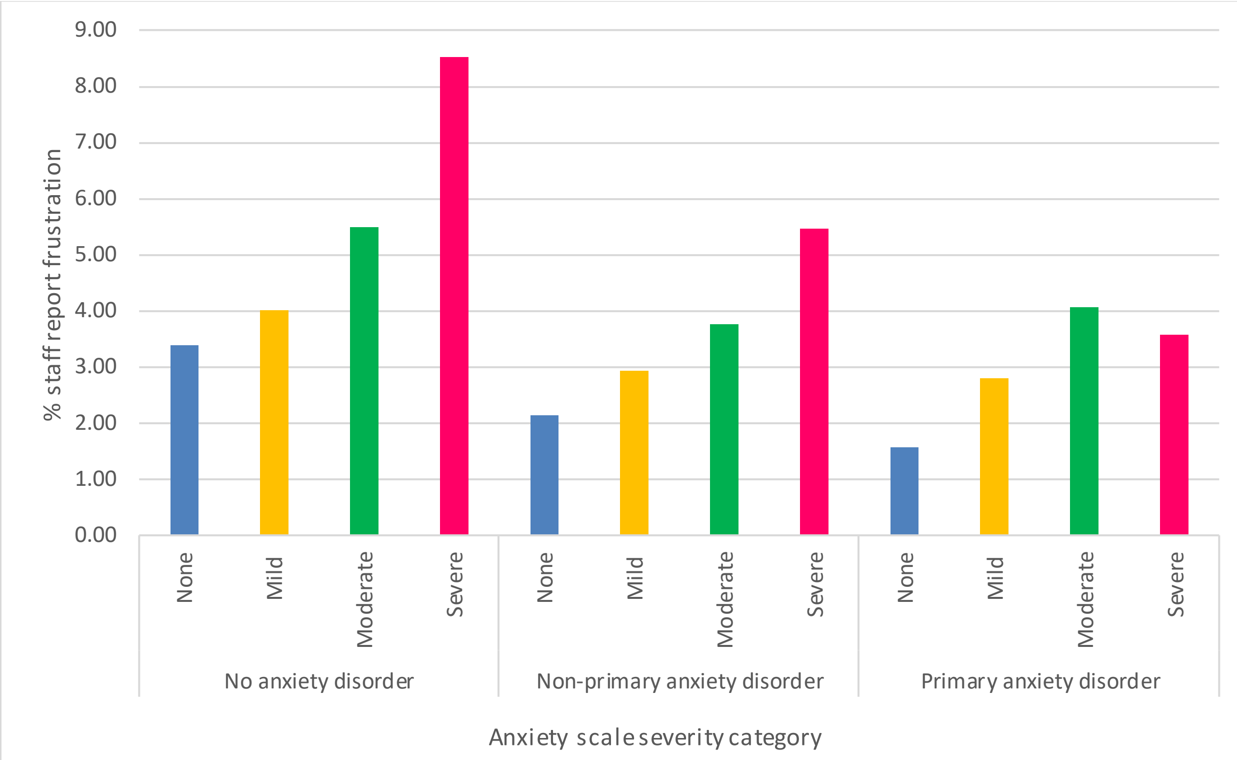

Figure 43. Prevalence of staff reporting persistent frustration in dealing with the person, by anxious symptom severity and anxiety disorder, among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Except for individuals with primary anxiety disorders ($\chi^2[3]=6.93$, p=.07), there was a significant difference in the prevalence of staff reporting frustration by anxious symptom severity among individuals with no anxiety disorder ($\chi^2[3]=299.41$, p<.0001) and individuals with non-primary anxiety disorders ($\chi^2[3]=25.82$, p<.0001). With each increase in severity of anxious symptoms, more staff reported feeling frustrated with the person, though like persistent hostility or criticism from family and friends, this outcome rarely occurred overall. Further, there was a significant difference associated with diagnosis ($\chi^2[2]=29.01$, p<.0001), with fewer staff reporting frustration when anxiety disorders were present.

4.3.3 Logistic regression models

4.3.3.1 Short-stay hospitalizations

Using the short-stay dataset, the odds of having a short stay of hospitalization were predicted using two logistic regression models, which are displayed below in Table 35.

Table 35. Binary logistic regression models predicting short-stay hospitalizations among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=98,607).

Model	Variables	Variable level	Parameter estimate (SE)	OR (95% CI)	χ2 p value
1	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.21 (0.02)	0.81 (0.78-0.85)	<.0001
		Primary	0.58 (0.03)	1.78 (1.67-1.90)	<.0001
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	-0.31 (0.02)	0.73 (0.71-0.76)	<.0001
		4-6	-0.72 (0.02)	0.49 (0.47-0.51)	<.0001
		7-15	-1.41 (0.03)	0.24 (0.23-0.26)	<.0001
	Age	*Continuous*	-0.04 (0.00)	0.96 (0.96-0.97)	<.0001
	Gender	*Female*	0.21 (0.01)	1.23 (1.20-1.27)	<.0001
2	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.13 (0.02)	0.88 (0.84-0.92)	<.0001
		Primary	0.58 (0.03)	1.78 (1.67-1.89)	<.0001
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	-0.27 (0.02)	0.77 (0.74-0.79)	<.0001
		4-6	-0.66 (0.03)	0.51 (0.49-0.54)	<.0001
		7-15	-1.34 (0.03)	0.26 (0.24-0.28)	<.0001
	Depressive disorder	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.64 (0.05)	0.53 (0.48-0.58)	<.0001
		Primary	-0.50 (0.02)	0.61 (0.58-0.64)	<.0001
	DSI score	*0 (ref)*	n/a	n/a	n/a
		1-3	-0.17 (0.02)	0.84 (0.81-0.88)	<.0001
		4-7	-0.12 (0.02)	0.89 (0.86-0.93)	<.0001
		8-15	-0.24 (0.02)	0.79 (0.75-0.83)	<.0001
	Age	*Continuous*	-0.04 (0.00)	0.96 (0.96-0.97)	<.0001
	Gender	*Female*	0.26 (0.01)	1.30 (1.26-1.33)	<.0001

Note. The c-statistics for model one and model two were c=0.62 and c=0.63, respectively.

In the first model, the odds of experiencing a short stay hospitalization were significantly higher for individuals with primary anxiety disorders than no anxiety disorder, but lower for individuals with non-primary anxiety disorders. This result indicates that hospital stays are especially short when anxiety disorders are the primary psychological concern, rather than a comorbid one. In terms of the anxiety scale, the odds of short stays were lower for each increase in symptom severity. Increasing age was also associated with lower odds of a short stay, while women had higher odds. In the second model, the same patterns were observed for variables in the first model, but now depressive disorders and increasing severity of depressive symptoms were both significantly associated with lower odds of a short stay, indicating that primary anxiety disorders are uniquely related to higher odds of short-stay hospitalizations. Compared to depressive symptoms, anxious symptom severity had a stronger association with short stay outcomes. For example, compared to the group with no symptoms of anxiety, the odds of short-stay hospitalizations were 74% lower in the group with severe symptoms. In contrast, the same ratio for severe symptoms of depression was 21%. Altogether, the odds of short-stay hospitalizations are greater when anxiety is ranked as the primary diagnosis, but lower when symptoms of anxiety are more severe.

4.3.3.2 Social resources

Since anxiety disorders and severity of symptoms appeared to have different relationships with social resources, a series of logistic regression models were performed to test this hypothesis. For social resource variables that demonstrated significant main effects for both anxiety disorders and anxiety symptoms, a third model was tested that included an interaction term between the two variables but is not included because interactions were insignificant in all models. Table 36, below, shows the logistic regression models predicting reports of not having a confidant.

Table 36. Binary logistic regression models predicting 'reports having no confidant' among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Model	Variables	Variable level	Parameter estimate (SE)	OR (95% CI)	χ2 p value
1	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	0.09 (0.03)	1.09 (1.02-1.17)	0.01
		Primary	0.02 (0.05)	1.02 (0.91-1.13)	0.77
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.18 (0.03)	1.19 (1.13-1.26)	<.0001
		4-6	0.30 (0.03)	1.36 (1.27-1.44)	<.0001
		7-15	0.56 (0.04)	1.76 (1.64-1.89)	<.0001
	Age	*Continuous*	-0.00 (0.00)	1.00 (0.99-1.00)	0.62
	Gender	*Female*	0.05 (0.02)	1.05 (1.01-1.10)	0.02
2	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.01 (0.04)	1.00 (0.93-1.07)	0.89
		Primary	0.00 (0.05)	1.00 (0.90-1.12)	0.96
	Anxiety scale symptom severity	*0 (ref)*	n/a	n/a	n/a
		1-3	0.05 (0.03)	1.05 (1.00-1.11)	0.07
		4-6	0.11 (0.03)	1.11 (1.04-1.19)	0.001
		7-15	0.28 (0.04)	1.33 (1.23-1.43)	<.0001
	Depressive disorder	*None (ref)*	n/a	n/a	n/a
		Non-primary	0.07 (0.06)	1.08 (0.96-1.20)	0.19
		Primary	0.22 (0.03)	1.24 (1.18-1.32)	<.0001
	DSI score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.33 (0.03)	1.39 (1.30-1.48)	<.0001
		4-7	0.56 (0.03)	1.75 (1.63-1.87)	<.0001
		8-15	0.88 (0.04)	2.41 (2.24-2.60)	<.0001
	Age	*Continuous*	-0.00 (0.00)	1.00 (0.99-1.00)	0.75
	Gender	*Female*	-0.04 (0.02)	0.96 (0.92-1.00)	0.04

Note. The c-statistics for model one and model two were c=0.55 and c=0.60, respectively.

Whereas non-primary anxiety disorders were significant in the first model (p=.01), they were insignificant in the second (p=.96). Further, primary anxiety disorders were insignificant in both models. In model one, each increase in anxious symptom severity led to greater odds of not having a confidant (p<.0001). In model two, mild anxiety (1-3) scores were no longer significant (p=.07), though moderate and severe anxiety were still positively predictive of not having a confidant (p=.001 and p<.0001, respectively). In contrast, having a primary depressive disorder (p<.0001), as well as increasing severity of depressive symptoms (p<.0001), significantly increased the odds of not having a confidant, demonstrating that depression has a stronger effect than anxiety. Age was insignificant in both models, and though gender was significant in model one (p=.02), it was no longer significant in model two (p=.04).

Table 37. Binary logistic regression models predicting 'family/close friends report feeling overwhelmed by person's illness' among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Model	Variables	Variable level	Parameter estimate (SE)	OR (95% CI)	χ2 p value
1	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.10 (0.03)	0.90 (0.86-0.95)	<.0001
		Primary	-0.33 (0.04)	0.72 (0.66-0.78)	<.0001
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.19 (0.02)	1.22 (1.17-1.26)	<.0001
		4-6	0.33 (0.02)	1.39 (1.33-1.46)	<.0001
		7-15	0.62 (0.03)	1.87 (1.77-1.97)	<.0001
	Age	*Continuous*	-0.01 (0.00)	0.99 (0.98-0.99)	<.0001
	Gender	*Female*	-0.29 (0.02)	0.75 (0.73-0.77)	<.0001
2	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.08 (0.03)	0.93 (0.88-0.97)	0.004
		Primary	-0.37 (0.04)	0.69 (0.63-0.75)	<.0001
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.17 (0.02)	1.18 (1.14-1.22)	<.0001
		4-6	0.27 (0.02)	1.31 (1.25-1.37)	<.0001
		7-15	0.54 (0.03)	1.71 (1.62-1.81)	<.0001
	Depressive disorder	*None (ref)*	n/a	n/a	n/a
		Non-primary	0.12 (0.04)	1.13 (1.04-1.22)	0.004
		Primary	-0.44 (0.02)	0.64 (0.62-0.67)	<.0001
	DSI score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.15 (0.02)	1.18 (1.13-1.23)	<.0001
		4-7	0.19 (0.02)	1.23 (1.17-1.28)	<.0001
		8-15	0.24 (0.03)	1.31 (1.24-1.38)	<.0001
	Age	*Continuous*	-0.01 (0.00)	0.99 (0.98-0.99)	<.0001
	Gender	*Female*	-0.27 (0.02)	0.76 (0.74-0.79)	<.0001

Note. The c-statistics for model one and model two were c=0.57 and c=0.58, respectively.

In model one, both anxiety disorders ($p<.0001$) and anxious symptom severity scores ($p<.0001$) were significant predictors of family and friends feeling overwhelmed. However, while anxiety disorders were associated with lower odds of feeling overwhelmed, each increase in anxious severity resulted in higher odds, indicating that having a diagnosis of anxiety might be a protective factor. Increasing age and female gender were also significantly associated with lower odds of family and friends feeling overwhelmed ($p<.0001$). In model two, all variables from model one remained significant. Like anxious symptoms, increasing severity of depressive symptoms resulted in greater odds of family and friends feeling overwhelmed ($p<.0001$). However, unlike non-primary anxiety disorders, non-primary depressive disorders increased the odds of family and friends feeling overwhelmed ($p=.004$), illustrating that diagnosis is not always a protective factor.

Table 38. Binary logistic regression models predicting 'family/friends are persistently hostile towards or critical of person' among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Model	Variables	Variable level	Parameter estimate (SE)	OR (95% CI)	χ2 p value
1	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	0.11 (0.06)	1.12 (1.00-1.26)	0.05
		Primary	-0.15 (0.10)	0.86 (0.71-1.05)	0.13
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.09 (0.05)	1.10 (1.00-1.21)	0.06
		4-6	0.29 (0.06)	1.33 (1.19-1.49)	<.0001
		7-15	0.64 (0.06)	1.90 (1.69-2.14)	<.0001
	Age	*Continuous*	-0.00 (0.00)	1.00 (0.98-1.01)	0.39
	Gender	*Female*	0.28 (0.04)	1.32 (1.22-1.43)	<.0001
2	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	0.07 (0.06)	1.07 (0.95-1.20)	0.27
		Primary	-0.17 (0.10)	0.85 (0.69-1.03)	0.10
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.01 (0.05)	1.01 (0.92-1.12)	0.78
		4-6	0.15 (0.06)	1.16 (1.04-1.31)	0.01
		7-15	0.43 (0.06)	1.54 (1.36-1.75)	<.0001
	Depressive disorder	*None (ref)*	n/a	n/a	n/a
		Non-primary	0.05 (0.10)	1.05 (0.87-1.27)	0.59
		Primary	-0.01 (0.05)	0.99 (0.90-1.09)	0.84
	DSI score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.11 (0.06)	1.12 (1.00-1.26)	0.06
		4-7	0.31 (0.06)	1.36 (1.21-1.54)	<.0001
		8-15	0.61 (0.07)	1.85 (1.62-2.10)	<.0001
	Age	*Continuous*	-0.00 (0.00)	1.00 (0.98-1.01)	0.41
	Gender	*Female*	0.22 (0.04)	1.25 (1.15-1.35)	<.0001

Note. The c-statistics for model one and model two were c=0.57 and c=0.59, respectively.

In model one, anxiety disorders did not significantly predict reports of hostility or criticism of the person from family or friends ($p \geq .05$). Mild symptoms of anxiety were also insignificant ($p=.06$), though moderate and severe symptoms of anxiety resulted in greater odds of hostility or criticism ($p<.0001$). Additionally, whereas age was not a significant predictor ($p=.39$), women had greater odds of reporting hostility or criticism from their family and friends (p<.0001). In model two, moderate-severe symptoms of anxiety and gender remained significant. Like anxiety, depressive disorders and mild symptoms of depression were not a significant predictor of hostility or criticism from family and friends (p>.05), though moderate and severe symptoms of depression were (p<.0001).

Table 39. Binary logistic regression models predicting 'staff reports persistent frustration in dealing with person' among inpatients aged 18-30 receiving care in psychiatric hospitals and units across Ontario, Newfoundland and Labrador, and Manitoba between 2005-2019 (n=65,528).

Model	Variables	Variable level	Parameter estimate (SE)	OR (95% CI)	χ2 p value
1	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.42 (0.07)	0.66 (0.57-0.75)	<.0001
		Primary	-0.58 (0.11)	0.56 (0.45-0.70)	<.0001
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.18 (0.05)	1.20 (1.09-1.33)	0.0003
		4-6	0.51 (0.06)	1.67 (1.50-1.86)	<.0001
		7-15	0.94 (0.06)	2.56 (2.29-2.87)	<.0001
	Age	*Continuous*	-0.01 (0.00)	0.99 (0.98-1.00)	0.07
	Gender	*Female*	0.08 (0.04)	1.09 (1.01-1.17)	0.03
2	**Anxiety disorder**	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.32 (0.07)	0.73 (0.63-0.83)	<.0001
		Primary	-0.59 (0.11)	0.56 (0.45-0.69)	<.0001
	Anxiety scale score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.21 (0.05)	1.23 (1.11-1.36)	<.0001
		4-6	0.53 (0.06)	1.69 (1.51-1.90)	<.0001
		7-15	0.96 (0.06)	2.60 (2.31-2.94)	<.0001
	Depressive disorder	*None (ref)*	n/a	n/a	n/a
		Non-primary	-0.32 (0.11)	0.73 (0.58-0.90)	0.004
		Primary	-0.76 (0.06)	0.47 (0.41-0.53)	<.0001
	DSI score	*0 (ref)*	n/a	n/a	n/a
		1-3	0.01 (0.05)	1.01 (0.91-1.12)	0.90
		4-7	-0.00 (0.06)	1.00 (0.89-1.12)	0.95
		8-15	-0.05 (0.07)	0.95 (0.83-1.08)	0.45
	Age	*Continuous*	-0.01 (0.00)	0.99 (0.98-1.00)	0.05
	Gender	*Female*	0.16 (0.04)	1.17 (1.08-1.26)	<.0001

Note. The c-statistics for model one and model two were c=0.59 and c=0.62, respectively.

In model one, anxiety disorders were associated with lower odds of staff reporting frustration with the person ($p<.0001$). However, increasing severity of anxious symptoms resulted in greater odds of staff frustration ($p\leq.0003$), indicating once again that anxiety diagnoses can potentially confer protective effects. Although age was insignificant ($p=.07$), the odds of staff reporting frustration were higher for women than men ($p=.03$). In model two, all variables retained their significance level. Both non-primary ($p=.004$) and primary depressive disorders demonstrated significantly lower odds of staff frustration ($p<.0001$). However, depressive symptoms were not significant predictors of staff frustration at any level ($p>.05$), demonstrating that anxiety is uniquely associated with poor therapeutic alliance.

4.4 Discussion

4.4.1 Summary and implications

To date, because primary anxiety disorders have been relatively rare in inpatient psychiatry, there has been limited capacity to gain the information necessary for establishing best care practices (Bandelow & Michaelis, 2015). Additional considerations need to be made when treating EA, since the first onset for many anxiety disorders occurs during this time (de Lijster et al., 2017; Kessler et al., 2007), but typically go untreated until symptoms of comorbid depression appear (Bandelow & Michaelis, 2015; Essau, 2005; Mackenzie et al., 2012; Preisig et al., 2001). To ensure that psychiatric hospitals are better equipped to provide coordinated care for EA presenting with anxiety, this chapter investigated three research questions covering the comorbidity between anxiety and depression, short-stay hospitalization outcomes, treatment patterns, and social resources. EA with primary anxiety disorders had lower odds of full admission into inpatient psychiatry, as anxiety is typically treated in these settings as a comorbid condition. However, while a primary anxiety diagnosis may lead to shorter hospital stays, it is associated with positive treatment patterns and informal social resources once in hospital, highlighting the need to assess symptoms to better identify anxiety among those without a diagnosis. As more Canadian youth present to EDs for treatment related to anxiety (Aratani & Addy, 2014; Brien et al., 2015; CIHI, 2020; Gandhi et al., 2016; Juhás & Agyapong, 2016), it is important that anxiety is recognized and care pathways from the ED are well-established, improving coordination of care and preventing over-utilization of emergency resources.

A higher proportion of primary anxiety disorders in the ED demonstrates that EA are seeking treatment for this condition, yet they are not receiving consistent care in other mental health settings. To understand existing pathways into inpatient psychiatric care among EA with anxiety, examination of depression was required as well, given that depression has been shown to influence health service use among those with anxiety (Bandelow & Michaelis, 2015; Essau, 2005; Mackenzie et al., 2012; Preisig et al., 2001). Consistent with previous health research, the results of this study found that anxiety disorders were more frequently comorbid with depressive disorders than the other way around, and that while individuals with symptoms of anxiety had comparable levels of depressive symptoms, EA with depression had varying levels of anxiety. Since primary anxiety disorders were present in only 4% across the sample, it is evident that anxiety is typically treated in hospital only when it is a comorbid condition. Given this association, it was expected that anxiety diagnoses would predict short-stay hospitalization outcomes differently depending on the order in which they were ranked. This hypothesis was correct, as the odds of short-stay hospitalizations were greater for primary anxiety disorders but lower for non-primary anxiety disorders. Further, both primary and non-primary depressive disorders demonstrated lower odds of short-stay hospitalizations, confirming that primary anxiety disorders are uniquely associated with short admissions into hospital. However, greater severity of anxious symptoms increased the odds of full admissions into inpatient psychiatry, regardless of diagnostic status. This means that even though fewer EA receive inpatient psychiatric care when anxiety is identified as their primary concern, they may still be admitted when they present with anxious symptoms, especially the more severe that they are. Additionally, the results demonstrate the importance of including the anxiety scale in addition to diagnosis when analyzing health service utilization, as meaningful variations in access will otherwise be overlooked.

Once EA with anxiety did receive inpatient care, they were not allocated fewer psychiatric resources than others. However, in some cases, diagnostic status was associated with slightly more professional consultative services, regardless of symptom severity. For instance, those with primary anxiety disorders had more contact with psychiatrists and psychologists, even when their scores on the anxiety scale were low. Additionally, individuals with primary anxiety disorders received individual, group, and family/couple therapy either more or just as recently as those with non-primary and no anxiety disorders. In contrast, less contact with nurse practitioners and MDs was observed when anxiety disorders were the primary diagnosis, which was unexpected given that medical resource utilization tends to be higher than other types of health care for individuals with anxiety disorders (Horenstein & Heimberg, 2020). It is possible that contact with psychiatrists was sufficient in meeting the pharmacological needs associated with anxiety, and that somatic health symptoms were recognized as indicators of anxiety rather than underlying medical conditions, and so less consultation with a nurse or MD was required. As well as diagnosis, increasing severity of anxious symptoms were also associated with a greater level of treatment, though this pattern was not as consistent as diagnosis. For example, individuals with no anxiety disorder - but a severe score on the anxiety scale - received less contact with a psychologist than those with a primary anxiety disorder and no symptoms of anxiety. Similarly, those with non-primary anxiety disorders and severe symptoms of anxiety received a similar degree of consultation with a psychiatrist as individuals with a primary anxiety disorder but no symptoms of anxiety. These patterns indicate that diagnosis may be an influential factor in receiving psychological treatment among EA, representing an important barrier to accessibility of care. Altogether, because most EA with anxiety received consultative services from a psychiatrist, as well as individual psychotherapy, it appears that psychiatric hospitals are generally following best care practice recommendations for treatment of anxiety disorders (Andrews et al., 2018; Bandelow et al., 2015).

While diagnosis and symptoms of anxiety generally shared a similar pattern for treatment interventions, there are still benefits of receiving a diagnosis when it comes to social resources. For instance, primary anxiety disorders demonstrated a protective effect against family and friends feeling overwhelmed by the person's illness, as well as staff reporting frustration in their interactions with the person. In contrast, increasing severity of anxious symptoms led to greater odds of not having a confidant, family and friends feeling overwhelmed, persistent hostility or criticism from family and friends, and staff reporting frustration. These results indicate that the presence of a diagnosis can positively affect social resources in a person's life, even when symptoms of anxiety are more severe. There are various possible reasons that diagnoses could be helpful for social relations, such as contributing towards better understanding of what the person is experiencing and helping to establish treatment plans, which may reduce conflict and the sense of feeling overwhelmed. While this could be true to some extent for psychological disorders generally, differential effects between diagnosis and symptoms on social resources were unique to anxiety in two instances: staff reporting frustration and family and friends feeling overwhelmed. Whereas symptoms of anxiety increased the odds of staff reporting frustration, depressive symptoms were insignificant. Since staff rarely reported frustration overall, it is difficult to determine the reason for this relationship. One potential explanation could be that because anxiety is not typically treated in psychiatric hospitals (Bandelow & Michaelis, 2015), this leads to some uncertainty in how to identify and approach treatment for these symptoms. The second unique effect of anxiety was that non-primary diagnoses did not contribute towards family and friends feeling overwhelmed, unlike non-primary diagnoses of depression. It is unclear why non-primary diagnoses of depression demonstrated a different pattern than anxiety, though it may involve differences in the level of functional impairment, which is typically more severe among those with depression (Cummings et al., 2014). Additionally, differences in social resources were also observed across gender, with more interpersonal conflict reported among women than men, suggesting that interpersonal responses to anxiety must also account for gender-based differences. Overall, incorporating social resource variables into mental health care is an essential component of treatment (Andrews et al., 2018; MHCC, 2016; Webster et al., 2012), especially for women and EA who are experiencing recent onset of anxious symptoms but are not yet diagnosed, as the results of this study suggest that they may be especially vulnerable to sources of interpersonal conflict.

Beyond contributing new knowledge on service use and treatment patterns for anxiety in psychiatric hospitals and units, the results of this study illustrate how measurement-based care can be used to advance the research and data-gathering recommendation proposed by the MHCC (2019) for improving mental health care of EA. Using interRAI assessment data, differences in health care accessibility among EA with anxiety disorders and symptoms were able to be identified, enabling mental health systems to recognize and respond to these trends. For EA with primary anxiety disorders, it is evident that continuity of care is a major challenge, as they have lower odds of receiving inpatient psychiatric care after visiting the ED. At the same time, they are also less likely to receive mental health care in the community (Horenstein & Heimberg, 2020; O'Donnell et al., 2017; Somers et al., 2006), meaning that primary care and ED settings may be the only settings where they can readily receive treatment. Consequently, ED visits involving anxiety are growing among EA (Brien et al., 2015; CIHI, 2020; Gandhi et al., 2016), which are struggling to maintain capacity for psychiatric visits as is (Baia Medeiros et al., 2019; CIHI, 2019b). To resolve this issue, mental health systems must develop ongoing community care interventions for EA with primary anxiety disorders following ED visits, which can be supported through the interRAI ESP and CMH assessments. At the same time, since anxiety is rising in the ED, psychiatric hospitals are also likely to observe greater frequencies of anxious symptoms. Therefore, in addition to developing strategies to improve accessibility of community mental health, mental health systems should also focus on establishing care guidelines for anxiety in psychiatric hospitals using data from the RAI-MH.

Within the interRAI suite of assessment instruments, a major implication arising from this study is that both diagnosis and symptoms are needed to effectively address anxiety in health research and care planning. For each set of analyses in this chapter, measuring anxious symptoms contributed important information that either enriched the knowledge obtained from diagnosis, or revealed an entirely different pattern. For instance, the anxiety scale demonstrated that increasing severity of anxious symptoms was associated with full admission into psychiatric hospitals, as well as greater susceptibility to lack of social resources, where anxiety diagnoses suggested the opposite. Since many anxiety disorders have an average age-of-onset beginning in the mid-20s (de Lijster et al., 2017; Kessler et al., 2007), it is crucial that symptoms of anxiety are incorporated into assessments and care planning for EA, as they may not yet have an anxiety diagnosis, or could be treated for other primary concerns such as depression. Anxious symptom severity also provided greater detail on treatment patterns than diagnosis alone, which is important when examining quality of care and resource allocation. This is especially relevant for individuals who do not have a diagnosed anxiety disorder but still experience symptoms of anxiety, as they received less treatment in some cases than individuals with a diagnosis but fewer symptoms of anxiety. Considering the differences observed between diagnosis and symptoms in predicting service use outcomes and informal social supports, this study highlights the benefits of including an anxiety scale in the interRAI assessment instruments.

4.4.2 Strengths and limitations

This study offers novel insight into psychiatric inpatient treatment for EA with anxiety, providing a more thorough understanding of how care is accessed, as well as treatment patterns and social resources related to anxious symptom severity. Since primary anxiety disorders are rare in psychiatric hospitals, there is little research available that examines this population (Bandelow & Michaelis, 2015), which is compounded further when focusing on EA due to high rates of disengagement from treatment (Edlund et al., 2002; MHCC, 2015). In this study, the relationship between anxiety and depression in accessing psychiatric hospital treatment among EA was illuminated, revealing that anxiety is more frequently treated as a comorbid condition to depression, despite having an earlier age-of-onset (Cummings et al., 2014; de Graaf et al., 2003; Ferdinand et al., 2005). As well as describing pathways into care, the results from this study can be used to improve care outcomes and social relationships. Given that diagnoses increased access to some treatment interventions and improved social relationships, this study articulates the value of recognizing anxiety among EA receiving care in psychiatric hospitals. Identifying anxiety, in the absence of an existing diagnosis, can be facilitated using the anxiety scale developed in the third chapter of this dissertation, marking another major strength of this study. Using the anxiety scale, it was possible to understand how severity of anxious symptoms influenced care patterns, such as increasing full admissions into psychiatric hospitals and treatment resources, as well as adverse effects on social relationships. The unique effects of anxious symptom severity on numerous dependent variables further served to showcase the utility of the initial anxiety scale. Finally, the use of RAI-MH data provided by OMHRS ensured comprehensive analysis of anxiety in inpatient psychiatric units and hospitals across Ontario, which is especially important given the rarity of anxiety disorders in these settings. Overall, this study offered new information on treatment of anxiety in psychiatric care settings, contributing towards measurement-based care for EA with anxiety.

While this study was able to determine how recently EA received contact from a psychiatrist, psychologist, and nurse practitioner or MD, as well as engagement in individual and group therapy, it was unknown what the nature of the treatment was. For individuals diagnosed with anxiety, recommended interventions include individual CBT and pharmacotherapy (Andrews et al., 2018; Bandelow et al., 2015). Since most of the sample was offered individual therapy and contact with a psychiatrist, it is possible that CBT and pharmacotherapy were regularly delivered, but this cannot be fully determined. Similarly, while short-stay hospitalizations were able to be analyzed, they do not represent those individuals who accessed the ED but were not admitted for any inpatient care. Considering the disparity between primary anxiety disorders in the ED and psychiatric hospitals in chapter two of this dissertation, it is likely that many EA with primary anxiety are discharged back into the community following ED visits. Comparing EA with primary anxiety who were admitted for short-stay inpatient care to those discharged back into the community following an ED visit could illuminate the risk and protective factors for admission, but this outcome could not be examined. Another limitation that this study was not able to address was engagement in mental health treatment following discharge from psychiatric hospitals, which would be useful for determining coordination of care. The previous two limitations can be addressed in further research by linking interRAI assessment datasets together.

4.4.3 Future research

Given that this study found that treatment patterns varied by anxiety disorder and anxious symptom severity, the next step would be to examine whether these differences affect change in symptoms over time. In particular, individuals with severe symptoms of anxiety received fewer resources when they had no anxiety disorder diagnosis, and so it would be useful to determine whether they also demonstrate less improvement in anxious symptoms over time due to lower resource allocation. As alluded to in the limitations section, a promising direction for ongoing research involves linking interRAI datasets to examine continuity of care across settings. By including data from ESP assessments, EA who are not admitted for any inpatient psychiatric care can be compared to those who are admitted for short-stay hospitalizations, providing greater depth of information on pathways into care. Similarly, longitudinal trends could be examined among EA who receive community mental health care before or after psychiatric hospitalization, enabling identification of factors that promote ongoing engagement in treatment, as well as longer-term effects of treatment interventions on mental health symptoms. If psychiatric hospitals are not an appropriate setting for treating anxiety, then collaboration between ED and community mental health agencies is essential for responding to the needs of EA accessing emergency care for anxiety, which could be researched by linking ESP and CMH assessments.

Finally, examining care pathways for anxiety among EA transitioning from the child and youth to the adult mental health system will be possible as more interRAI ChYMH assessments are completed in the future, which is needed to explore patterns of disengagement from treatment that result from policy disruptions.

4.4.4 Conclusions

Mental health care systems that effectively serve the needs of EA require integration between service providers, ensuring that individuals have access to ongoing care that matches their level of need and promotes their long-term well-being, as prolonged delays between development of anxious symptoms and consistent mental health treatment have been associated with worse clinical prognosis (Horenstein & Heimberg, 2020). Coordinated care is also necessary for preventing over-utilization of emergency resources (CMHA, 2008; MHCC, 2015; MHCC, 2016), which is a growing issue as more Canadian youth present to EDs for treatment related to anxiety (Aratani & Addy, 2014; Brien et al., 2015; CIHI, 2020; Gandhi et al., 2016; Juhás & Agyapong, 2016). Given increases in anxiety among youth presenting to the ED, psychiatric hospitals across Canada need to prepare for potential increases in anxiety as well. Traditionally, anxiety is treated in psychiatric hospital units as a comorbid psychological condition, frequently alongside depression. As a result, while non-primary anxiety disorders and severity of anxious symptoms are related to full admissions into inpatient care, individuals with primary anxiety disorders experience short stays. Despite lower odds of being admitted for inpatient psychiatric care, EA with primary anxiety disorders did not receive fewer treatment resources while in hospital. However, in some cases, treatment was lower for individuals with no anxiety disorder diagnosis but severe symptoms of anxiety, demonstrating the importance of diagnosis in resource allocation. Further, primary anxiety diagnoses were protective against adverse effects on social resources in one's life, even as increasing severity of anxious symptoms were associated with interpersonal challenges. Differences in treatment and social resource outcomes between individuals with and without anxiety disorder diagnoses highlight the need to measure symptoms as part of care planning. By improving recognition of anxious symptoms, mental health systems can better promote treatment access and social health among EA.

Discussion

5.1 Summary of dissertation

Between the ages of 18-29, EA undergo several major life transitions (Arnett, 2000; Arnett, 2007; Arnett et al., 2014), while also demonstrating high rates of psychological distress (Drapeau et al., 2014), lower mood and daily vigour (McNeil et al., 1994), and new onset of various psychological disorders (APA, 2013; Kessler et al., 2007; Pearson et al., 2013; Schulenberg & Zarrett, 2006; Smetanin et al., 2011). Despite greater need for mental health care, EA consistently report low rates of mental health treatment (SAMHSA, 2012; Statistics Canada, 2012), as well as higher rates of treatment attrition than other age groups (Edlund et al., 2002). To determine which systemic factors may be responsible for reducing mental health treatment among EA, the MHCC released two policy reports focused on this issue. Several factors were identified as obstacles for attaining ongoing care, such as the transition between the youth and adult mental health systems, poor integration between service providers, and lack of mental health research initiatives focused on EA. To resolve these problems, the MHCC published four priority policy recommendations for improving mental health care of EA, two of which are coordination of care across service settings and enhancing national infrastructure for research and data gathering. This dissertation contributed to both these recommendations using a measurement-based care approach (Aboraya et al., 2018; Connors et al., 2021; Kilbourne et al., 2018; Scott & Lewis, 2015) and assessment data obtained from interRAI mental health instruments, identifying gaps in coordination of care between psychiatric EDs, hospital, and community mental health settings among EA.

To better understand the clinical needs of EA receiving mental health care in psychiatric hospitals and units, EDs, and community mental health agencies, the second chapter of this dissertation used interRAI assessment data to examine the characteristics of EA receiving treatment in these settings. While some differences were observed across age groups within EA, most of the clinical variation was related to care setting. For instance, psychiatric hospitals demonstrated stronger patterns of acute illness and risk of danger, while EA receiving treatment in community settings had higher frequencies of functional impairment and symptoms of depression and social withdrawal. Those accessing the ED had characteristics that corresponded more closely with needs observed in the general population, such as higher frequencies of primary anxiety, neurodevelopmental, and personality disorders. Considering the widespread prevalence of anxiety disorders in the general population (Kessler et al., 2007) and post-secondary institutions (ACHA, 2016; Bayram & Bilgel, 2008; Beiter et al., 2015; Macaskill, 2013), the service pattern results of this study suggests that continuity of care among EA with anxiety is especially problematic.

Although there is an urgent need to investigate anxiety in mental health care settings, it is challenging to adequately research this construct, as anxiety disorders are one of the most heterogeneous psychological diagnostic categories (APA, 2015; WHO, 1992). Nonetheless, because there are limitations to using diagnosis as the sole indicator of anxiety in research and clinical practice, the third chapter of this dissertation constructed a general anxiety symptoms scale. Using the HARS (Hamilton, 1959) and BAI (Beck & Steer, 1988) as a guide, six psychological and five somatic health variables from the RAI-MH were selected for the initial item pool in deriving an interRAI anxiety scale. Results from factor analyses suggested that a unidimensional scale consisting of only psychological indicators was the best fit for the data, with weak factor loadings observed for all somatic health items. Among the six psychological indicators, both IRT and LCA analyses indicated that compulsive behaviour was not a strong contributor to anxiety, and so a five-item version of the continuous psychological indicators scale was created that excluded this item. After testing several alternate versions of the anxiety scale using logistic regression models, the five-item continuous scale was chosen as the final candidate, as it produced the best balance between model fit and parsimony. Criterion validity of this initial scale was supported by its relationship with concurrent indicators and discriminant measures of depression. Further evidence of validity for the anxiety scale was demonstrated by responsiveness to change over time. While future work may lead to some refinements to the anxiety scale, the initial version can be used to support research initiatives and clinical practice.

An immediate research opportunity involving the interRAI anxiety scale in chapter four was to examine continuity of care for EA with primary anxiety disorders in psychiatric hospitals, which has historically been challenging to investigate due to small sample sizes (Bandelow & Michaelis, 2015). Overall, anxiety disorders and symptoms were frequently comorbid with depression, indicating that anxiety is typically treated alongside this condition. Consequently, primary anxiety disorders reduced the odds of hospital stays lasting at least three days, while increasing severity of anxious symptoms increased those odds. Once in hospital, EA with anxiety disorders and symptoms generally received comparable treatment resources as those without anxiety. However, individuals with more severe anxiety symptoms received slightly less contact with mental health professionals when they did not have an anxiety disorder, indicating the importance of diagnosis. Disparities between diagnoses and symptoms of anxiety were especially evident for social resources, with diagnoses conferring some protective effects. Altogether, it is essential that inpatient service providers assess symptoms of anxiety when they are formulating care plans, as anxious symptoms may be overlooked.

Altogether, each chapter of this dissertation contributes towards a broader understanding of clinical needs and service use patterns among EA receiving mental health care in Canada, as well as demonstrating how policy decision-makers and researchers can use clinical assessment data to identify gaps in service provision across care settings. In particular, the results revealed an urgent need to address mental health care for EA with primary anxiety concerns, as they are especially susceptible to disruptions in ongoing care and informal social support resources. The implications of these findings for mental health care systems and research, as well as recommendations for ongoing work, are described in the following sections.

5.2 Implications and recommendations for mental health care of EA

5.2.1 Policy and system design

As per the Canada Health Act, all citizens must be provided with health care that is publicly administered, comprehensive, universal, portable, and accessible (Health Canada, 2021). However, because community mental health services are not covered under Ontario's provincial health insurance plan for those over the age of 18 (Government of Ontario, 2021b), mental health care is neither fully universal nor accessible. Further, the transition into the adult mental health system is particularly disruptive to EA, leading to disengagement from mental health treatment (MHCC, 2015; MHCC, 2016). The results from this dissertation provide suggestions for policy revision covering mental health care of EA in two areas: 1) establishing service pathways for EA with primary anxiety concerns and, 2) adopting a measurement-based care model for system performance evaluation and the interRAI suite of mental health assessment instruments.

The results of this dissertation suggest that accessibility of mental health services are influenced by the administrative structure of care settings, creating gaps in continuity of care that can be solved through service restructuring and funding for community mental health. These gaps were exacerbated among individuals with specific types of mental health needs, such as EA with primary anxiety and personality disorders, who were disproportionately represented in the ED. This pattern indicates that psychiatric hospital units and community mental health agencies are not structured to meet the needs of all EA seeking mental health care, leading to overuse of the ED (CMHA, 2008). Examination of care pathways into inpatient psychiatry among EA revealed that while primary diagnoses of anxiety led to shorter hospital stays, non-primary diagnoses had the opposite effect, demonstrating that anxiety is not usually the main focus of psychiatric intervention. It is possible that psychiatric hospitals are not the optimal setting for treating primary anxiety, in which case, short stays may not necessarily be an inappropriate outcome. Instead, a combination of counselling and pharmacological treatment in the community is likely the most suitable care plan following discharge from the ED (Roberge et al., 2011). However, community mental health is often inaccessible to EA with primary anxiety disorders, due in part to financial barriers and system-related factors (CMA & CPA, 2016; O'Donnell et al., 2017; Roberge et al., 2011; Sunderland & Findlay, 2013). Without access to community mental health treatment or a primary care doctor, youth and EA struggling with anxiety may have no recourse but to visit the ED when they need help managing their symptoms. As EDs across Canada are currently struggling to meet the capacity for psychiatric treatment (Baia Medeiros et al., 2019), especially among youth and EA (Brien et al., 2015; CIHI, 2017b; CIHI, 2020), resourcing problems are likely to worsen as more youth seek mental health treatment over time (CIHI, 2020; Gandhi et al., 2016; Wiens et al., 2020). Although funding for community mental health programs is limited in Ontario (CIHI, 2019b), it is recommended that Ontario Health invest in community-based services that specialize in treating anxiety among EA, as well as ensuring that these services are integrated with partner EDs to support the referral process.

In addition to increasing accessibility of mental health services, policy makers can use the methods established in this dissertation to ensure that data-driven decision-making is integrated into national and provincial research strategies. To promote an evidence-based approach to mental health system planning in Ontario, the Mental Health and Addictions Centre of Excellence of Ontario Health (Kurdyak & Clark, 2021) recommended the adoption of a measurement-based care approach. Measurement-based care proposes that the clinical assessment data gathered during treatment serve as the basis for evaluating service provision and system performance (Aboraya et al., 2018; Connors et al., 2021; Kilbourne et al., 2018; Scott & Lewis, 2015). Using interRAI assessment data, this dissertation applied the principles of measurement-based care to reveal clinical needs and gaps in service use among EA receiving psychiatric treatment in different settings, showcasing the utility of this approach for informing responsive system design. In addition to benefiting regional health systems that have mandated health assessment tools, measurement-based care can provide globally valuable health service research. For instance, because the RAI-MH is used in all inpatient psychiatric hospitals and units across Ontario, sufficient data was available to investigate service use outcomes and treatment patterns among a rare subgroup of EA with primary anxiety disorders, which no previous studies have been able to do (Bandelow & Michaelis, 2015). Combined with the cost-effectiveness of using routine clinical assessment data gathered by service providers, there are several benefits of adopting a measurement-based care framework for mental health research and policy, supporting The Mental Health and Addictions Centre of Excellence's proposal for adopting measurement-based care (Kurdyak & Clark, 2021).

For measurement-based care models to be effective, it is necessary that service providers use valid and reliable health assessment tools that are cross-compatible across care settings, such as the interRAI tools and the anxiety scale introduced in this dissertation. Not only does interRAI offer a suite of mental health assessment instruments that have demonstrated strong psychometric properties (Chan et al., 2014; Foebel et al., 2013; Hirdes et al., 1999; Hirdes et al., 2008; Hirdes et al., 2020), but several of these tools are already being used to support service provision and system planning in various regions across Canada. For example, data from the RAI-MH assessment is used in regular quality indicator reporting for psychiatric hospitals across Ontario (CIHI, 2021; Hirdes et al., 2020; Perlman et al., 2013). This dissertation can further support interRAI's utility in quality reporting by introducing the anxiety scale as a potential new indicator. Initial evidence for the anxiety scale as a quality indicator was demonstrated through its responsiveness to change over time, as well as its ability to detect variations in care outcomes, revealing that approximately 20% of individuals with severe symptoms of anxiety did not improve substantially by the time of discharge. Combined with the finding that EA with severe symptoms of anxiety received less consultation from psychologists and psychiatrists when they did not have a primary anxiety diagnosis, it is possible that lack of improvement in anxiety symptoms is partially due to differences in service provision. If future research determines that this is the case, then it is especially important that the anxiety scale be considered as a quality indicator, ensuring that anxiety symptoms are recognized and treated accordingly.

Overall, to improve the inconsistent mental health treatment rates observed among EA (Edlund et al., 2002; MHCC, 2015 Statistics Canada, 2012), it is necessary to implement systemic policy changes that better align with their psychiatric service use patterns and clinical needs. Based on the results of this dissertation, policy decision-makers and service planners must prioritize improving care pathways and treatment outcomes for EA with primary anxiety disorders - especially within the community - ensuring that the ED is not the only resource for those seeking affordable and available treatment. With the addition of a new anxiety scale - pending future research - quality indicator reporting for treatment of anxiety can be facilitated using the interRAI assessment instruments. Further, given that interRAI data are already being used to support system evaluation and accountability in psychiatric hospitals and units across Ontario, it is recommended that policy decision-makers adopt these instruments as part of a measurement-based care approach to service delivery and policy planning.

5.2.2 Service provision

Like policy and system planning, incorporating evidence-based care into service delivery is just as important for improving mental health treatment outcomes for EA. This dissertation presents some considerations for treatment of EA broadly, as well as practices specific to anxiety, particularly the importance of assessing symptoms in addition to diagnosis. By reviewing the clinical characteristics associated with younger EA in each care setting, service providers can make use of this information to anticipate the types of care needs they are more likely to encounter and prepare accordingly. For instance, cannabis use, risk of self-harm, neurodevelopmental disorders, eating disorders, and personality disorders were all more prevalent among EA aged 18-25, signifying that more resources specific to these conditions are needed in settings that treat a high proportion of young EA. While clinical characteristics are the focus of psychological treatment, it is also necessary for service providers to account for sociodemographic factors that are more distinctive to young EA, such as enrolment in post-secondary education, unemployment, marital status, and living alone. Since sociodemographic characteristics can influence mental health outcomes through the availability of financial and social resources (Lindell & Campione-Barr, 2016; Newcomb-Anjo et al., 2017; O'Connor et al., 2011; Power et al., 2015), it is valuable to incorporate these variables along with clinical characteristics when developing mental health care plans for EA.

While understanding broad trends in clinical and sociodemographic characteristics among EA is useful for informing service planning, this dissertation illustrates that deeper examination into care outcomes and treatment patterns is needed to pinpoint where gaps are occurring. After developing an anxiety scale, this dissertation revealed that service providers working in psychiatric hospitals and units may under-detect symptoms of anxiety when treating EA. Since most anxiety disorders have an average age-of-onset in young- and mid-adulthood (de Lijster et al., 2017; Kessler et al., 2007), but are often untreated in the absence of comorbid depressive symptoms (Bandelow & Michaelis, 2015; Essau, 2005; Mackenzie et al., 2012; Preisig et al., 2001), it is likely that many individuals presenting with anxiety symptoms in psychiatric hospitals - especially EA - do not yet have a diagnosis. Further, individuals can experience symptoms of anxiety for years before they receive an anxiety disorder diagnosis (Bandelow & Michaelis, 2015). By increasing recognition of anxious symptoms, it may be possible to improve treatment outcomes for individuals who are undiagnosed, as having an anxiety disorder diagnosis conferred some advantages for both resource allocation in hospital and informal social support resources. Given that these benefits were also observed for non-primary anxiety disorders and held constant when accounting for the severity of anxious symptoms, these results suggest that the act of identifying anxiety is important. Since the anxiety scale was predictive of anxiety disorders occurring within the same episode of care, it may also help care providers by serving as an indicator for potential new diagnoses, much like the interRAI DRS and depressive disorders in complex continuing care settings (Martin et al., 2008). Taken together, symptoms of anxiety must be routinely assessed and provided as a summary scale to clinical staff, enhancing the ability to detect anxiety and monitor treatment progress over time. This process can be facilitated using the interRAI assessment instruments, now that an initial anxiety scale has been developed, benefiting staff further by reducing the need to use external anxiety screening tools. In summary, it is recommended that service providers incorporate regional clinical assessment data into their care planning practices, with an emphasis on responding to developmental variations in care needs and detection of anxious symptoms among EA.

5.3 Implications and recommendations for research

5.3.1 Age ranges for defining EA

Since EA is a cultural concept rather than a discrete developmental period defined by consistent changes in biology (Arnett, 2000; Arnett, 2007; Arnett et al., 2014), it is unclear what age range should be used in research, with the results from this dissertation indicating that it depends on study context. Few studies have explicitly investigated how different age ranges affect mental health research findings, and among those that have, there have been mixed findings. For example, while one study found that EA aged 18-25 had more substance use disorder diagnoses than adults aged 26-34 (Adams et al., 2014) – consistent with research reported in the DSM 5 (APA, 2013) – another study reported no differences between the age groups of 15-22 and 23-29 (Qadeer et al., 2019). Adding to the complexity of these results, this study found that in psychiatric service settings, substance use disorders were generally greater among individuals aged 26-35, though more EA between the ages of 18-25 had recently consumed cannabis.

Divergent patterns in substance use among EA was reflected in the substance use CAP, with more 18- to 25-year-olds triggering the 'current substance use' level, even though they had fewer substance use disorders than older age groups. A possible explanation for these findings is that substance use disorders are diagnosed differentially depending on the types of substances that are used. Since EA between the ages of 18-25 less recently consumed illicit substances such as cocaine and opiates, it is probable that they did not meet the same criteria for substance use disorder diagnoses as older adult age groups. Therefore, when investigating substance use trends among EA, it is necessary to stratify age groups appropriately so that important variations can be detected. The same consideration needs to be made for other clinical conditions that are more prevalent among EA aged 18-25, such as neurodevelopmental, personality, and eating disorders, as well as higher risk of self-harm. Further, sociodemographic characteristics also differed between the 18-25 and 26-30 age groups, which may be relevant factors that need to be accounted for in research. Altogether, depending on the context of the study and the research questions being investigated, it may be necessary to divide age groups within EA. Hence, it is recommended that researchers investigate potential influences of age ranges when investigating mental health trends and outcomes among EA.

5.3.2 Anxiety scales and inclusion in interRAI assessments

After identifying the urgent need to address anxiety among EA seeking mental health care in Canada, it was evident that the interRAI assessment instruments required a general anxiety symptoms scale that could aid in this effort, leading to the creation of an initial interRAI anxiety scale. Throughout the process of scale development, it was discovered that somatic health items did not contribute towards measuring anxiety, nor symptoms of compulsive behaviour, both of which have important implications for clinical anxiety research. Within the interRAI organization, the introduction of an anxiety scale also poses some new considerations for research. Other than formally adopting the anxiety scale, interRAI should also consider the inclusion of new mood indicators that represent social anxiety disorder and GAD, as well incorporate the full set of anxiety items into the ESP.

When deriving the interRAI anxiety scale, the HARS and BAI were used as guides for item selection and structural modeling because of the evidence supporting the reliability and validity of those scales. Although both the HARS and BAI contain a somatic health factor, a similar factor did not function well in the interRAI anxiety scale, indicating that somatic items may not be needed for measuring anxiety in clinical settings. One potential explanation for the poor performance of somatic indicators is that they are more strongly associated with certain types of anxiety disorders, such as panic disorder (De Ayala et al., 2005; Julian, 2011), and so they may be less useful for general anxiety measures. However, because the correlation matrix used in the factor analyses demonstrated weak relationships between somatic items and episodes of panic, it is unlikely that the presence of a somatic factor was obscured by broader anxiety symptoms. A more plausible reason is that somatic health items are not specific to anxiety (Julian, 2011), but pervasive physical health problems that are present across various subgroups of the psychiatric inpatient population, especially older adults with multiple comorbid medical conditions. Another benefit to excluding somatic items from the anxiety scale is that it reduces the total number of variables included and allows for a unidimensional scale, preserving the accuracy and appropriateness of the Cronbach’s alpha coefficient of reliability (Cortina, 1993; Henson, 2019). A possible disadvantage of excluding somatic health items is that it may reduce external validity in cultures where manifestations of anxiety are considered more physical than psychological (Reed et al., 2019). However, because the interRAI assessments contain somatic health items, they are still evaluated as part of routine practice and can be incorporated into clinical judgement and research as needed. To summarize, the results of this dissertation suggest that somatic health items are not necessary for measuring clinical anxiety and so it is recommended that they are excluded from anxiety scales.

Another item excluded from the interRAI anxiety scale was compulsive behaviour, which was both rarely observed in the overall sample and was weakly discriminant of the latent anxiety construct. Compulsive behaviour is one of the primary symptoms involved in OCD, which was removed from the anxiety disorder category in both the DSM (APA, 2013) and ICD (Kogan et al., 2016) after several studies indicated that it is a biologically and functionally distinctive psychological disorder. However, the second symptom representing OCD – obsessive thoughts – was a relatively strong variable within the anxiety scale. Unlike compulsive behaviour, it is possible that the 'obsessive thoughts' variable captures some of the cognitive elements that are typically present in anxiety, such as excessive worrying and apprehension (APA, 2013; Porter et al., 2017; Spitzer et al., 2006). Given that unrealistic fears and phobias shared the strongest association with obsessive thoughts, it is reasonable to suspect that these thoughts occasionally functioned as the cognitive manifestation of an underlying fear. While further research is needed to confirm how obsessive thoughts are evaluated by clinical assessors, the present findings suggest that while compulsive behaviour is a distinctive symptom belonging to OCD and not anxiety, obsessive thoughts may be a shared feature between both disorders. As such, while there is tentative evidence supporting the inclusion of obsessive thoughts in the anxiety scale, general anxiety scales can reasonably exclude symptoms of compulsive behaviour.

Not only does the interRAI anxiety scale offer novel insight into measuring general anxiety for research with clinical populations, but also presents three research directions for the interRAI mental health assessment instruments. Firstly, after establishing adequate construct and criterion validity of the anxiety scale, as well as its responsiveness to change over time, there is sufficient evidence supporting implementation of the anxiety scale as an official interRAI tool. Secondly, while the initial version of the interRAI anxiety scale has clinical and research utility as is, research is needed to determine whether adding new variables to the scale is helpful, such as symptoms related to social anxiety and GAD. Although adding new items into the assessment tools must be done with caution, as too many variables can create administrative burden for care staff (Aboraya et al., 2018), there may be sufficient justification for including these two symptoms of anxiety. For instance, social anxiety disorder is one of the most prevalent subtypes of anxiety in the general population of North America and is also prominent among adolescents and EA (APA, 2013; Kessler et al., 2009), making it a potentially useful item for screening anxiety in younger populations, as well as permitting research specific to this condition. Similarly, because GAD was the second most prevalent anxiety disorder subtype in the psychiatric population, including a relevant symptom would likely enhance the diagnostic predictive power of the anxiety scale. Further, incorporating a symptom measuring excessive worrying and apprehension could increase the utility of the anxiety scale by broadening its research applications, such as research on psychological well-being (Stones & Kozma, 1985). Lastly, given the prevalence of primary anxiety disorders observed in the ED among EA in both this dissertation as well as previous Canadian research (Brien et al., 2015; CIHI, 2019b; Gandhi et al., 2016), it is recommended that the full set of anxiety mood indicators be added to the ESP assessment. Taken together, the interRAI organization should formally adopt the anxiety scale to enable immediate use for research and clinical practice, as well as commit to ongoing research investigating the addition of new anxiety symptoms into the assessment instruments.

5.4 Overall strengths, limitations, and future research

Given that the strengths and limitations for each chapter have already been described extensively, as well as opportunities for future research, only a brief overview of the major discussion points are summarized in this section. The chief methodological strength shared by each chapter of this dissertation was the extensiveness of the inpatient psychiatric sample. Following the provincial mandate to use the RAI-MH assessment instrument in all designated psychiatric hospitals and units across Ontario, fully representative data for all adults receiving care in these settings were available from 2005-2019. As a result, compared to previous studies described in the literature reviews, the psychiatric inpatient sample used throughout this dissertation was considerably larger and more comprehensive. Since the third and fourth chapters of this dissertation focused heavily on research involving primary anxiety disorder diagnoses, which are rarely observed in psychiatric hospital settings (Bandelow & Michaelis, 2015), it is essential that a large and representative sample was available for analysis. Another advantage of the provincial mandate is that it requires that the RAI-MH be administered at the time of discharge, meaning that this project was able to identify those individuals who received a diagnosis after the initial admission assessment. Further, change in anxious symptoms over the course of treatment was also able to be evaluated, without the limitation of sample attrition, strengthening the methodological rigour of this dissertation.

Whereas the representativeness of the inpatient psychiatric sample is a notable strength of this dissertation, sampling restrictions inherent in the ED and community mental health datasets presented some limitations, as well as the inability to link these datasets together. In contrast to the RAI-MH, the CMH and ESP are used voluntarily by participating organizations. Consequently, the ED and community mental health samples were not fully representative of the province, diminishing the generalizability of these datasets. Due to the diversity of community mental health agencies that provide services (CIHI, 2017), as well as the fragmented nature of this system, it is possible that sampling bias affected the results reported in the second chapter of this dissertation. Despite limitations in sampling of organizations, the sample sizes for the ED and community mental health datasets were large enough to permit investigation of clinical characteristics of EA receiving care in these settings, providing valuable information for system planning and service provision. Secondly, while this study was able to identify gaps in continuity of care among EA presenting to the ED with primary anxiety disorders, each care setting was analyzed as an independent, cross-sectional dataset. To properly examine cross-sectoral service use patterns among EA, future research is needed that links each of these datasets together, which was not a possibility at the time of this dissertation.

Although this dissertation contained some limitations to addressing mental health care in community and ED settings, these issues can be addressed in future research studies. As more assessment data are added to the ESP and CMH datasets in the Chatham-Kent and Bluewater Health regions of Ontario, the next research direction is to link these datasets together - along with the RAI-MH - to examine longitudinal clinical and service use outcomes among EA. In particular, it would be valuable to determine the predictors of receiving follow-up care in community and psychiatric hospital settings following discharge from the ED, especially those with primary anxiety disorders. In addition to strengthening mental health research for EA in community and ED settings, there are also numerous research directions arising from the anxiety scale developed in this dissertation. Its use as a potential quality indicator for mental health settings has been described previously, as well as a screener to flag potential anxiety disorders. Other applications of the anxiety scale include the ability to track anxiety throughout the life course as individuals access different points of the health care system, providing a longitudinal perspective on the chronicity and morbidity of this condition that is difficult to detect using cross-sectional data.

Another avenue for research with the anxiety scale is to incorporate it into current and ongoing project initiatives within interRAI. For example, a previous study involving nursing home residents found that that while both self-reported and observer-rated scales of depression were reliable and valid, each captured different aspects of depression (Koehler et al., 2005). Due to the differences observed between clinician- and self-rated mood items, interRAI is considering the development of self-rated mental health indicators. An early version of an interRAI self-reported mood scale has been proposed that contains three items with a three-day lookback period, one of which is 'anxious, restless, or uneasy' (Betini et al., 2021). Creating self-reported anxious items that are congruent with the clinician-rated anxiety scale would permit direct comparisons between these two types of raters, presenting a valuable research opportunity for the immediate future. At the time of literature review and data collection for this dissertation, the onset of the coronavirus disease 2019 (COVID-19) pandemic had not yet begun, and so its effect on anxious symptoms in health care settings could not be investigated. However, initial results from a web-based survey conducted with Canadian adults during the first wave of the COVID-19 pandemic found that self-reported anxiety levels increased substantially following lockdown, especially among EA (Betini et al., 2021). As a result, it is possible that the prevalence of anxious symptoms in health care settings has also increased dramatically among EA since the end of the data collection period for this dissertation, warranting urgent investigation using both the anxiety scale and self-reported anxiety items. Further, it may be that certain types of anxious symptoms have increased more than others as a result of the pandemic, particularly social anxiety and general worrying and apprehension, confirming the need to include these symptoms in the interRAI assessment instruments. Overall, expanding the findings of this dissertation by integrating the interRAI assessment datasets to examine mental health care trends among EA and confirming the items for the anxiety scale are promising avenues for future research.

5.5 Conclusions

Mental health systems that effectively meet the needs of EA require coordination of care between service providers, as well as research and data gathering strategies to inform evidence-based evaluation and planning. Using measurement-based care and interRAI assessment instruments, this dissertation provides several recommendations for policy and research to improve the mental health care of EA. First, care pathways into psychiatric service settings must be restructured to promote ongoing care for EA with primary anxiety disorders, requiring integration between community mental health and EDs, as well as enhanced funding for community programs. Secondly, to support ongoing mental health research for EA, it is recommended that policymakers and service providers adopt a measurement-based care approach to system evaluation, which can be supported using the interRAI suite of mental health assessment instruments. Finally, for issues related to anxiety, the new interRAI anxiety scale can be used to evaluate service use patterns and treatment outcomes for EA, such as recognition of anxious symptoms and effects on social resources. The anxiety scale can also be used to inform broader research on anxiety, such as the exclusion of somatic health indicators and compulsive behaviours from measures of general anxiety. In conclusion, this dissertation demonstrates how policy makers, service providers, and researchers can use clinical assessment data to enhance mental health care for EA.

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Appendices

Appendix A: Description of interRAI scales and CAPS

Scales

Scales provide an overview of a person's overall functioning within a specific domain, allowing clinicians to identify their strengths and needs more easily, and are calculated using items contained in the health assessment instruments. For all the scales used in this dissertation, this section describes what each of the scales represent, which variables go into their algorithm, and what the range of resulting scores are.

Aggressive Behaviour Scale (ABS)

The ABS is a clinical scale that is generated to determine an individual's level of aggressive behaviour. The ABS is calculated based on the following items in the RAI-MH: verbal abuse, physical abuse, socially disruptive behaviour, and resistance of care. The scale ranges from 0-12, with higher scores signifying more frequent and more varied aggressive behaviour.

Cognitive Performance Scale (CPS)

The CPS is a clinical scale that is generated to determine an individual's level of cognitive impairment. The CPS is calculated based on the following items in the RAI-MH: short term memory, cognitive skills for daily decision making, making self understood, and ADL self-performance – eating. The scale ranges from 0-6, with higher scores signifying greater cognitive impairment.

Depressive Severity Index (DSI)

The DSI is a clinical scale that is generated to determine an individual's level of depressive symptoms. The DSI is calculated based on the following items in the RAI-MH: sad/pained facial expression, negative statements, self-deprecation, guilt/shame, and hopelessness. The scale ranges from 0 to 15, with higher scores signifying more depressive symptoms.

Positive Symptom Scale – Short version

The PSS is a clinical scale that is generated to determine an individual's level of positive psychotic symptoms. The PSS is calculated based on the following items in the RAI-MH: hallucinations, command hallucinations, delusions, and abnormal thought process. The scale ranges from 0-12, with higher scores signifying more positive symptoms.

Social Withdrawal

The social withdrawal scale is generated to determine an individual's level of withdrawal from social activities. Social withdrawal is calculated based on the following items in the RAI-MH: anhedonia, withdrawal, lack of motivation, and reduced social interaction. The scale ranges from 0-12, with higher scores signifying greater social withdrawal.

Risk of Harm to Others (RHO)

The RHO is a clinical algorithm that is designed to assess an individual's risk for harming others. The RHO is calculated based on both individual items in the RAI-MH, as well as another scale. The following criteria for RHO are: delusions, insight into mental health, difficulty falling asleep, sleep problems due to hypomania, violence towards others, intimidation, violent ideation, extreme behaviour disturbance, police intervention for violent crime, and score on the ABS. The scale ranges from 0-6, with higher scores representing increased risk for harming someone else.

Self-Care Index (SCI)

The SCI is a clinical algorithm based on psychiatric symptoms that is designed to assess an individual's inability to care for self. The SCI is calculated based on the following items in the RAI-MH: daily decision making, insight into mental health, decreased energy, abnormal thought process, and making self understood. The scale ranges from 0-6, with higher scores representing decreased ability to care for self.

Severity of Self-Harm (SoS)

The SoS is a clinical algorithm that is designed to assess an individual's risk for harming themselves. The SoS is calculated based on both individual items in the RAI-MH, as well as three other scales (one of which is based on the Emergency Screener for Psychiatry [ESP]). The following criteria for SoS are: most recent self-injurious attempt, intent of any self-injurious attempt was to kill themselves, family/others concerned about person's risk for self-injury, suicide plan, score on the DSI, score on the CPS, and score on the ESP version of the PSS - short. The scale ranges from 0-6, with higher scores representing increased risk for harming oneself.

Clinical Assessment Protocols

CAPs were developed to support clinicians in using evidence-based information to evaluate patient care needs and service planning, including areas like exercise and interpersonal conflict. To do this, CAPs use variables contained in the RAI-MH to create predictive algorithms that distinguish between different "trigger levels." Trigger levels denote either varying levels of risk (e.g. moderate versus high), or different contexts that are relevant to the risk in question (e.g. with or without accompanying cognitive deficits). Trigger levels help clinician's identify patient's strengths and needs and provide them with prevalence estimates and potential treatment strategies. For all the CAPs used in this dissertation, this section describes what each CAP represents, what the trigger levels are, and what variables go into determining trigger levels.

Criminal Activity

The criminal activity CAP describes a person's history of criminal behaviour. This CAP has one trigger for reducing risk of violent or nonviolent criminal behaviour. The following items are used to determine the trigger level: experienced police intervention for any history of violent crime or non-violent crime within the past year OR were admitted from a correctional facility or have been identified as a forensic admission.

Interpersonal Conflict

The interpersonal conflict CAP describes an individual's dysfunctional interpersonal relationships and behaviours. This CAP includes triggers for 1) reducing widespread conflict, and 2) reducing conflict within specific relationships. The following items are used to determine trigger levels: anger, conflict with staff/others, conflict with family/friends, staff reports frustration in dealing with person.

Sleep Disturbance

The sleep disturbance CAP describes dysfunctions in an individual's sleeping patterns. This CAP includes triggers for 1) current sleep disturbance and no worse than moderate cognitive impairment, and 2) current sleep disturbance and severe cognitive impairment. The following items and scales are used to determine trigger levels: difficulty sleeping, too much sleep, and CPS.

Social Relationships

The social relationships CAP describes an individual's experiences of social isolation. This CAP includes triggers for 1) reducing social isolation, and 2) family dysfunction and improving close friendships and family functioning. The following items from the RAI-MH are used to determine trigger levels: withdrawal, reduced social interactions, social activities, visit with family member, other interaction with family member, family overwhelmed by person's illness, dysfunctional family relationship, presence of confidant, and conflict-laden relationship.

Social Supports for Discharge (SSDIS)

The SSDIS CAP describes post-discharge difficulties that an individual may experience due to lack of supportive resources. This CAP includes one trigger for possible difficulties. The following items are used to determine the trigger level: reason for assessment, residence admitted from, support person positive about discharge, help with childcare available, supervision for personal safety available, crisis support available, ADL/IADL support available, living status after discharge.

Substance Use

The substance use CAP describes an individual's past and current history of substance abuse. This CAP includes triggers for 1) current problematic substance abuse, and 2) history of problematic substance abuse. The following items from the RAI-MH are used to determine trigger levels: intentional misuse of medications, number of alcoholic drinks in last 14 days, inhalant use, hallucinogen use, cocaine use, stimulant use, opiate use, cannabis use, injection drug use, told to cut down use, bothered by criticism about alcohol/drug use, guilt about drinking/drug use, starts morning with alcohol/drugs, and social environment encourages use.

Traumatic Life Events

The trauma CAP describes an individual's history and experience of traumatic life events. This CAP includes triggers for 1) immediate safety concerns, and 2) reducing the impact of prior traumatic life events. The following items from the RAI-MH are used to determine trigger levels: intense fear, serious accident, death of a family member, lived in war zone, witnessed severe accident, victim of crime, victim of sexual assault, victim of physical assault, victim of emotional abuse, fearful of family member, concerns for safety, and family history of abuse.

Appendix B: Ethics Clearance

15/5/2014 Form 101 Review Page

ORE OFFICE USE ONLY

ORE # 18228

APPLICATION FOR ETHICS REVIEW OF RESEARCH INVOLVING HUMAN PARTICIPANTS

Please remember to PRINT AND SIGN the form and forward with all attachments to the Office of Research Ethics, Needles Hall, Room 1024.

A. GENERAL INFORMATION

1. Title of Project: Secondary Analyses of Anonymized interRAI Data from the Data Sharing Agreement with the Canadian Institute for Health Information

2. a) Principal and Co-Investigator(s)

NEW As of May 1, 2013, all UW faculty and staff listed as investigation must complete the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Tutorial, 2nd Ed. (TCPS2) prior to submitting an ethics application. The tutorial takes at least three hours; it has start and stop features.

Name	Department	Ext:	e-mail:
John Hirdes (faculty)	School of Public Health and Health Systems	32007	hirdes@uwaterloo.ca

2. b) Collaborator(s)

NEW As of May 1, 2013, all UW faculty and staff listed as investigation must complete the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Tutorial, 2nd Ed. (TCPS2) prior to submitting an ethics application. The tutorial takes at least three hours; it has start and stop features.

Name	Department	Ext:	e-mail:

3. Faculty Supervisor(s)

NEW As of May 1, 2013, all UW faculty and staff listed as investigation must complete the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Tutorial, 2nd Ed. (TCPS2) prior to submitting an ethics application. The tutorial takes at least three hours; it has start and stop features.

Name	Department	Ext:	e-mail:

4. Student Investigator(s)

Name	Department	Ext:	e-mail:	Local Phone #:

5. Level of Project: Faculty Research **Specify Course:**

Research Project/Course Status: New Project\Course

6. Funding Status (If Industry funded and a clinical trial involving a drug or natural product or is medical device testing, then Appendix B is to be completed):

http://iris.uwaterloo.ca/ethics/Form101/ReviewApp.asp?id=31685&prn=YES 1/8

INVESTIGATORS' AGREEMENT

I have read the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans, 2nd Edition (TCPS2) and agree to comply with the principles and articles outlined in the TCPS2. In the case of student research, as Faculty Supervisor, my signature indicates that I have read and approved this application and the thesis proposal, deem the project to be valid and worthwhile, and agree to provide the necessary supervision of the student.

NEW As of May 1, 2013, all UW faculty and staff listed as investigators must complete the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans Tutorial, 2nd Ed. (TCPS2) prior to submitting an ethics application. Each investigator is to indicate they have completed the TCPS2 tutorial. If there are more than two investigators, please attach a page with the names of each additional investigator along with their TCPS2 tutorial completion information.

_______________________ 5/15/14

Print and Signature of Principal Investigator/Supervisor **Date**

Completed TCPS2 tutorial:
___YES ___NO ___ In progress

_______________________ _______________

Print and Signature of Principal Investigator/Supervisor **Date**

Completed TCPS2 tutorial:
___YES ___NO ___ In progress

Each student investigator is to indicate if they have completed the Tri-Council Policy Statement, 2nd Edition Tutorial (http://pre.ethics.gc.ca/eng/education/tutorial-didacticiel/). If there are more than two student investigators, please attach a page with the names of each additional student investigator along with their TCPS2 tutorial completion information.

_______________________ _______________

Signature of Student Investigator **Date**

Completed TCPS2 tutorial:
___YES ___NO ___ In progress

_______________________ _______________

Signature of Student Investigator **Date**

Completed TCPS2 tutorial:
___YES ___NO ___ In progress

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