The utility of measuring disability, functioning and other factors when assessing mental health in both the general population and a patient population that seeks treatment at a psychiatric emergency department and when predicting recidivism to a psychiatric emergency department

by

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Institute of Medical Science
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Abstract

The social, economic and health burdens of mental and behavioural disorders are large, and although treatment rates for such disorders are low, the use of emergency departments for mental and behavioural disorders is high. Accordingly, this thesis compares the use of disability, functioning, non-specific psychological distress and diagnosis to characterize mental and behavioural disorders. Furthermore, this thesis examines if predisposing and levels of mental illness factors are correlated to baseline and subsequent emergency department visits. The general population surveys of the 2011, 2012 and 2013 Centre for Addiction and Mental Health (CAMH) Monitors were used as a general population sample of Ontario adults. Data from patients were obtained by time-based sampling from August 2011 to February 2012 in the emergency department of CAMH (a psychiatric hospital that provides services to adults); the CAMH emergency department database was used to track subsequent emergency department visits. Disability and functioning were measured using the World Health Organization Disability Assessment Schedule, and non-specific psychological distress was measured using the General Health Questionnaire.

Data from the CAMH Monitors indicated that although disability, functioning and non-specific psychological distress are correlated (except for people with somatic illnesses), all such measures are needed to accurately describe mental health. Among patients in the psychiatric emergency department, differences in disability and functioning were not significant across diagnoses; however, a substantial heterogeneity in disability and functioning was observed within diagnoses. Furthermore, using data from patients in the psychiatric emergency department, we observed that the number of previous visits, the WHODAS scores, and employment status were predictors of psychiatric emergency department recidivism. Based on the results of this study, it is clear that measures of disability, functioning and non-specific psychological distress may be needed to adequately describe the mental health of the general population. Furthermore, in psychiatric as well as in general hospital emergency departments, data on disability and functioning and on the number of previous visits if collected in addition to diagnosis data for patients with mental and behavioural disorders could lead to more effective triaging of these patients, alignment with the appropriate intensity of resources, and prediction of recidivism.

Acknowledgments

Contributions

The candidate conducted the literature review presented in the Introduction, with guidance from the Program Advisory Committee (Drs. Jürgen Rehm, Paul Kurdyak and Paul Shuper). The candidate, together with the Program Advisory Committee, conceptualized the research aims and hypotheses of this thesis. The candidate, together with Drs. Jürgen Rehm, Paul Kurdyak, Janet Durbin, Brian Rush and Elizabeth Lin, designed the study of people who sought emergency care at the Centre for Addiction and Mental Health in Toronto. The informed consent forms and the survey for the study at the Centre for Addiction and Mental Health were each developed by the candidate. The candidate was responsible for obtaining ethics approval from the Centre for Addiction and Mental Health and the University of Toronto research ethics boards. The candidate wrote the first draft of all chapters of this thesis. Drafts of all chapters presented in this thesis, including the manuscripts found in Chapter 2 ("Latent classes of disability, functioning and non-specific psychological distress in the general population"), Chapter 3 ("A study of the disability and functioning of patients who present at psychiatric hospital emergency services") and Chapter 4 ("Predisposing and level of illness predictors of the risk of recidivism to a psychiatric emergency department"), were presented to the Program Advisory Committee and revised based on the committee's recommendations. Dr. Svetlana (Lana) Popova acted as a peer reviewer for each of the research manuscripts. All manuscripts presented in this thesis have been or will be submitted by the candidate to peer-reviewed academic journals.

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List of Abbreviations

AIC   Akaike information criterion

ASSIST   Alcohol, Smoking and Substance Involvement Screening Test

AUDIT   Alcohol Use Disorders Identification Test

BIC   Bayesian information criterion

CAD   Canadian dollars

CAMH   Centre for Addiction and Mental Health

CIDI   Composite International Diagnostic Interview

DALYs   Disability-Adjusted Life Years

DIS   Diagnostic Interview Schedule

DSM   Diagnostic and Statistical Manual of Mental Disorders

ED   Emergency department

FIM   Functional Independent Measure

GBD   Global Burden of Disease

GHQ   General Health Questionnaire

HALYs   Health-Adjusted Life Years

HD-LF-HNSPD   high disability, low functioning and high non-specific psychological distress

HD-LF-MNSPD   high disability, low functioning and moderate non-specific psychological distress

HRQL   Health-related quality of life

ICF	International Classification of Functioning, Disability and Health
K6	Kessler Psychological Distress Scale (6 item version)
K10	Kessler Psychological Distress Scale (10 item version)
LD-HF-LNSPD	low disability, high functioning and low non-specific psychological distress
LHS	London Handicap Scale
MD-MF-MNSPD	moderate disability, moderate functioning and moderate non-specific psychological distress
NHP	Nottingham Health Profile
OR	Odds Ratio
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
REB	Research Ethics Board
RRR	relative risk ratios
YLD	Years Lived with Disability
YLL	Years of Life Lost
WHO	World Health Organization
WHODAS	World Health Organization Disability Assessment Schedule

Chapter 1
Introduction, literature review and thesis outline

1 Introduction, literature review and thesis outline

Mental and behavioural disorders are prevalent globally [1-3], in Canada [4, 5] and in Ontario [6], and the resulting social [7], economic [4, 8, 9] and health burdens [10-12] caused by these disorders are large. Despite the prevalence of mental and behavioural disorders and the resulting burdens, key knowledge gaps exist in the literature about the disability, functioning and non-specific psychological distress they cause, that if addressed could lead to an improvement in the quality of life of people with these disorders. Specifically, little is known about (i) whether measures of disability, functioning and non-specific psychological distress, when considered separately, are adequate descriptors of the mental health of the general population, (ii) the underlying class structure of the population (when based on disability, functioning and non-specific psychological distress) (i.e. ordinal or nominal), and how many people in Canada have high non-specific psychological distress, high disability and low functioning, and (iii) the correlates of having impaired disability and functioning and non-specific psychological distress in the general population.

There are also key knowledge gaps in the literature concerning people who attend psychiatric emergency departments (EDs). Specifically, (i) among people with mental and behavioural disorders, only one study has examined differences in disability and functioning, using wide diagnostic categories, and, therefore, a study that examines differences in disability and functioning using finer diagnostic categories is warranted, (ii) it is not known whether frequent versus non-frequent users of a psychiatric ED differ in terms of their disability and functioning, and (iii) the distribution of disability and functioning among people who seek treatment at a psychiatric ED has not been compared to the general population.

Finally, there are key knowledge gaps in the literature regarding repeat visits to a psychiatric ED. In particular, although studies have looked at frequent versus non-frequent users of psychiatric EDs, it is not known how predisposing factors and clinical factors are correlated to recidivism to psychiatric EDs and/or to the number of ED visits within the following year among recidivists.

Accordingly, this chapter presents, in multiple sections, an introduction and scholarly in-depth literature review, framing the research questions addressed by this thesis. The first section of this

chapter covers the definition of mental and behavioural disorders, the diagnosis of mental and behavioural disorders, the prevalence of mental and behavioural disorders, and the resulting social, economic and health burdens. The second section of this chapter outlines the measurement of disability and functioning. The third section describes the measurement of non-specific psychological distress. The fourth section covers what is known in terms of the correlates of the use of psychiatric general care and the use of psychiatric emergency services. The fifth section of this chapter outlines the thesis in terms of study design, research aims and hypotheses.

1.1 Literature Review

1.1.1 Mental and behavioural disorders

The two main, accepted definitions of mental and behavioural disorders are found in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) [13] and the International Classification of Diseases revision 10 (ICD-10) [14]; although they provide similar definitions, they approach what constitutes a mental and behavioural disorder from slightly different perspectives. The DSM-5 defines a mental and behavioural disorder as a syndrome that is characterized by a disturbance in the cognition, emotion regulation, or behaviour of an individual, caused by a dysfunction in the psychological, biological, or developmental processes underlying mental functioning [13]. Furthermore, the DSM-5 indicates that mental and behavioural disorders are associated with distress in social, occupational, or other important activities [13]. The ICD-10 defines mental and behavioural disorders as a set of symptoms or behaviours that are clinically recognizable and are, in most cases, associated with distress and interference in function [14].

1.1.1.1 Diagnosis of mental and behavioural disorders

The diagnosis and classification of mental and behavioural disorders is made primarily by using the internationally standardized lists of current mental and behavioural disorders provided by the DSM-5 and the ICD-10 (which will be replaced by the ICD-11 in 2017 [15]), both of which have shared (i) clinical uses, (ii) research uses, (iii) teaching and training uses, (iv) health statistics uses, and (v) public health uses. However, in countries other than Canada, previous versions of the DSM (such as the DSM-IV which uses five "axes" or dimensions to diagnosis mental disorders) and the ICD are used to diagnose mental and behavioural disorders, and in some cases

country-specific tools are used in diagnosis. Diagnoses of mental and behavioural disorders can be determined by a general practitioner's (and other medical doctors') use of the diagnostic criteria outlined in the ICD and the DSM, or a diagnosis can be determined using a survey measure such as the Diagnostic Interview Schedule (DIS) [16] or the Composite International Diagnostic Interview (CIDI) [17] (both of which are based on the ICD classification system).

1.1.1.2   Prevalence of mental and behavioural disorders

Mental and behavioural disorders are prevalent [1, 18], especially in high-income countries, and Canada is no exception [6, 19]. In Canada, estimates of the past 12-months prevalence of a mental and behavioural disorder range from 10.1% (as reported by Pearson and colleagues) [5] to 19.8% (as reported by Smetanin and colleagues) [4]. Figure 1-1 presents prevalence estimates for mental and behavioural disorders as reported by Smetanin and colleagues [4]. These estimates are presented herein, as they were adjusted for populations not included in the survey estimates upon which they were based and they were triangulated with other incidence data.
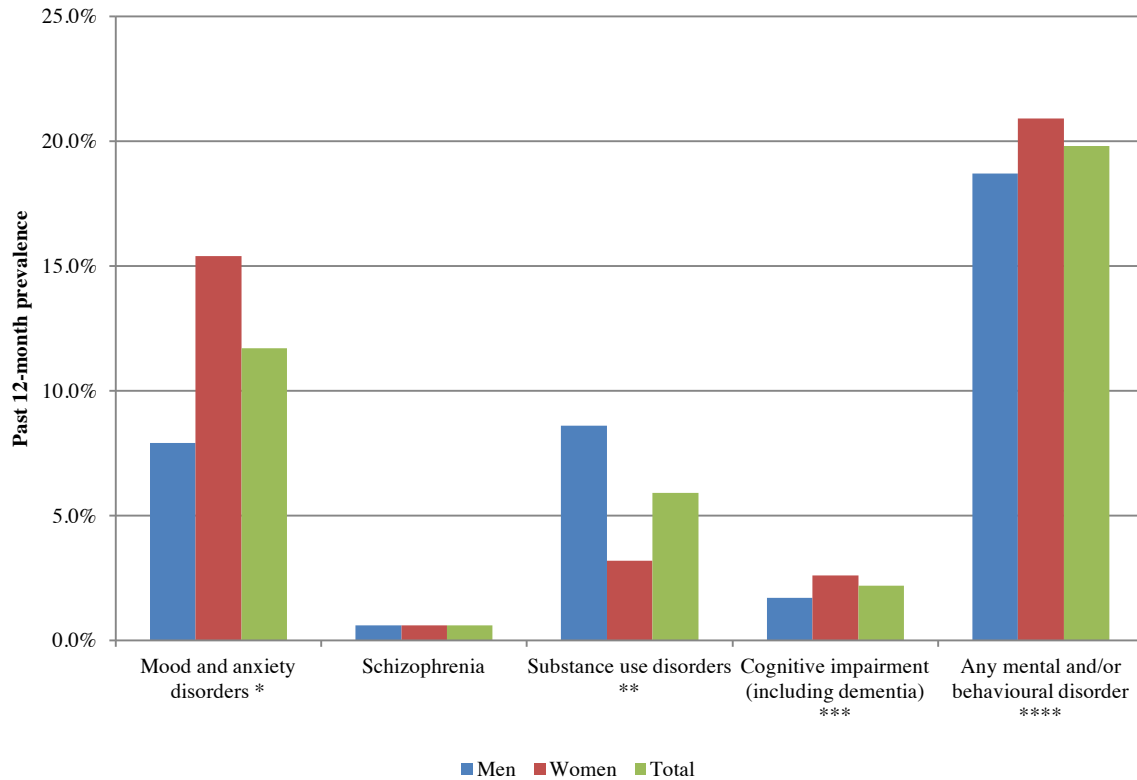
* Mood and anxiety disorders: major depressive disorder, bipolar disorder, dysthymia, generalized anxiety disorder, panic disorder, simple phobia, agoraphobia and social phobia
** Substance use disorders: alcohol abuse and/or dependence, and drug abuse and/or dependence
***Cognitive impairment (including dementia): cognitive impairment, vascular dementia, Alzheimer's disease, organic psychotic conditions
**** Includes disorders of childhood and adolescence (conduct disorder, attention deficit hyperactivity disorder and oppositional defiant disorder)

Figure 1-1. Past 12-months prevalence of various mental and behavioural disorders in 2011 in Canada among people of all ages as reported by [4].

In 2011, in Canada, the most prevalent (as measured by past year prevalence) diagnostic category of mental and behavioural disorders was mood and anxiety disorders (11.7%), followed by substance use disorders (5.9%). These findings are consistent with the findings of other studies that anxiety disorders (ICD 10 codes: F40-F42) constitute the largest category of mental and behavioural disorders, while major depressive disorders (F32-F33) constitute the second largest category [2, 20].

In 2011, the past year prevalence of mental and/or behavioural disorders was greater among women (20.9%) than among men (18.7%). In particular, women had a higher past year prevalence of mood and anxiety disorders (15.4% among women compared to 7.9% among men)

and cognitive impairment (including dementia) (2.6% among women compared to 1.7% among men). In contrast, men had a higher past year prevalence of substance abuse (3.2% among women compared to 8.6% among men). Lastly, the past year prevalence of schizophrenia was approximately equal among men and women (0.6% among women and 0.6% among men).

The prevalence of mental and behavioural disorders is correlated with age, with the past year prevalence of such disorders by age having a bi-modal distribution [4]. The first local maximum in the past year prevalence of any mental and/or behavioural disorder occurs at ages 13 to 29, driven by the prevalence of mood, anxiety and substance use disorders, while the second local maximum occurs at 90 years of age and older, driven by the prevalence of cognitive impairment disorders.

The prevalence of having a mental and/or behavioural disorder is projected to increase in Canada from 19.8% to 20.5% from 2011 to 2041 (as reported by Smetanin and colleagues [4]). This increase in prevalence is hypothesized to be the result of an increase in the average age of the population, and, thus, an increase in cognitive impairment disorders. It should be noted that although the prevalence of cognitive impairment disorders is expected to increase, there is no expected decrease in the prevalence of other mental and/or behavioural disorders in Canada, and, thus, the prevalence of these disorders in Canada is expected to remain high.[1]

The estimates of the prevalence of mental and behavioural disorders should be interpreted with caution, as they are based on a survey of the general population and not on clinical populations. In particular, many of the cases measured in the survey are community cases, with few cases representing people in treatment (except for schizophrenia, which has a higher treatment coverage [21]). This is an important consideration when measuring disability and functioning, as community cases have considerably less severe disorders than do cases in treatment [22].

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[1] It should be noted that for the purposes of this thesis cognitive impairment disorders are of little importance as they are typically due to diseases classified in chapter VI (diseases of the nervous system) of the ICD-10 rather than in chapter V (mental and behavioural disorders). Furthermore, as cognitive impairment disorders typically do not involve relapse and remittance, there is a lower likelihood that individuals with these disorders will use a psychiatric ED when compared to other disorders (see chapter 2).

The prevalence estimates of mental and behavioural disorders are also limited based on various study design factors. For instance, the prevalence estimates by Pearson and colleagues only included data on the selected mental and behavioural disorders of major depressive episode, bipolar disorder, generalized anxiety disorder, and abuse of or dependence on alcohol, cannabis or other drugs [5]. The estimates are also affected by the survey methods used to measure the prevalence of mental and behavioural disorders, and are subject to the questions asked in the survey (i.e. the prevalence of mental and behavioural disorders are affected by (i) the ability of the questions to measure a construct, (ii) the participants' comprehension of the questions asked, (iii) poor, inaccurate recall of the information, and (iv) deliberate misreporting of information [23]). Furthermore, people who are eligible for participation but who do not participate in the survey [24], as well as the populations excluded in the survey design (in some cases, correction methods are used to adjust the prevalence estimates for the excluded populations), are more likely to have mental and behavioural disorders [23, 24].

The methods used for diagnosing mental and behavioural disorders can also lead to differences in the estimated prevalence. In particular, previous studies have shown that the prevalence of mental and behavioural disorders is different when assessed by a general practitioner compared to when it is measured using a survey instrument such as the CIDI [17, 25]. In particular, Rehm and colleagues found that the past year prevalence of alcohol dependence was estimated to be higher for people at a younger age when measured with the CIDI compared to when assessed by a general practitioner's diagnosis, while at older ages the past year prevalence of alcohol dependence was higher when diagnosed by a general practitioner compared to the CIDI measurement [25].

The probability of being diagnosed accurately with a mental and/or behavioural disorder may not be the same for the entire population; for instance, at low levels of disability and high levels of functioning, people may receive a false positive or false negative diagnosis (the probability of which is correlated to various socio-demographic factors [26, 27]).

1.1.1.3   The burden of mental and behavioural disorders internationally and in Canada

Mental and behavioural disorders present major problems for Canada and other countries in terms of the social, economic and health burdens caused by these diseases [9, 19].

1.1.1.3.1 Economic and social burdens of mental and behavioural disorders in Canada

The main areas of economic and social burdens associated with mental and behavioural disorders are (a) health care, (b) crime and public disorder, (c) prevention and research, (d) costs and harms to the person with a mental and/or behavioural disorder, their family, other people within their social network, and strangers, and (e) workplace and productivity losses [9, 28, 29]. Furthermore, costs within these areas can be classified as either (a) direct costs, which are related to an identifiable direct source or asset (e.g. the health care costs of treating a disease), or (b) indirect costs, which are not related to an identifiable direct source or asset (e.g. productivity loss) [30].

For 2001, Stephens and Joubert estimated that the total costs of mental and behavioural disorders in Canada was 14.4 billion Canadian dollars (CAD) [9], while Jacobs and colleagues estimated that in 2007/2008 the total annual public expenditure (not including the area of crime and public disorder) for mental and behavioural disorders in Canada was 14.3 billion CAD (this estimate does not include the indirect costs of unpaid resources) [28]. Of the costs assessed by Stephens and Joubert, 8.1 billion CAD originated from lost productivity costs, and 6.3 billion CAD originated from treatment costs. Jacobs and colleagues estimated that treatment costs (inpatient costs, physician costs, and pharmaceuticals) were 7.0 billion CAD, community and social services costs amounted to 3.6 billion CAD, and income support costs (workers compensation etc.) amounted to 3.7 billion.

The results from these studies are corroborated by studies in other countries that have observed high economic and social burdens from mental and behavioural disorders [30, 31]. It is important to note, however, that the results of the study of Stephens and Joubert should be interpreted with caution; their study used depression and distress as indicators of a mental disorder for estimating the economic burden of short-term disability and the costs of non-medically insured public health professionals, and, thus, did not estimate the costs associated with all mental and behavioural disorders. Furthermore, additional studies have examined the costs associated with specific mental and behavioural disorders, such as substance abuse, which was found to be responsible for total costs of $40 billion CAD in 2002 [32]. Therefore, the total economic burden of mental and behavioural disorders, taking into consideration all cost domains, is likely to be much higher than reported by Stephens and Joubert or by Jacobs and colleagues [9, 28].

1.1.1.3.2 Burden of disease caused by mental and behavioural disorders internationally and in Canada

The burden of disease in terms of population health can be measured in Disability-Adjusted Years of Life (DALYs) lost [33], Quality-Adjusted Life Years lost [34], or Health-Adjusted Life Years (HALYs) lost [35], which combine the number of years of life lost due to premature mortality with a measure of the impact of the disease on (i) disability and reduced functioning, (ii) quality of life, and (iii) suboptimal states of health respectively.

In 2010, the estimated burden of mental and behavioural disorders for Canada was 1.0 million DALYs lost (12.5% of all DALYs lost), and mental and behavioural disorders caused 2.2 thousand deaths (0.8% of all deaths in Canada in 2010) [19]. The majority of the burden caused by mental and behavioural disorders globally and in Canada is due to Years Lived with Disability (YLD) as opposed to Years of Life Lost (YLL). (See Table 1-1 for the burden of mental and behavioural disorders by age and gender for Canada, high-income countries and globally.) Therefore, when measuring the burden of mental and behavioural disorders, and making decisions on allocating health care resources, a measure of disability and functioning in addition to mortality statistics is critical. The 1993 World Development Report [36] from the World Bank also reaches this conclusion, and states that global attention must be focused on the relative burden associated with disease morbidity, rather than only taking into consideration mortality statistics.

Table 1-1. Burden of mental and behavioural disorders in Canada, high-income countries and globally in 2010*

Burden measure	Canada			High-income countries			Global		
	Total	Men	Women	Total	Men	Women	Total	Men	Women
Deaths (in 1000s)	2.2	1.5	0.7	70.0	49.3	20.7	231.9	169.0	63.0
Deaths per 100,000 (age standardized)**	4.7	6.8	2.7	5.3	8.0	2.7	3.5	5.2	1.8
% of all deaths	0.8%	1.1%	0.6%	0.8%	1.1%	0.5%	0.4%	0.6%	0.3%
Years of life lost (YLL) (in 10,000s)	6.4	4.6	1.8	234.2	176.8	57.4	856.4	645.7	210.7
YLL per 100,000 (age standardized)**	160.6	233.6	88.0	209.7	320.6	98.6	126.4	190.8	61.8
% of all YLL	1.6%	2.0%	1.0%	1.7%	2.2%	1.0%	0.5%	0.6%	0.3%
Years lived with disability (YLD) (in 10,000s)	97.6	46.7	50.9	2,996.4	1,411.1	1,585.2	17,534.8	8,455.0	9,079.8
YLD per 100,000 (age standardized)**	2,823	2,741	2,900	2,879	2,769	2,983	2,556	2,440	2,669
% of all YLDs	22.7%	23.4%	22.2%	23.4%	23.6%	23.2%	22.8%	22.7%	22.9%
Disability-adjusted life years (DALYs) lost (in10,000s)	103.9	51.2	52.7	3,230.6	1,587.9	1,642.6	18,391.2	9,100.7	9,290.5
DALYs lost per 100,000 (age standardized)**	2,983.6	2,974.1	2,988.5	3,089.0	3,089.7	3,081.6	2,682.8	2,630.6	2,730.6
% of all DALYs lost	12.5%	11.9%	13.1%	12.1%	11.3%	13.1%	7.4%	6.7%	8.3%

* Data obtained from the 2010 Global Burden of Disease study [19].
** Standardized to the global population in 2010.

Despite there being a difference in the past year prevalence of mental and behavioural disorders by sex, the burden of disease caused by mental and behavioural disorders affects men and women equally in Canada; however, across diagnosis categories, the burden of disease is not equally distributed (see Figures 1-2 and 1-3). In Canada, in 2010, substance use disorders were responsible for 77.9% of all deaths caused by mental and behavioural disorders, while the remaining 22.1% were caused by other mental and behavioural disorders (eating disorders were responsible for the majority of deaths within this category). No deaths were caused by unipolar depressive disorders, bipolar disorders or anxiety disorders.
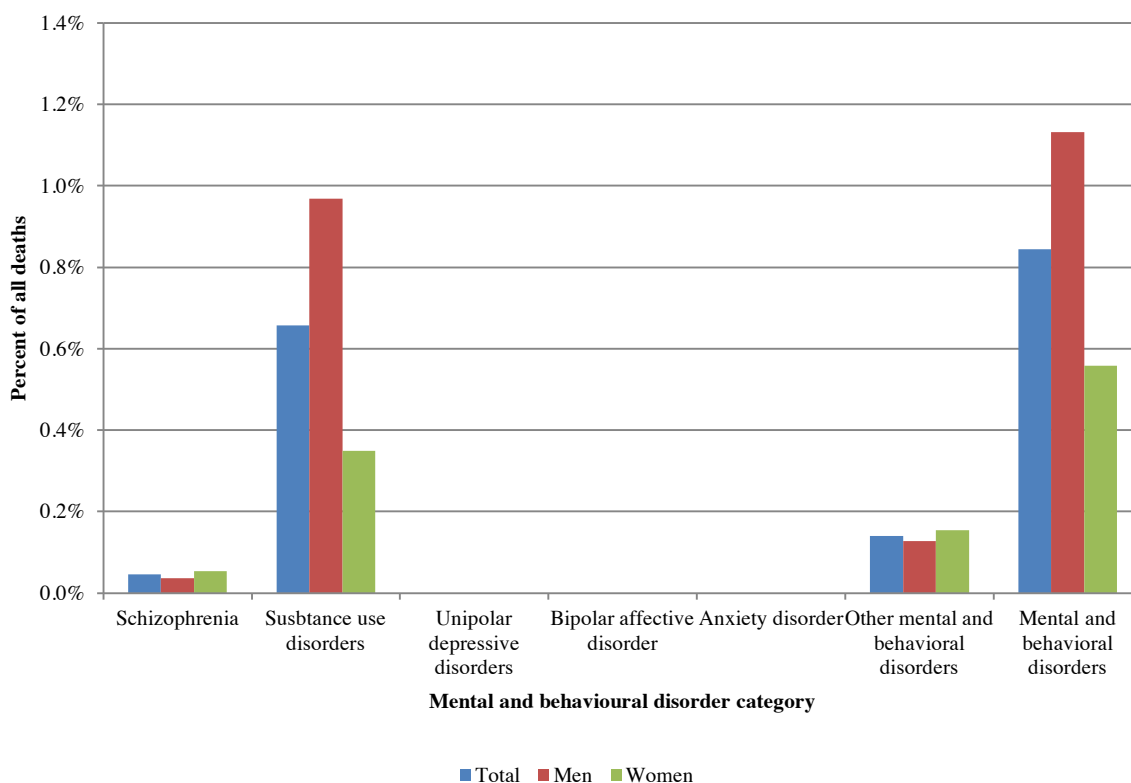
Figure 1-2. Percentage of all deaths in 2010 in Canada caused by mental and behavioural disorders by cause and sex*

* Deaths are based on the number of deaths where the primary cause listed on the death certificate or determined by a verbal autopsy was a mental and/or behavioural disorder

The total burden of disease as measured in DALYs lost also differs by mental and behavioural diagnosis category. Unipolar depressive disorders were responsible for the largest burden of disease in Canada (4.8% of all DALYs lost in Canada in 2010 and 38.1% of all DALYs lost

caused by mental and behavioural disorders), while substance use disorders were responsible for the second largest burden of disease in Canada (3.1% of all DALYs lost in Canada in 2010 and 24.8% of all DALYs lost caused by mental and behavioural disorders). Although anxiety disorders were the most prevalent mental and behavioural disorders in Canada, anxiety disorders were responsible for the third largest burden of disease (1.5% of all DALYs lost in Canada in 2010 and 11.9% of all DALYs lost caused by mental and behavioural disorders).
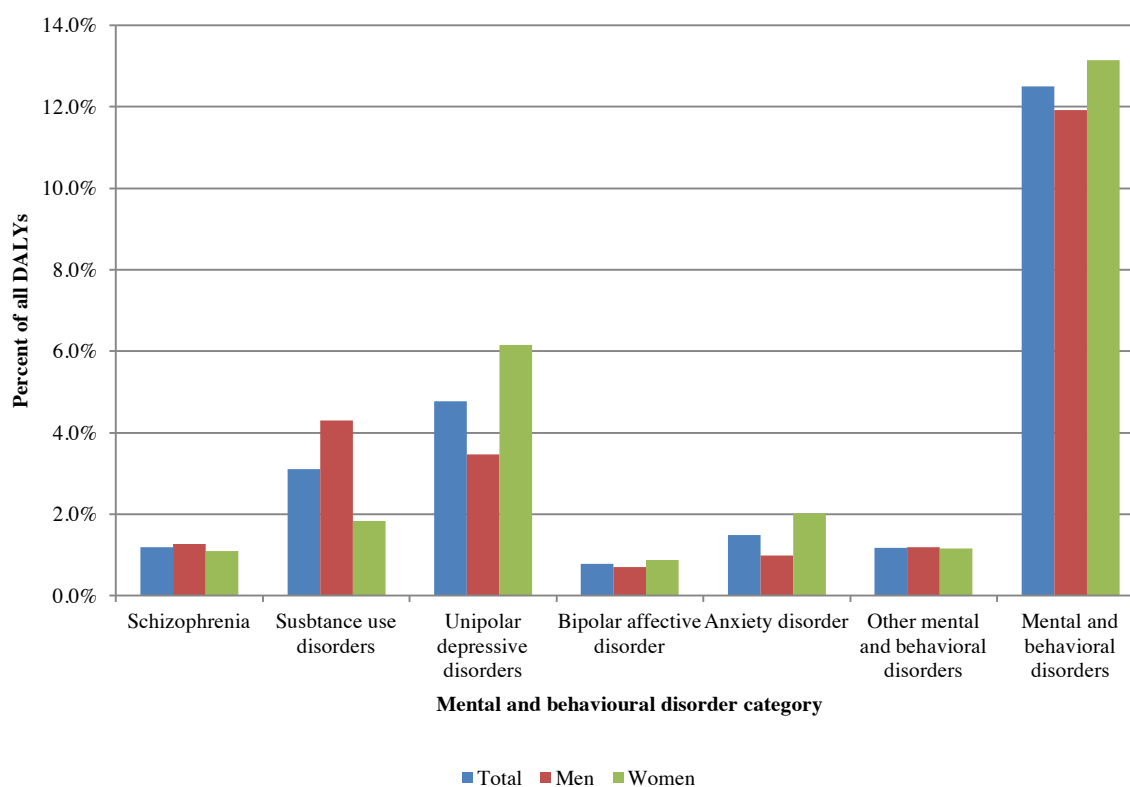
Figure 1-3. Percentage of all DALYs lost in 2010 in Canada caused by mental and behavioural disorders by cause and sex*

* DALYs are based in part on the number of deaths where the primary cause listed on the death certificate or determined by a verbal autopsy was a mental and/or behavioural disorder

1.1.1.3.2.1   Burden of mental and behavioural disorders in Canada by time

Although the burden of mental and behavioural disorders in Canada has remained relatively constant from 1990 (2,653.0 DALYs lost per 100,000 people [age standardized to the 2010 global population]) to 2010 (2,983.6 DALYs lost per 100,000 people [age standardized to the 2010 global population]), the percentage of the total burden due to mental and behavioural

disorders has increased from 1990 (11.0% of all DALYs lost) to 2010 (12.5% of all DALYs lost). This increase in the proportion of all DALYs lost due to mental and behavioural disorders results from a decrease in the burdens caused by communicable, maternal, neonatal and nutritional disorders, injuries, and other non-communicable diseases. Despite the progress made in reducing these other causes of the burden of disease, no progress has been made in reducing the burden of mental and behavioural disorders in Canada.

1.1.1.3.3 Burden of mental and behavioural disorders in the Canadian province of Ontario

Within Canada, the health burden caused by mental and behavioural disorders in the province of Ontario is large [6, 37]. The total percentage of all HALYs lost due to mental and behavioural disorders was not estimated in the Ontario study by Ratnasingham and colleagues; however, in a comparison analysis, Ratnasingham and colleagues found that in terms of HALYs lost, the burden of mental and behavioural disorders was 1.5 times that of cancer and seven times that of infectious diseases. Furthermore, the results of Ratnasingham's and colleagues' study corroborate the 2010 Global Burden of Disease (GBD) study which found that major depression, substance use disorders (alcohol use disorders, cocaine use disorder and prescription opioid misuse) and anxiety disorders (social phobia, panic disorder and agoraphobia) were the leading causes of HALYs lost due to mental and behavioural disorders.

1.1.1.3.3.1 Differences in the burden of mental and behavioural disorders by diagnosis

The differences in the rankings for prevalence and for the burden of disease indicate that, on average, in the general population, both unipolar depression and substance use disorders cause a greater burden of disability per person than do anxiety disorders. The disability weights for mental and behavioural disorders by cause used in the 2010 GBD study are outlined in Figure 1-4. Disability weights, which are the metric used to determine the quality of life of an individual [38], range from 0-1, with 0 representing perfect health and 1 representing a complete loss of health or death [38]. Even though differences in the burden of disability caused per person depend on their mental and/or behavioural disorder, the disability weights from the 2010 GBD study show that for all mental and behavioural disorders there is a wide range of disability weights within categories. However, it should be noted that the disability weights that were used

in estimating the YLD were dependent on the public's perceived quality of life of an individual with the symptoms of a specified mental and/or behavioural disorder measured using the 36-item Short Form (SF) health survey [38, 39], and, thus, may be biased due to stigmas attached to different diseases [40].
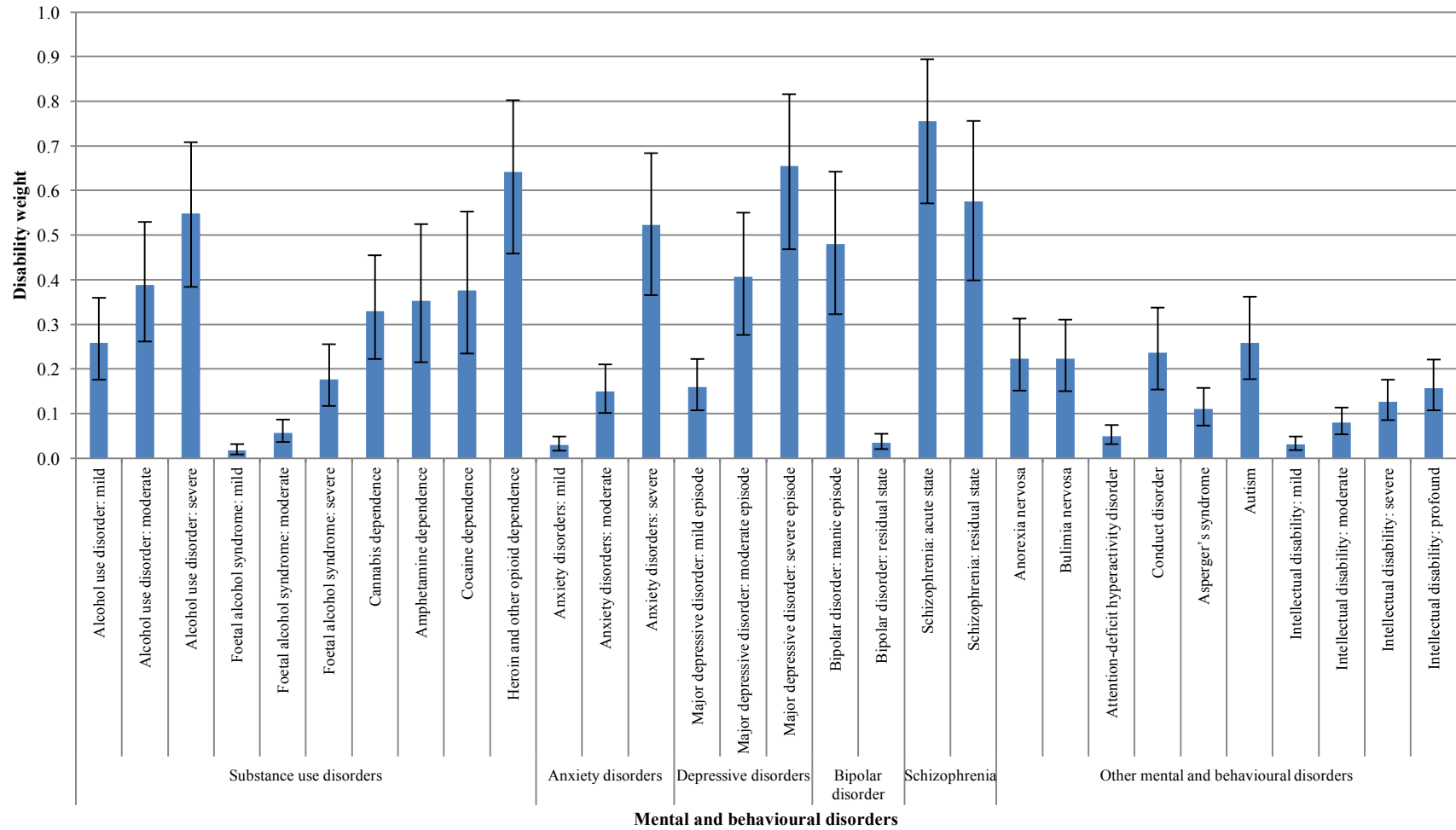
Figure 1-4. Disability weights used in the 2010 Global Burden of Disease study for mental and behavioural disorders by cause (obtained from [38])

1.1.2 Potential problems with the operationalization of mental and behavioural disorders

Despite their findings of the large social, economic and health burdens of mental and behavioural disorders, the current literature is limited due to the instruments used to diagnose these disorders. Specifically, mental and behavioural disorders are defined usually as a list of disorders developed by accretion, where conditions are most often designated as mental and/or behavioural disorders out of practical necessity [18]. Although the list of mental and behavioural disorders as set out in the DSM and ICD diagnosis systems has evolved over time for the purpose of allowing clinicians to align patients with appropriate resources [18] and for research, teaching and insurance purposes [41], the DSM-5 and the ICD-10 provide an overarching definition of mental and behavioural disorders.

These systems for diagnosis were developed and have evolved over time to inform prognosis and to align patients with treatments specific to their diagnosis [13, 18]. For example, patients with psychotic disorders are prescribed an antipsychotic and patients with mood/anxiety disorders are prescribed an anxiolytic and/or an antidepressant. In addition to diagnosis, disability and functioning should be important measures for determining the appropriate intensity of diagnostically-specific treatment(s), and, thus, it is imperative to assess if there are differences in disability (defined as "what a person cannot do when ill" [42]) and in functioning (defined as objective performance in a given life domain [42]) (both measured by the World Health Organization Disability Assessment Schedule (WHODAS) version 2.0 (WHODAS 2.0)) among and between diagnostic categories which are more specific than the categories of alcohol use problems, drug problems and mental health problems used by Üstün and colleagues [42, 43]. The level of disability and functioning can be inferred from the criteria outlined in the DSM-5, but the determination of disability within this framework is not well standardized [13]. Furthermore, the impact of the symptoms by diagnostic category on disability and functioning suggests that, on average, diseases such as schizophrenia have a higher impact on disability and functioning than does bipolar disorder, which, in turn, has a higher impact on disability and functioning than does major depressive disorder [13].

Given the shortcomings in the current diagnostic systems, there is a hypothesis that, under these systems, mental and behavioural disorders are based on groupings of symptoms and are not

independent psychiatric illnesses with clear boundaries waiting to be explained [44-46], but rather are heuristic constructs [47-49]. The usefulness of these groupings has been questioned, and some speculate that there may be no right or wrong way to group symptoms [50].

Despite the difficulties in defining mental and behavioural disorders as a category, it is important for population health surveillance and health planning purposes to be able to subset these disorders into various diagnostic categories, measure their prevalence, measure the burden of disease they cause, and measure treatment rates. Furthermore, definitions of mental and behavioural disorders as a whole category can be amorphous, protean and heterogeneous, and, therefore, mental and behavioural disorders are loosely defined [18]; however, taking into consideration the various definitions of mental and behavioural disorders, there is a common theme of acts, behaviours, feelings and/or thoughts that result in noticeable distress, social impairment and/or occupational impairment [18]. Thus, information on the effects of mental and behavioural disorders, specifically on levels of disability, functioning and non-specific psychological distress, in addition to diagnosis may provide more accurate information on mental health than does diagnosis alone.

1.1.2.1 Specificity and sensitivity of diagnostic tools for detecting mental and behavioural disorders

In addition to potential limitations in the categorization of mental and behavioural disorders, the diagnostic and screening tools may be limited, as they do not have perfect sensitivity and specificity. Therefore, in addition to people being correctly identified as either having or not having a mental and/or behavioural disorder, some people will be identified as having a mental and/or behavioural disorder when they actually do not (false positive), and some people will be identified as not having a mental and/or behavioural disorder when they actually do (false negative) [18, 51].

As a result, there may be an over-diagnosis of disorders such as anxiety and depression, leading to the over-prescription of drugs used to treat these disorders. In addition to unnecessary treatment costs, people who do not actually have a diagnosable mental and/or behavioural disorder, but who are among the worried well, will not benefit, and will most likely experience detrimental consequences from pharmacological or behavioural therapies [18]. Furthermore,

individuals who are falsely diagnosed with a mental and/or behavioural disorder may experience stigma, and may incur unnecessary expenses related to their diagnosis [18].

In contrast to people who are falsely classified as having a mental and/or behavioural disorder, there are also people with mental and/or behavioural disorders who are not receiving pharmacological or behavioural therapies who are in need of such therapies. These individuals are not diagnosed with a mental and/or behavioural disorder through screening by a family doctor, physician or psychiatrist using an instrument of general physiological distress and/or they do not fulfill the diagnostic criteria of the ICD or DSM.

Therefore, given the specificity and sensitivity of current diagnostic tools, there may be a need to have additional tools in order to understand the morbidity experienced by a person with a mental and/or behavioural disorder and to assist health care professionals in aligning patients with the appropriate intensity of health care resources.

1.1.3 Measuring the effects of mental and behavioural disorders

1.1.3.1 Disability and functioning and their relationship to mental and behavioural disorders

Given, (i) the social, economic and health burdens that stem from psychiatric disorders in Ontario, Canada, high-income countries, and globally, and that treatment coverage, clinician competence and patient compliance are key to reducing the burden of disease for mental and behavioural disorders [52], and (ii) the previously highlighted problems with the diagnosis of mental and behavioural disorders, and the observation that the burden of these disorders stems primarily from disability and functioning, there is a need to accurately measure disability and functioning among people who have mental and behavioural disorders and to ensure high coverage rates using effective treatments for these disorders.

Although diagnosis is a useful measure, it does not indicate whether a person can participate in activities that fulfil their roles at home, school, work, or in other social areas. Therefore, although disability and functioning are taken into account by clinical practitioners, social service workers and other health care professionals, they are not taken into account using a standardized measure of disability and functioning, and are often based, instead, on expert opinion [42].

1.1.3.1.1 The measurement of disability and functioning

Various internationally standardized measures are used to ascertain aspects of disability, functioning, quality of life and general health. The most commonly used measure of these dimensions of disability and functioning is the WHODAS [42].

In addition to the WHODAS, the World Health Organization Quality of Life (WHOQOL) [53], the London Handicap Scale (LHS) [54], the SF Health Survey [55], the Nottingham Health Profile (NHP) [56], the Barthel Index [57] and the Functional Independent Measure (FIM) [58, 59] measure disability and functioning; however, these additional measures are limited in their measurement of disability and functioning in both the general population and in people with mental and behavioural disorders. First, the WHODAS is the only measure that fully maps to the International Classification of Functioning, Disability and Health (ICF). Second, the WHOQOL measures subjective well-being (i.e. the level of satisfaction of one's performance in a life domain), while the WHODAS 2.0 measures functioning (i.e. the objective performance in a life domain) [42]. Third, the LHS, FIM and the Barthel Index are designed to be used for clinical populations only, and, thus, are not validated to measure disability and functioning in the general population [42]. Fourth, the SF Health Survey measures health-related quality of life (HRQL) (which can be defined as the overall quality of life shown to affect health, including income, freedom, and quality of the environment [60]), while the WHODAS 2.0 measures disability and functioning. Although disability and HRQL are correlated, the measure of the SF Health Survey does not include a disability domain (although it includes the domains of physical and social functioning). Fifth, the NHP measures a layman's perception of health rather than a clinical perception, and, thus, does not directly measure disability and functioning [56].

1.1.3.1.2 Using the WHODAS to measure disability and functioning

The WHODAS 2.0 is a general measure of functioning and disability in the following major life domains: (i) cognition, (ii) mobility, (iii) self care, (iv) getting along, (v) life activities, and (vi) participation in society. Furthermore, as mentioned previously, the WHODAS is the only measure of disability and functioning that fully maps to the ICF [61]. The ICF is based on three levels of functioning (body functions and structures, activities and participation), with three parallel levels of disability (impairments, activity limitations, and participation restrictions). Additionally, the WHODAS can clearly distinguish between measurements of symptoms,

disability and subjective appraisal [42]. Furthermore, the WHODAS applies to all diseases, including physical, mental and substance-use disorders, assesses disability in a culturally-sensitive manner across a standard rating scale, has been tested in numerous countries, and has been found to have good concurrent validity measures of health, such as the WHOQOL [53], the LHS [54], the FIM [58], and the SF Health Survey [55].

The WHODAS score ranges from 0 to 100, with 0 representing no disability and perfect functioning and 100 representing an extreme disability and decreased functioning. The two main variations of the WHODAS 2.0 are the full set of 36 questions (estimated completion time of 20 minutes), and a version that uses a reduced set of 12 questions (estimated completion time of 5 to 10 minutes) [42]. The 12-item WHODAS 2.0 explains 81% of the variance of the 36-item WHODAS 2.0 [42]. Other less common variations of the WHODAS 2.0 include the 6- and 24-item versions [62].

1.1.3.1.2.1 Potential utility of measuring disability and functioning in a clinical setting

Dimensional scales are widely used to screen for mental illness in primary care [63] and to assess the severity of symptoms and the effectiveness of treatments for mental and behavioural disorders in clinical studies [64]. However, currently, no measure of disability and functioning is systematically collected in primary, secondary or tertiary care settings, despite its potential function in evaluating the level of illness of an individual, aligning the patient with the appropriate intensity of resources and assessing outcomes of prescribed treatments.

1.1.3.2 Measurement of non-specific psychological distress

Non-specific psychological distress (a measure of the psychopathology of mental and behavioural disorders in the general population using measures of non-specific symptoms of these disorders) [65] is one of the main indicators of mental and behavioural disorders, and scales that measure non-specific psychological distress are used as first stage screeners to identify respondents with broadly defined emotional problems for a more in-depth clinical assessment [66]. Various measures of non-specific psychological distress exist for clinical and/or general population use.

The two main items used to measure non-specific psychological distress are the 12-item General Health Questionnaire (GHQ-12) [67], and the Kessler Psychological Distress Scale (K6 and K10) [68]. Each of the 12 items in the GHQ-12 is measured on a 4-point scale (answering 0 to 3), with the summation of the scores ranging from 0 (no non-specific psychological distress) to 36 (extreme non-specific psychological distress). The K6 and K10 measure non-specific psychological distress using 6 and 10 questions respectively [68], with each question being scaled from 0 to 4 and then summed to provide a total score of 0 to 24 and 0 to 40 respectively. Each question of the K6 and the K10 asks about various symptoms in the past 30 days. The K6 and K10 were constructed using modern psychometric methods to maximize precision in the clinical range of the population distribution, using measures selected from 18 different scales of non-specific psychological distress which had a total of 612 questions [68].

The K6, K10 and GHQ-12 perform differently in terms of distinguishing between cases of psychiatric illness. Specifically, although the K6 and K10 have fewer items than the GHQ-12, both the K6 and K10 significantly outperform the GHQ-12 in discriminating ICD-10 cases of anxiety and mood disorders when measured with the CIDI [69].

1.1.3.3   Studying a population using measures of disability, functioning and non-specific psychological distress

Previous studies have examined the correlates of disability and functioning in the general population and in clinical populations [62, 70, 71], and other previous studies have examined the correlates of non-specific psychological distress in the general population and in clinical populations [65, 72, 73]. However, no study has examined the use of disability, functioning and non-specific psychological distress to characterize a population, and no study has looked at the correlates of disability, functioning and non-specific psychological distress combined.

Although the latent measures of disability, functioning and non-specific psychological distress are correlated, they are unique concepts. Theoretically, a person with high disability and low functioning may have low to mild non-specific psychological distress if the disease(s) and/or condition(s) that are causing the disability and functioning are mental, behavioural or neurological diseases [42]. Furthermore, people who have somatic illnesses may experience moderate to high disability, moderate to low functioning and moderate non-specific psychological distress [42], while the general population experiences low disability, high

functioning and low non-specific psychological distress [42, 68, 74]. (See Figure 1-5 for the hypothesized distribution of disability, functioning and non-specific psychological distress in the general population by mental and behavioural disorder subgroup.) Therefore, given the screening potential of non-specific psychological distress to detect cases of mental and behavioural disorders through the use of the K6, K10 and GHQ-12, and the ability to measure the effects of diseases on disability and functioning through the use of the WHODAS, an analysis of the general population that combines these measures would provide a more complex and accurate picture of mental health within a population.
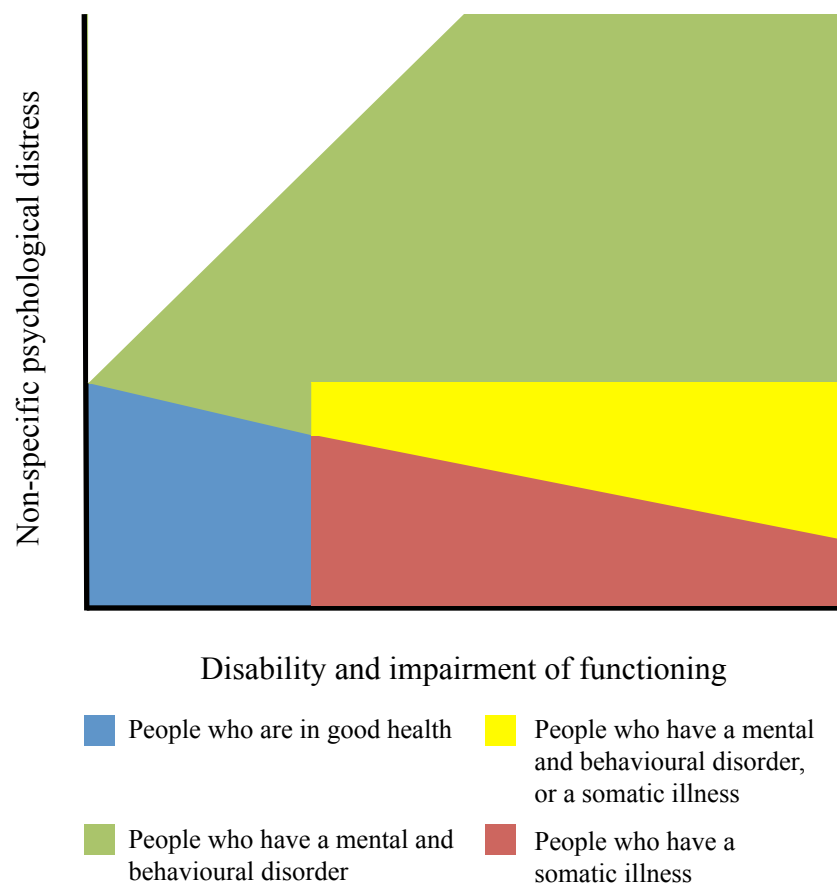
Figure 1-5. Hypothesized distribution of disability, functioning and non-specific psychological distress in the general population

The combination of the latent measures of disability, functioning and non-specific psychological distress can be performed through a principal components analysis, a factor analysis or a latent class analysis. Both the principal components analysis and the factor analysis create a unified measure of mental and behavioural health and its impact on disability and functioning (although

they use different methodological approaches), while the latent class analysis detects latent subgroups that are different in terms of disability, functioning and non-specific psychological distress. The combination of measures of disability, functioning and non-specific psychological distress allows for an analysis of the correlates of mental health in a population; however, if there is a complex structure of latent classes, such as classes of people who are well, have a somatic illness, or have a mental and behavioural disorder, then a latent class analysis allows the separation of these subgroups, while a principal components analysis or a factor analysis does not (as these latter two methods produce a one-dimensional summary score). Therefore, given the complex nature of the relationship between disability, functioning and non-specific psychological distress in the general population, a latent class analysis more accurately describes the distribution of these variables in the general population. Furthermore, latent class analysis allows the investigation of the nature of the underlying class structure in order to evaluate if a summary score based on disability, functioning and non-specific psychological distress will suffice for describing the health of a general population.

As indicated, latent class analysis detects the underlying structure of a population based on set measurements by forming a number of discrete classes with similar levels of disability, functioning and non-specific psychological distress. Specifically, latent class analysis does not make assumptions concerning the nature of latent class categorization (such as nominal, or ordinal (discrete or interval)) and allows the investigation of configuration and dimensional class structures. In the case of an ordinal model being the best description of the underlying classes, and if the classes reflect an increasing severity of disability, functioning and non-specific psychological distress, the probability of reporting higher disability, lower functioning and higher non-specific psychological distress increases linearly when comparing ordered classes [75]. Thus, a complex classification scheme based on disability, functioning and non-specific psychological distress, with ample room for heterogeneity among the population, has motivated the application of statistical methods to examine empirically the underlying structure of mental health based on the levels of disability, functioning and non-specific psychological distress in the population. Specifically, to test if the relationship between variables used in the latent class analysis has a nominal or ordinal classification, one can use the measurement of Cronbach's alpha [76].

1.1.3.4 Correlates of disability, functioning, non-specific psychological distress, and mental and behavioural disorders

As most of the morbidity from mental and behavioural disorders is in the form of disability, functioning and non-specific psychological distress, there is a need to understand the correlates of disability, functioning and non-specific psychological distress in both general and clinical populations, so as to make sure that population inequities in mental health can be addressed. Previous studies have examined the correlates of disability and functioning in the general population and in clinical populations [62, 70, 71], and research has also examined the correlates of non-specific psychological distress in the general population and in clinical populations [65, 72, 73]. However, although studies have combined measures of well-being and non-specific psychological distress [77], no study has combined disability and functioning with non-specific psychological distress to form a combined measure, and no study has examined the use of this combined measure of disability, functioning and non-specific psychological distress to characterize a population, therefore limiting the findings of these prior analyses.

To account for this knowledge gap, a latent class analysis by disability, functioning and non-specific psychological distress facilitates the determination of whether socio-demographic variables, substance use and abuse and traumatic brain injury are correlated to disability, functioning and non-specific psychological distress class memberships in the general population, and could be used to assess the factors correlated with a combined measure of disability, functioning and non-specific psychological distress.

1.1.3.4.1 Gender and mental and behavioural disorders

Previous research has found that women have a higher prevalence of mental and behavioural disorders than do men in Canada and internationally, particularly with respect to depression and anxiety disorders where the prevalence among women is double that of men [3, 4, 78]. This higher prevalence of depression and anxiety disorders among women is caused by interconnected and co-occurring gender risk factors, namely: (i) gender roles, (ii) gender-associated stressors, and (iii) gender-based negative life experiences [79]; however, biological differences in the reaction of the endocrine system to stress also increase the risk of mental and behavioural disorders, specifically depression among women [80]. In agreement with these findings, a study by Pratt and colleagues observed that the prevalence of high non-specific psychological distress

is higher among women, even after stratification of the data by age [81]. Although men have a lower overall prevalence of mental and behavioural disorders, they do have a higher prevalence of substance use disorders [4], which is hypothesized to be due to drug use initiation and abuse [82].

In addition to women having a higher prevalence of mental and behavioural disorders than do men, women are more likely to be diagnosed with an anxiety disorder and/or a major depressive disorder by a general physician, and to be prescribed and potentially abuse anxiolytic and antidepressant medications, even when the severity of symptoms is taken into account, indicating a diagnosis and treatment bias by gender [83-86].

1.1.3.4.2   Age and mental and behavioural disorders

The onset of mental and behavioural disorders has been observed to differ by age [3, 87]. Indeed, a study from the United States found that the median age of onset for both anxiety disorders and for impulse-control disorders was 11 years of age [87, 88], the median age of onset for substance use disorders was 20 years of age, and the median age of onset for mood disorders was 30 years of age [87, 88]. In addition to an age of onset effect, a cohort effect for mental and behavioural disorders has also been observed, with people 18 to 29 years of age having a low lifetime prevalence of mental and behavioural disorders, people 30 to 44 years of age having the highest lifetime prevalence of mental and behavioural disorders, and an observed decline in the lifetime prevalence of mental and behavioural disorders from age 45 upwards [87, 88]. The lifetime prevalence of mental and behavioural disorders is the lowest in older age groups (i.e. people 60 years of age and older) [87, 88]. The observed differences in the prevalence of mental and behavioural disorders among younger and older age groups stems primarily from an increase in the prevalence of drug abuse and drug dependence, post-traumatic stress disorder and bipolar disorders in the younger age groups [87, 88]. Taking into account cohort effects and the age of onset, duration and relapse of mental and behavioural disorders, as previously mentioned, the past year prevalence of mental and behavioural disorders in Canada has a bi-modal distribution [4]; the first local maximum in the past year prevalence of any mental and/or behavioural disorder occurs at ages 13 to 29, driven by mood, anxiety and substance use disorders, and the second local maximum occurs at 90 years of age and older, driven by the prevalence of cognitive impairment disorders. However, in contrast to these observations, Pratt and colleagues found that

the highest prevalence of severe non-specific psychological distress in the United States was among people 45 to 64 years of age [81].

Observations concerning the prevalence of mental and behavioural disorders by age may depend on the instrument(s) used to diagnose the disorders. For example, estimates of the prevalence of mental and behavioural disorders which are based on survey data have limitations [24]. As mentioned above, previous studies have shown that the prevalence of mental and behavioural disorders is different when assessed by a general practitioner compared to when it is measured using a survey instrument, such as the CIDI [17, 25]. For example, Rehm and colleagues found that the prevalence of alcohol dependence was estimated to be higher for people at a younger age when measured with the CIDI compared to when assessed by a general practitioner's diagnosis, while at older ages, the past year prevalence of alcohol dependence was higher when diagnosed by a general practitioner compared to the CIDI measurement [25].

1.1.3.4.3   The effect of marital status on mental and behavioural disorders

People who have never married, or who are divorced, separated, or widowed have been observed to have a higher prevalence of mental and behavioural disorders compared to people who are married [89-91]. This difference in mental health by marital status is hypothesized to be due to differences in gender roles by marital status [89], the emotional benefits of marriage [89], and the effects of the transition from marriage to divorce [92]; men and women are hypothesized to benefit equally from marriage [91, 93]. However, the relationship between the prevalence of mental and behavioural disorders and marital status may be due, in part, to the co-occurring mental and behavioural disorder risk factors of age, race, education, household income, and parental status [91], and also may be due to reverse causality, whereby people who transition to divorce are at a higher risk for a mental and behavioural disorder [91]. In agreement with these observations, Pratt and colleagues observed that people who have never been married, or who are divorced, separated or widowed have a higher prevalence of severe non-specific psychological distress when compared to people who are currently married [81].

1.1.3.4.4   The effect of education, employment and income on mental and behavioural disorders

The correlation between socio-economic status and mental illness has long been known [94, 95], with education, employment and income being strongly correlated with the prevalence of mental

and behavioural disorders [3, 96]. Furthermore, low socio-economic status (in terms of education, employment and income) has also been observed to be correlated with high non-specific psychological distress compared to people with higher socio-economic status [81].

Low levels of education have been observed to be a consistent risk factor for mental and behavioural disorders [96], with a dose-response like relationship being observed between an increase in the level of education and a decreased probability of a mental and/or behavioural disorder [97]. Reverse causality, whereby the presence of mental and/or behavioural disorders affects a person's level of education, is unlikely to play a role as the age of onset for most mental and behavioural disorders occurs after childhood [98]; however, early onset mental and behavioural disorders have been shown to truncate educational attainment [88]. The social consequences for a person with a low level of education and their impact on mental and behavioural disorders are hypothesized to be the result of reduced opportunities to access resources to improve the person's situation and an increased probability that the person will live in poverty [99, 100].

The relationship between employment status and mental health has long been known. Research studies in the United States during the 1930s' depression found that unemployment was correlated with dysfunctionality and apathy [101, 102]. The relationship between employment status and mental health is complex, and the existence of any such relationship has been debated [103]. Additionally, employment status is correlated to other co-occurring risk factors such as gender, education and income [104, 105]; however the beneficial effects of employment on mental health have been observed when controlling for potential confounding factors [104]. The existence of a relationship between employment status and mental health is now accepted, with the state of a person's mental health being likely to have an impact on their level of employment [106]. The effects of employment on mental health are hypothesized to be the result of employment leading to improved mental health by providing greater opportunities for establishing social networks and having greater satisfaction with one's life roles [104, 107]. In contrast, people who are unemployed have a lower level of psychological well-being when compared to people who are employed, even when the data are stratified by age and sex [108]. Furthermore, the prevalence of mental and behavioural disorders among people who are unemployed is higher when compared to people with other occupational statuses [78, 109].

Once a person's basic needs are met, there is an observed relationship between mental health and income [110, 111], with lower levels of income and poverty being risk factors for mental and behavioural disorders [112]. The pathway for low-income increasing the risk of developing a mental and/or behavioural disorder is hypothesized to act through social causation, while the reverse causation pathway is hypothesized to act through social selection [112]. The social causation pathway hypothesizes that low-income leads to adversity, stress, and reduced capacity to cope, thereby leading to an increased risk of the development of mental illness [112, 113]. The social selection pathway hypothesizes that individuals who are predisposed to developing a mental and/or behavioural disorder have a predisposition to having a low socio-economic status [112]. Both of these pathways have an effect on mental and behavioural disorders; the social causation pathway plays a greater role in the association between income and depression, substance use, and antisocial personality disorder [112], while the social selection pathway plays a greater role in the association between income and schizophrenia [114].

1.1.3.4.4.1   The effect of other socio-demographic and genetic factors on mental and behavioural disorders

In addition to age, gender and marital status, there are other predisposing factors that are correlated with the prevalence of mental and behavioural disorders, including race, household composition, living situation (i.e. if a person is homeless or not), family history of mental and behavioural disorders, history of a traumatic event [78, 115-117], where a person lives (i.e. urban or rural) and other community level factors [78, 115].

1.1.3.4.5   The effect of substance use, substance abuse and traumatic brain injury on mental and behavioural disorders

The effects of tobacco use, alcohol use, cannabis use, non-medical prescription opioid use, cocaine use and traumatic brain injury on mental health, disability and functioning have been well documented. In addition to an increased risk of mental and behavioural disorders, tobacco use [118, 119], alcohol use [42, 120], cannabis use [120, 121], non-medical prescription opioid use, cocaine use [120, 121] and traumatic brain injury [122, 123] have been linked with increased disability, decreased functioning and increased non-specific psychological distress. Furthermore, substance use and traumatic brain injury also differ by socio-demographic variables [121, 124], and, thus, it is important to control for these variables when analyzing socio-

demographic differences by disability, functioning and non-specific psychological distress since substance use and traumatic brain injury may act as confounders [51].

1.1.3.4.5.1   The effect of tobacco use on mental and behavioural disorders

Tobacco smoking has been linked to an increased risk of mental and behavioural disorders [118, 119], with people with a mental and/or behavioural disorder in the United States representing 22% of the total population, while smoking approximately 44% of all cigarettes sold. [125]. Thus, people with a mental and/or behavioural disorder are more likely to smoke when compared to the general population and more likely to be addicted to nicotine [125]. Furthermore, people with a mental and/or behavioural disorder also find it more difficult to quit smoking when compared to the general population [126]. When comparing categories of mental and behavioural disorders, the prevalence of smoking was observed to be the highest among people with bipolar disorder (68.8% of people with a bipolar disorder are current smokers), the second highest for people with a non-affective psychotic disorder (49.4% of people with a non-affective psychotic disorder are current smokers), and the third highest for people with an anxiety disorder (46.0% of people with anxiety disorders are current smokers) [127]; however, within the category of non-affective psychotic disorders, smoking prevalence varies considerably, with the prevalence of people with schizophrenia having a tobacco use prevalence of 70%–85% [128]. For purposes of comparison, the point prevalence of smoking in the United States was observed to be 22.5% for people without a mental and/or behavioural disorder [127].

Despite a strong correlation, the relationship between tobacco use and mental health is complex. First, the prolonged use of tobacco products can cause tobacco use disorder and tobacco withdrawal [13, 129]. Conversely, the use of tobacco products has been shown to alleviate some of the symptoms of attention-deficit hyperactivity disorder, and may reduce the symptoms of anxiety and depression [130]. Furthermore, the use of tobacco products has been shown to alleviate some of the symptoms of schizophrenia [131] and reduce the intensity of the side effects of antipsychotic medications [132]. Therefore, people with mental and behavioural disorders may use tobacco as a method of self-treatment [127]; however, the negative effects of tobacco use by people who have a mental and/or behavioural disorder far outweigh the positive effects [133].

1.1.3.4.5.2   The effect of alcohol use on mental and behavioural disorders

The use and abuse of alcohol has been observed to be correlated with an increased prevalence of mental and behavioural disorders [42, 120]. Furthermore, the co-occurrence of alcohol use disorders and other mental and behavioural disorders is high [134, 135]. Specifically the co-occurrence of alcohol dependence (the most severe form of an alcohol use disorder) is highest among people with anxiety disorders (60.7% and 35.8% of men and women respectively with anxiety disorders also had alcohol dependence within their lifetime), and second highest among other drug use disorders (40.6% and 47.1% of men and women respectively with other drug use disorders also had alcohol dependence within their lifetime) [135]. The relationship between alcohol consumption and anxiety is due primarily to the use of alcohol to self-treat the symptoms of anxiety [136].

The consumption of alcohol is a causal risk factor for the development of multiple mental and behavioural disorders. First, the excessive and prolonged use of alcohol can lead to the development of an alcohol use disorder, specifically, alcohol abuse or alcohol dependence, and can lead to alcohol withdrawal [13]. Second, alcohol consumption is also causally associated with unipolar depressive disorders [137]; however, the exact nature of this relationship is currently unknown. Specifically, the lack of research on the extent to which unipolar depression is caused by (i) people consuming alcohol as a method of self-treatment [138], and (ii) potential confounding factors that are correlated with both alcohol consumption and depression, makes it impossible to ascertain what percentage of depression in a population is attributable to alcohol consumption .

In addition to mental and behavioural disorders, alcohol consumption has also been shown to increase the risk of intentional self-harm [139], with alcohol being causally related to an increase in the risk of suicide [140].

1.1.3.4.5.3   The effect of cannabis use on mental and behavioural disorders

The use and abuse of cannabis has been shown to be correlated to the prevalence of mental and behavioural disorders [120, 121]. First, the prolonged use and abuse of cannabis can lead to the development of a cannabis use disorder and cannabis withdrawal [13]. Second, the use of cannabis has been shown to be strongly correlated with the incidence of psychotic disorders,

independently of confounding and transient intoxication effects [141]. Specifically, the use of cannabis has been shown to increase the risk of developing schizophrenia, independently of other psychoactive drugs or personality traits relating to social integration [142]. The effect of cannabis use on the development of psychotic disorders may be heightened in people who use cannabis as an adolescent [143]. The evidence of the effects of cannabis use on affective outcomes is less clear, with experimental evidence suggesting a link between cannabis use and affective disorders [144]; however, the effect of cannabis on affective outcomes has not been clearly observed through observational studies [142].

1.1.3.4.5.4　　The effect of non-medical prescription opioid use on behavioural disorders

The use of prescription opioids for non-medical purposes is an increasing problem in Canada and the United States [145, 146], and has been observed to be correlated to the prevalence of various mental and behavioural disorders [147]. First, as with other opioids, the prolonged use of prescription opioids for medical and non-medical purposes can lead to opioid use disorder and opioid withdrawal [13]. Second, the prolonged daily use of prescription opioids has been observed to be correlated with depressive, mood, anxiety and drug abuse disorders [147, 148]. The misuse of prescription opioids has been shown to increase the risk of depression in a longitudinal follow-up study [149]; however, this relationship is complex, as people use prescription opioids to self-medicate for depression [150]. Furthermore, existing depressive, mood, anxiety and drug abuse disorders have been observed to be predictors of non-medical prescription opioid use [148, 151].

1.1.3.4.5.5　　The effect of cocaine use on mental and behavioural disorders

The use of cocaine is highly correlated with the prevalence of various mental and behavioural disorders; a study of treatment-seeking cocaine abusers found that 55.7% of cocaine abusers met current criteria for a mental and/or behavioural disorder other than a substance use disorder, and 73.5% of cocaine abusers met lifetime criteria for a mental and/or behavioural disorder other than a substance use disorder [152]. The development of depression and other drug use disorders is generally preceded by cocaine use initiation, while the development of anxiety disorders, antisocial personality, and attention-deficit disorder generally proceeds cocaine use initiation [152]. This may partially be explained by the fact that cocaine can induce mood disorders and

anxiety disorders [13]. Additionally, as with all addictive substances, the prolonged use and abuse of cocaine can lead to cocaine use disorders and withdrawal [13].

1.1.3.4.5.6   The effect of other drug use on behavioural disorders

The drugs examined in this chapter were limited to those measured by the Centre for Addiction and Mental Health (CAMH) Monitors 2011-2013 [153-155], as the correlation between substance use and mental health, discussed in Chapter 2, was limited to the data available in these surveys. The drugs not discussed in this chapter include sedatives, hypnotic drugs, anxiolytic drugs, opioids other than prescription opioids, amphetamine-type stimulants and other stimulants, all of which are associated with drug use disorders and withdrawal [13].

1.1.3.4.5.7   The effect of traumatic brain injury on mental and behavioural disorders

Traumatic brain injuries show a wide variation in severity; traumatic brain injuries can be penetrating or closed, the resulting central nervous system injury can be primary or secondary, and the area of injury can be diffuse or localized [156]. The presence of a past traumatic brain injury has been observed to be correlated to the prevalence of other mental and behavioural disorders [122, 123]; however, the extent of the risk of a subsequent mental and behavioural disorder does not seem to be dependent on the characteristics of the traumatic brain injury [156, 157]. Furthermore, traumatic brain injury causes a vulnerability to psychiatric illness in some individuals even decades after the original injury [156] by increasing the risk of having depressive episodes, delusional disorder, and personality disturbances [156, 157]. Conversely, a previous traumatic brain injury is not strongly associated with either substance abuse or schizophrenia [156]. Furthermore, there is not enough research on the correlation between a previous traumatic brain injury and the development of a personality disorder to assess causality [156].

1.1.4   Treatment of mental and behavioural disorders

In addition to a need to examine the levels of disability, functioning and non-specific psychological distress in the population, there is also a need to examine treatment interventions that are currently aimed at reducing disability, functioning and non-specific psychological distress among people with mental and behavioural disorders. The treatment of mental and

behavioural disorders can take many forms, including, but not limited to, pharmacological treatment, motivational interviewing, cognitive behavioural therapy and brief interventions [90], all of which can be administered in a variety of settings, such as an ED [90].

A population survey found that in 1990 and 1991 among adults 15 to 64 years of age in Ontario the treatment rates of people with mental and/or behavioural disorders (as indicated using the CIDI and DSM-III-R diagnostic criteria) were highest for generalized anxiety disorder (treatment rate of 60.0%), second highest for dysthymia (treatment rate of 59.4%), third highest for major depression (treatment rate of 55.5%), fourth highest for panic disorder (treatment rate of 53.0%), fifth highest for bipolar disorder (treatment rate of 37.7%) and six highest for alcohol abuse and alcohol dependence (treatment rate of 21.9%) [21, 158]. The treatment rate for schizophrenia (including other non-affective psychoses) was not assessed for Ontario; however, the median treatment rate for schizophrenia was the highest of all disorders at 58.8% across all other studies.[2]

Data on treatment rates in Ontario are corroborated by data from Edmonton, Alberta, Canada (assessed among people diagnosed with a mental and/or behavioural disorder using DIS and DSM-III criteria), which found that in 1983-1986 among adults 18 years of age and older treatment rates for mental and/or behavioural disorders were low, especially among people with substance use disorders [159]. Systematic reviews of treatment rates by Andrews and colleagues, Kohn and colleagues, and Alonso and colleagues (restricted to European countries) also corroborate findings of low-treatment rates for Canada, other high-income countries and globally [21], with treatment rates for mental and/or behavioural disorders internationally ranging from 69% for schizophrenia to 24% for substance use disorders [21, 90, 160].

The low treatment rates for mental and/or behavioural disorders in Ontario, in Canada, and internationally affect population health and health services utilization. First, low treatment rates for mental and/or behavioural disorders create an unnecessary burden of disease caused by these

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[2] Even through treatment rates reflect the percentage of people who are treated for their mental and/or behavioral condition(s) who are in need of such treatment, they do not reflect the percentage of people who are treated with the most effective treatment for their specific mental and/or behavioral disorder. Thus, the types of treatment offered and received should also be taken into consideration when looking at treatment coverage rates and deciding on the allocation of health resources.

disorders that would not be present under the counterfactual scenario of higher treatment coverage rates (see [161] for an example analysis of increased treatment coverage for alcohol dependence). Low treatment rates for patients with mental and/or behavioural disorders often lead to the use of costly ED resources due to a lack of primary care and barriers to accessing mental health or addiction treatment, resulting in unnecessary emergency psychiatric episodes [162-164].

1.1.4.1   Health care utilization for mental and behavioural disorders

For those with a mental and/or behavioural disorder, access to treatment is of paramount importance to reduce the morbidity caused by their disorder; however, access to treatment for mental and behavioural disorders is not equal for all people in the population, as access differs depending on the socio-demographic group [165]. This unequal access to treatment for people with mental and behavioural disorders is problematic, as achieving health equity is a top priority of the World Health Organization (WHO), and achieving health targets without an equitable distribution is of limited value [166]. Accordingly, the WHO has prioritized identifying and quantifying the determinants of health inequities [166, 167], and, thus, an investigation of the distribution of health loss caused by risk factors among subpopulations can increase our understanding of how health inequities arise and how best they should be addressed [168-170].

Achieving health equity through an equitable improvement in health care utilization is of the utmost importance as: (i) there is a majority consensus that medical care is a right, and a person's health care access should not be based on their ability to pay for this care [171], (ii) there is a general belief that certain population groups, such as people who are poor, do not have access to and are not receiving comparable health care services (in terms of quality and quantity) when compared to the rest of the population [172, 173], and (iii) there are high expectations for the potential of medical care to improve the general health level of the population [174].

Furthermore, in Canada (where the data presented in the manuscripts of this thesis were collected), health insurance is provided for every citizen by their province of residence; however, depending on the province, these public insurance schemes do not include coverage for the cost of pharmaceuticals for all citizens [175, 176].

The health care system for mental and/or behavioural disorders (which includes physicians' care, drugs, and services provided by other health care practitioners) can be subdivided into resources (labour and capital devoted to health care) and organization (what a system does with its resources). Limitations, such as the amount of resources allocated to mental health care and the organization of the mental health care system, create barriers to treatment of mental and behavioural disorders [21]. Thus, it is important to understand the factors that affect health services utilization and how to facilitate increased utilization of these services.

According to Anderson's theoretical framework of health care utilization, the utilization of health services for mental and/or behavioural disorders can be considered an individual behaviour. Furthermore, an individual's behaviour concerning health care access and the factors affecting this access are complex and interconnected [174] (see Figure 1-6 for a modified version of Anderson's Framework for viewing health services utilization). Anderson's framework suggests that social determinants (comprised of technology factors and norms) affect the health services system. The social determinants and the health services system then affect the individual determinants (comprised of predisposing factors, enabling factors and the level of illness), which, in turn, affect a person's health services utilization (in terms of the type of health care accessed and the purposes for which health care is accessed).
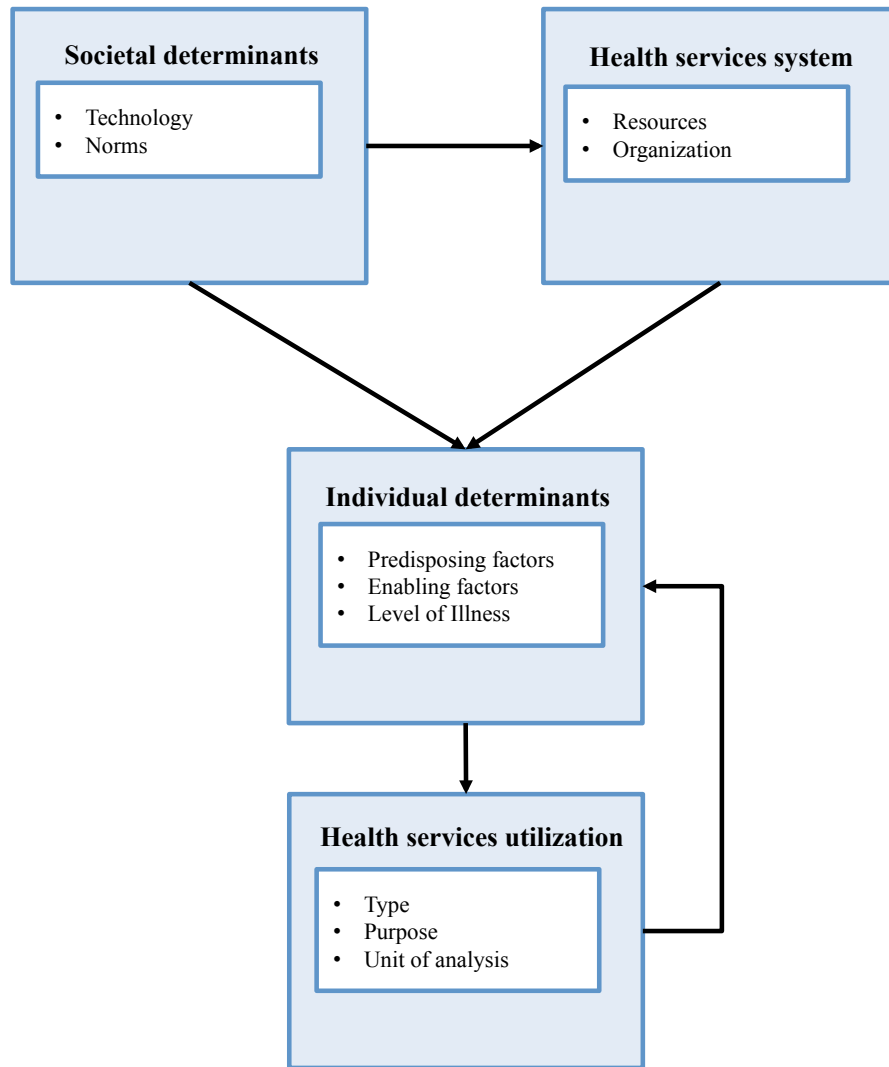
Figure 1-6. A modified version of Anderson's Framework for viewing health services utilization*

* This model was modified to take into account individuals who access follow-up health services

Multiple levels of care exist for mental and/or behavioural disorders, with the most relevant levels being primary care (dealing with the illness before its symptoms appear or worsen), secondary care (treatment to return an individual to their original state of functioning), and tertiary care (treatment and support programs that provide stabilization and prevent relapse among people). The factors affecting health care utilization are thought to be different for each level of care. For mental and/or behavioural disorders, the characterization of the treatment system is also important when determining health care utilization after the initial point of entry into the health care system. For instance, the treatment system as well as individual level factors

determine the specific diagnosis provided, continuity of care prescribed and received, level of patient compliance and patterns of referral. Therefore, characterization of both the individual and the treatment system are important in determining the probability and context of health care utilization for the initial point of entry into the health care system for a mental and/or behavioural disorder, as well as for follow-up health care utilization.

Figure 1-7 outlines Anderson's model of the individual determinants of health care utilization. This model divides the factors that affect health care utilization into three main categories: (i) predisposing factors, (ii) enabling factors, and (iii) level of illness factors. Furthermore, within these categories, various subcategories of factors exist.
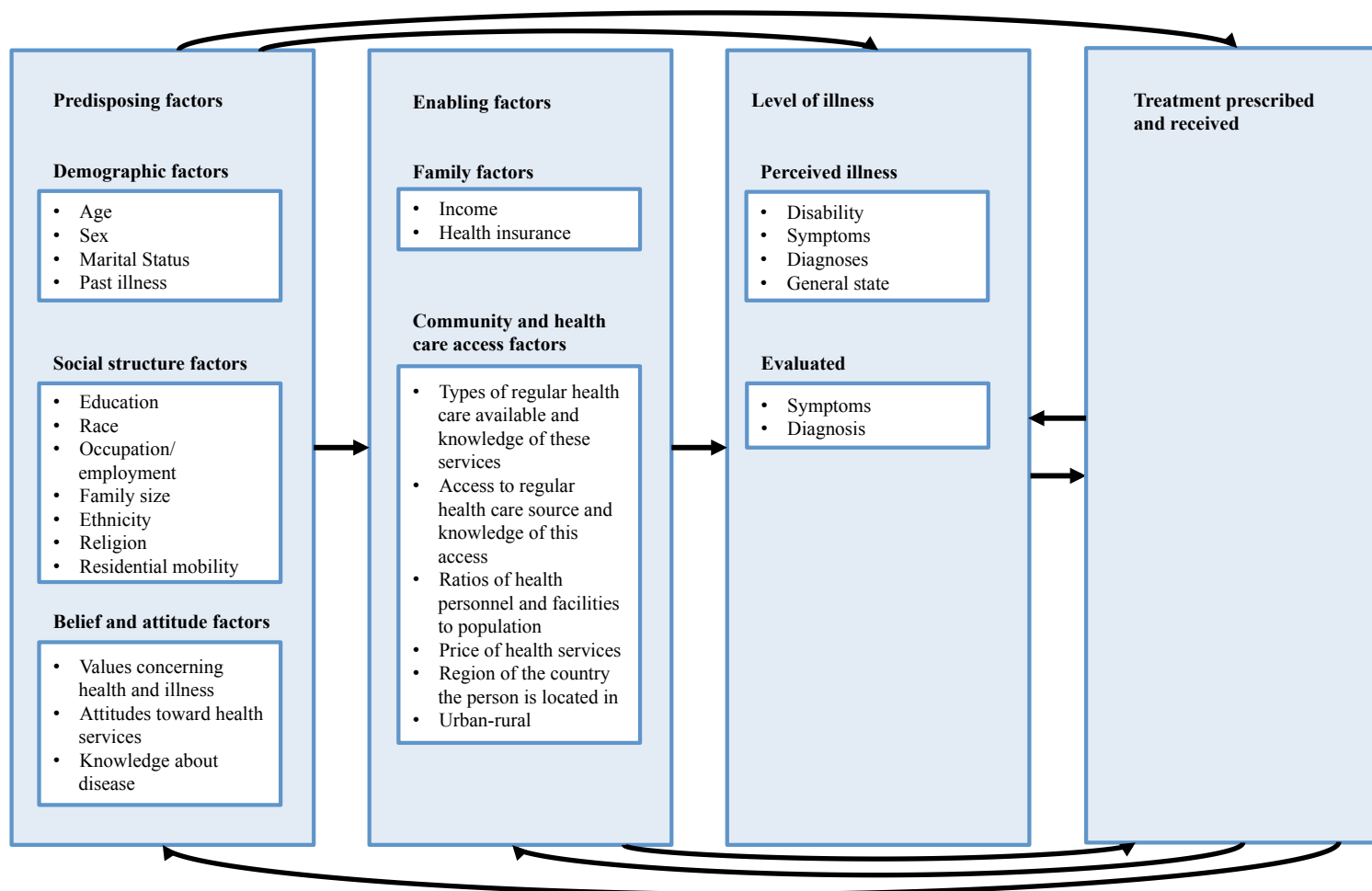
Figure 1-7. A modified version of Anderson's framework for the individual determinants of health care utilization*

*The presented health care utilization model is a modified model based on [174]. This model also includes knowledge of health care access as well as the actual access of an individual to health care. Furthermore, the factor of regular health care is now placed in the subgroup of community and health care access factors. The effects on treatment prescribed and treatment received have been added to the original model.

Predisposing factors are factors that are correlated to an individual having an increased or decreased propensity to use health care services more than other individuals; propensity towards health care use can be the characteristics of the individual prior to the symptom(s) of a disease appearing for which he or she seeks treatment. For example, predisposing factors include demographic factors (such as age and gender), social structure factors (factors which reflect and/or influence the status and location of a person in a society, such as education and race), and belief and attitudinal factors (how an individual perceives their own health and how they perceive health services, such as an individual's values concerning health). Although these predisposing factors may be related to the risk of disease (such as gender and age), predisposing factors are not considered to be the reason a person seeks health care (i.e. one does not seek health care to treat age, but rather to treat diseases related to age).

In addition to predisposing factors, there are also enabling factors that determine an individual's probability of accessing health care. Specifically, health care services must be accessible to an individual (community and health care access factors). The density, variety and cost of health care services available to an individual within his or her community determine the probability of health care usage; greater density and variety and lower costs of health care resources will create an increased use of health care resources [174]. Furthermore, barriers created by enabling factors to some health care resources, such as primary care, lead to greater use of other health care resources, such as secondary care (e.g. the use of EDs for the purpose of dealing with primary care concerns [163].

Even when the presence of predisposing and enabling conditions are taken into account, an individual, his family or someone in their close social network needs to perceive that an illness is present, or that there is an appreciable probability of an illness occurring, for health services to be used. The measures of a person's perceived illness include, but are not limited to, the number of physically and mentally unhealthy days experienced by the person. The severity of the illness on such days is indicated by an increase in disability (i.e. the person is unable to perform their normal tasks at work, school or at home). Other indicators of a person's perceived illness include, but are not limited to, the disease's symptoms, non-specific psychological distress [66, 67] and a decrease in functioning [42].

Mental and behavioural disorders are complex chronic illnesses that require longitudinal pharmacological treatment and behavioural therapy [13], and the success of both the initial treatment received and of follow-up care is just as important as the initial point of health services contact for patients with these disorders. Therefore, given the nature of mental and behavioural disorders, it is important to also take into account in Anderson's model the treatment(s) prescribed and received [31]. In particular, the treatment prescribed for a mental and/or behavioural disorder (either pharmacological or behavioural treatment) should act to lessen the symptoms of the disease as well as the effects unrelated to the symptoms of the disease (i.e. they should have an effect on the individual's perceived and evaluated level of illness). Furthermore, Anderson's theoretical framework of health care utilization does not directly account for the treatment received once someone utilizes health care services, nor does it consider maintenance of follow-up care. These limitations, which result from not taking into account changes in an individual's health care decision-making process after his or her initial health service contact, is also found in the health care utilization models presented by Rosenstock (the Health Belief Model) [177] and by Greenlick and colleagues [178]. These limitations are important to take into account when assessing health care utilization that is longitudinal, as the success of treatment received and the prescribed follow-up care is dependent on the predisposing, enabling and level of illness factors.

In a follow-up care model, the treatment(s) prescribed and received can also have an effect on the predisposing, enabling and level of illness factors; access to and maintenance of follow-up care are important for mental and/or behavioural disorders which are, as previously noted, chronic remitting and relapsing diseases [31]. Furthermore, some of the demographic and social structure predisposing factors, such as sex, age and race, are non-modifiable.

Although Anderson's framework provides a comprehensive explanation of the factors influencing health care utilization, use can be made of other frameworks and models. For example, the Health Belief Model [177, 179], the Theory of Planned Behaviour [180], the Self-Regulation Model [179], and Greenlick's and colleagues' health care utilization model [179] have been used to describe health care utilization. These models are based on the health change (i.e. health care utilization) which occurs when an individual believes that his or her illness (real or perceived) could have a large impact on the activities of daily living, when an individual believes that an effective intervention exists, and when an individual believes that there are either

few or no barriers that will prevent them from accessing the intervention [179]. These models are similar to Anderson's framework of health utilization, and the factors described in these models correspond to those described by Anderson as levels of illness and enabling factors [174].

1.1.5 Emergency psychiatric services aimed at treating people with mental health and addiction problems

Various forms of ambulatory, crisis and emergency psychiatric services exist that treat and/or address mental health emergencies, such as phone help lines (e.g. suicide help lines), community mental health teams and clinics (such as mobile outreach teams consisting of police and/or mental health professionals [181]), and ambulatory, crisis and emergency care systems (such as psychiatric EDs and general hospital EDs). The treatment of mental health emergencies by psychiatric EDs in particular responds to a wide range of mental and/or behavioural disorders, and a wide range of severities of these disorders [182], and, thus, the EDs of psychiatric hospitals present an effective and efficient means of examining this population of patients in terms of their disability and functioning.

The primary objectives of treatment in an ED are to minimize short-term mortality and morbidity [183]; however, longer-term mortality and morbidity may also be influenced by early actions. For psychiatric EDs, the main objective is to reduce morbidity (however, in the case of substance abuse and suicidal idealization, a reduction in mortality is also a goal), and, therefore, measures of disability and functioning are the most useful indicators of the baseline level of illness. Furthermore, a baseline study of patients who seek treatment at EDs enables an analysis of the differences in disability and functioning between diagnostic categories, thereby allowing an assessment of the usefulness of collecting data on disability and functioning in addition to diagnosis when triaging patients and aligning them with the appropriate intensity of resources. Additionally, a longitudinal study of patients who seek treatment at EDs allows an analysis of the baseline correlates of changes in disability and functioning after these baseline visits.

Currently, disability and functioning are not measured using a standardized instrument in EDs for people who present with mental and/or behavioural disorders, and, thus, other information is relied upon for the triaging and aligning of patients with the appropriate intensity of resources. In EDs, diagnosis is useful for proper triaging and determining the course of care for people with mental and/or behavioural disorders, as people who visit EDs represent a broad spectrum of the

population [184, 185]. The triage process is central to the operation of EDs as a strategy for sorting patient care and treatment according to the severity of illness or injury [186]. The current triaging process is usually based on answers to the following questions: (i) "Does this patient require immediate life-saving intervention?"; (ii) "Is this a patient who shouldn't wait?"; (iii) "How many resources will this patient need?"; and (iv) "What are the patient's vital signs?" [187]. For people with mental and/or behavioural disorders, the questions that are asked in the triage process relate primarily to diagnosis, level of functioning (assessed by expert opinion [188]) and suicidal idealization. There is currently a lack of inter-rater agreement when triaging patients with mental and/or behavioural disorders, especially with respect to those individuals who do not require urgent care [189, 190]; however, there is a consensus on diagnoses [191].

Disability and functioning together with diagnosis are useful for predicting treatment outcomes for people with mental and/or behavioural disorders. Specifically, among people with mental and/or behavioural disorders, diagnosis alone is not sufficient to predict service needs [192], length of hospitalization [193], level of care required [194], and outcomes of hospitalization [195]. However, among people with mental and/or behavioural disorders, diagnosis and disability have been shown to predict health service utilization [195], length of hospitalization [196], and improvement in functioning after hospitalization [195]. Thus, a systematic method of measuring levels of disability and functioning could be established, and such data in addition to diagnosis data could be routinely collected to establish an additional clinical measure which may improve the understanding of the living experiences of a person with a mental and/or behavioural disorder, help guide treatment interventions and management strategies, align patients with a range of resources, and measure improvements in disability and functioning after the administration of various treatments [42].

To date, no research has been performed on the disability and functioning of people with mental and/or behavioural disorders who access psychiatric emergency services (see Panel 3-1), and little research has been performed to assess the disability and functioning of psychiatric patients with different diagnoses. Therefore, studies are warranted to determine if there are differences in disability and functioning between people with different diagnoses.

1.1.5.1 Observing people who seek treatment in a psychiatric emergency department

Psychiatric-specific emergency services are an emerging care model, and are currently limited to a few metropolitan areas with a large population, such as CAMH in Toronto, Canada, the Bellevue Hospital Center facility in New York, USA, and the Harborview Medical Center's crisis triage unit in Seattle, USA [182]. Furthermore, other hospitals may have general EDs that also are staffed partially by psychiatric health care professionals, so that people who seek emergency treatment at these general EDs receive psychiatric emergency care if it is required [197]. Although these services are not yet widespread, the use of psychiatric-specific emergency services presents a unique opportunity to study individuals who access these facilities, as all individuals who present at these institutions are seeking psychiatric treatment, as opposed to general hospital EDs where only a proportion of patients are seeking psychiatric treatment. Furthermore, as these facilities are not common, patients are likely to return to them for follow-up emergency care allowing for a longitudinal study of recidivism to psychiatric EDs.

1.1.5.2 Methods to follow a baseline sample of patients who access an emergency department for psychiatric treatment

People who access emergency services at a psychiatric hospital differ from the general population; the population of people who seek services at a psychiatric hospital are more likely to be homeless [182, 198], previously incarcerated [182, 199] or previously hospitalized [182]. Thus, patients who seek treatment at a psychiatric ED are generally highly mobile and typically harder to monitor longitudinally than is the general population. The expected low follow-up rate of people who seek treatment at a psychiatric ED would limit the conclusions reached from a longitudinal follow-up study, as the large expected loss in numbers of a follow-up population would result in a decrease in power. Furthermore, the loss in numbers of a follow-up population would likely depend on various predisposing factors, biasing an analysis of data from a population sample (even after correcting for non-random loss to follow-up through multiple imputation methods [200]).

Given the difficulties in following a population, a follow-up study that uses institutional data would ensure a complete follow-up of patients who seek treatment at a psychiatric ED. Therefore, by using institutional follow-up data (specifically subsequent ED visits within a year),

it is possible to longitudinally follow a population that seeks treatment at a psychiatric ED without having to deal with the shortcoming of low follow-up rates.

1.1.5.3   Costs and other problems confronting emergency department services

Previous studies have shown that a small proportion of health care users account for a large proportion of total health care costs [201, 202]. For these individuals, health care expenditures are generally high, and remain so over time, particularly for individuals with chronic conditions such as mental and behavioural disorders [203]. Indeed, a study of the costs of mental health services in Ontario in 2012 found that mental health care utilization accounted for a total of 1.4 billion CAD of health services expenditures, which is an average cost of 36,502 CAD per mental health care utilizer and 50% greater than the average cost for a non-mental health care utilizer [203]. Furthermore, research has shown that patients who access psychiatric health care services tend to use these services repeatedly, as they require ongoing and continuous care [201].

In particular, a large proportion of the potentially avoidable costs from mental health care utilization is due to ED visits [204]; already limited ED services and resources are disproportionately affected by high frequency utilizers, who by virtue of their high utilization are the source of disproportionately large health care resource expenditures [205-208]. The burden that frequent ED users place on ED resources is evidenced by a systematic review which found that while frequent users comprise 4.5% to 8% of all ED patients, they account for 21% to 28% of all visits [209]. Furthermore, ED crowding, which is partially due to frequent ED use, has been linked with patient mortality, transport delays, treatment delays, ambulance diversion, and financial costs [210]. The number of frequent ED users is also an expanding problem, and has increased since 1990 in the United States [211, 212] and in other countries, such as Canada [213] and Australia [214]. Thus, there is a need to understand the socio-demographic characteristics of frequent ED users.

Patients who frequent psychiatric emergency services are a heterogeneous group of patients with multiple health care needs and are often portrayed as unnecessarily clogging EDs by presenting there with primary care complaints which would be better treated elsewhere [182, 215]. Of the diseases and/or conditions for which frequent ED users seek treatment, the largest contributor has been observed to be mental and behavioural disorders [216], with a study finding that more than 90% of frequent ED users have at least one mental and/or behavioural diagnosis [217].

In addition to frequent ED use creating a large cost, the frequent use of EDs may be an indicator of insufficient care received during an ED visit and afterwards; studies have shown that people with mental and behavioural disorders who attend EDs for treatment often are not referred to appropriate facilities or resources and encounter insufficient or inadequate aftercare [218-220]. Thus, recidivism to the ED has been suggested as a performance indicator of treatment prescribed and received at an ED [221]; however, there are also other potential factors that affect ED recidivism, such as access to primary care [163].

Given the costs of frequent ED use and the observation that frequent ED use may be an indicator of the efficacy of the prescribed treatment, targeting frequent users of psychiatric emergency services by increasing their access to primary care may present an opportunity to lower health care costs, while, at the same time, ensuring that health outcomes are not jeopardized. However, first there is a need to understand who is frequently visiting psychiatric EDs in terms of their socio-demographics and their disability and functioning.

1.1.5.3.1   Defining frequent ED use

Despite there being a large literature base concerning frequent users of EDs [209], there is a large heterogeneity in the definition of frequent or heavy use of emergency services across studies, with most definitions of frequent use ranging from three to five visits over a one year period; however, definitions of frequent use range from two visits per year to twelve visits per year [209]. Other operational definitions of frequent use have also been used, such as the upper 10th percentile of psychiatric ED users [222, 223]. Given the heterogeneity in the definition of frequent ED use found in various studies, only indirect comparisons of the results between studies are possible.

1.1.5.3.1.1   Other operational definitions of ED recidivism

Another aspect of frequent ED use is the time between visits or the time to next visit. Predisposing and level of illness factors may not just affect the number of visits but also the time between visits, and, thus, the hazard of recidivism is an important aspect of emergency use patterns, especially for mental and/or behavioural disorders which are chronic, remitting and relapsing diseases [31]. Accordingly, to assess the research that has been performed on this topic, we searched PubMed up to and including May 7, 2015 using the disease key words:

"psychiatric," "mental," "behavioural," combined with the population key word "emergency" and the outcome key word "time," in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Guidelines [224]. Of the 16 search results, no study examined the time between ED visits for people with mental and/or behavioural disorders or the factors that may affect this time span. However, a search of Google Scholar revealed two articles within the top 100 results that looked at the effects of diagnosis and age on the hazard of a subsequent psychiatric ED visit after baseline among adults [197], and the effects on the hazard of a subsequent general ED visit of patients in a general ED with a mental and behavioural disorder who leave against medical advice and without being examined by medical staff [225]. Therefore, given that the only previous study to consider the factors that influence the hazard of a repeat psychiatric ED visit examined the effects of age and diagnosis on the repeat visits, a study is needed to assess the predisposing and level of illness factors which affect the time between a baseline visit and the next ED visit for people with mental and/or behavioural disorders.

1.1.5.3.2 Correlates of health care services access and emergency department use

As indicated by Anderson's theory, predisposing, enabling and level of illness factors affect health care utilization. The predisposing factors act to increase the use of psychiatric EDs through two pathways: (i) increasing the risk and severity of a mental and/or behavioural disorder that needs to be treated at an ED [90], and (ii) decreasing access to primary care services, thereby leading to the use of psychiatric EDs for primary care purposes and/or leading to an increase in the severity of mental and behavioural disorders that are not treated in a primary care setting [163]. Consequently, the probability of accessing primary and secondary psychiatric health care services is not the same for the entire population; furthermore, recidivism to a psychiatric ED and the frequent use of psychiatric EDs are not the same for the entire population. Specifically, previous studies have found differences in people who have primary care physicians, people who use EDs (compared to the general population), and people who are

frequent users of EDs in terms of the socio-demographic factors of age, gender, marital status and socio-economic status [226] [3].

Additionally, the level of illness is also hypothesized to affect the use of EDs through multiple pathways, including as a result of low treatment rates for mental and/or behavioural disorders (which differ depending on diagnosis and socio-demographic factors), thereby leading to an increased use of psychiatric EDs for primary and secondary care purposes [160].

1.1.5.3.2.1   The effects of age on psychiatric health services use

Age has been linked to health care access, with people who are younger in age typically not using primary care services, even after controlling for the percentage of the population within each age group with a chronic health condition [227]. In addition to a reduced use of primary care services in the form of family physicians, people of younger ages also have been found to be more likely to use emergency services for primary care or non-urgent purposes [228]; however, another study has found that age is not significantly correlated with the use of EDs for primary care purposes [163]. Furthermore, a study has found that people who are younger are more likely to be frequent users of psychiatric EDs when compared to people who are older in age [229].

1.1.5.3.2.2   The effects of gender on psychiatric health services use

Gender has been previously observed to be correlated with primary health care access, with women using primary care sources, such as family physicians, more often than men [230], and with women also being more likely than men to access non-emergency psychiatric services [231]. These observations may be due to women being more likely to have positive attitudes towards these services [231]. Previous studies have observed that men are more likely to use EDs than are women [232]; however, as with age, another study has found that gender is not associated with the use of EDs for primary care purposes [163, 226, 228]. In alignment to these findings concerning ED users, a systematic review and a study published since this systematic review of repeat users of psychiatric EDs observed that various studies showed a higher proportion of men as repeat users, while other studies showed a higher proportion of women as

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[3] This thesis did not examine the effects of enabling factors on ED use, or on improvements in disability and functioning after a baseline visit to a psychiatric ED, as the data used in this thesis were from a single psychiatric ED.

repeat users [229]; however, this finding of non-significance may be due to the diagnostic caseload of the specific psychiatric EDs examined (see text on diagnostic correlates of frequent ED use).

1.1.5.3.2.3 The effect of marital status on psychiatric health services use

Marital status has been previously observed to be correlated to access to primary care for men, but not for women; men who were never married had less access to primary care than did men who were currently married [233]. Additionally, most users of EDs for psychiatric conditions have been observed to be single, separated, divorced, or widowed [232]. Among frequent ED users, people who were single or divorced (as compared to people who were currently married) were observed more likely to be frequent ED users [234]; however, frequent ED use has also been observed not to vary by marital status [235, 236].

1.1.5.3.3 The effect of education, employment and income on psychiatric health services use

The observations that low socio-economic status as compared to high socio-economic status is associated with a decrease in access to primary care, an increase in the use of EDs, and an increase in the probability of being a frequent user of EDs have been found in multiple studies [237-239].

The use of primary care is hypothesized to differ by educational status, as education has been shown to affect lifestyle behaviours, problem-solving abilities, and values [233, 240, 241]. In agreement with this hypothesis, people with lower levels of education have a lower rate of accessing primary care services for their mental and/or behavioural problems as compared to people with higher levels of education [242]. Furthermore, previous studies have observed an increased use of EDs by people with lower levels of education compared to people with higher levels of education [243, 244]. Additionally, people with lower levels of education have been observed to be more likely to be frequent users of EDs [234].

Employment creates a barrier to primary care, with people who are unemployed having less access to primary care when compared to people who have paid employment [237]. This results in an increase in the use of ED visits for primary care purposes among people who do not have paid employment [237]. Additionally, a systematic review found that people who are

unemployed have an increased probability of being frequent ED users as compared to people who are employed [238, 244], and another study observed that people who are unemployed have a higher probability of being frequent psychiatric ED users [229]. However, these results are not easily interpretable, as people who are unemployed represent a heterogeneous group of individuals in terms of income and housing [245]. For instance, some within the group of unemployed people may be homeless (which has also been previously observed to be associated with high frequency ED use [197]), others may not be homeless, but may be chronically unemployed, and others may be unemployed for only a short amount of time. Therefore, analyses that examine the effects of employment status should correct for these potential confounding factors.

Income has been observed to be a barrier to primary care, which is especially important for people with chronic illnesses who require longitudinal care [239]. Income inequality creates a barrier to primary care use by people who have lower incomes [237], and may lead to an increase in the use of EDs which, in turn, leads to less continuity of care for lower income people with mental and/or behavioural disorders and causes an increase in the incidence of emergency health incidents that require treatment at an ED [162]. Indeed, it has been observed that people who have lower incomes are more likely to use EDs than are people who have higher incomes, even in countries where there are public insurance plans [244] (see [226] for a study of Ontario adults who are covered under a provincial health insurance plan). Furthermore, a study has observed that people with no income are more likely to be frequent users of psychiatric EDs as compared to people with an income [229].

1.1.5.3.4   The effect of other socio-demographic and community level factors on psychiatric health services use

In addition to age, gender, marital status and socio-economic status, there are other predisposing factors that are correlated with access to primary care, the probability of using an ED and the probability of being a frequent ED user. Specifically, research has shown that racial and ethnic differences lead to differences in primary care access and emergency services use, with some racial minorities being less likely to use primary health care services and more likely to rely on EDs [246]. Furthermore, family composition [247] and living situation (i.e. if a person is homeless) [206] have been linked with the use of EDs. Additionally, the density of health services has been shown to affect access to primary care and the subsequent use of EDs. For

example, in the province of Ontario, it has been observed that the use of EDs is higher within the northern region of the province, where health care resources are spread out and not as easily accessible; therefore, the geographical location, in terms of density of available resources and the closest health services, also affects ED use [226].

1.1.5.3.5 Level of illness correlates of health care services access and emergency department use

In terms of their level of illness, people who access EDs are sicker (they have a higher number of comorbidities and hospital admissions and higher triage priority) than people who are infrequent users of EDs [209]. Furthermore, the probability of hospital admission is greater for people who are frequent users of EDs, they are more likely to be transferred by ambulance, and they have higher rates of mortality [209]; however, as LaCalle's and Rabin's analysis included all ED visits, and not just ED visits due to mental and/or behavioural disorders, these findings may be due to non-psychiatric diseases. Frequent users of EDs for psychiatric illnesses have been found to have more serious diagnoses than do non-frequent users [222], and diagnoses of chronic mental and behavioural disorders [248]. Additionally, a study has also found that frequent ED users are frequent users of other health care services, which may indicate that these people are more likely than the average person who uses an ED to have a chronic illness [249].

In terms of diagnosis, frequent ED users for psychiatric illnesses are more likely to have a diagnosis of a psychotic disorder [248, 250, 251], schizophrenia [232, 250], personality disorder [248, 250], anxiety disorder [248], and substance abuse [248]. Furthermore, with respect to the relationship between age and diagnosis, a previous study found that age modifies the risk of psychiatric ED recidivism among people who have schizophrenia and psychosis, but not affective disorders, adjustment disorder, or substance use disorders [197].

Furthermore, as different mental and behavioural disorders have various pathologies with different relapse and remittance characteristics [13], and treatment rates and outcomes differ based on diagnosis [6, 9], it can be expected that the rate of recidivism to a psychiatric ED will differ by diagnosis.

1.1.5.3.6 Previous ED use and future ED use

The most important predictor of the hazard of recidivism to a psychiatric ED and the number of subsequent visits among psychiatric ED recidivists is the number of previous visits to a psychiatric ED. This factor of past visits predicting future visits has been overlooked in the literature concerning frequent ED use [209]. Previous studies have indicated that although people may be frequent ED users in a particular year, a large proportion of these people may not be frequent ED users in the following year [209]. This result of a loss of frequent users over time may indicate a constantly shifting patient population, and may reflect decreased medical need, a change in insurance or access, or even death.

1.1.6 Conclusions of the literature review

Mental and behavioural disorders are prevalent globally [1-3], in Canada [4, 5] and in Ontario [6], and the resulting social [7], economic [4, 8, 9] and health burdens [10-12] caused by these disorders are large. Given the size of these burdens, there is a need to understand the complex ways that disability, functioning and non-specific psychological distress are represented in the general population and to determine if these measures are adequate descriptors of the mental health of the general population. Furthermore, if these measures can adequately describe the mental health of the general population, there is a need to determine the correlates of having non-specific psychological distress and impaired disability and functioning in the general population.

There are current knowledge gaps in the literature about patients who use psychiatric emergency services in terms of disability and functioning. Furthermore, the repeated use of EDs for mental and behavioural disorders is costly, and indicates that these repeat users may have received insufficient or inadequate aftercare [218-220]. Therefore, first, research is needed to examine differences in disability and functioning using finer diagnostic categories than were used in the one previous study that examined these differences, to determine if differences in disability and functioning exist between frequent versus non-frequent users of a psychiatric ED, and to determine differences in the distribution of disability and functioning among people who seek treatment at a psychiatric ED when compared to the general population. Second, research is needed to determine how predisposing factors and clinical factors are correlated to recidivism to psychiatric EDs and/or to the number of ED visits within the following year among recidivists.

1.2 Outline and specific aims of the thesis

1.2.1 Thesis outline

As noted in the literature review, despite the observations that (i) mental and behavioural disorders are prevalent globally, in Canada and in Ontario [1, 2, 6], (ii) the resulting social, economic and health burdens caused by these disorders are large [9, 19], and (iii) the health care system in Canada (as well as in other countries) is also confronted by a subset of patients with mental and behavioural disorders who are high frequency utilizers of psychiatric emergency services and who, by virtue of their high utilization, are the source of disproportionately large health care resource expenditures [205-208], knowledge gaps exist in the literature concerning mental and behavioural disorders. Accordingly, the body of this doctoral thesis addresses these knowledge gaps by presenting research undertaken by the PhD candidate and described in three research manuscripts. A professor outside of the Program Advisory Committee has reviewed each of the research manuscripts to ensure their scientific rigour. The final chapter of this thesis presents a discussion and synthesis of the findings of the three presented research papers.

1.2.2 Study design, research aims and hypotheses of study 1

The first research manuscript presents the results of a latent class analysis of disability, functioning and non-specific psychological distress data from the 2011, 2012 and 2013 waves of the CAMH Monitors, a general population survey of adults 18 years of age and older in Ontario. In this study, disability and functioning were assessed using the 12-item WHODAS 2.0, and non-specific psychological distress was measured using the GHQ-12.

Research aim 1a: The first objective of study 1 was to examine if the general population could be split into various subgroups through a latent class analysis based on (i) disability and functioning, and (ii) non-specific psychological distress, and, further, to assess the nature of these classes (i.e. ordinal or nominal).

Hypothesis 1a: Based on the disability, functioning and non-specific psychological distress profiles of people with somatic illnesses or mental and behavioural disorders, it was hypothesized that the resulting latent class groups would have a nominal structure. However, if the study sample was restricted to people without a somatic illness, it was

hypothesized that the levels of disability and functioning of the remaining sample would be associated with their non-specific psychological distress, and that the measures of disability, functioning and non-specific psychological distress would be univariate.

Research aim 1b: The second objective of study 1 was to examine differences in socio-demographic factors, drug abuse, and traumatic brain injury between those classes that were determined as a result of completing research aim 1a.

> Hypothesis 1b: Based on previous research on the correlates of disability and functioning and the correlates of non-specific psychological distress, it was hypothesized that women, people who were unemployed, people who had little education, people who were never married, people who abused substances, and people who had a traumatic brain injury would have a higher probability of belonging to a class with high disability, low functioning and high non-specific psychological distress.

1.2.3   Study design, research aims and hypotheses of study 2

The second research manuscript presents the results of an analysis of the disability and functioning of people who sought help at the ED of a psychiatric hospital by diagnosis and frequency of psychiatric ED visits. The second research manuscript also presents the results of a comparison of the demographics and the levels of disability and functioning of people who sought help at the ED of a psychiatric hospital versus the general population.

Research aim 2a: The first objective of study 2 was to assess the levels of disability and functioning (as measured by the WHODAS) of patients who presented at CAMH psychiatric emergency services by diagnosis.

> Hypothesis 2a: Based on a previous study by Üstün and colleagues that observed differences in levels of disability and functioning by broad diagnosis categories [42], it was hypothesized that levels of disability and functioning among patients who presented at a psychiatric ED would differ by diagnosis, and, further, that people with schizophrenia would have, on average, the highest levels of disability and the lowest levels of functioning.

Research aim 2b: The second objective of study 2 was to assess if differences exist in levels of disability and functioning between frequent psychiatric ED users and non-frequent psychiatric ED users.

Hypothesis 2b: Based on previous research that observed differences in the levels of illness of frequent psychiatric ED users versus non-frequent psychiatric ED users, it was hypothesized that levels of disability and functioning, as measured by the WHODAS, would differ between frequent and non-frequent psychiatric ED users, with frequent psychiatric EDs users having higher levels of disability and lower levels of functioning compared to non-frequent psychiatric ED users.

Research aim 2c: The third objective of study 2 was to assess if patients who accessed psychiatric emergency services differed in terms of their demographics and their levels of disability and functioning compared to the general population.

Hypothesis 2c: Based on previous research that observed that people with mental and behavioural disorders differ in terms of socio-demographic factors, it was hypothesized that people who seek psychiatric ED treatment have significantly higher disability and significantly lower functioning compared to the general population. Furthermore, based on previous research of correlates of ED use, it was hypothesized that people who seek treatment at a psychiatric ED will be more likely to be male, younger in age, never married, and unemployed.

1.2.4 Study design, research aims and hypotheses of study 3

The third research manuscript presents the results of a longitudinal cohort study of the correlates of recidivism to a psychiatric ED. This analysis examines the baseline correlates of the hazard of recidivism within the year following the baseline visit, and the correlates of the number of repeat psychiatric ED visits among recidivists.

Research aim 3a: Given the resource burdens caused by recidivism to EDs by psychiatric patients, and the above-described gaps in our knowledge, the objective of study 3 was to examine if the number of previous psychiatric ED visits, baseline disability and functioning, primary diagnosis of the baseline psychiatric ED visit, age, gender, marital status and employment status were predictors of the hazard of recidivism to a psychiatric ED and/or the number of subsequent psychiatric ED visits among recidivists.

> Hypothesis 3a: Based on existing literature of frequent ED use, we hypothesized that being a person with high disability and low functioning, having substance use disorders and/or schizophrenia, and being younger in age, a man, not previously married and unemployed would increase a person's risk for recidivism to a psychiatric ED and lead to an increased number of subsequent visits among psychiatric ED recidivists.

Chapter 2
Latent classes of disability, functioning and non-specific psychological distress in the general population

This research manuscript is currently under review with the *International Journal of Methods in Psychiatric Research*

2 Latent classes of disability, functioning and non-specific psychological distress in the general population

2.1 Abstract

To classify the general population into subgroups using a latent class analysis based on disability, functioning and non-specific psychological distress, and to assess if alcohol and drug misuse, traumatic brain injury and social demographics differ by subgroup, we used data from the 2011-2013 Centre for Addiction and Mental Health Monitor general population surveys. The General Health Questionnaire (GHQ-12) measured non-specific psychological distress and the World Health Organization Disability Assessment Schedule (WHODAS) measured disability and functioning.

The GHQ-12 scores and the WHODAS domain scores were not univariate, even after excluding people with a suspected somatic illness. WHODAS scores were correlated with GHQ-12 scores only among people without a suspected somatic illness. Membership in the class with high disability, low functioning and high non-specific psychological distress, compared to membership in the class with low disability, high functioning and low non-specific psychological distress, was correlated to gender, employment, marital status, alcohol abuse, non-medical prescription opioid use and traumatic brain injury.

In conclusion, the use of both disability and functioning and non-specific psychological distress measures provides a better indication of mental health than does either measure alone. Additionally, further research is needed to explain the observed socio-demographic differences.

2.2   Introduction

Mental and behavioural disorders are highly prevalent globally [1, 2, 252], with Canada being no exception [20, 253]; the past year prevalence of any mental and/or behavioural disorder in Canada was 19.8% in 2011 [4]. Furthermore, the resulting health, social and economic burdens caused by these disorders are large and affect people of all ages, with mental and behavioural disorders causing 12.5% of all Disability-Adjusted Life Years (DALYs) lost worldwide in 2010 [6, 9, 254]. The majority of these burdens are due to the impact of the mental and behavioural disorders on (i) disability and reduced functioning, (ii) quality of life, and (iii) suboptimal states of health [6, 9, 254]. In addition to these health outcomes, one of the main symptoms of all mental and behavioural disorders is non-specific psychological distress, defined as the psychopathology of these disorders in the general population manifested as non-specific symptoms [65, 67]. In particular, disability and functioning and non-specific psychological distress are correlated but separate measures, with previous research using one measure or the other as a measure of morbidity [42]. Previous studies have examined correlates of disability and functioning in the general population and in clinical populations [62, 70, 71], and research has also examined correlates of non-specific psychological distress in the general population and in clinical populations [65, 72, 73]. Although studies have combined measures of well-being and non-specific psychological distress [77], no study has combined disability and functioning with non-specific psychological distress to form a combined measure, and no study has examined the use of disability, functioning and non-specific psychological distress to characterize a population. Furthermore, no previous analysis has examined the correlates of a combined measure of disability and functioning and non-specific psychological distress, therefore limiting the findings of prior analyses.

2.2.1   The impact of disease on disability, functioning and non-specific psychological distress

People with somatic illnesses, people with mental and/or behavioural disorders, and the general population have been observed to have heterogeneous non-specific psychological distress, disability and functioning profiles. Specifically, people who have somatic illnesses experience moderate to high disability, moderate to low functioning and moderate non-specific psychological distress [42]; people with mental and/or behavioural disorders experience moderate to high disability, moderate to low functioning and moderate to high non-specific

psychological distress [42]; and, on average, the general population experiences low disability, high functioning and low non-specific psychological distress [42, 68, 74]. Thus, for people with somatic illnesses, their levels of disability and functioning are hypothesized to lead to non-specific psychological distress [42], while for people with a mental and/or behavioural disorder, their levels of disability and functioning are hypothesized to be the result of non-specific psychological distress [42]. However, the complex ways that distress, disability and functioning are represented in a population are currently unknown. Furthermore, as disability and functioning and non-specific psychological distress are correlated but separate measures of morbidity [42], there is a need to ascertain the relationship between these two measures for (i) the general population, and (ii) the population without a suspected somatic illness where their levels of disability and functioning are hypothesized to be the result of non-specific psychological distress.

2.2.2   Correlates of mental and behavioural disorders

Previous research has found that women have a higher prevalence of mental and/or behavioural disorders than do men, particularly with respect to depressive and anxiety disorders where the prevalence among women is double that of men [255]. Furthermore, other socio-demographic variables, such as marital status, employment, education, and age, have also been shown to be associated with disability, functioning and non-specific psychological distress [81, 256, 257]. Specifically, people who are divorced or never married, are unemployed, have little education, and are older in age have been observed to have increased disability, decreased functioning and increased non-specific psychological distress when compared to people who are currently married, have paid employment, have a high level of education and are younger in age [81, 256, 257]. Furthermore, tobacco smoking [118, 119], cocaine use [120, 121], abuse of alcohol [42, 120], abuse of cannabis [120, 121], and traumatic brain injury [122, 123] have been linked with increased disability, decreased functioning, and increased non-specific psychological distress. Substance use and traumatic brain injury also differ by socio-demographic variables [124, 258, 259], and, thus, it is important to control for these variables when analyzing the socio-demographic differences by disability, functioning and non-specific psychological distress since substance use and traumatic brain injury may act as confounders.

2.2.3   The present study

Given the size of the burden created by mental and behavioural disorders, and the observation that this burden is not decreasing [19, 252], it is important to understand the complex ways that distress, disability and functioning are represented in a population. Thus, the first objective of this study was to examine if the general population can be split into various subgroups through a latent class analysis, based on (i) domains of disability and functioning, and (ii) non-specific psychological distress, and to assess the nature of these classes (i.e. ordinal or nominal). Based on the disability, functioning and non-specific psychological distress profiles of people with somatic illnesses and mental illnesses, we hypothesized that the resulting groups would have a nominal structure. However, if the study sample was restricted to exclude people with a suspected somatic illness (all diseases and injuries other than psychiatric illness)[4], we hypothesized that the levels of disability and functioning of the study sample would be associated with non-specific psychological distress, and that the measures of disability and functioning and of non-specific psychological distress would be univariate as they are both measures of psychiatric illness morbidity [42].

The second objective of this study was to examine differences in socio-demographic factors, drug abuse, and traumatic brain injury between those classes that were determined as a result of completing the first objective, as no study has examined the correlates of a combined measure of disability and functioning and non-specific psychological distress. Based on the correlates of disability and functioning and the correlates of non-specific psychological distress, we hypothesized that women, people who were unemployed, people who had little education, people who were never married, people who abused substances, and people who had a traumatic brain injury would have a higher probability of belonging to a class with high disability, low functioning and high non-specific psychological distress.

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[4] Somatic illnesses excluded psychosomatic illnesses.

2.3   Methods

2.3.1   The CAMH Monitors 2011, 2012 and 2013

The 2011, 2012 and 2013 waves of the Centre for Addiction and Mental Health (CAMH) Monitor, surveyed the Ontario adult (18 years of age and older) general population using a two-stage, probability sample based, computer-assisted telephone interviewing, random-digit dialling method. All surveys took place during all months of the year, with an equal number of participants sampled each month. The sampling was constructed using all active area codes and exchanges in Ontario obtained from ATI long lines tape, as well as telephone numbers on either side of each number (if not already included). This sampling method included adults with a home phone (listed and some unlisted numbers) and/or some cellphone numbers; however, a proportion of people with an unlisted number and/or a cellphone were not included in the sampling frame. The sampling frame was then stratified into regions (based on counties) as follows: Toronto, Central Western Ontario, Central Eastern Ontario, Western Ontario, Eastern Ontario, and Northern Ontario (see [153-155] for the exact counties included within each region). Within each stratum, a random sample of telephone numbers was selected with equal probability. In the stratum of Toronto a letter was sent to each selected household informing them that they would be contacted and describing the history and objectives of the CAMH Monitor surveys. Within selected households, the respondent who was 18 years of age or older, who had the most recent birthday, and who could complete the interview in either English or French was selected to participate. A minimum of twelve call-backs were placed to unanswered numbers, and all households that refused to participate on the first contact were re-contacted and asked again if they would be willing to participate. No incentives were offered for participation. The CAMH Monitors 2011, 2012 and 2013 had response rates of 51%, 51% and 48% respectively. *A posteriori* population expansion weights were calculated for the CAMH Monitors by triangulating survey data with census information on age and gender.

2.3.2   Measures

2.3.2.1   Socio-demographics

The CAMH Monitors 2011, 2012 and 2013 collected data on a diverse set of socio-demographic variables, including age, gender, employment, education and marital status.

2.3.2.2   Measures of disability and functioning, non-specific psychological distress and mental health

The WHODAS 2.0 measures disability and functioning and applies to all diseases, including mental and substance-use disorders, and has been found to have good concurrent validity with the WHO Quality of Life measure [53], the London Handicap Scale [54], the Functional Independent Measure [58], and the Short Form Health Survey [55]. WHODAS scores range from 0 to 100, with a score of 0 indicating no disability and perfect functioning and a score of 100 indicating an extreme disability and decreased functioning. The CAMH Monitors used the 12-item inventory version of the WHODAS 2.0 [42], which asks two questions to measure each of the following six domains: (i) cognition, (ii) mobility, (iii) self care, (iv) getting along, (v) life activities, and (vi) participation in society.

The 12-item GHQ measures non-specific psychological distress [67]. Each of the 12 items is measured on a 4-point scale (answering 0 to 3), with the summation of the GHQ-12 scores ranging from 0 (no non-specific psychological distress) to 36 (extreme non-specific psychological distress). Furthermore, non-specific psychological distress can be used to identify cases of mental and/or behavioural disorders in the general population (as measured by the Composite International Diagnostic Interview) [69]. The WHODAS and the GHQ-12 are correlated measures and have been used previously for cross-validation purposes [42, 62].

2.3.2.3   Drug abuse and traumatic brain injury

Cannabis risk was assessed using the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) [260], alcohol abuse was measured using a cut-off score of 8 on the Alcohol Use Disorders Identification Test (AUDIT) [261], cocaine risk was measured using the past year prevalence of cocaine use, smoking prevalence was measured using daily cigarette use, and traumatic brain injury was measured as a lifetime prevalence of a traumatic brain injury.

2.3.2.4   Medication for psychiatric treatment

A determination of whether an individual sought treatment for a possible mental and/or behavioural disorder was made based on the self-reported past 12-months use of prescription medications to reduce anxiety, panic attacks, or depression, which are the most prevalent mental and/or behavioural disorders [4].

2.3.3   Statistical analyses

2.3.3.1   Latent class analysis

The latent class structure of the population was determined by the WHODAS domain scores and by the GHQ-12 scores. The latent class analysis assumes as a necessary condition that disability, functioning and non-specific psychological distress are the result of a class structure in a population. Akaike information criterion (AIC) and Bayesian information criterion (BIC) statistics were used to determine the number of classes that best described the underlying class structure of the population. See the web appendix for further information regarding the latent class model selection.

2.3.3.2   Classical test theory analysis

Cronbach's alpha was used to assess if the WHODAS domain scores and the GHQ-12 scores were univariate (i.e. to assess if they had high internal consistency). Based on Bland and Altman's guidelines, scores of Cronbach's alpha < 0.7 indicated poor internal consistency and a nominal class structure, scores of Cronbach's alpha ≥ 0.7 and < 0.9 indicated satisfactory internal consistency and a nominal class structure, and scores of Cronbach's alpha ≥ 0.9 indicated high internal consistency, an ordinal class structure, and that the measures were univariate (i.e. there was redundancy in the questions that composed the scale) [76].

2.3.3.3   Regression analysis

A multinomial logistic regression was performed to determine population differences by class [262]. A general linear model with a Gaussian distribution and an identity link function was used to model the association between the GHQ-12 (square root transformed) and the WHODAS scores. Variance inflation factors were used to examine collinearity, and dfbetas were examined to identify overly influential observations [263].

All analyses were performed using R version 3.1.3 [264], and the R software packages 'poLCA' [265] (for latent class analysis), 'glmnet' (for multinomial regression) [266], and 'survey' (to take into account the survey design) [267]. For all analyses, a significant association was defined using an α of 0.05.

2.3.4   Ethics

The procedures and interviews of the CAMH Monitor surveys were approved by the CAMH Research Ethics Board (REB approval: 305-2009-01, 305-2009-02 and 305-2009-03 for the CAMH Monitors 2011, 2012 and 2013 respectively) [153-155].

2.4   Results

Our latent class analysis was based on a total sample of 5,658 adults who provided data on both the WHODAS and the GHQ-12 measurements. Descriptive statistics and regression analyses were based on a sample of 5,278 adults who provided data on gender, employment status, education, marital status, anxiolytic and/or antidepressant medication use, cocaine use, alcohol abuse, non-medical prescription opioid use, cannabis use and traumatic brain injury.

2.4.1   Sample characteristics

Based on the CAMH Monitor survey data, in Ontario in 2011, 2012 and 2013 combined, 47.6% of the adult population was male, 52.4% was female, and the average age of adults was 46.6 years (range: 18 to 95 years of age). The majority of individuals were either employed-full time (50.0%) or employed part-time (10.2%), were university or college educated (34.1%), or had some post-secondary education (37.1%), and were currently married (60.4%). Furthermore, 10.2% of adults were taking either anxiolytic and/or antidepressant medications, 12.2% smoked daily, 1.3% used cocaine in the past year, 13.0% had an alcohol use problem (as indicated by the AUDIT), 6.0% were abusing cannabis (as indicated by the ASSIST), and 15.8% had a lifetime prevalence of a traumatic brain injury. Table 2-1 outlines socio-demographic variables, disability and functioning, non-specific psychological distress, drug abuse and traumatic brain injury.

Table 2-1. Socio-demographic, mental health, and drug abuse characteristics of the 2011, 2012 and 2013 sample of Ontario adults by latent class

Variable	Total sample (n = 5,278)		Class 1: low disability, high functioning, low non-specific psychological distress (n = 3,326)		Class 2: high disability, low functioning, moderate non-specific psychological distress (n = 282)		Class 3: moderate disability, functioning and non-specific psychological distress (n = 1,372)		Class 4: high disability, low functioning, high non-specific psychological distress (n = 298)	
	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI
Age	46.6	(45.9, 47.2)	45.9	(45.1, 46.6)	59.1	(56.4, 61.9)	46.4	(45.1, 47.7)	47.0	(44.2, 49.7)
Gender										
Female	52.4%	(50.7%, 54.1%)	50.0%	(47.9%, 52.1%)	52.2%	(44.8%, 59.6%)	57.0%	(53.5%, 60.4%)	61.7%	(53.9%, 69.5%)
Male	47.6%	(45.9%, 49.3%)	50.0%	(47.9%, 52.1%)	47.8%	(40.4%, 55.2%)	43.0%	(39.6%, 46.5%)	38.3%	(30.5%, 46.1%)
Employment										
Full-time employment	50.0%	(48.3%, 51.8%)	54.4%	(52.3%, 56.5%)	33.0%	(25.8%, 40.3%)	44.9%	(41.5%, 48.3%)	30.2%	(23.2%, 37.1%)
Part-time employment	10.2%	(9.1%, 11.3%)	10.1%	(8.8%, 11.4%)	6.5%	(3.1%, 9.8%)	10.6%	(8.4%, 12.8%)	12.4%	(6.5%, 18.3%)
Self-employed	4.7%	(4.0%, 5.4%)	5.1%	(4.2%, 6.0%)	2.2%	(0.0%, 4.8%)	4.5%	(3.1%, 6.0%)	2.5%	(0.6%, 4.5%)
Student	7.4%	(6.2%, 8.7%)	7.3%	(5.7%, 8.8%)	2.1%	(0.0%, 6.2%)	8.8%	(6.1%, 11.5%)	6.4%	(1.4%, 11.4%)
Homemaker	3.6%	(3.0%, 4.2%)	3.1%	(2.5%, 3.7%)	4.4%	(1.0%, 7.8%)	4.8%	(3.5%, 6.1%)	3.4%	(0.9%, 6.0%)
Retired	18.3%	(17.3%, 19.4%)	16.4%	(15.1%, 17.6%)	41.3%	(34.5%, 48.1%)	19.9%	(17.8%, 22.1%)	18.0%	(13.1%, 22.9%)
Unemployed	3.3%	(2.6%, 4.0%)	2.5%	(1.8%, 3.2%)	3.5%	(0.8%, 6.3%)	4.4%	(2.7%, 6.1%)	9.1%	(4.6%, 13.5%)
Other	2.3%	(1.9%, 2.8%)	1.1%	(0.7%, 1.6%)	7.0%	(3.4%, 10.6%)	1.9%	(1.0%, 2.8%)	18.1%	(13.0%, 23.1%)
Education										
Less than high school	9.0%	(8.0%, 10.0%)	7.0%	(6.0%, 8.0%)	16.7%	(12.0%, 21.4%)	11.3%	(9.0%, 13.6%)	18.5%	(12.2%, 24.8%)
High school	19.8%	(18.4%, 21.2%)	19.5%	(17.8%, 21.2%)	21.2%	(15.6%, 26.8%)	20.5%	(17.9%, 23.2%)	18.6%	(13.3%, 23.9%)
Some post-secondary	37.1%	(35.4%, 38.7%)	37.5%	(35.4%, 39.6%)	33.9%	(26.8%, 41.0%)	35.6%	(32.3%, 38.9%)	41.7%	(34.5%, 49.0%)
College or University	34.1%	(32.5%, 35.7%)	36.0%	(33.9%, 38.0%)	28.2%	(21.3%, 35.2%)	32.6%	(29.4%, 35.8%)	21.2%	(14.4%, 28.0%)
Marital status										
Cohabiting	7.0%	(6.2%, 7.8%)	7.1%	(6.0%, 8.1%)	5.8%	(2.8%, 8.9%)	6.8%	(5.2%, 8.4%)	8.1%	(4.3%, 12.0%)

Variable	Total sample (n = 5,278)		Class 1: low disability, high functioning, low non-specific psychological distress (n = 3,326)		Class 2: high disability, low functioning, moderate non-specific psychological distress (n = 282)		Class 3: moderate disability, functioning and non-specific psychological distress (n = 1,372)		Class 4: high disability, low functioning, high non-specific psychological distress (n = 298)	
	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI
Currently married	60.4%	(58.6%, 62.1%)	63.2%	(61.1%, 65.4%)	58.9%	(51.8%, 65.9%)	54.8%	(51.3%, 58.3%)	51.5%	(44.0%, 59.1%)
Never married	22.4%	(20.7%, 24.2%)	21.9%	(19.7%, 24.0%)	11.6%	(6.0%, 17.3%)	25.6%	(22.1%, 29.1%)	22.2%	(14.4%, 30.0%)
Previously married	10.2%	(9.4%, 11.0%)	7.9%	(7.0%, 8.7%)	23.7%	(18.3%, 29.0%)	12.8%	(10.9%, 14.7%)	18.1%	(13.7%, 22.6%)
WHODAS score (0 to 100)	5.3	(4.9, 5.6)	0.5	(0.5, 0.6)	24.7	(23.5, 26.0)	8.8	(8.5, 9.2)	36.3	(34.1, 38.4)
GHQ 12 score (0 to 36)	8.5	(8.4, 8.7)	7.4	(7.3, 7.5)	9.0	(8.5, 9.5)	9.7	(9.4, 10.0)	17.6	(16.5, 18.7)
Medication use										
Anxiety medication	7.8%	(6.9%, 8.7%)	4.2%	(3.3%, 5.0%)	14.0%	(9.3%, 18.7%)	11.1%	(9.0%, 13.2%)	36.9%	(29.5%, 44.3%)
Depression medication	6.7%	(5.9%, 7.5%)	3.1%	(2.4%, 3.8%)	9.8%	(5.8%, 13.7%)	10.3%	(8.3%, 12.2%)	35.2%	(28.1%, 42.3%)
Either	10.2%	(9.2%, 11.2%)	5.5%	(4.6%, 6.5%)	18.7%	(13.4%, 23.9%)	14.8%	(12.5%, 17.1%)	44.0%	(36.6%, 51.5%)
Drug abuse										
Daily smoking										
No	87.6%	(86.4%, 88.7%)	89.8%	(88.5%, 91.0%)	84.8%	(79.3%, 90.3%)	85.6%	(83.2%, 88.1%)	69.3%	(62.3%, 76.3%)
Yes	12.5%	(11.3%, 13.6%)	10.2%	(9.0%, 11.5%)	15.2%	(9.7%, 20.7%)	14.4%	(11.9%, 16.8%)	30.7%	(23.7%, 37.7%)
Cocaine use (past 12 months										
No	98.7%	(98.2%, 99.2%)	99.3%	(98.9%, 99.7%)	98.5%	(96.1%, 100.0%)	98.5%	(97.5%, 99.4%)	91.5%	(85.3%, 97.6%)
Yes	1.3%	(0.8%, 1.8%)	0.7%	(0.3%, 1.1%)	1.5%	(0.0%, 3.9%)	1.5%	(0.6%, 2.5%)	8.5%	(2.4%, 14.7%)
Alcohol abuse										
No alcohol use problems (AUDIT score < 8)	87.0%	(85.7%, 88.2%)	88.0%	(86.6%, 89.5%)	92.5%	(88.7%, 96.4%)	84.5%	(81.9%, 87.2%)	80.5%	(73.6%, 87.5%)
Alcohol use problems (AUDIT score ≥ 8)	13.0%	(11.8%, 14.3%)	12.0%	(10.5%, 13.4%)	7.5%	(3.6%, 11.3%)	15.5%	(12.8%, 18.1%)	19.5%	(12.5%, 26.4%)
Non-medical prescription opioid use										
No	97.2%	(96.6%, 97.8%)	98.1%	(97.6%, 98.7%)	96.2%	(93.0%, 99.4%)	96.1%	(94.6%, 97.6%)	90.3%	(84.7%, 96.0%)
Yes	2.8%	(2.2%, 3.4%)	1.9%	(1.3%, 2.4%)	3.8%	(0.6%, 7.0%)	3.9%	(2.4%, 5.4%)	9.7%	(4.0%, 15.3%)

Variable	Total sample (n = 5,278)		Class 1: low disability, high functioning, low non-specific psychological distress (n = 3,326)		Class 2: high disability, low functioning, moderate non-specific psychological distress (n = 282)		Class 3: moderate disability, functioning and non-specific psychological distress (n = 1,372)		Class 4: high disability, low functioning, high non-specific psychological distress (n = 298)	
	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI	Point estimate	95% CI
Cannabis abuse										
Cannabis use risk level low (ASSIST ≤3)	94.0%	(93.0%, 94.9%)	95.7%	(94.7%, 96.7%)	93.7%	(89.7%, 97.8%)	90.9%	(88.5%, 93.3%)	86.6%	(80.6%, 92.5%)
Cannabis use risk level moderate to high (ASSIST ≥ 4)	6.0%	(5.1%, 7.0%)	4.3%	(3.3%, 5.3%)	6.3%	(2.2%, 10.3%)	9.1%	(6.7%, 11.5%)	13.4%	(7.5%, 19.4%)
Physical injury										
Traumatic brain injury										
No	84.2%	(83.0%, 85.5%)	86.3%	(84.9%, 87.8%)	78.0%	(71.6%, 84.4%)	82.3%	(79.7%, 85.0%)	70.5%	(64.0%, 77.0%)
Yes	15.8%	(14.5%, 17.0%)	13.7%	(12.2%, 15.1%)	22.0%	(15.6%, 28.4%)	17.7%	(15.0%, 20.3%)	29.5%	(23.0%, 36.0%)

2.4.2   Underlying class structure of the population

The correlation between the WHODAS and the GHQ-12 scores was significant (p<0.001); however, the two measures had an R^2 of 0.139 (see the appendix for the correlations between the WHODAS domain scores and the GHQ-12 scores). The latent class models using the WHODAS domain scores and the GHQ-12 scores indicated that a latent class structure of four classes best described the underlying structure of the populations sampled by the CAMH Monitors 2011 to 2013 (see the appendix for the AIC and BIC statistics and for the conditional probability graphs). The prevalence of people in each class was not significantly different by survey year. Of the four classes that described the underlying population, people in Class 1 had low disability, high functioning and low non-specific psychological distress (LD-HF-LNSPD) and accounted for 66.2% (95% Confidence Interval (CI): 64.6%-67.7%) of the examined population; people in Class 2 had high disability, low functioning and moderate non-specific psychological distress (HD-LF-MNSPD) and accounted for 3.9% (95% CI: 3.4%-4.5%) of the examined population; people in Class 3 had moderate disability, moderate functioning and moderate non-specific psychological distress (MD-MF-MNSPD) and accounted for 25.1% (95% CI: 23.6%-26.5%) of the examined population; and people in Class 4 had high disability, low functioning and high non-specific psychological distress (HD-LF-HNSPD) and accounted for 4.8% (95% CI: 4.2%-5.5%) of the examined population. Table 2-2 and Figure 2-1 outline the class structure of the population by the WHODAS and the GHQ-12 scores.

Table 2-2. Class structure based on the average WHODAS and GHQ-12 scores

		GHQ-12 score (non-specific psychological distress)		
		Low	Moderate	High
WHODAS score (disability and functioning)	High		Class 2	Class 4
	Moderate		Class 3	
	Low	Class 1		
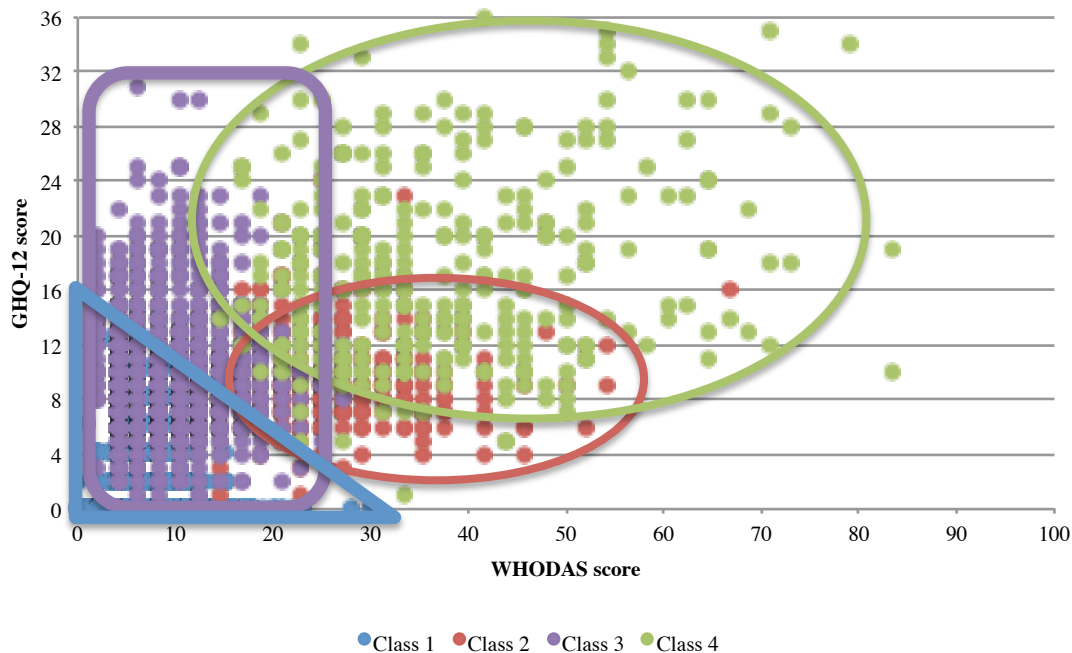
Figure 2-1. World Health Organization Disability Assessment Schedule (WHODAS) scores and General Health Questionnaire (GHQ-12) scores by latent class

These population classes formed a nominal class structure with a measured Cronbach's alpha (for the GHQ-12 scores and the WHODAS domain scores) of 0.708 (95% CI: 0.691 - 0.724). Classes 1, 3 and 4 visually indicated an ordinal relationship between non-specific psychological distress and disability and functioning; however, the measured Cronbach's alpha of 0.712 (95% CI: 0.691-0.731) indicated that there was only satisfactory internal consistency between measures, and, thus, the measures were not univariate and the class structure across these groups was, in fact, nominal. Additionally, among people with MD-MF-MNSPD, some individuals had below average WHODAS scores in a case where we would expect average or above-average WHODAS scores, demonstrating that the WHODAS and the GHQ-12 scores were not univariate.

As the grouping of Classes 1, 3 and 4 was visually different than what was observed for Class 2, we tested to see if there was an interaction between membership in Class 2 and the relationship between the GHQ-12 scores and the WHODAS scores. A likelihood ratio test indicated that the interaction was significant ($p<0.001$) between membership in Class 2 (as compared to Classes 1, 3, and 4 combined) and the relationship between the GHQ-12 scores and the WHODAS scores;

an increase in GHQ-12 scores per increase in WHODAS scores was observed for Classes 1, 3 and 4 combined, but not for Class 2 (see Figure 2-2). Furthermore, when the analysis was restricted to Class 2, there was no significant correlation between the GHQ-12 scores and the WHODAS scores ($p = 0.337$).
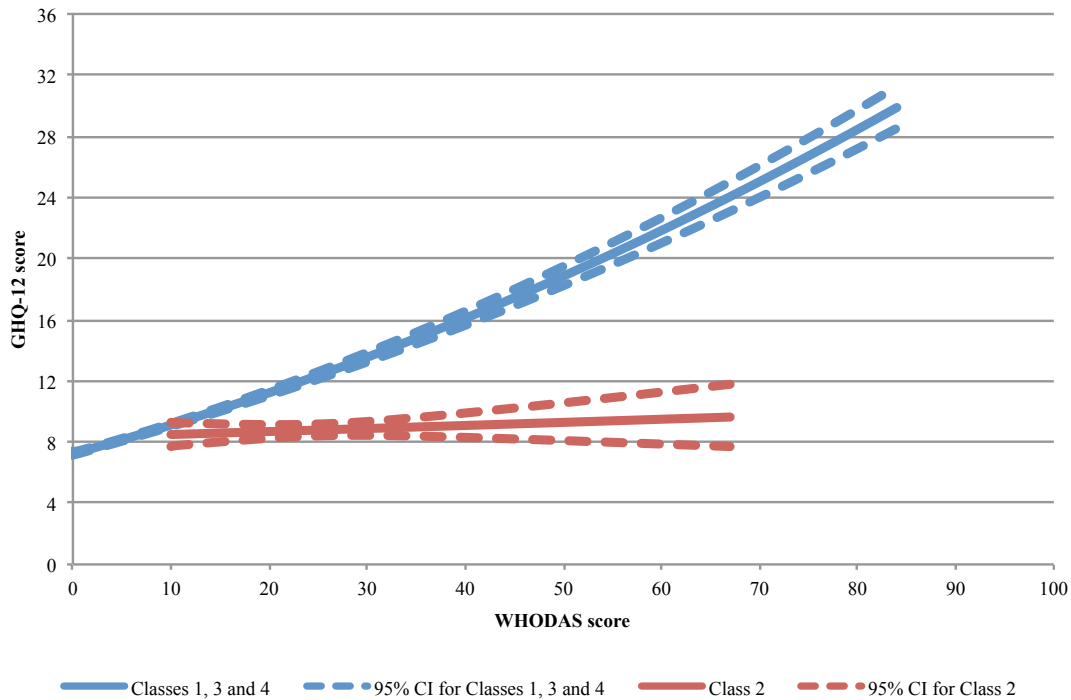
Figure 2-2. The relationship between World Health Organization Disability Assessment Schedule (WHODAS) scores and General Health Questionnaire (GHQ-12) scores by latent class*

* Data presented are constrained by WHODAS score ranges observed in each class group
Class 1: low disability, high functioning and low non-specific psychological distress
Class 2: high disability, low functioning and moderate non-specific psychological distress
Class 3: moderate disability, moderate functioning and moderate non-specific psychological distress
Class 4: high disability, low functioning and high non-specific psychological distress

2.4.3   Correlates of class membership

When we compared people across classes, we observed that being older in age, unemployed (as compared to employed), previously married (as compared to currently married), using anxiolytic and/or antidepressant medications, and having a traumatic brain injury were each associated with an increased probability of being in Class 2 (as compared to Class 1). Additionally, we observed that being a woman, a homemaker, retired or unemployed (compared to full-time employment), being never married or previously married (compared to people who are currently married),

having an alcohol use problem, using non-medical prescription opioids, and having a traumatic brain injury were each significantly associated with an increased risk of being in Class 3 or Class 4. Furthermore, we observed that being older in age, unemployed, previously married, smoking daily, using non-medical prescription opioids, abusing cannabis, and having a traumatic brain injury each significantly increased the risk of being in Class 4. Finally, having a college or university education was significantly associated with a decreased risk of being in Class 4. Table 3 outlines the relative risk ratios for each of Classes 2, 3 and 4 compared to Class 1.

Figure 2-3. Relative Risk Ratios (RRRs) of being in different classes by socio-demographic, substance use and abuse, and traumatic brain injury variables

Variable	Class 2 (HD-LF-MNSPD) compared to Class 1 (LD-HF-LNSPD)			Class 3 (MD-MF-MNSPD) compared to Class 1 (LD-HF-LNSPD)			Class 4 (HD-LF-HNSPD) compared to Class 1 (LD-HF-LNSPD)		
	Point estimate	95% CI	*p-value*	Point estimate	95% CI	*p-value*	Point estimate	95% CI	*p-value*
Age (5 year increase)	1.22	(1.14, 1.31)	<0.001	1.03	(0.96, 1.10)	0.380	1.04	(1.01, 1.07)	0.013
Gender									
Female	REF	-	-	REF	-	-	REF	-	-
Male	0.84	(0.64, 1.11)	0.217	0.75	(0.65, 0.86)	<0.001	0.53	(0.39, 0.72)	<0.001
Employment									
Full-time employment	REF	-	-	REF	-	-	REF	-	-
Part-time employment	1.01	(0.58, 1.76)	0.976	1.20	(0.95, 1.51)	0.134	1.43	(0.87, 2.33)	0.155
Self-employed	0.43	(0.15, 1.20)	0.108	0.95	(0.68, 1.31)	0.741	0.92	(0.42, 2.00)	0.828
Student	0.41	(0.05, 3.08)	0.386	1.35	(0.92, 1.99)	0.124	1.85	(0.81, 4.20)	0.143
Homemaker	1.23	(0.58, 2.64)	0.589	1.71	(1.23, 2.38)	0.002	1.40	(0.67, 2.90)	0.370
Retired	1.38	(0.91, 2.08)	0.130	1.25	(1.02, 1.55)	0.035	1.47	(0.93, 2.32)	0.098
Unemployed	2.12	(0.96, 4.66)	0.061	1.49	(1.00, 2.24)	0.053	4.34	(2.42, 7.81)	<0.001
Other	5.95	(3.24, 10.96)	<0.001	1.78	(1.10, 2.89)	0.020	15.53	(9.23, 26.13)	<0.001
Education									
Less than high school	1.37	(0.93, 2.03)	0.110	1.16	(0.91, 1.48)	0.223	1.37	(0.88, 2.15)	0.167
High school	REF	-	-	REF	-	-	REF	-	-
Some post-secondary	0.92	(0.66, 1.30)	0.644	0.97	(0.81, 1.15)	0.708	1.14	(0.80, 1.63)	0.457
College or University	0.79	(0.54, 1.14)	0.200	0.92	(0.76, 1.10)	0.350	0.66	(0.44, 1.00)	0.050
Marital status									
Cohabiting	1.33	(0.76, 2.34)	0.314	1.01	(0.77, 1.33)	0.932	0.91	(0.52, 1.59)	0.749
Currently married	REF	-	-	REF	-	-	REF	-	-
Never married	1.34	(0.84, 2.13)	0.213	1.50	(1.23, 1.84)	<0.001	0.95	(0.61, 1.48)	0.827
Previously married	1.68	(1.25, 2.26)	0.001	1.41	(1.19, 1.68)	<0.001	1.61	(1.16, 2.23)	0.004
Medication use									

Variable	Class 2 (HD-LF-MNSPD) compared to Class 1 (LD-HF-LNSPD)			Class 3 (MD-MF-MNSPD) compared to Class 1 (LD-HF-LNSPD)			Class 4 (HD-LF-HNSPD) compared to Class 1 (LD-HF-LNSPD)		
	Point estimate	95% CI	*p-value*	Point estimate	95% CI	*p-value*	Point estimate	95% CI	*p-value*
Either (anxiolytics and/or antidepressants)	3.68	(2.63, 5.16)	<0.001	2.66	(2.17, 3.26)	<0.001	9.92	(7.40, 13.30)	<0.001
Drug abuse									
Daily smoking									
No	REF	-	-	REF	-	-	REF	-	-
Yes	1.19	(0.80, 1.77)	0.383	1.06	(0.87, 1.31)	0.555	1.70	(1.21, 2.40)	0.002
Cocaine use (past 12 months									
No	REF	-	-	REF	-	-	REF	-	-
Yes	2.09	(0.42, 10.32)	0.365	1.06	(0.48, 2.35)	0.891	2.67	(0.91, 7.87)	0.074
Alcohol abuse									
No alcohol use problems (AUDIT score < 8)	REF	-	-	REF	-	-	REF	-	-
Alcohol use problems (AUDIT score ≥ 8)	0.83	(0.49, 1.40)	0.488	1.39	(1.12, 1.73)	0.003	1.44	(0.95, 2.18)	0.088
Non-medical prescription opioid use									
No	REF	-	-	REF	-	-	REF	-	-
Yes	1.55	(0.68, 3.56)	0.299	1.75	(1.16, 2.64)	0.007	2.47	(1.29, 4.74)	0.006
Cannabis abuse									
Cannabis use risk level low (ASSIST ≤3)	REF	-	-	REF	-	-	REF	-	-
Cannabis use risk level moderate to high (ASSIST ≥ 4)	2.02	(1.00, 4.11)	0.052	1.64	(1.17, 2.31)	0.004	2.02	(1.15, 3.53)	0.014
Physical injury									
Traumatic brain injury									
No	REF	-	-	REF	-	-	REF	-	-
Yes	1.55	(1.10, 2.17)	0.012	1.48	(1.24, 1.77)	<0.001	2.38	(1.74, 3.26)	<0.001

LD-HF-LNSPD: low disability, high functioning and low non-specific psychological distress
HD-LF-MNSPD: high disability, low functioning and moderate non-specific psychological distress
MD-MF-MNSPD: moderate disability, moderate functioning and moderate non-specific psychological distress
HD-LF-HNSPD: high disability, low functioning and high non-specific psychological distress

2.5   Discussion

A nominal four-class structure resulted when the adult population sample was placed in classes based on disability, functioning and non-specific psychological distress, with the WHODAS domain scores and the GHQ-12 scores not being univariate regardless of the classes examined. Furthermore, among these classes, we observed that in the population class with HD-LF-MNSPD (Class 2, i.e. those with a suspected somatic illness), the GHQ-12 scores were not correlated with the WHODAS scores; however, for all other classes there was a significant correlation. We also observed that a large proportion of the adult population in Ontario had either MD-MF-MNSPD (Class 3) or HD-LF-HNSPD (Class 4). Lastly, we observed that people with HD-LF-HNSPD were more likely to be women, homemakers, retirees or people who were unemployed, people who had never been married or were previously married, people with alcohol use problems, people who used non-medical prescription opioids, and people with a traumatic brain injury.

The findings of this study are unique as the study methodology improves upon previous studies by using a combination of non-specific psychological distress (as measured by the GHQ-12) and disability and functioning (as measured by the WHODAS). Additionally, in order to assess the association between disability and functioning and non-specific psychological distress, previous studies have restricted their study sample to people diagnosed with having a mental and/or behavioural problem [105, 268], whereas this study does not. This difference is important, especially when considering the unclear boundary between normality and mental and behavioural disorders [269], and removes bias by factors such as gender from the process of diagnosis by a physician [270].

2.5.1   Correlates of being in different classes

Among the population groups examined in this study, those individuals with (i) MD-MF-MNSPD (Class 3) and with (ii) HD-LF-HNSPD (Class 4) were more likely to have mental health problems. The results of this study are consistent with other population surveys that have indicated that 15–30% of the adult population experienced a mental disorder in the past year [85, 271-273]. As hypothesized, we found that women were more likely to have HD-LF-HNSPD (Class 4) (a marker for mental health problems [42]), even when correcting for other socio-demographic factors, drug use and drug abuse. We also found, as hypothesized, differences in

the prevalence of employment, education, marital status, drug use and drug abuse by population class. Thus, our analysis demonstrates that socio-demographic factors are related to mental and/or behavioural problems, even when controlling for the possibility that these factors bias physicians' diagnoses [256], and taking into account disability, functioning and non-specific psychological distress.

2.5.2 Class structure based on disability, functioning and non-specific psychological distress

Given the correlates of being in each class, members of Class 1 (LD-HF-LNSPD) are likely to be healthy individuals; members of Class 2 (HD-LF-MNSPD) are likely to have somatic ailments that are associated with age; and members of Class 3 (MD-MF-MNSPD) and of Class 4 (HD-LF-HNSPD) are likely to have mental and/or behavioural health problems, with members of Class 4 having more severe mental and/or behavioural health problems than do members of Class 3.

When analyzing the classes, we found that the WHODAS domain scores and the GHQ-12 scores have satisfactory internal consistency. Thus, data on both the WHODAS domain scores and the GHQ-12 scores provide unique information, and are needed for a complete picture of mental health. Furthermore, some people with MD-MF-MNSPD (Class 2) were observed to have WHODAS scores below the population average, and, thus, the addition of disability and functioning questions to screening tools for mental illness (such as the Kessler Psychological Distress Scale and the GHQ-12 which have been shown to be able to predict only approximately 80% of cases of depression [274]) may increase the predictability of these screening instruments. The results of this study indicate that neither non-specific psychological distress nor disability and functioning is sufficient to characterize mental health, and, thus, both measures may be needed when analyzing the correlates of mental health in a population, rather than examining separately correlates of non-specific psychological distress and correlates of disability and functioning.

2.5.3 Limitations

This study was limited by several factors. First, the CAMH Monitors did not collect information on somatic illnesses, and, therefore, the presence of a somatic illness was inferred based on the disability, functioning and non-specific psychological distress class profiles. Second, the study

was limited by the sample size, and, thus, did not have enough power to detect differences in correlates, such as cocaine use, which are not prevalent in the general population. Third, the findings of this study are based on the CAMH Monitor surveys for 2011 to 2013, which are telephone surveys and have biases by design [24]. For example, the CAMH Monitors excluded populations without a landline or cellphone, such as the homeless and people who are institutionalized (including people who are hospitalized) [153-155]; however, the size of this population is small, and their exclusion is unlikely to noticeably bias the results of this study [24]. Fourth, if the variables examined in this study are associated with participation bias, this bias may lead to an underestimation of the WHODAS scores in the general population [275]. Fifth, the questions used in this study are also susceptible to inaccurate recall of the information (especially over the time periods covered) and to deliberate misreporting of information (especially for drug use and mental health problems, which are highly stigmatized) [23, 24]. Sixth, the measurement of the use of anxiolytic and/or antidepressant medications was not separated into medical use and non-medical use; however, as the prevalence of the non-medical use of prescription anxiolytic and/or antidepressant medications is likely small, our results should not have been impacted appreciably [83, 276]. Seventh, as with all telephone surveys, the response rates for the CAMH Monitors were approximately 50%, and, therefore, non-response bias (which is correlated to substance use and abuse) may bias the results of this study [24]. Additionally, to increase participation rates in Toronto, letters were sent to potential participating households before telephone calls were made to these households, which also may increase bias if there were unequal participation rates in Toronto when compared to the rest of the province of Ontario. Lastly, the information provided by the CAMH Monitors 2011, 2012 and 2013 is cross-sectional, and, thus, an analysis of a causal pathway was not possible.

2.6   Conclusions

Among people without a suspected somatic illnesses, disability and function domain scores and measures of non-specific psychological distress were not univariate and thus, measures of both disability and functioning and non-specific psychological distress provide a better indication of a person's mental health than does either measure alone. Furthermore, as these measures were not univariate, the use of measures of non-specific psychological distress as a screener for mental and behavioural disorders may be improved in terms of specificity and sensitivity by the addition of questions on disability and functioning. Additionally, socio-demographic factors differed

between people with mental and/or behavioural health problems and people who were well. This identification of disparities is important; achieving health equity by identifying and quantifying the determinants of health inequities is a top priority of the World Health Organization (WHO), as reaching health targets without an equitable distribution of health improvements is of limited value [166, 167]. Thus, further research should seek to determine to the extent to which gender, employment and marital status affect potential mediating factors such as health-seeking behaviours and access to health care.

Chapter 3
A study of the disability and functioning of individuals who present at psychiatric hospital emergency services

This research manuscript is currently under peer review with the *Journal of Clinical Psychiatry*

3 A study of the disability and functioning of individuals who present at psychiatric hospital emergency services

3.1 Abstract

The objectives of this study were to firstly compare the level of disability and functioning of patients who access psychiatric emergency services by diagnosis and service use frequency. The second objective of this study, to compare patients who access psychiatric emergency services to the general population in terms of demographics, and the level of disability and functioning. To accomplish these objectives we analyzed data from 450 patients obtained by time-based sampling from August 2011 to February 2012 in the emergency department of a psychiatric hospital that provides services to adults. The 2011 and 2012 Centre for Addiction and Mental Health Monitor surveys were used as a representative adult general population sample. Disability and functioning were measured using the World Health Organization Disability Assessment Schedule (WHODAS). Our study observed that, variation in WHODAS scores among psychiatric emergency patients was observed within but not between diagnostic categories and within frequency of use of these services categories (frequent and non-frequent service users). The WHODAS scores of psychiatric emergency patients were higher than those of the general population; however, there was overlap in the distribution of WHODAS scores. Furthermore, compared to the general population, psychiatric emergency patients were more likely to be younger in age, never married, and unemployed or a student. In conclusion, psychiatric emergency patients are demographically different when compared to the general population. Furthermore, since disability and functioning are highly variable within but not between psychiatric diagnostic categories, data on disability and functioning could be collected for psychiatric emergency patients, in addition to diagnosis data, which may lead to more accurate alignment of patients with the appropriate intensity of services.

3.2   Introduction

Mental and behavioural disorders are highly prevalent [1, 2], and their burden in terms of morbidity and total burden of disease (i.e., disability-adjusted life years lost) is high [6, 19]. Thus, the treatment of these disorders should be a global health priority [277]. However, treatment rates of mental and behavioural disorders are fairly low, ranging from 69% for schizophrenia to 24% for substance use disorders [21, 90, 160]. Additionally, patients with mental and behavioural disorders often use costly emergency departments (EDs) due to barriers to accessing mental health or addiction treatment [162-164].

Diagnoses were developed and have evolved over time to inform prognosis and to align patients with treatments specific to their diagnosis [18]. For example, patients with psychotic disorders are prescribed an antipsychotic and patients with mood/anxiety disorders are prescribed an anxiolytic and/or an antidepressant. In addition to diagnosis, disability and functioning could be important measures for determining the appropriate intensity of diagnostically-specific treatment(s), and, thus, it is imperative to assess if there are differences in disability (defined as "what a person cannot do when ill" [42]) and in functioning (defined as objective performance in a given life domain [42]) (both measured by the World Health Organization Disability Assessment Schedule version 2.0 (WHODAS 2.0)) among and between the diagnostic categories of alcohol use problems, drug problems and mental health problems [42]. The level of disability and functioning can be inferred in the criteria outlined in the DSM-5, but the determination of disability within this framework is not well standardized [13]. A study has found differences in mental health disability by broad mental and behavioural diagnostic categories [278]. The impact of the symptoms by diagnostic category on disability and functioning suggests that, on average, diseases such as schizophrenia have a higher impact on disability and function than does bipolar disorder which, in turn, has a higher impact on disability and function than does major depressive disorder [13]. Thus, we hypothesize that levels of disability and functioning will differ by diagnosis. Thus, an investigation of the differences in disability and functioning by more precise diagnostic categories (when compared to Üstün and colleagues [42]) was warranted to determine if differences exist within these broad categories (such as disability and functioning among patients with schizophrenia, as compared to disability and functioning among patients

with mood [affective] disorders). Furthermore, this analysis will provide an opportunity to expound on the relative merits of using level of disability and functioning in addition to diagnosis to screen and triage a sample of individuals in order to align them with appropriate resource intensities.

Patients who frequent psychiatric emergency services are a heterogeneous group of patients with multiple health care needs [182, 215]. A systematic review found that frequent ED users tend to be sicker (they have higher number of comorbidities, hospital admissions and higher triage priority) than non-frequent ED users [209]. However, the studies included in the systematic review have not examined the level of disability and functioning of frequent and non-frequent psychiatric ED users, which we hypothesize will significantly differ between frequent and non-frequent psychiatric ED users. Therefore, an examination of the disability and functioning of patients who access emergency psychiatric services by frequency of use is warranted.

Given the gaps in the current literature, one objective of this paper was to present an assessment of the level of disability and functioning by diagnosis of patients who present at psychiatric emergency services. Secondly, this study aimed to assess differences in disability and functioning by frequency of psychiatric emergency services use. Finally, this study assessed differences in patients who access psychiatric emergency services compared to a general population in terms of demographics and the level of disability and functioning.

3.3   Methods

3.3.1   Psychiatric emergency services sample

Data were collected on patients at least 17 years of age who presented at the Centre for Addiction and Mental Health (CAMH) psychiatric emergency services from August 2011 to February 2012. Patients were recruited using time-based sampling, with the sampling based on the number of patients who usually visit the EDs by hour over a 24-hour period. Trained interviewers along with a staff psychiatrist approached potential participants. If a potential participant was deemed not sufficiently psychologically stable to be interviewed by a staff psychiatrist in the ED, the individual was contacted later at the Crisis Clinic.

Prior to their participation in the study, participants provided written informed consent. The length of the participant interview was approximately 45 minutes. Participants were compensated with 20 Canadian dollars for their participation.

Using patients' medical records numbers, we matched our survey data to 2011 and 2012 data from the CAMH psychiatric emergency services database. From this database, we obtained for each patient the 4-digit ICD-10 code diagnosis (as specified by the psychiatrist who saw the patient in emergency care) that was the primary reason for any visit within one year of recruitment (six months (188 days or half a year) before and six months after recruitment). Diagnoses were further categorized into seven groupings as follows: mental and behavioural disorders due to psychoactive substance use (ICD-10 codes: F10-F19), schizophrenia, schizotypal and delusional disorders (F20-29), mood [affective] disorders (F30-F39), neurotic, stress-related and somatoform disorders (F40-F48), disorders of adult personality and behaviour (F60-F69), and all other diagnoses. Statistics for diagnosis code groupings other than those presented above were not possible due to sample size limitations. Furthermore, diagnostic grouping prevents bias from the lack of reliability of diagnostic coding for mental and behavioural disorders, as the intra-rater agreement on large diagnostic groupings is much better than the intra-rater agreement on a more specific diagnosis [279].

Disability and functioning were examined by frequency of CAMH psychiatric emergency services use. "Frequent use" was defined as five or more visits within a one-year period; this definition of frequent use is consistent with other studies where the definition of frequent use usually ranges from three to five visits per year [209]. The one-year period was operationalized as six months before and six months after recruitment.

3.3.2   General population (comparison) sample

The 2011 and 2012 CAMH Monitors [153, 154] were used as the general population comparator group. The 2011 and 2012 CAMH Monitors were a county-stratified two-stage (telephone household, respondent) probability sampling of adults from the province of Ontario in Canada (18 years and older) performed between January 2011 and December 2012, and had response rates of 51% for 2011 and 51% for 2012. The surveys were conducted using random-digit-dialling methods and computer-assisted telephone interviewing. The total sample size included in

the analysis was 6,069 adults. *A posteriori* population expansion weights were calculated for the CAMH Monitors by triangulating survey data with census information on age and gender.

3.3.3 Measures

3.3.3.1 Demographics

The CAMH psychiatric emergency services data set contained information on diverse socio-demographic variables, including gender, age, marital status and current employment status. These variables were also available for the CAMH Monitors 2011 and 2012.

3.3.3.2 Measures of disability and functioning

The WHODAS 2.0 is a general measure of functioning and disability in the following major life domains: (i) cognition, (ii) mobility, (iii) self care, (iv) getting along, (v) life activities, and (vi) participation in society. Furthermore, the WHODAS 2.0 can also be mapped to the International Classification of Functioning, Disability and Health [61] and can clearly distinguish between measurements of symptoms, disability and subjective appraisal [42].

The WHODAS 2.0 applies to all diseases, including physical, mental and substance-use disorders, assesses disability in a culturally-sensitive manner across a standard rating scale, has been tested in numerous countries, and has been found to have good concurrent validity measures such as the WHO Quality of Life measure [53], the London Handicap Scale [54], the Functional Independent Measure [58], and the Short Form Health Survey [55]. Furthermore, the WHODAS has been shown to be good at differentiating the nature and severity of psychiatric issues [280].

The WHODAS score ranges from 0 to 100, with 0 representing no disability and perfect functioning and 100 representing an extreme disability and decreased functioning. The psychiatric emergency patient sample was assessed using the 36-item WHODAS version 2.0, while the CAMH Monitors used the 12-item inventory. The 12-item WHODAS explains 81% of the variance of the 36-item WHODAS [42].

3.3.4 Statistical Analyses

Disability and functioning comparisons were performed using quasi-Poisson regressions adjusted for the hypothesized confounding factors of age and gender [281]. As a person could have more

than one diagnosis, differences in WHODAS scores were assessed using a specific diagnosis group as the dependent variable and the WHODAS score, age, and sex and other psychiatric diagnoses as independent variables. When multiple tests were required for a hypothesis, a Bonferroni correction was employed. To account for potential effect modification, the differences in the WHODAS scores among individuals who presented at psychiatric emergency services as compared to the general population were examined by gender. Socio-demographic differences between the general population and the psychiatric ED patient population were performed using survey χ^2 tests. All analyses that included the CAMH Monitors 2011 and 2012 accounted for the complex survey design.

All analyses were performed using R version 3.1.3 [264] and the R software package 'survey' [267].

3.3.5   Ethics

Ethics approval for this project was obtained from the CAMH Research Ethics Board (REB) (approval code: 186/2010-02) and the University of Toronto REB (approval code: 28872).

3.4   Results

A total of 468 patients completed the interview, representing 15.4% of all patients who visited the CAMH psychiatric emergency services during the study period. A total of 12 patients had their interview stopped, as they became psychologically unstable. Data on all variables were available for 450 patients. Of the 450 participants, 6.7% were not located within the CAMH ED database and, thus, were not included in the analysis of disability and functioning by diagnosis.

3.4.1   Psychiatric emergency services sample characteristics

Among the 450 study participants who presented at psychiatric emergency services, 52.7% were male, 47.1% were female and 0.2% identified as transgender. The average age of study participants was 36.5 years, the majority (71.6%) of study participants were never married, and 40.0% were unemployed (see Table 1). Significant differences between the psychiatric ED sample and the general population sample were observed by age, marital status and employment status, but not by gender.

Based on records of primary psychiatric diagnoses at CAMH, 21.9% of participants presented for psychoactive substance use, 20.2% for schizophrenia, schizotypal and/or a delusional disorder, 55.7% for a mood [affective] disorder, 16.7% for neurotic, stress-related and somatoform disorders, 4.8% for a disorder of adult personality and/or behaviour, and 5.5% for another cause to the CAMH EDs in 2011/12. The participants who accessed psychiatric emergency services at CAMH did so on average 2.1 times (standard deviation: 2.2) in the one-year period surrounding their survey measurement visit. Additionally, 10.2% of all participants who presented at psychiatric emergency services were frequent users of these services (≥5 visits in the year surrounding their survey measurement visit).

Table 3-1. Demographics of the general population and of patients who accessed psychiatric emergency services by diagnosis and frequency of use

	Emergency and ambulatory psychiatric services sample									General population survey
	All	F10-F19*	F20-F29*	F30-F39*	F40-F49*	F60-F69*	All other diagnoses	Frequent users (>= 5 visits in one year)	Non-frequent users (<5 visits in one year)	
	450	92	85	234	70	20	23	46	404	n = 3742
Gender										
Male	52.7%	66.3%	51.8%	48.7%	42.9%	30.0%	52.2%	47.8%	53.2%	47.5%
Female	47.1%	33.7%	48.2%	50.9%	57.1%	70.0%	47.8%	52.2%	46.5%	52.5%
Transgender	0.2%	-	-	0.4%	-	-	-	-	0.2%	-
Age (years)										
15 to 24	26.7%	17.4%	23.5%	26.5%	34.3%	55.0%	17.4%	23.9%	27.0%	13.1%
25 to 34	22.4%	28.3%	17.6%	23.5%	22.9%	25.0%	26.1%	21.7%	22.8%	15.3%
35 to 44	21.3%	25.0%	23.5%	20.9%	15.7%	15.0%	13.0%	21.7%	21.3%	21.0%
45 to 54	18.2%	19.6%	22.4%	16.2%	22.9%	-	30.4%	19.6%	18.1%	19.2%
55 to 64	8.2%	9.8%	8.2%	9.0%	4.3%	5.0%	13.0%	13.0%	7.7%	16.0%
65 plus	3.1%	-	4.7%	3.8%	-	-	-	-	3.2%	15.5%

	Emergency and ambulatory psychiatric services sample									General population survey
	All	F10-F19*	F20-F29*	F30-F39*	F40-F49*	F60-F69*	All other diagnoses	Frequent users (>= 5 visits in one year)	Non-frequent users (<5 visits in one year)	
	450	92	85	234	70	20	23	46	404	n = 3742
Marital status										
Currently married	14.0%	13.0%	4.7%	17.5%	10.0%	10.0%	4.3%	8.7%	14.6%	59.6%
Cohabiting	6.7%	12.0%	8.2%	6.4%	2.9%	5.0%	13.0%	6.5%	6.7%	7.1%
Previously married	7.6%	7.6%	4.7%	8.1%	7.1%	5.0%	8.7%	4.3%	7.9%	10.5%
Never married	71.6%	67.4%	82.4%	67.5%	80.0%	80.0%	73.9%	80.4%	70.5%	22.2%
Missing	0.2%	-	-	0.4%	-	-	-	-	0.2%	0.7%
Employment status										
Paid work	24.9%	21.7%	14.1%	25.2%	30.0%	20.0%	26.1%	6.5%	27.0%	59.6%
Self employed	4.0%	7.6%	2.4%	3.0%	4.3%	-	-	4.3%	4.0%	4.8%
Student	13.1%	4.3%	7.1%	15.4%	18.6%	20.0%	4.3%	6.5%	13.9%	7.5%
Keeping house/Homemaker	1.1%	-	1.2%	1.3%	-	-	-	-	1.2%	3.6%
Retired	3.3%	3.3%	2.4%	3.8%	-	-	-	-	3.7%	17.8%
Unemployed	40.0%	46.7%	56.5%	38.5%	35.7%	40.0%	56.5%	63.0%	37.4%	3.6%

	Emergency and ambulatory psychiatric services sample									General population survey
	All	F10-F19*	F20-F29*	F30-F39*	F40-F49*	F60-F69*	All other diagnoses	Frequent users (>= 5 visits in one year)	Non-frequent users (<5 visits in one year)	
	450	92	85	234	70	20	23	46	404	n = 3742
Other	13.3%	16.3%	16.5%	12.4%	10.0%	20.0%	13.0%	19.6%	12.6%	2.6%
Missing	0.2%	-	-	0.4%	-	-	-	-	0.2%	0.4%
Number of visits (1 years)	2.1	3.0	3.4	2.3	3.1	4.5	4.3	7.4	1.5	-

* ICD-10 codes: F10-F19: Mental and behavioural disorders due to psychoactive substance use, F20-29: schizophrenia, schizotypal and delusional disorders, F30-F39: mood [affective] disorders, F40-F48: neurotic, stress-related and somatoform disorders, F60-F69: disorders of adult personality and behaviour

3.4.2 Disability and functioning by diagnostic category in psychiatric emergency services sample

The average WHODAS score for participants who accessed psychiatric emergency services was 37.4 (95% Confidence Interval (CI): 35.6 to 39.3) using the 36-item WHODAS 2.0. Figure 3-1 outlines the distribution of WHODAS scores for the psychiatric emergency services sample (by diagnostic category and frequency of use of psychiatric emergency services) and for the general adult population. When comparing the WHODAS scores of participants who accessed psychiatric emergency services by diagnostic categories (adjusting for age, sex and other diagnoses), no significant differences were observed when comparing any diagnostic category to all other diagnostic categories (controlling for age, sex and presence of another diagnosis); however, variation in WHODAS scores within diagnostic categories was observed. Figure 3-2 outlines the WHODAS domain scores for the psychiatric emergency services sample and for the general population (by diagnostic category and frequency of use of psychiatric emergency services). As with the total WHODAS score, no significant differences were observed when comparing the domain scores of the WHODAS by diagnostic category.

3.4.3 Disability and functioning by frequency psychiatric emergency services use

As with disability and functioning by diagnostic category, when separated by frequency of psychiatric emergency services use, there were no significant differences observed in the overall WHODAS scores or WHODAS domain scores of patients who were frequent users of psychiatric emergency services compared to patients who were non-frequent users of psychiatric emergency services (adjusted for age and sex).
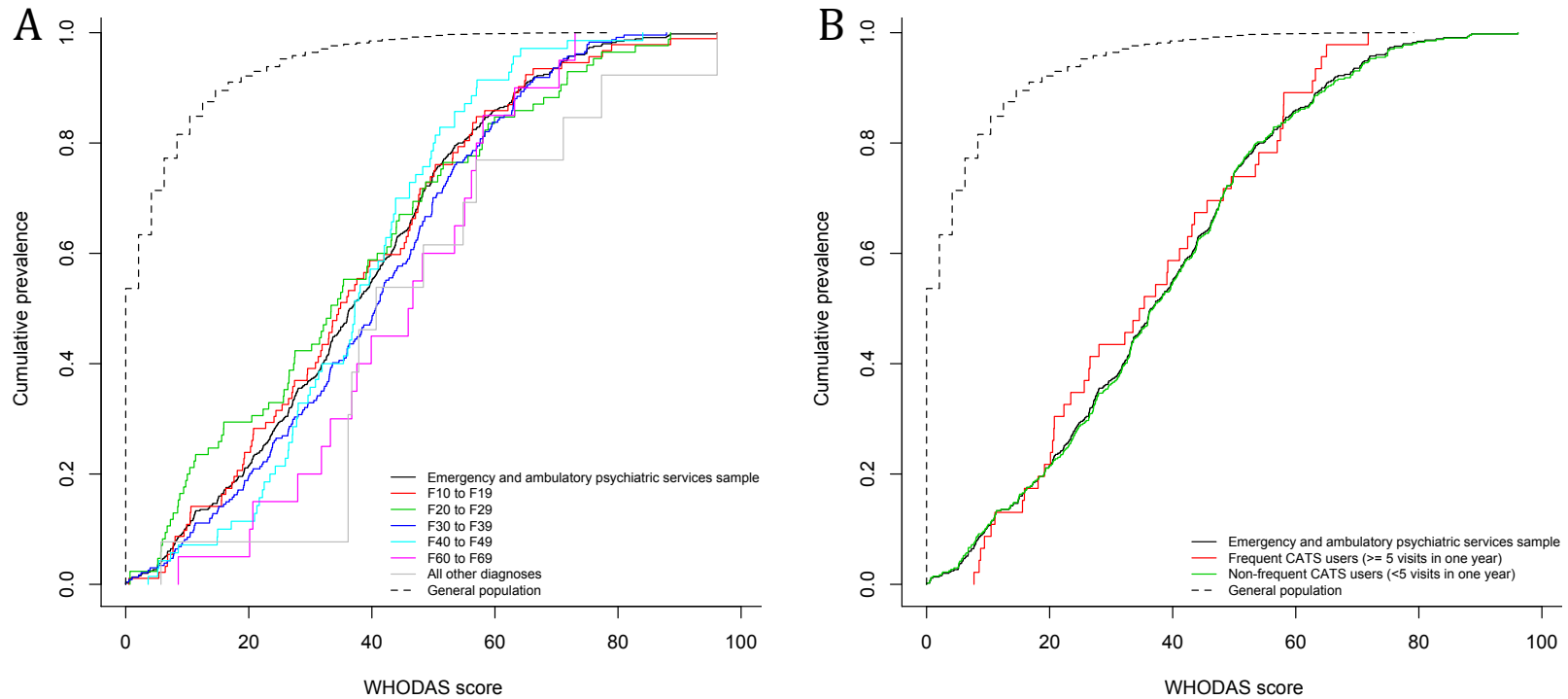
Figure 3-1. Percentile graphs for patients who accessed emergency psychiatric services and for the general population by (A) diagnosis*, and (B) frequency of use

* ICD-10 codes: F10-F19: Mental and behavioural disorders due to psychoactive substance use, F20-29: schizophrenia, schizotypal and delusional disorders, F30-F39: mood [affective] disorders, F40-F48: neurotic, stress-related and somatoform
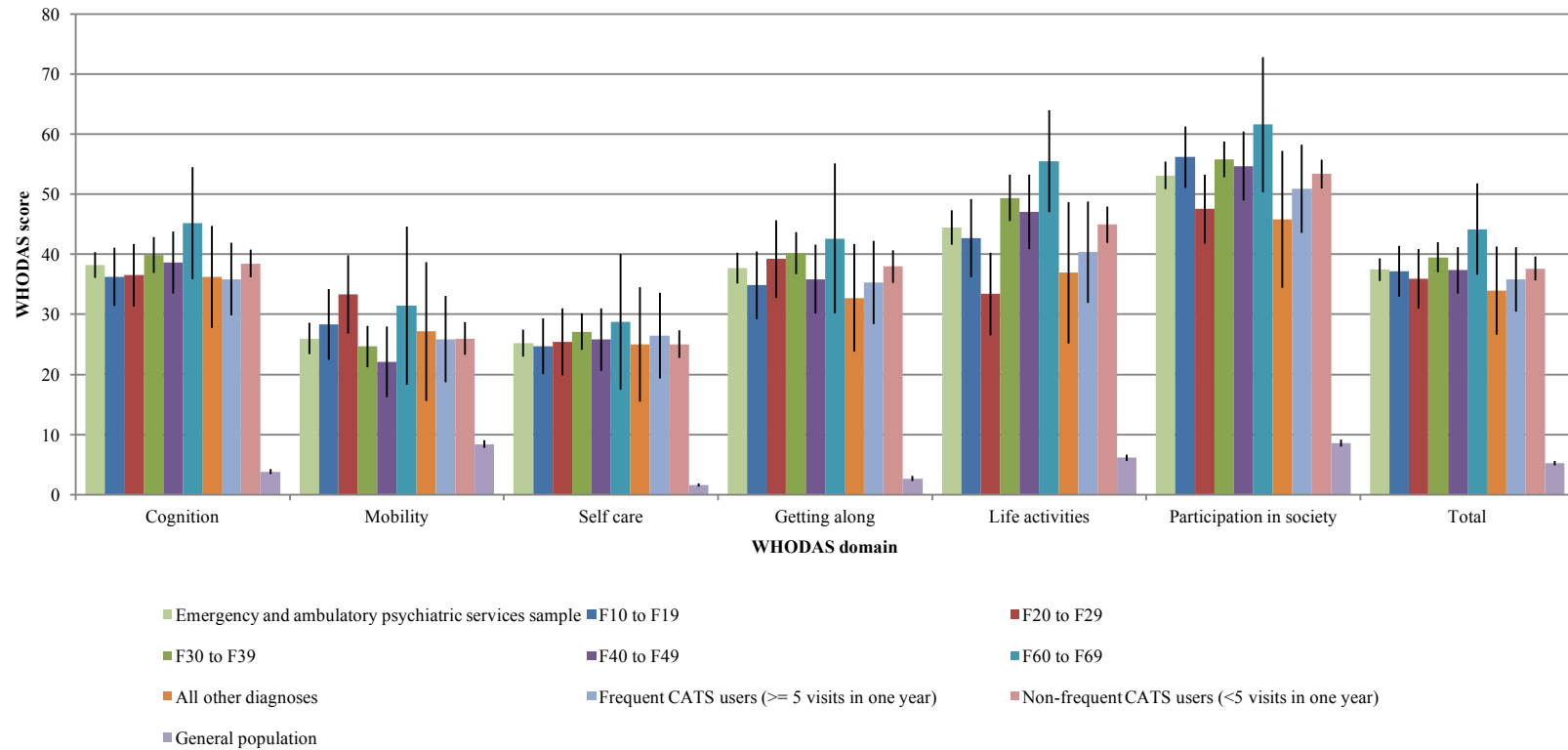
Figure 3-2. WHODAS domain scores for patients who accessed psychiatric emergency services (by diagnosis and frequency of use of psychiatric emergency services) compared to the general population* **

* Error bars represent 95% Confidence Intervals

** ICD-10 codes: F10-F19: Mental and behavioural disorders due to psychoactive substance use, F20-29: schizophrenia, schizotypal and delusional disorders, F30-F39: mood [affective] disorders, F40-F48: neurotic, stress-related and somatoform disorders, F60-F69: disorders of adult personality and behaviour

3.4.4 Comparison of the psychiatric emergency services sample to a general population sample

The patients who accessed psychiatric emergency services were more likely to be younger in age, were more likely to have never been married or to have been previously married, and were more likely to be a student or currently unemployed when compared to the general population of Ontario. As previously noted, the average WHODAS score for patients who accessed psychiatric emergency services was 37.4, whereas the general population had a significantly different (adjusted for age and sex) average WHODAS score of 5.2 (95% CI: 4.9 to 5.6). There was an increasing prevalence ratio of patients who accessed psychiatric emergency services as compared to the general population as the WHODAS scores increased while controlling for age and sex (p<0.001). Figure 3-3 outlines the prevalence ratios by WHODAS scores for patients who accessed psychiatric emergency services in comparison to the general population. The prevalence ratio of being in the psychiatric emergency services sample for WHODAS scores above 30 was higher for women than for men. For example, the prevalence ratio of being in the psychiatric emergency services sample for WHODAS scores of 70 to 100 was 241 (95% CI: 108 to 540) for women and 176 (95% CI: 93 to 331) for men.

A

B

C
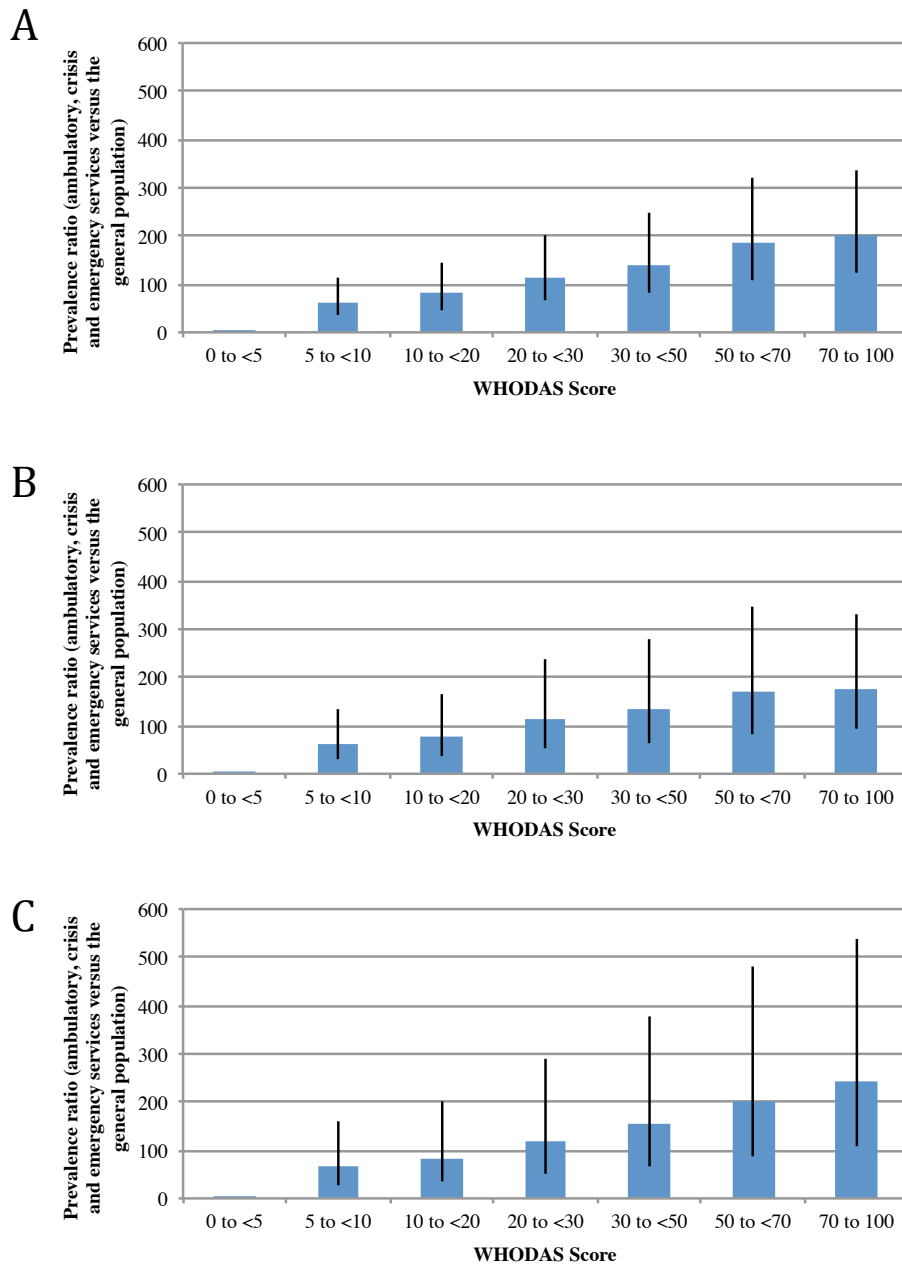
Figure 3-3. **Prevalence ratios by WHODAS 2.0 score for patients who accessed psychiatric emergency services compared to the general population for (A) men and women, (B) men, and (C) women**

The difference between the general population and the psychiatric emergency services sample was not equal for all domains of disability and functioning. Interestingly, the WHODAS 2.0 questions that provided the greatest relative difference in scores between the general population and the psychiatric emergency services sample were those concerning participation in society,

with people in the patient sample being much more emotionally affected by their health problems and having difficulty joining in community activities when compared to the general population.

3.5   Discussion

This is the first study to examine disability and functioning using the WHODAS for patients who accessed emergency services (see Panel 3-2), although other narrow measures of disability and functioning, such as activities of daily living, have been used to predict the frequency of ED visits [282]. This study is also important considering the WHODAS' potential role in triaging patients, aligning patients with the appropriate intensity of resources, and measuring changes in patients' disability and functioning after seeking treatment at an ED for a mental and/or behavioural disorder.

Panel 3-1. WHODAS use in emergency services

Systematic search strategy

We searched PubMed up to and including March 24, 2015 using the measurement search terms: WHODAS, "WHO DAS", "World Health Organization Disability Assessment Schedule", "World Health Organization's Disability Assessment Schedule", "WHO Disability Assessment Schedule", "WHO's Disability Assessment Schedule" combined with the population search terms: "emergency", "ambulatory", "crisis". The systematic review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Guidelines [224].

Results and interpretation

Of the four search results that were returned, none was relevant after examination of titles and abstracts. The WHODAS has never been used in peer-reviewed research to examine disability and functioning among people who visit emergency psychiatric health services. Therefore, this is the first study to examine the use of WHODAS to measure disability and functioning in an emergency services setting. The use of measures such as the WHODAS to accurately measure disability and functioning within emergency patient populations may be a useful additional tool to help triage patients as well as to assist medical personnel in determining appropriate treatment(s).

Furthermore, contrary to what was hypothesized, among patients who accessed psychiatric emergency services, no significant differences in disability and functioning were observed among diagnostic categories. Furthermore, and again contrary to what was hypothesized, no significant differences were observed in disability and functioning by frequency of psychiatric emergency services use. Disability and functioning were highly variable *within* diagnostic categories and visit frequency, which may explain our inability to discriminate disability by diagnosis or frequency. This study did observe that patients who used psychiatric emergency services were more likely to be younger in age, never married or previously married, and/or a student or currently unemployed when compared to the general population. This study also observed that patients who used psychiatric emergency services experienced greater disability and decreased functioning when compared to the general population.

3.5.1   Disability and functioning and their relationship to diagnostic category

In contrast to our hypothesis that disability and functioning would differ by diagnostic category, and despite distress, disability, dyscontrol and dysfunction being stated as the basis for mental and behavioural disorder categorizations [13, 283-286], we did not observe significant differences in disability and functioning by diagnosis, despite what has been observed previously in non-emergency samples [42, 43]. This observed non-significant association between disability and functioning and diagnosis is consistent with existing evidence about the predictive ability of psychiatric diagnosis with and without disability measurement. Among patients with psychiatric disorders, diagnosis alone is not sufficient to predict service needs [192], length of hospitalization [193], level of care required [194], and outcomes of hospitalization [195], but the additional measurement of disability improves the prediction of health services utilization [287], length of hospitalization [196], and improvement in functioning after hospitalization [195]. The intensity of resource allocation and treatment has been suggested to be best determined by the disability experienced by a person [288]. Therefore, given that we found that diagnosis did not indicate disability, disability and not diagnosis could be used to determine the intensity of treatment a person receives. Furthermore, our results suggest that information on disability and functioning obtained using a standardized instrument, such as the WHODAS, would improve our limited understanding of the living experiences of a patient with a mental or behavioural disorder, in order to help guide treatment interventions and management strategies, to align patients with a range of resources, and to measure improvements in disability and functioning after the administration of various treatments [42]. However, as disability and functioning did not predict frequent ED use, additional measures could be collected to align patients with treatments that prevent ED recidivism.

3.5.2   Frequent ED visits

Since 1990, there has been a large increase in the number of mental health-related general hospital ED visits in the United States and in countries [211, 212, 214]. Targeting frequent users of emergency services may present an opportunity to minimize any resulting increase in costs, while, at the same time, it is important not to jeopardize the health outcomes of this population. In contrast to what was hypothesized, this study did not find statistically significant differences in the disability and functioning of frequent users of psychiatric emergency services as compared to non-frequent users. This observation indicates that the severity of disability and decreased

level of functioning in both frequent and non-frequent users of psychiatric emergency services may be correlated with multiple factors, such as the chronic nature of the condition for which they are seeking treatment, the effectiveness of treatments previously received, satisfaction with treatments previously received, and access to non-emergency mental health care [209]; these factors should be explored in future research.

3.5.3 Psychiatric ED use and disability and functioning as compared to the general population

Although the WHODAS scores for patients who accessed psychiatric emergency services were significantly different compared to the general population, a wide range of the level of disability and functioning among patients who sought psychiatric emergency treatment was observed. Therefore, even at higher scores, an increase in the WHODAS score is associated with the probability that an individual will present at psychiatric emergency services; however, an analysis that corrects for other emergency services use is needed to determine if this is the case for patients who seek emergency services for mental and behavioural disorders in general. The wide range of scores also indicate that patients with lower WHODAS scores may be using psychiatric emergency services for non-emergency issues as a result of dissatisfaction with previous health care services they have received in a general hospital and/or due to barriers related to receiving general care [162, 163, 209]. Furthermore, our data indicate that women were more likely to seek medical treatment for psychiatric problems at higher WHODAS scores, while men were more likely to seek medical treatment for psychiatric problems at lower WHODAS scores. This has been observed for general hospital EDs, with men being more likely to use EDs for non-emergency treatment [289], and women being more likely to seek treatment for psychiatric diseases [290]. Therefore, efforts could be made to increase access to and utilization of primary care for psychiatric problems among men in order to prevent costly ED treatment for non-emergency conditions.

3.5.4 Limitations

This study has several limitations. The sample size of patients who accessed psychiatric emergency services is limited due to the following reasons. Firstly, psychiatric emergency services are an emerging care model and, as a result of the nature of these services, those who access them may differ from those people who access general hospital EDs for their psychiatric

issues. Secondly, participants in this study needed to be sufficiently psychologically stable to participate, and, thus, participants with attention deficit disorder or with unspecified dementia were excluded from the study. These mental disorders are more disabling when compared to others and, thus, their exclusion could reduce the differences between diagnostic categories [13]. Thirdly, data from this study are from one ED, and, thus, the external validity of these results is unknown. In addition, the clinical sample size was not sufficient to detect small differences in disability and functioning by diagnostic category. Another limitation is that only the primary diagnosis was provided per visit to CAMH emergency services, even though patients can have multiple psychiatric comorbidities. Furthermore, data on refusal rates and reasons were not collected; however, as indicated by interviewers, refusal rates were low. If refusal was non-random and associated with disability, functioning and diagnosis, this may limit our ability to observe differences in disability and functioning by diagnosis. Lastly, data on demographic factors such as homelessness, and somatic health conditions such as cancer, heart disease, and respiratory problems were not collected and, thus, could not be controlled for.

The CAMH Monitors were population telephone surveys and, thus, had common limitations that are inherent with all such surveys [24, 291-293]. For example, the CAMH Monitors excluded populations without a landline or cellphone, such as individuals who are homeless and who are institutionalized (including people who are hospitalized) [153, 154]; however, the size of this population is small, and, thus, their exclusion is unlikely to bias the results of this study [24]. Additionally, if disability and functioning are associated with participation bias [275, 294], this bias may lead to an underestimation of WHODAS scores in the general population.

3.6   Conclusions

Among patients who accessed psychiatric emergency services, we observed a large variation in disability and functioning within psychiatric diagnostic categories; however, the disability boundaries between diagnostic categories were non-significant. Thus, disability and functioning data in addition to diagnosis data for patients with mental and behavioural disorders could be systematically collected in EDs as these data may aid in triaging patients and aligning them with the appropriate intensity of care and resources. Furthermore, as disability and functioning were not associated with the frequency of use of psychiatric emergency services, other possible explanations for the frequency of use of such services should be investigated to ensure that these

patients are receiving adequate psychiatric care in and outside of EDs to address their specific health care needs.

Chapter 4
Predisposing and level of illness predictors of the risk of recidivism to a psychiatric emergency department

4 Predisposing and level of illness predictors of the risk of recidivism to a psychiatric emergency department

4.1 Abstract

A subset of patients who visit psychiatric emergency departments (EDs) do so frequently, creating a considerable drain on resources. We examined if the number of prior psychiatric ED visits, baseline disability and functioning, primary diagnosis of the baseline visit to the psychiatric ED, age, gender, marital status, and/or employment status predict the hazard of recidivism to a psychiatric ED and/or the number of subsequent psychiatric ED visits among ED recidivists. To accomplish this objective we analyzed data from a sample of 415 patients obtained from August 2011 to February 2012 in the emergency department of the Centre for Addiction and Mental Health (CAMH), a psychiatric hospital in Toronto, Canada by time-based sampling. Data on follow-up ED visits at CAMH were obtained from the hospital database. Disability and functioning were measured using the World Health Organization Disability Assessment Schedule (WHODAS). Factors affecting the time to the next psychiatric ED visit were assessed using a Cox proportional hazards model, while the number of subsequent psychiatric ED visits was assessed through a zero-inflated negative binomial model. Within a year of baseline, 38.3% of all study participants had a subsequent psychiatric ED visit; among people who had a subsequent psychiatric ED visit, the average number of subsequent visits was 2.94. The number of before baseline ED visits, the WHODAS score, and employment status were predictors of the hazard of a subsequent psychiatric ED visit, whereas diagnosis, age, gender and marital status were not. The effect of a higher WHODAS score was time-dependent, with the magnitude of the effect of the WHODAS score on the hazard of a subsequent psychiatric ED visit decreasing over time. Furthermore, only the number of previous ED visits and employment status predicted the number of psychiatric ED visits within the following year, whereas diagnosis, disability and functioning, age, gender and marital status did not. In conclusion, data on the number of ED visits in the six months before baseline and the WHODAS score could be used when determining the intensity of resources allocated to reducing psychiatric ED recidivism. Furthermore, more research is needed to determine the exact nature of the relationship between employment and psychiatric ED recidivism.

4.2   Introduction

Among patients who access Emergency Departments (EDs), a small subset of these patients are high utilizers who create considerable costs for the health care system [205-208]. Specifically, a systematic review found that while frequent users comprise 4.5% to 8% of all ED patients, they account for 21% to 28% of all visits [209]. Furthermore, high frequency ED use is a growing problem, as the number of frequent ED users has increased since 1990 in the United States [211, 212] and in other countries, such as Canada [213] and Australia [214]. Of the conditions that contribute to frequent ED use, psychiatric conditions are the greatest cause of the frequent use of ED services [216], with a study observing that greater than 90% of frequent ED users have at least one psychiatric diagnosis [217]. Thus, understanding the determinants of recidivism amongst individuals who are high frequency ED users for psychiatric reasons is an important component of any intervention to address high frequency ED use in general.

In addition to costs, recidivism to the ED by people with psychiatric conditions may indicate that the primary objective of their treatment in an ED, which is to minimize their short-term morbidity (in the case of substance abuse and suicidal idealization, a reduction in mortality is also a goal) [183], has not been met. Furthermore, frequent use of EDs also may be an indicator of insufficient aftercare. Studies show that people with mental and behavioural disorders who attend EDs for treatment are often not referred to appropriate facilities or resources and encounter insufficient or inadequate aftercare [218-220]. Furthermore, recidivism to the ED has been suggested as a performance indicator of treatment at an ED [221]. Thus, one of the most productive ways to measure the effectiveness of initial and/or follow-up treatment in an ED is to determine the number of subsequent visits by these patients to an ED.

The current literature on recidivism to an ED for psychiatric conditions may be of limited value as it focuses on frequent users of psychiatric EDs, and not on the hazard of recidivism or the number of visits among recidivists. Additionally, these prior analyses use categorizations of frequent ED users (which are often inconsistent [209, 295]) that exclude people who may have multiple psychiatric emergency visits but who do not meet the threshold of frequent use. Furthermore, the cumulative burden on health care resources caused by repeat visits that are under this threshold of frequent ED use may be greater than the burden caused by the visits of designated frequent users if the number of sub-threshold psychiatric ED recidivists is large.

4.2.1 Predictors of ED recidivism

Reaching a better determination of the factors that are correlated with psychiatric ED recidivism is an important and necessary first step to reduce ED recidivism and to identify patients whose conditions could be managed in primary care settings or by auxiliary services. Most importantly, past behaviours have been shown to predict future behaviours [296], with past frequency of episodic ED use being shown to predict future use [297-300]; however, only a few studies have examined the effect of past frequent ED use on future frequent ED use [209].

Numerous, different mental and/or behavioural conditions are treated at psychiatric EDs. Frequent users of EDs for psychiatric illnesses have been found to have more serious diagnoses than do non-frequent users [222], and diagnoses of chronic mental and behavioural disorders [248]. Specifically, frequent ED use for psychiatric illnesses is more likely to result in a diagnosis of a psychotic disorder [248, 250, 251], schizophrenia [250], personality disorder [248, 250], anxiety disorder [248] and substance abuse [248]. Different mental and behavioural disorders also have various pathologies with different relapse and remittance characteristics [13], and treatment rates and outcomes differ based on diagnosis [6, 9]. Furthermore, the frequency of using psychiatric ED services may be correlated with the condition for which treatment is sought, the effectiveness of treatments previously received, and the level of satisfaction with treatments previously received, all of which differ by diagnosis [209].

EDs are utilized by a range of psychiatric patients, with different levels of disability and functioning for both primary and secondary care. In particular, EDs are often utilized when individuals have difficulty accessing mental health or addiction treatment [162-164], and access to primary health care is considered to be a currently unmet need of utmost importance for people with a mental and/or behavioural disorder [301]. Specifically, access to psychiatric treatment is difficult and treatment rates are fairly low [6, 9, 19], which partially explains the observed increased use of ED services [162-164]. Thus, ED services act as an entry point and/or emergency treatment service for a wide range of psychiatric patients who vary in terms of their psychological distress as well as their disability and functioning [212].

The effects of baseline correlates on the probability of a follow-up psychiatric ED visit are likely to be mediated through access to primary care, the care prescribed, follow-up care, and adherence to follow-up care [209]. In particular, socio-demographics differences (namely

gender, age, marital status and employment status) have been shown to lead to disparities in the access to, and the continuity and quality of, psychiatric health care [187]. Men have been observed to be frequent users of psychiatric services, whereas women have been observed to have higher contact rates with psychiatric EDs [302, 303]. Age has also been shown to be a factor in ED use, with people who are young tending to use EDs more frequently [229] for primary care purposes [304]. Studies of the association of marital status and ED use have reached contradictory results, with a study not observing an association [305], and other studies observing a statistically significant association with people who were not previously married tending to use EDs more frequently [223, 226, 306]. Lastly, unemployment has been shown to be a barrier to primary care [307], and Dhossche & Ghani found that unemployment was associated with ED patients who had two or more previous ED visits as compared to patients with one such previous visit [197].

4.2.2   Present study

Given the resource burdens caused by recidivism to EDs by psychiatric patients, and the above-described gaps in our knowledge, the objective of this study was to examine if the number of previous psychiatric ED visits, baseline disability and functioning, primary diagnosis of the baseline psychiatric ED visit, age, gender, marital status and employment status were predictors of the hazard of recidivism to a psychiatric ED and/or the number of subsequent psychiatric ED visits among recidivists. Based on existing literature of frequent ED use, we hypothesized that being a person with high disability and low functioning, having substance use disorders and/or schizophrenia, and being younger in age, a man, not previously married and unemployed would increase a person's risk for recidivism to a psychiatric ED and lead to an increased number of subsequent visits among psychiatric ED recidivists.

4.3   Methods

4.3.1   CAMH psychiatric emergency services cohort

Baseline data were collected respecting study participants who presented at the Centre for Addiction and Mental Health (CAMH) psychiatric emergency services from August 2011 to February 2012. Recruitment of participants took place in the CAMH ED using time-based sampling based on the number of people who usually visit the ED by hour over a 24-hour period. Trained interviewers along with a staff psychiatrist approached potential participants. All

participants were required to be psychologically stable at the time of the interview. If a potential participant was assessed at that time as not being sufficiently psychologically stable to be interviewed by a psychiatrist, the individual was contacted later at the Crisis Clinic, an ambulatory service attached to the CAMH psychiatric ED providing service within one week of an ED visit. Additionally, all participants were required to be at least 17 years of age. Prior to their interview, study participants provided written informed consent. The length of the interview was approximately 45 minutes. Participants were compensated with 20 Canadian dollars for the baseline interview. Data on people who refused to participate and/or were not psychologically stable were not collected.

4.3.1.1   Demographics

The CAMH psychiatric emergency services database contained information on diverse socio-demographic variables, including gender, age, marital status and employment status. Two people who had a missing marital status and/or current employment status, and one person who did not identify their gender as being either male or female were excluded from the analysis.

4.3.1.2   Measures of disability and functioning

The World Health Organization Disability Assessment Schedule (WHODAS) 2.0 is a general measure of functioning and disability in the following major life domains: (i) cognition, (ii) mobility, (iii) self care, (iv) getting along, (v) life activities, and (vi) participation in society. The WHODAS score ranges from 0 to 100, with 0 representing no disability and perfect functioning and 100 representing an extreme disability and decreased functioning. The psychiatric ED patient sample was assessed using the 36-item WHODAS version 2.0.

4.3.1.3   CAMH psychiatric emergency services database

Using patients' medical records numbers, we matched our cohort data to data from the CAMH ED utilization database. From the CAMH ED utilization database, we obtained for each patient a 4-digit ICD-10 code diagnosis (as specified by the psychiatrist who saw the patient in emergency care) for the baseline visit. Diagnoses were further categorized into seven groupings as follows: mental and behavioural disorders due to psychoactive substance use (ICD-10 codes: F10-F19), schizophrenia, schizotypal and delusional disorders (F20-29), mood [affective] disorders (F30-F39), neurotic, stress-related and somatoform disorders (F40-F48), disorders of adult personality

and behaviour (F60-F69), and all other diagnoses. Statistics for diagnosis code groupings other than those presented were not possible due to sample size limitations.

Data on the number of subsequent visits one year after baseline were also obtained from the CAMH ED utilization database. The percentage of frequent users of CAMH's ED was estimated using the common definitions of frequent ED use, namely (i) four or more times during the year following baseline or (ii) five or more times during the year following baseline [209, 295].

4.3.2 Statistical Analyses

Differences between the descriptive statistics of people who had a subsequent psychiatric ED visit within one year of baseline and of people who did not were tested using t-tests and chi-squared tests. Kaplan-Meier analysis was used to estimate cumulative survival curves. Factors affecting the hazard of a subsequent psychiatric ED visit were assessed using a Cox proportional hazards model, while the number of subsequent psychiatric ED visits was assessed through a zero-inflated negative binomial model. Regression coefficients included in the model were determined based on theory alone. All analyses were performed using R version 3.1.3 [264].

4.3.3 Ethics

Ethics approval for this project was obtained from the CAMH Research Ethics Board (REB) (approval code: 186/2010-02) and the University of Toronto REB (approval code: 28872).

4.4 Results

The study sample totalled 431 individuals who completed the baseline interview and whose data were located in CAMH's ED database. Of these individuals, 415 provided data on all measures, and, thus, were included in the present analyses.

Of the study participants, 52.8% were male and the mean age was 36.7 years (standard deviation (SD): 14.0). Study participants were also most likely to be never married (72.0%) and unemployed (41.7%). The average baseline WHODAS score was 38.0 (SD: 19.6). More than 1 in 4 (28.4%) of the participants had a psychiatric ED visit in the six months prior to the baseline. The largest diagnostic category of the baseline visits was mood [affective] disorders (F30-F39) (49.6% of participants), the second largest diagnostic category was schizophrenia, schizotypal and delusional disorders (F20-F29) (16.9% of all participants), and the third largest diagnostic

category was mental and behavioural disorders due to psychoactive substance use (F10-F19) (15.2% of all participants). Table 1 presents the sample characteristics of the psychiatric ED patients.

Table 4-1. Baseline characteristics of the study sample

Measure	Total sample (n = 415)		No visits in the following year (n = 256)		At least on visit in the following year (n = 159)		p-value*
	Point estimate	95% confidence interval	Point estimate	95% confidence interval	Point estimate	95% confidence interval	
Number of CAMH ED visits in the year following the baseline interview							
Mean number of visits	1.13	(0.89, 1.36)	0.00	-	2.94	(2.44, 3.44)	-
Percent returning within a year	38.3%	(33.6%, 43.2%)	0.0%	-	100%	-	-
Number of CAMH ED visits in the six months prior to the baseline interview							
Mean number of visits	0.53	(0.42, 0.63)	0.31	(0.22, 0.41)	0.87	(0.64, 1.10)	<0.001
Percent who have visited in the past six months	28.4%	(24.1%, 33.0%)	20.3%	(15.6%, 25.8%)	41.5%	(33.8%, 49.6%)	<0.001
WHODAS score (0 to 100)	38.0	(36.1, 39.9)	36.9	(34.5, 39.4)	39.8	(36.8, 42.7)	0.150
Baseline diagnosis (ICD-10)**							
F10 to F19	15.2%	(14.3%, 21.9%)	13.7%	(10.0%, 18.9%)	17.6%	(17.5%, 31.3%)	0.066
F20 to F29	16.9%	(14.5%, 22.1%)	13.3%	(9.7%, 18.5%)	22.6%	(18.6%, 32.6%)	

Measure	Total sample (n = 415)		No visits in the following year (n = 256)		At least on visit in the following year (n = 159)		p-value*
	Point estimate	95% confidence interval	Point estimate	95% confidence interval	Point estimate	95% confidence interval	
F30 to F39	49.6%	(45.4%, 55.3%)	54.3%	(47.2%, 59.7%)	42.1%	(37.4%, 53.4%)	
F40 to F49	13.0%	(11.4%, 18.5%)	12.9%	(10.0%, 18.9%)	13.2%	(10.4%, 22.3%)	
F60 to F69	1.4%	(1.5%, 5.0%)	2.0%	(0.6%, 4.5%)	0.6%	(1.8%, 8.9%)	
Other ICD codes	3.9%	(2.8%, 7.1%)	3.9%	(0.9%, 5.0%)	3.8%	(4.4%, 13.6%)	
Gender							
Male	52.8%	(47.8%, 57.7%)	52.7%	(46.4%, 59.0%)	52.8%	(44.8%, 60.8%)	
							1.000
Female	47.2%	(42.3%, 52.2%)	47.3%	(41.0%, 53.6%)	47.2%	(39.2%, 55.2%)	
Age	36.7	(35.4, 38.0)	36.4	(34.7, 38.1)	37.3	(35.1, 39.4)	0.526
Marital status							
Currently married	14.0%	(10.8%, 17.7%)	16.8%	(12.4%, 22.0%)	9.4%	(5.4%, 15.1%)	
Cohabiting	7.2%	(4.9%, 10.2%)	7.8%	(4.8%, 11.8%)	6.3%	(3.1%, 11.3%)	
							0.139
Previously married	6.7%	(4.5%, 9.6%)	5.9%	(3.3%, 9.5%)	8.2%	(4.4%, 13.6%)	
Never married	72.0%	(67.5%, 76.3%)	69.5%	(63.5%, 75.1%)	76.1%	(68.7%, 82.5%)	

Measure	Total sample (n = 415)		No visits in the following year (n = 256)		At least on visit in the following year (n = 159)		p-value*
	Point estimate	95% confidence interval	Point estimate	95% confidence interval	Point estimate	95% confidence interval	
Employment							
Employed	24.3%	(20.3%, 28.8%)	23.8%	(18.7%, 29.5%)	25.2%	(18.6%, 32.6%)	
Student	3.4%	(1.9%, 5.6%)	3.9%	(1.9%, 7.1%)	2.5%	(0.7%, 6.3%)	
							0.924
Unemployed	41.7%	(36.9%, 46.6%)	41.4%	(35.3%, 47.7%)	42.1%	(34.4%, 50.2%)	
Other ***	21.9%	(18.0%, 26.2%)	21.9%	(17.0%, 27.4%)	22.0%	(15.8%, 29.3%)	

* No visits in the following year compared to at least one visit. p-values were calculated by means of t-tests and chi-squared tests
** ICD-10 codes: F10-F19: mental and behavioural disorders due to psychoactive substance use; F20-29: schizophrenia, schizotypal and delusional disorders; F30-F39: mood [affective] disorders; F40-F48: neurotic, stress-related and somatoform disorders; F60-F69: disorders of adult personality and behaviour
*** Includes people who are retired, homemakers, volunteers and people who designated their employment status as "other"

In the year following their baseline assessment, 38.3% of the study participants had a subsequent psychiatric ED visit. Figure 1 presents the Kaplan-Meier survival plot for the proportion of the sample that had a subsequent psychiatric ED visit. A steep decrease was observed in the number of people who did not have a subsequent psychiatric ED visit between baseline and 60 days after baseline, with 20.7% of people having at least one subsequent psychiatric ED visit within 60 days of their baseline interview. After 60 days from baseline until the end of follow-up (365 days) there was a smaller linear decrease in the proportion of the sample that did not have subsequent psychiatric ED visits.
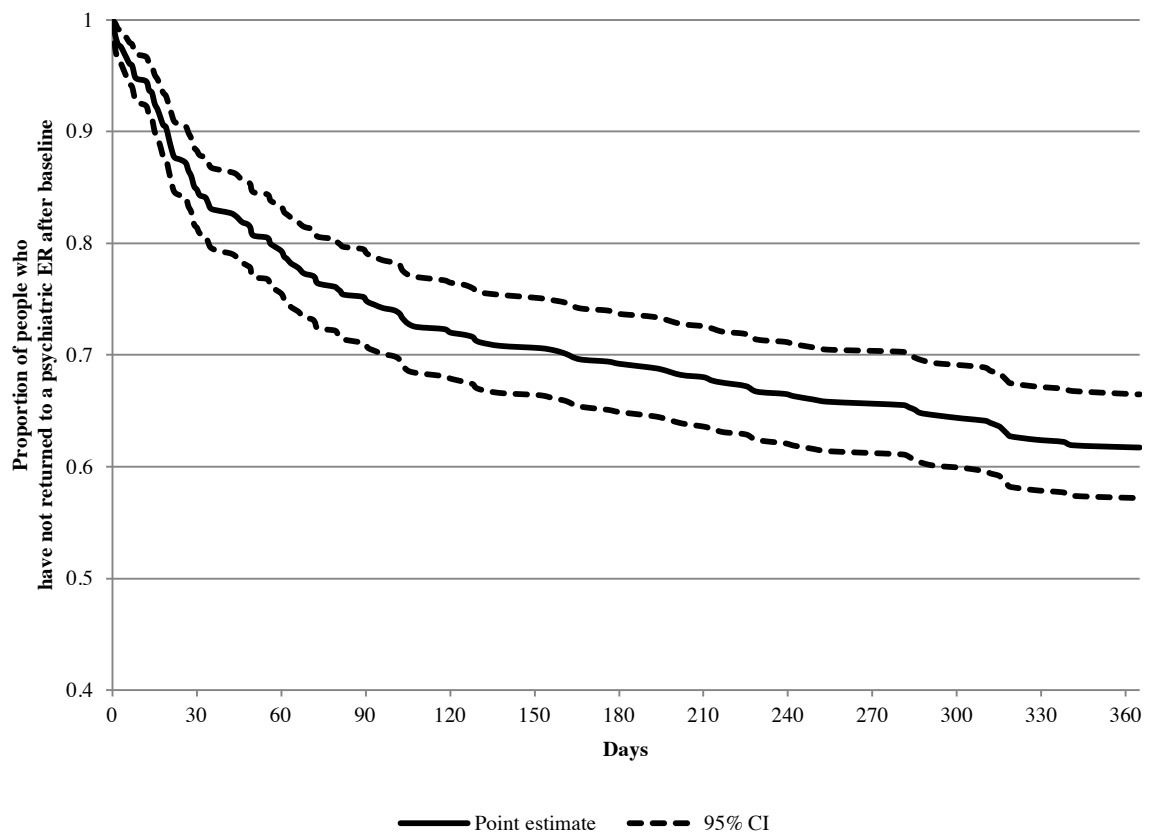
Figure 4-1. Kaplan-Meier plot of the proportion of people who did not return to the psychiatric emergency department after baseline

The unadjusted Cox proportional hazards model observed that the hazard of a subsequent visit to the psychiatric ED was significantly correlated with the number of psychiatric ED visits in the 6 months prior to the baseline interview and with the baseline diagnosis, but not with marital or

employment status. In the unadjusted Cox proportional hazards model we also observed that the hazard of recidivism by WHODAS score was time-dependent. After accounting for this time dependency, the WHODAS score predicted recidivism immediately after an ED visit; however, the association between the WHODAS score and recidivism decreased over time. With respect to diagnoses, people who had a baseline diagnosis of a disorder due to psychoactive substance use (F10 to F19) or schizophrenia, schizotypal and delusional disorders (F20 to F29) had a significantly higher hazard of a subsequent visit when compared to people with mood [affective] disorders (F30 to F39). In contrast to the findings of the unadjusted model, the adjusted (for all variables) Cox proportional hazards model revealed that the hazard of a subsequent visit to the psychiatric ED was significantly correlated with the number of psychiatric ED visits in the six months prior to the baseline interview, the WHODAS score (accounting for the interaction with time), and employment status, but not with diagnosis or marital status (see Table 2 for the results of the Cox proportional hazards models). With respect to employment status, people who were unemployed or who had an occupation status of "other" were less likely to visit the psychiatric ED than people who were employed.

Table 4-2. Predictors of the hazard of recidivism to a psychiatric emergency department

Measure	Unadjusted model*			Adjusted model**		
	Hazards ratio	95% confidence interval	p-value	Hazards ratio	95% confidence interval	p-value
Number of CAMH ED visits in the six months prior to the baseline interview	1.3	(1.2, 1.4)	<0.001	1.2	(1.1, 1.3)	0.003
WHODAS score (per 10 point increase)	10.1	(7.8, 13.2)	<0.001	11.4	(8.6, 15.2)	<0.001
WHODAS score (per 10 point increase) * log (time [10 days])	0.3	(0.3, 0.4)	<0.001	0.3	(0.3, 0.4)	<0.001
Baseline diagnosis (ICD-10)***						
F10 to F19	1.6	(1.0, 2.4)	0.050	0.9	(0.5, 1.5)	0.650
F20 to F29	1.8	(1.2, 2.7)	0.005	1.5	(0.9, 2.3)	0.083
F30 to F39	REF	-	-	REF	-	-
F40 to F49	1.4	(0.9, 2.3)	0.190	1.3	(0.8, 2.2)	0.350
F60 to F69	0.5	(0.1, 3.4)	0.460	0.5	(0.1, 3.7)	0.500
Other ICD codes	1.3	(0.6, 3.1)	0.490	1.2	(0.5, 2.8)	0.670

Measure	Unadjusted model*			Adjusted model**		
	Hazards ratio	95% confidence interval	p-value	Hazards ratio	95% confidence interval	p-value
Gender						
Male	REF	-	-	REF	-	-
Female	1.0	(0.8, 1.4)	0.830	0.7	(0.5, 1.0)	0.081
Age (per 5 year increase)	1.0	(1.0, 1.0)	0.620	1.0	(0.9, 1.1)	0.690
Marital status						
Currently married	REF	-	-	REF	-	-
Cohabiting	5.5	(0.1, 298.4)	0.410	1.2	(0.5, 2.9)	0.660
Previously married	2.0	(1.0, 4.2)	0.066	1.9	(0.9, 4.1)	0.094
Never married	1.7	(1.0, 2.9)	0.056	1.3	(0.7, 2.3)	0.460
Employment						
Employed	REF	-	-	REF	-	-
Student	0.9	(0.5, 1.5)	0.620	0.6	(0.3, 1.1)	0.081
Unemployed	1.0	(0.7, 1.5)	0.980	0.5	(0.3, 0.8)	0.006
Other****	1.0	(0.6, 1.6)	0.930	0.5	(0.3, 0.9)	0.023

* Cox proportional hazards are not adjusted for any other covariates
** Cox proportional hazards are adjusted for all other covariates
*** ICD-10 codes: F10-F19: mental and behavioural disorders due to psychoactive substance use; F20-29: schizophrenia, schizotypal and delusional disorders; F30-F39: mood [affective] disorders; F40-F48: neurotic, stress-related and somatoform disorders; F60-F69: disorders of adult personality and behaviour
**** Includes people who are retired, homemakers, volunteers and people who designated their employment status as "other"

Figure 2 presents the distribution of the number of visits within the year following the baseline interview. The number of subsequent visits to the psychiatric ED within the year after baseline among all participants ranged from 0 to 28, with an average number of subsequent visits of 2.94 among people who had at least one subsequent visit. Furthermore, we observed that 9.2% of all participants visited the psychiatric ED four or more times during the year following baseline, while 7.5% of all participants visited the psychiatric ED five or more times in the year following baseline.
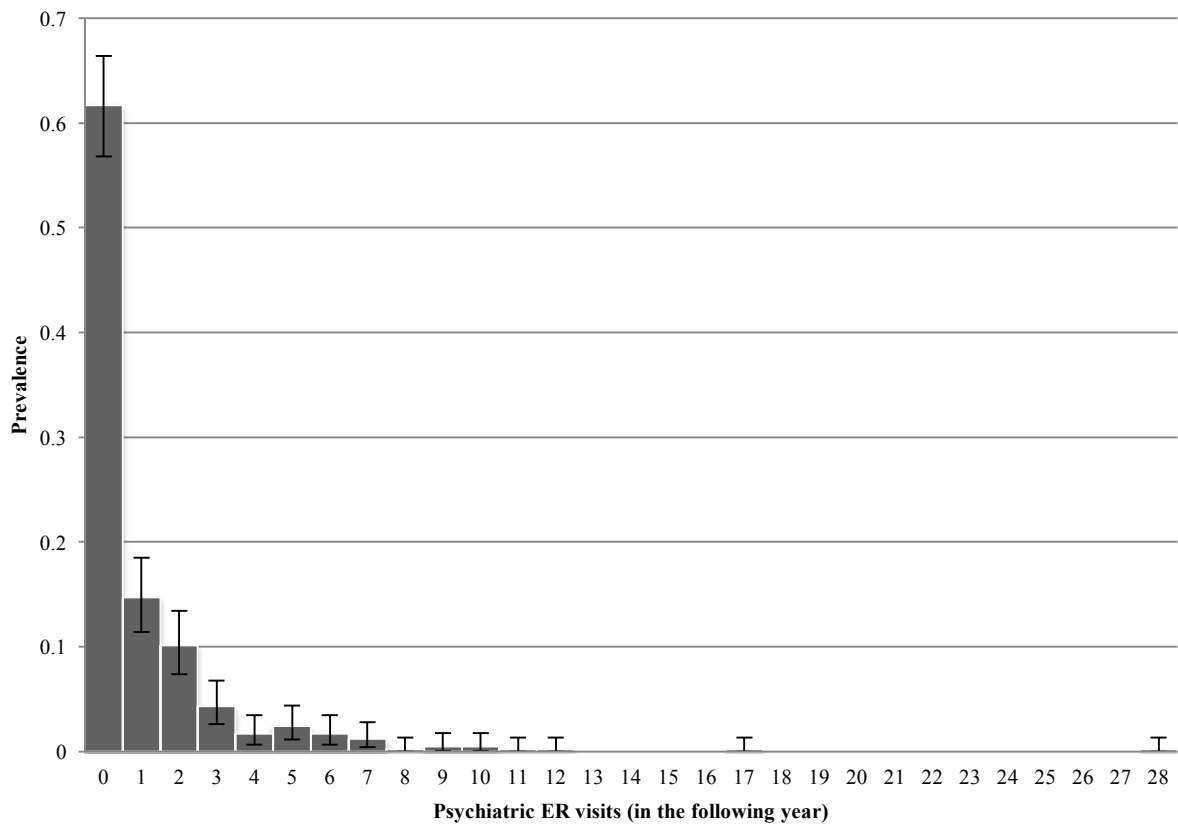
Figure 4-2. Number of subsequent psychiatric emergency department visits within the year following baseline

Table 3 presents the predictors of the number of subsequent psychiatric ED visits among recidivists. The number of prior visits to the psychiatric ED in the six months before baseline strongly predicted the number of subsequent visits within a year after baseline, with an increase

of one prior psychiatric visit increasing the count ratio by 1.28 (this ratio increases as the number of previous psychiatric ED visits in the six months prior to baseline increases). Employment status was also a significant predictor of the number of subsequent visits within a year after baseline, with people who were students and unemployed having a count ratio of 2.33 and 2.60 respectively (compared to people who were employed). Baseline WHODAS score, diagnosis, gender, age, and marital status were not significant predictors of the number of subsequent visits to the psychiatric ED in the year after baseline. Furthermore, the results of the logit portion of the zero-inflated negative binomial model corroborate the results of the Cox proportional hazards model in that the number of previous psychiatric ED visits, the WHODAS score, and employment status were predictors of the probability of a subsequent psychiatric ED visit (see the web appendix for the logit portion of the zero-inflated negative binomial model).

Table 4-3. **Predictors of the number of subsequent psychiatric emergency department visits among recidivists**

Measure	Count model		
	Count ratio	95% confidence interval	p-value
Number of CAMH ED visits in the six months prior to the baseline interview	1.28	(1.12, 1.47)	<0.001
WHODAS score (per 10 point increase)	0.96	(0.87, 1.05)	0.352
Baseline diagnosis (ICD-10)*			
F10 to F19	1.51	(0.86, 2.64)	0.149
F20 to F29	1.04	(0.63, 1.72)	0.873
F30 to F39	REF	-	-
F40 to F49	1.46	(0.78, 2.73)	0.235
F60 to F69	3.13	(0.36, 27.13)	0.300
Other ICD codes	2.65	(0.91, 7.72)	0.075
Gender			
Male	REF	-	-
Female	0.88	(0.57, 1.36)	0.577
Age (per 5 year increase)	1.02	(0.94, 1.11)	0.679
Marital status			
Currently married	REF	-	-
Cohabiting	0.92	(0.34, 2.51)	0.878
Previously married	1.01	(0.37, 2.72)	0.986
Never married	1.37	(0.61, 3.07)	0.446

Measure	Count model		
	Count ratio	95% confidence interval	p-value
Employment			
Employed	REF	-	-
Student	2.33	(1.02, 5.32)	0.044
Unemployed	2.60	(1.49, 4.52)	0.001
Other**	1.28	(0.69, 2.37)	0.426

* ICD-10 codes: F10-F19: mental and behavioural disorders due to psychoactive substance use; F20-29: schizophrenia, schizotypal and delusional disorders; F30-F39: mood [affective] disorders; F40-F48: neurotic, stress-related and somatoform disorders; F60-F69: disorders of adult personality and behaviour
** Includes people who are retired, homemakers, volunteers and people who designated their employment status as "other"

4.5 Discussion

Prior to this study it was unknown to what extent the initial magnitude of disability and functioning, diagnosis, previous frequency of psychiatric ED use, age, gender, marital status and employment status, were related to the hazard of another psychiatric ED visit and/or to the number of subsequent psychiatric ED visits. As hypothesized, disability and functioning, the number of prior visits, and employment status were predictors of the hazard of recidivism to a psychiatric ED, and the number of prior visits and employment status were predictors of the number of subsequent visits among psychiatric ED recidivists. However, contrary to what was hypothesized, after correction for all other factors, diagnosis, age, gender and marital status were not significant predictors of recidivism to a psychiatric ED, and disability and functioning, diagnosis, age, gender and marital status were not significant predictors of the number of subsequent ED visits among psychiatric ED recidivists.

This study is novel in multiple aspects. First, it investigated the time-based hazard of recidivism to a psychiatric ED, a study design that has not been commonly used in research on ED use. A search of PubMed and Google scholar revealed one study that examined the effects of diagnosis and age on the hazard of recidivism to a psychiatric ED [197], while another study examined the effects for people with mental and/or behavioural disorders of leaving a hospital against medical advice (a rare occurrence) on repeat admission to a general ER [225]. Second, this study examined the factors that predict the number of subsequent psychiatric ED visits among

recidivists. Third, this study used the factors of disability and functioning and prior psychiatric ED visits as predicting factors; disability and functioning have never been used to predict recidivism to a psychiatric ED. Fourth, all other factors were controlled for when the significance of individual factors in predicting recidivism was estimated, and, therefore, the results of this study account for possible confounding.

4.5.1   Clinical predictors of recidivism to a psychiatric ED

Having corrected for all other potential confounding factors, diagnosis did not significantly predict the hazard of recidivism to the psychiatric ED or the number of subsequent psychiatric ED visits among recidivists. This is in direct contrast to what has been found in previous studies [248, 250, 251]; however, this is the first study to control for disability, functioning and the past number of ED visits when assessing the effect of baseline diagnosis on psychiatric ED recidivism and the number of subsequent psychiatric ED visits among recidivists. The results from this study indicate that the lack of effect of diagnosis on recidivism to a psychiatric ED may be due to differences in disability, functioning, number of previous psychiatric ED visits and employment status across diagnostic categories. Thus, based on the findings of this study, the diagnosis given to a person seeking treatment at a psychiatric ED is not a predictor of ED recidivism, and consideration of the diagnosis may not lead to any benefit when aligning psychiatric patients with resources aimed at reducing recidivism to the ED.

The most important predictor of the hazard of recidivism to a psychiatric ED and of the number of subsequent visits among psychiatric ED recidivists was the number of previous visits to a psychiatric ED. This factor of past visits predicting future visits has been overlooked, for the most part, in the literature concerning frequent ED use [209]. Previous studies have indicated that although people may be frequent ED users in a particular year, a large proportion of these people may not be frequent ED users in the following year [209].

It was observed that the baseline WHODAS score and the hazard of recidivism were time-dependent; baseline disability and functioning of a psychiatric ED patient predicted short-term recidivism, but not long-term recidivism. This is likely due to people with higher WHODAS scores using the psychiatric ED for secondary care purposes, and people with lower WHODAS scores using the psychiatric ED for primary care purposes. These results are corroborated by findings that people with more severe mental illness are more likely to be frequent users of the

ED [209]. Furthermore, in the long term, differences in WHODAS scores may not be an important measure of recidivism, since patients are sent home if there is no severe mental disorder and/or if they do not require urgent care based on the current triage philosophy of psychiatric EDs [219]; however, this practice may lead to future psychiatric ED use. Therefore, the collection of disability and functioning data in the psychiatric ED may help predict future psychiatric ED recidivism, as well as being useful in the alignment of patients with the appropriate intensity of resources and in the measurement of improvements in morbidity [42]; however, the utility of measuring disability and functioning in predicting psychiatric ED recidivism is limited as it does not predict the hazard of psychiatric ED recidivism in the long term or the number of visits among ED recidivists.

4.5.2   Socio-demographic predictors of recidivism to a psychiatric ED

Contrary to what was hypothesized, after adjusting for all other potential confounding factors, participants who were unemployed (as compared to people who were employed) were less likely to use psychiatric EDs after a baseline psychiatric ED visit; however, in agreement with what was hypothesized, if participants who were unemployed (as compared to people who were employed) did use a psychiatric ED after a psychiatric ED baseline visit, they were more likely to use psychiatric EDs frequently. This is the first study to observe this relationship, as previous studies focused only on frequent psychiatric ED use rather than on the hazard of recidivism and the number of subsequent psychiatric ED visits among recidivists [197]. The explanation for this unexpected effect of unemployment on psychiatric ED recidivism is likely complex and multi-factorial, as people who are unemployed represent a large, heterogeneous group. For instance, some within the group of unemployed people may be homeless (which has also been previously observed to be associated with high frequency ED use [197]), others may not be homeless, but may be chronically unemployed, and others may be unemployed for only a short amount of time. Thus, as the exact relationship between unemployment and psychiatric ED recidivism is unknown (as the status of being unemployed may be antecedent to psychiatric ED recidivism, correlated to other variables that are related to psychiatric ED recidivism, or the result of other variables related to psychiatric ED recidivism), a longitudinal study is needed to ascertain the exact relationship between unemployment and psychiatric ED recidivism among the sub-populations of people who are unemployed.

4.5.3   Limitations

This study is limited by multiple factors. First, all participants needed to be sufficiently psychologically stable to participate; however, if they were not psychologically stable, patients were followed-up at the CAMH Crisis Clinic for possible participation in the study. If individuals with higher levels of disability, who are more likely to have subsequent psychiatric ED visits, were excluded from our study, then the relationship between disability and recidivism may be underestimated. Second, CAMH's ED database only contained data on the primary diagnosis, even though patients can have multiple psychiatric comorbidities; therefore, this study was not able to adjust for psychiatric comorbidities that may have been present at baseline. Specifically, substance use disorders are frequent psychiatric comorbid diagnoses; thus, the impact of a substance use disorder may have been underestimated. Third, refusal rates were not collected in this study; however, as indicated by interviewers, refusal rates were low, and, thus, should not have noticeably biased the study results. Fourth, data on additional demographic factors (such as homelessness) and on somatic health conditions were not collected, and, thus, could not be controlled for in the presented analyses. Lastly, the follow-up data of this study were based on hospital ED records, and did not take into account censoring due to death or moving (resulting in a person being more likely to use a different ED); however, mortality due to mental and/or behavioural disorders is low [308] and, thus, the effects of this censoring should not have noticeably biased the study results. Additionally, because we were restricted to return ED visits to the CAMH psychiatric ED only, we were not able to capture recidivism to other EDs.

4.6   Conclusion

Among patients who accessed psychiatric EDs, disability and functioning, number of past psychiatric ED visits, and employment status were predictors of recidivism; however, contrary to prior research, age, gender, marital status, and diagnostic categories were non-significant predictors after adjusting for all confounders. Thus, for patients with mental and/or behavioural disorders, data on disability and functioning and the number of past psychiatric ED visits could be systematically collected in psychiatric EDs as data on these variables may identify those patients at high risk for recidivism. Furthermore, as unemployment (as compared to employment) was a predictor of recidivism, future research should focus on determining the exact relationship between unemployment and the risk of psychiatric ED recidivism.

Chapter 5
Conclusions and Recommendations for Future Research

5   Conclusions and Recommendations for Future Research

The research described in the three studies presented in this thesis was designed to extend our current understanding of (i) the state of mental health in the general population as measured by disability and functioning and by non-specific psychological distress, (ii) the health of patients who seek treatment at a psychiatric Emergency Department (ED) as measured by disability, functioning and diagnosis, and (iii) the predictors of recidivism to a psychiatric ED after an initial visit. By employing data analyses that used data from two studies, namely the Centre for Addiction and Mental Health (CAMH) Monitor 2011, 2012, and 2013 surveys and data collected from participants who attended at a psychiatric ED, this study was able to fill a number of current knowledge gaps. The use of two distinct data sources also allowed for a comparison between samples of disability and functioning, with the general population sample acting as the reference population. Furthermore, these studies are novel in numerous aspects. Specifically, these are the first studies to (i) describe the general population using a combined measure of (a) disability and functioning, and (b) non-specific psychological distress, and (ii) to examine the disability and functioning of people who attended a psychiatric ED. Additionally, this thesis presents the first study to examine the use of disability and functioning, gender, marital status, and employment as predictors of the hazard of psychiatric ED recidivism and, further, to examine the socio-demographic and level of illness correlates of the number of subsequent psychiatric EDs among recidivists.

This final chapter of the thesis presents (i) a summary of the research findings described in the three manuscripts presented in this thesis, (ii) a review of the limitations of the research designs and analyses used to address the outlined research objectives, (iii) the implications of the results from the three manuscripts, and (iv) suggestions for future research directions.

5.1   Summary of research findings

In study one (see Chapter 2), it was observed that when the general adult population was described using disability and functioning domain measures and non-specific psychological distress measures through a latent class analysis, the result was an underlying nominal four-class structure. In contrast to what was hypothesized, after restricting the sample to people without a suspected somatic illnesses (i.e. not including people with high disability, low functioning and moderate non-specific psychological distress (HD-LF-MNSPD) (Class 2)), the measures of

disability and functioning (determined by World Health Organization Disability Assessment Schedule (WHODAS) domain scores) and of non-specific psychological distress (measured by the 12-item General Health Questionnaire (GHQ-12)) were not univariate. Therefore, it can be concluded that to accurately describe the mental health of the general population, measures of both disability and functioning and of non-specific psychological distress are needed rather than relying on a measure disability and functioning or of non-specific psychological distress.

In agreement with what was hypothesized, the research described in study 1 (see Chapter 2) found that for people with a suspected somatic illness, the GHQ-12 scores were not correlated with the WHODAS scores; however, when people with a suspected somatic illness were excluded, there was a significant correlation. It was also observed that a moderate proportion of the adult population in Ontario had either moderate disability, moderate functioning and moderate non-specific psychological distress (MD-MF-MNSPD) (Class 3) or high disability, low functioning and high non-specific psychological distress (HD-LF-HNSPD) (Class 4). This proportion of people in Classes 3 and 4 (30%) is consistent with other population surveys that have indicated that 15–30% of the adult population experienced a mental disorder in the past year [85, 271-273]. Lastly, as was hypothesized, we observed that people with HD-LF-HNSPD were more likely to be women, homemakers, retirees or people who were unemployed, people who had never been married or were previously married, people with alcohol use problems, people who used non-medical prescription opioids, and people with a traumatic brain injury.

As described in study 2 (see Chapter 3), contrary to what was hypothesized, among patients who accessed psychiatric ED services, disability and functioning did not significantly differ by diagnosis; however, a high variability of the levels of disability and functioning within diagnostic categories was observed. Furthermore, and again contrary to what was hypothesized, no significant differences were observed in disability and functioning between frequent psychiatric ED services users and non-frequent psychiatric ED services users, but there was a high variability of the levels of disability and functioning within these groups. Additionally, as hypothesized, study 2 found that patients who attended at psychiatric EDs were more likely to be younger in age, never married or previously married, and/or a student or currently unemployed when compared to the general population. Contrary to what was hypothesized, patients who attended at psychiatric EDs were not more likely to be male; however, this association approached significance.

Lastly, in study 2, a wide range of the level of disability and functioning was observed among patients who sought psychiatric emergency treatment. Therefore, even at higher scores, an increase in the WHODAS score was associated with the probability that an individual would present at psychiatric emergency services; however, this analysis did not correct for other emergency services use. Furthermore, as hypothesized, we also observed that patients who used psychiatric ED services experienced greater disability and decreased functioning when compared to the general population; however, the nature of the relationship between disability and functioning and the probability of using psychiatric ED services was different for men and women, as women were more likely to seek medical treatment for psychiatric problems at higher WHODAS scores, while men were more likely to seek medical treatment for psychiatric problems at lower WHODAS scores.

In study 3 (see Chapter 4), we found, as hypothesized, that disability and functioning and the number of prior visits were correlated with an increased hazard of recidivism to a psychiatric ED; however, contrary to what was hypothesized, unemployment was correlated with a decreased hazard of recidivism to a psychiatric ED. Furthermore, contrary to what was hypothesized, age, gender, marital status and diagnosis were not correlated with the hazard of recidivism. We also observed, as hypothesized, that the number of subsequent visits among ED recidivists was positively correlated with the number of previous visits and with unemployment; however, contrary to what was hypothesized, gender, age, marital status, diagnosis, and disability and functioning were not correlated with the number of subsequent psychiatric ED visits among recidivists.

5.2   General discussion

5.2.1   Study strengths

As previously mentioned, the research manuscripts presented in this thesis are novel in multiple respects. Study 1 is the first research manuscript to combine the measures of disability and functioning (as measured by the WHODAS) with non-specific psychological distress (as measured by the GHQ-12) to characterize the mental health of the general population; a previous study combined measures of well-being and non-specific psychological distress [77]. Additionally, in order to assess the association between disability and functioning and non-specific psychological distress, previous studies restricted their study sample to people diagnosed

with having a mental and/or behavioural problem [105, 268], whereas this study did not. This difference is important, especially considering the unclear boundary between normality and mental and behavioural disorders [269], and considering that a methodology that does not use diagnoses removes factors that may have biased a physician's diagnosis, such as gender [270].

Study 2 is novel as it was determined through a systematic search to be the first research manuscript that examined disability and functioning among people who sought treatment at an ED (see the systematic review in Chapter 3 for details of the systematic search). Therefore, study 2 presents the first research to examine differences in disability and functioning by diagnosis among people who attended at a psychiatric ED, and is the first study to compare differences in disability and functioning between frequent users of psychiatric EDs and non-frequent users of psychiatric EDs. Furthermore, study 2 is the first to examine the disability and functioning distribution of a population that sought treatment at a psychiatric ED compared to the general population.

Study 3 is novel as it presents the investigation of the time-based hazard of recidivism to a psychiatric ED, which is a study design not commonly used in research on ED use. The study design of examining the hazard of recidivism to a psychiatric ED was used in a previous study that examined the effect of diagnosis and age on psychiatric ED recidivism [197], while another study looked at the hazard of recidivism to a general hospital ED for people with mental and/or behavioural disorders who left a general hospital ED against medical advice (a rare occurrence) [225]. Study 3 is the first to examine the correlation between disability and functioning and recidivism to a psychiatric ED. Furthermore, study 3 controlled for other potential confounding factors, such as age and gender, which has not been done by most other studies on frequent ED use [209].

5.2.2   Limitations of the three research studies

There are general limitations of the research presented in this thesis in terms of the methods used to address the research aims. Accordingly, the findings presented in this thesis should be interpreted within the context of these limitations. The specific limitations of the research presented herein, in terms of the internal and external validity of the empirical results presented in this thesis, stem from the data available for analysis, the quality of which depends on the study designs and questionnaires that were used to collect and compile the data.

5.2.2.1 Limitations of the data from the CAMH Monitors

Study 1 relies on data from the CAMH Monitor general population telephone surveys. These telephone surveys are limited by multiple study design factors [24]. First, the CAMH Monitors excluded populations without a landline or cellphone, such as the homeless, institutionalized and hospitalized [153-155]. As people who are homeless [182, 198], incarcerated [182, 199] or hospitalized [182] are more likely to have mental health problems, their exclusion may have led to an underestimation of the prevalence of people with HD-LF-HNSPD (Class 4). However, the size of this population may be small, and, thus, their exclusion may not have noticeably biased the results of study 1 or the external validity of these results in terms of their application to the general adult population of Ontario. Second, as with most North American telephone surveys conducted in the 21st century, the response rates were low, at 51%, 51% and 48% for the 2011, 2012, and 2013 waves of the CAMH Monitor respectively. Given these response rates, non-response bias, which in general population surveys has been previously observed to be correlated to substance use and abuse [24], may have affected the results of study 1 by leading to an underestimation of the number of people with impaired disability, impaired functioning and non-specific psychological distress in the general population. Third, as part of the study design for the CAMH Monitor surveys, letters about the survey were sent to selected households only in the strata of Toronto. If this method of attempting to increase participation led to a difference in participation between Toronto and the rest of Ontario, and if the participation ratios were associated with any of the correlates of disability functioning, and non-psychological distress that were assessed in study 1, there may have been an unequal bias of results for Toronto participants versus results for participants from elsewhere in Ontario. Fifth, data from the CAMH Monitors are cross-sectional, and, thus, it was not possible to determine the temporal and causal pathway of how socio-demographic factors and substance abuse measures were correlated with disability, functioning and non-specific psychological distress. Sixth, the CAMH Monitors did not provide data on somatic illnesses, and, therefore, in study 1, the latent class that was designated to have a somatic illness was determined based on the disability, functioning and non-specific psychological distress profiles.

5.2.2.2 Limitations of the data from the psychiatric ED

There are also limitations in terms of the findings based on data from the CAMH psychiatric ED that were presented in studies 2 and 3. First, psychiatric emergency services are an emerging care

model and, as a result of the nature of these services, those who access them may differ from those people who access general hospital EDs for their psychiatric issues.

Second, during recruitment for our study of patients from the psychiatric ED, participants were required to be deemed by a staff psychiatrist to be sufficiently psychologically stable to participate. If the potential participant was deemed to be not psychologically stable in the ED, patients were followed-up at the CAMH Crisis Clinic for possible participation in the study. This exclusion of people who are not sufficiently psychologically stable to participate may have led to a participation bias, with the sample underrepresenting people with mental and behavioural disorders that lead to chronic psychological instability, and their exclusion could have reduced the differences between diagnostic categories [13]. However, by using the two-stage process of recruiting people at the psychiatric ED, and then at the CAMH Crisis Clinic if the person was not sufficiently psychologically stable at the psychiatric ED, the exclusion of people who were not psychologically stable should not have noticeably biased our results.

Third, the data within CAMH's ED database only contained details of the primary diagnosis, even though patients may have multiple psychiatric comorbidities. As study 2 described differences in disability and functioning by diagnosis data, and as mental and behavioural conditions are chronic remitting and relapsing conditions, data from all visits within a year of the study visit were used to characterize participants. However, study 3 was not able to adjust for psychiatric comorbidities that may have been present at baseline, as only measures from baseline were used to predict follow-up. Furthermore, the use of prior diagnoses in study 3 would have strongly covaried with the number of previous visits to the psychiatric ED, making it difficult to ascertain the effects of multiple diagnoses and number of previous ED visits.

Fourth, among those patients in the ED who were approached to participate in our study, the number of people who refused to participate, or were not sufficiently psychologically stable to participate was not collected; however, interviewers indicated that refusal rates were low, and, thus, non-participation should not bias noticeably the study results.

Lastly, with respect to study 3, the follow-up data concerning whether people returned to a psychiatric ED were limited to what was contained in the clinical database of CAMH. This methodological design creates two limitations: first, since the data were based on hospital ED records, they did not account for deaths. Despite the fact that mortality due to mental and/or

behavioural disorders is generally low [308], there is a slight increased mortality rate for people with substance abuse disorders [10] and mental and behavioural disorders correlated with suicidal idealization [10], and, thus, this methodological limitation may have caused a slight underestimation of the recidivism hazard and of the number of subsequent psychiatric ED visits for people with substance abuse disorders or suicidal idealization. Second, as the follow-up data were limited to the CAMH ED, participants could have attended at another psychiatric ED due to factors such as changes in their place of residence; however, this pattern of using multiple psychiatric EDs is rare, and studies that have examined frequent ED use commonly limit their analysis to one ED [209].

5.2.2.3   Limitations common to all of the studies

The data from the CAMH Monitors and from the ED studies were both limited by biases inherent in the questions asked, the data available for analysis, and the sample size of the study. The survey questions used in the CAMH Monitor and the ED studies are susceptible to inaccurate recall of the information, as they ask about past behaviours that in some cases cover the past 30 days and in other cases cover the past year. The use of a long time period, such as a year, or even the past 30 days, may lead to a forward telescoping effect where events that were more distant are perceived as more recent by the interviewer [309], resulting in an overestimation of the effects. The survey questions asked are also susceptible to a response bias in terms of people who deliberately misreport information in order to conform to social norms valued by society [310]. This response bias is observed especially in cases of highly stigmatized behaviours, such as drug use or mental health problems [23, 24, 310], which may lead to an underestimation of the prevalence of substance abuse and disability and an overestimation of functioning in the population.

The findings of the studies presented in this thesis are limited by the data available for analysis. First, with respect to the research presented in study 1, the GHQ-12 was used as a measure of non-specific psychological distress (see Chapter 2). The GHQ-12 performs well in measuring non-specific psychological distress, as evidenced by its correlation to other measures of non-specific psychological distress (such as the Kessler Psychological Distress Scale (K6 and K10)) and its ability to distinguish between cases of depression [69]; however, as previously mentioned, the K6 and K10 have been shown to outperform the GHQ-12 in distinguishing

between cases of depression, and, thus, may be a better measure of non-specific psychological distress [69]. Therefore, study 1 was limited by the use of the GHQ-12 measure rather than the K6 or K10 measures since the CAMH Monitors 2011, 2012 and 2013 measured non-specific psychological distress using only the GHQ-12.

Second, the CAMH Monitors and the CAMH ED studies did not collect additional data on other demographic factors (such as homelessness), and studies 2 and 3 did not have information on the level of education a person had attained (i.e. high school, college, university, etc.). Besides our inability to control for these additional socio-demographic factors, this lack of data also creates a problem for our interpretation of the results. With respect to study 3 in particular, this lack of data presents a problem when interpreting findings concerning unemployment (as compared to paid employment). Specifically, study 3 observed that unemployment (as compared to paid employment) was associated with a decrease in the hazard of ED recidivism; however, among recidivists, being unemployed (as compared to having paid employment) was found to be correlated to an increase in the average number of visits. These results may be due to the existence of subgroups of people who are unemployed; thus, the results of study 3 were limited, as unemployed people could not be designated into potential socio-demographic subgroups.

Third, the data collected for study 2 was cross-sectional, and, thus, it was not possible to assess the temporal effects of socio-demographic and level of illness variables on ED attendance. Fourth, studies 2 and 3 did not collect information on access to primary care or on attitudes towards health care services, and, thus, it was not possible to assess the role of health care access or attitudes towards health care services as mediators of the effects of socio-demographic and level of illness variables on ED attendance and recidivism. Fifth, data on ED treatment received and prescribed were not collected in study 3, and, thus, it was not possible to look at the potential effects of these variables on ED recidivism. Lastly, the results presented in study 3 are limited as data on somatic health conditions were not collected, and, thus, could not be controlled for as a potential confounder in the presented analyses.

Both studies 1 and 2 were limited by the available sample sizes. In study 1, although data from the 2011, 2012 and 2013 waves of the CAMH Monitors were used (the only years where the 12-item WHODAS was included), the sample size did not provide enough power to detect differences in population classes by correlates that are not prevalent in the general population,

such as cocaine use. In study 2, the sample size was not sufficient to detect small differences in disability and functioning by diagnostic category; however, as this study observed large variations in disability and functioning within diagnostic categories, small average differences in the levels of disability and functioning by diagnostic category would not change the conclusion that the collection of data on disability and functioning would improve the ability of health care professionals to triage patients with mental and/or behavioural disorders and align them with the appropriate intensity of resources.

Both studies 2 and 3 have external validity limitations that originate from the methods used for diagnosis. These studies used physicians' diagnoses to determine mental and behavioural disorders; physicians' diagnoses have been shown to differ from diagnoses obtained using the Composite International Diagnostic Interview (CIDI) and other survey measures to screen for mental and behavioural disorders. Specifically, as shown by Rehm and colleagues with the example of alcohol dependence, although there is a relatively equal prevalence of mental and behavioural disorders when a diagnosis is made using the CIDI compared to when a diagnosis is made by a general practitioner, there is a poor overlap of cases identified by both of these methods [25]. Furthermore, even when the severity of symptoms is taken into account, factors such as gender have been shown to be correlated to the diagnosis that a person receives [83-86], and, therefore, diagnoses used in studies 2 and 3 may have been biased.

5.2.2.4   Summary of limitations

Overall, the limitations associated with the results presented in this thesis, in terms of these limitations' effects on both the internal and external validity of the empirical results presented in this thesis, are relatively small, and should not affect, to any appreciable extent, the conclusions of this thesis. Most importantly, however, the cross-sectional nature of the CAMH Monitor survey data makes it impossible to infer a temporal or causal relationship. This limitation can be addressed in future research studies.

5.3   Implications of the research findings

As stated in the first chapter of this thesis, mental and behavioural disorders are prevalent globally, in Canada and in Ontario [1, 2, 6], and the resulting social, economic and health burdens caused by these disorders are large [9, 19]. In addition to a large prevalence of mental

and behavioural disorders, the health care system in Canada (as well as in other countries) is also confronted by a subset of patients with these disorders who are high frequency utilizers of psychiatric emergency services and who, by virtue of their high utilization, are the source of disproportionately large health care resource expenditures [205-208]. Therefore, given the prevalence of mental and behavioural disorders, the resulting burdens of these disorders, and the burden on the health care system of the repeated use of psychiatric EDs, the research detailed in this thesis addressed key knowledge gaps in the literature that if addressed could lead to an improvement in the quality of life of people with mental and behavioural disorders and could lessen psychiatric ED health care costs. The findings of the studies presented in this thesis address these knowledge gaps, and have multiple theoretical, practical, and methodological implications.

5.3.1   Screening the general population for mental and behavioural disorders

The data presented in study 1 demonstrate that measures of non-specific psychological distress could be improved as a method of screening for mental and behavioural disorders in the general population if questions concerning disability and functioning were added to these instruments. Specifically, when the sample used in the research presented in study 2 was restricted to people without somatic illnesses, it was observed that the WHODAS domain scores and the GHQ-12 scores were correlated, but were not univariate. Furthermore, within the population class of people with MD-MF-MNSPD (Class 3), we also observed that some individuals had above average non-specific psychological distress, but a below average WHODAS score (indicating low disability and high functioning). Based on these findings, it can be concluded that in the general population a measurement of high non-specific psychological distress does not necessarily indicate that a person has a higher level of disability and a lower level of functioning. Therefore, the addition of measures of disability and functioning to non-specific psychological distress screeners for mental and behavioural disorders may improve the sensitivity and specificity of these questionnaires to screen for mental and behavioural disorders, including identifying those people who require interventions.

5.3.2   Socio-demographic correlates of mental health and of psychiatric ED use

The identification of socio-demographic disparities in health is important, as achieving health equity by identifying and quantifying the determinants of health inequities is a top priority of the

World Health Organization, and reaching health targets without an equitable distribution of health improvements is of limited value [166]. Therefore, this thesis analyzed the correlates of mental health in the general population, correlates of psychiatric ED use, and correlates of recidivism to psychiatric EDs.

5.3.3 Correlates of mental health in the general population

Study 1 identified socio-demographic differences in disability, functioning and non-specific psychological distress in the general population. As hypothesized, study 1 observed that women were more likely to have HD-LF-HNSPD (Class 4), a marker for mental health problems, than to have LD-HF-LNSPD (Class 1) [4, 42], even when correcting for other socio-demographic factors, drug use and drug abuse. This is consistent with previous research that has found that women are more likely than men to have mental and/or behavioural disorders [255]. Furthermore, as hypothesized, study 1 also observed that people who were unemployed, people who had never been married or were previously married, people with alcohol use problems, people who used non-medical prescription opioids, and people with a traumatic brain injury had a higher probability of having HD-LF-HNSPD (Class 4) than having LD-HF-LNSPD (Class 1). This is consistent with previous research that has observed differences in mental and behavioural disorders by employment [81, 256, 257, 311-313], education [97, 98, 311], marital status [81, 256, 257, 311, 314], alcohol abuse [42, 120], non-medical prescription opioid use [147] and traumatic brain injury [122, 123]. However, these findings are inconsistent with previous research that has observed differences in mental and behavioural disorders by tobacco use [118, 119], cannabis abuse [120, 121] and cocaine use [120, 121]. As noted above in the discussion of the limitations of our studies, the sample size used in the research presented in study 1 may not have been sufficient to capture the associations between a rare exposure, such as cocaine use, and disability, functioning and non-specific psychological distress. The non-significant effects of tobacco use and cannabis abuse are unexpected, and should be studied further. Overall, our analysis demonstrates that socio-demographic factors are related to mental and/or behavioural problems, even when controlling for the possibility that these factors bias physicians' diagnoses [270, 315] and when controlling for disability, functioning and non-specific psychological distress.

5.3.4   Correlates of ED use

Study 2 identified socio-demographic differences between a sample of people who sought treatment in a psychiatric ED and the general population. As hypothesized, and consistent with previous research [209, 226, 228, 232, 295], psychiatric ED patients were more likely to be younger in age, never married or previously married, and/or a student or currently unemployed when compared to the general population. In contrast to study 1, study 2 did not examine prevalence differences in education between people who sought treatment at a psychiatric ED compared to the general population, as data was not collected in the psychiatric ED study on the achieved level of education. We also found that at lower levels of disability and functioning, men were using psychiatric emergency services at CAMH more than were women; however, at higher levels of disability and functioning, women were more likely to use CAMH emergency services than were men. This also has been observed for general hospital EDs, with men being more likely to use EDs for non-emergency treatment [232, 289], and women being more likely to seek ED treatment for psychiatric diseases [231]. Therefore, efforts could be made to increase among men access to and utilization of primary care for psychiatric problems in order to prevent costly ED treatment for non-emergency conditions.

With respect to the effects of employment status and marital status on the use of psychiatric EDs, the results of study 2 are consistent with the results of study 1, namely that people who were never married or previously married, and those who are unemployed have increased levels of disability and functioning, and an increased probability of seeking treatment at a psychiatric ED. However, the findings of study 2 with respect to the effects of gender and age on psychiatric ED use are inconsistent with the findings of study 1, with people who are younger in age having a higher prevalence in the psychiatric ED population when compared to the general population. As stated in study 1, women were more likely to have HD-LF-HNSPD (Class 4), and age was not associated with membership in the class of people with HD-LF-HNSPD. This discrepancy in the findings of studies 1 and 2 is likely due to men and people younger in age being more likely to use ED services for primary care purposes as a result of barriers to access to primary care for these populations and also due to negative attitudes towards primary health care services [165, 227, 230, 316]. However, it is unknown at the present time the extent to which these two pathways (i.e. (i) an increase in the probability of having a mental and/or behavioural disorder, and (ii) barriers to access to primary care and negative attitudes towards primary health care

services) mediate differences in the probability of seeking health care at a psychiatric ED by socio-demographic correlates.

An understanding of the lived experiences of a patient with a mental and/or behavioural disorder can help to guide treatment interventions and management strategies, to align patients with a range of resources, and can be used to measure improvements in disability and functioning after the administration of various treatments [42]. Accordingly, the results of study 2, specifically the observation that disability and functioning do not significantly differ by diagnosis but that there is a high variability of levels of disability and functioning within diagnostic categories, demonstrate that the current methods of triaging patients with mental and/or behavioural disorders and of aligning these patients with the appropriate intensity of resources could be improved by the collection of data concerning levels of disability and functioning in addition to diagnosis. This observation is consistent with the observation that, with respect to patients with psychiatric disorders, diagnosis alone is not sufficient to predict service needs [192], length of hospitalization [193], level of care required [194], and outcomes of hospitalization [195]. Furthermore, previous research has observed that the use of information on disability, functioning and diagnosis allows for the prediction of health services utilization [287], length of hospitalization [196], and improvement in functioning after hospitalization [195].

The collection of disability and functioning data in an ED using the WHODAS may also be useful for additional reasons. First, the WHODAS applies to all diseases, including physical, mental and substance use disorders, and, thus, enables the triaging of somatic and non-somatic illnesses in a general hospital ED to be made in a consistent manner. Second, the WHODAS has been shown to be good at differentiating the nature and severity of psychiatric issues and has been found to have good concurrent validity measures such as the WHO Quality of Life measure [53], the London Handicap Scale [54], the Functional Independent Measure [58], and the Short Form Health Survey [55], and, thus, provides an accurate measure of disability and functioning [280]. Third, the WHODAS assesses disability in a culturally-sensitive manner across a standard rating scale, has been tested in numerous countries, and, therefore, can be used to triage patients in various ED settings.

5.3.5   Reducing psychiatric ED recidivism

The number of frequent ED users is an expanding problem and has increased since 1990 in the United States [211, 212] and in other countries, such as Canada [213] and Australia [214]. Therefore, there is a need to reduce recidivism to psychiatric EDs; however, to reduce recidivism to psychiatric EDs there is first a need to identify and quantify the correlates of psychiatric ED recidivism.

First, the disability and functioning profile of an individual was hypothesized to be correlated to the frequent use. In contrast to what was hypothesized and the observation of past studies that level of illness is correlated to the frequent use of ED services [222], study 2 found that disability and functioning were not associated with the frequent use of psychiatric EDs. In contrast to this finding, study 3 found that disability and functioning were correlated to the hazard of psychiatric ED recidivism; however, this hazard decreased over time to be non-significant. Furthermore, in agreement with the findings of study 2, study 3 also found that disability and functioning were not associated with the number of psychiatric ED visits among recidivists. Thus, it can be concluded that although disability and functioning are not associated with frequent psychiatric ED use, disability and functioning are associated with a short-term risk of recidivism to a psychiatric ED.

Second, the observation of a lack of a correlation between diagnosis and psychiatric ED recidivism described in study 3 is interesting, as previous studies have observed that frequent use of an ED for a mental and/or behavioural disorder was significantly correlated with having a psychotic disorder [248, 250, 251]; schizophrenia [250], a personality disorder [248, 250], an anxiety disorder [248], and substance abuse [248]. However, these studies did not control for differences in disability, functioning and number of previous visits. Furthermore, different mental and behavioural disorders also have various pathologies with different relapse and remittance characteristics [13], and treatment rates and outcomes differ based on diagnosis [9, 37]. Additionally, the frequency of using psychiatric ED services may be correlated with the condition for which treatment is sought, the effectiveness of treatments previously received, and the level of satisfaction with treatments previously received, all of which differ by diagnosis [209]. However, study 3 found that, after controlling for the number of previous psychiatric ED visits, disability and functioning and socio-demographic factors, diagnosis did not predict the

hazard of recidivism to a psychiatric ED. Although contrary to what was hypothesized, the observation of there being a significant difference between frequent users of psychiatric EDs and non-frequent users of psychiatric EDs may be due to heterogeneity in the rates of recidivism and in levels of disability and functioning among people within diagnostic categories.

Third, study 3 observed that the number of previous psychiatric ED visits was correlated with psychiatric ED recidivism. This factor of past visits predicting future visits has been overlooked, for the most part, in the literature concerning frequent ED use [209]. Previous studies have indicated that although people may be frequent ED users in a particular year, a large proportion of these people may not be frequent ED users in the following year [209].

Lastly, study 3 examined the baseline predictors of recidivism to a psychiatric ED, and found, contrary to what was hypothesized, that unemployment was significantly related to a reduction in the hazard of recidivism to a psychiatric ED after a baseline visit, but was also related to an increase in the number of visits among unemployed psychiatric ED recidivists. This is the first study to observe this relationship, as it is also the first study to separately examine the hazard of recidivism and the number of subsequent visits among recidivists; most other studies have examined the frequent use of a general hospital ED or psychiatric ED. As mentioned previously, people who are unemployed represent a heterogeneous group of people, and, thus, the results of this study are not easily interpretable.

The findings of this thesis concerning the factors that are correlated to psychiatric ED recidivism are important for three main reasons. First, previous studies have shown that a small proportion of health care users account for a large proportion of total health care costs [201, 202], with people who are frequent users of psychiatric EDs being responsible for some of these potentially avoidable costs [204]. Second, ED crowding, which is partially due to frequent ED use, has been linked with patient mortality, transport delays, treatment delays, ambulance diversion, and financial costs [210], and therefore the reduction of frequent use of the psychiatric ED allows for a reallocation of resources that could be used to reduce the negative effects of ED crowding. Third, the factors leading to frequent psychiatric ED use are hypothesized to be (i) the treatment prescribed and received during a psychiatric ED visit [218-220], (ii) the level of adherence to follow-up treatment, and (iii) restricted access to primary care [163]. Thus, increasing the effectiveness of treatment received and prescribed during a psychiatric ED visit, increasing

adherence to prescribed care, and increasing access to primary care, may lead to an increase in patients' functioning and a decrease in their disability, while simultaneously decreasing psychiatric ED recidivism. Although the increase in access to primary care will increase the health care costs associated with this type of care, it is hypothesized that the potential reduction in the costs of psychiatric ED use will more than offset the increased costs [210]. Therefore, there is a need for future research to examine the nature of the relationships between factors that are correlated to psychiatric ED recidivism, so that interventions can be implemented to reduce the recidivism to psychiatric EDs.

5.3.6   Methodological Implications

5.3.6.1   Studying mental health in the general population

The latent class research approach to characterizing mental health in the general population demonstrates that a latent class analysis of the population using domain scores of the WHODAS and the overall score of the GHQ-12 can provide a good separation of the population in terms of disability, functioning and non-specific psychological distress. The alternative to this approach is to use a general population survey that measures the prevalence and correlates of mental and behavioural disorders by using a survey questionnaire such as the CIDI. This methodology of using the CIDI and other survey measures to screen for mental and behavioural disorders is problematic, and has external validity limitations when applied to a clinical population. Specifically, as shown by Rehm and colleagues with the example of alcohol dependence, although there is a relatively equal prevalence of mental and behavioural disorders when a diagnosis is made using the CIDI compared to when a diagnosis is made by a general practitioner, there is a poor overlap of cases identified by both these methods. Indeed, in Rehm's and colleagues' study, the past year prevalence of alcohol dependence was estimated to be higher for people at a younger age when measured with the CIDI compared to when assessed by a general practitioner's diagnosis, while at older ages the past year prevalence of alcohol dependence was higher when diagnosed by a general practitioner compared to the CIDI measurement [25]. Thus, the use of a latent class analysis to describe the mental health of the general population by disability, functioning and non-specific psychological distress may reduce the external validity limitations of using a general population survey instrument such as the CIDI.

5.3.6.2   Studying psychiatric ED recidivism

Previous studies on repeat psychiatric ED use have focused on frequent users of psychiatric EDs [209]. However, the definition of frequent psychiatric ED use varies considerably [222, 223], thereby reducing the comparability of results between studies that have examined the correlates of frequent psychiatric ED use. Instead of examining the frequent use of psychiatric EDs, study 3 examined correlates of (i) the hazard of recidivism to the psychiatric ED after the baseline visit, and (ii) the number of subsequent visits among psychiatric ED recidivists. This methodology eliminates the problem of heterogeneity in the definition of what constitutes frequent psychiatric ED use, and accounts for people who are users of psychiatric EDs but who may not meet a defined threshold for frequent psychiatric ED use. Furthermore, this methodology also accounts for differences in the correlates of the hazard of recidivism and the number of subsequent psychiatric ED visits among recidivists. Since the research presented in study 3 observed that the correlates of the hazard of recidivism to a psychiatric ED are not the same as the correlates of the number of subsequent psychiatric ED visits, the separation of the dimensions of recidivism is important. Thus, based on the results of study 3, subsequent studies that examine the correlates of recidivism to a psychiatric ED should no longer examine the correlates of frequent psychiatric ED use and instead examine the correlates of the hazard of recidivism to a psychiatric ED and the number of subsequent psychiatric ED visits among recidivists.

5.4   Future research directions

This thesis addresses important knowledge gaps in the literature concerning (i) the characterization of mental health in the general population and in the population of people who access psychiatric EDs, and (ii) recidivism to a psychiatric ED after a baseline visit. However, as a result of the research presented in this thesis, new and important questions have arisen that should be addressed in future research studies.

5.4.1   Screening for mental and behavioural disorders in the general population

As described in study 1, it was observed that neither the WHODAS domain scores nor the GHQ-12 scores were able to characterize mental health fully in a general population, with some people with a high GHQ-12 score having a below average WHODAS score. Given that the GHQ-12 [67] and other similar instruments, such as the Kessler Psychological Distress Scale [68], are used to screen for mental and behavioural disorders [69], this observation is problematic as it is

likely, based on previous research [42], that a person with a mental and/or behavioural disorder will have above average disability and below average functioning. Therefore, future research should examine the utility of adding disability and functioning measurements to these screening instruments in order to improve their sensitivity and specificity in identifying mental and behavioural disorders in the general population.

5.4.2 Correlates of disability, functioning and non-specific psychological distress

Study 1 found, as hypothesized, that women, homemakers, retirees or people who were unemployed, people who had never been married or were previously married, people with alcohol use problems, people who used non-medical prescription opioids, and people with a traumatic brain injury were more likely to have HD-LF-HNSPD (Class 4) as compared to LD-HF-LNSPD (Class 1). However, as mentioned in the limitations section of this thesis, in study 1, data were collected in a cross-sectional manner, and, thus, a temporal relationship between the correlates of disability, functioning and non-specific psychological distress could not be ascertained. Therefore, future research should examine the temporal nature of these correlations using longitudinal data.

5.4.3 Socio-demographic correlates of psychiatric ED attendance and recidivism

Study 2 observed, as hypothesized, that patients who used psychiatric EDs were more likely to be younger in age, never married or previously married, and a student or currently unemployed when compared to the general population. The exact casual pathway by which socio-demographic variables affect the use of psychiatric EDs is unclear; it is currently hypothesized that the relationship between socio-demographic variables and psychiatric ED use is mediated by (i) the probability of having a mental and/or behavioural disorder, (ii) access to primary care [163, 317], and (iii) attitudes towards health care services [316]. This complex relationship between socio-demographic variables and psychiatric ED use is demonstrated by the results of studies 1 and 2; study 1 observed that women had a higher chance of having HD-LF-HNSPD (Class 4), while study 2 observed that men had a higher chance of attending a psychiatric ED. These observations indicate that, when looking at ED attendance, reduced access to primary care and negative attitudes towards health care services among men may be a more important factor than the increased risk of a mental and behavioural disorder among women. Thus, given the

complex nature of the pathway by which socio-demographic variables are related to ED use, a longitudinal path analysis study is required to determine the extent to which gender, age employment and marital status affect potential mediating factors such as health-seeking behaviours and access to health care.

5.4.4   Correlates of psychiatric ED recidivism

Study 3 also observed that disability and functioning were associated with the short-term hazard of recidivism to a psychiatric ED, and that the number of visits to the psychiatric ED in the previous six months was associated with the hazard of recidivism to a psychiatric ED and the number of subsequent visits among recidivists; however, this study did not examine the effect of mediating factors. Thus, future research should examine the role of (i) triage decisions, (ii) alignment of patients with the appropriate intensity of resources, and (iii) decisions regarding who is an inpatient and who is an outpatient on mediating the impact of disability and functioning, on the number of previous psychiatric ED visits before baseline, and on recidivism to a psychiatric ED. Furthermore, based on our observations, future research should examine how best to reduce psychiatric ED recidivism in the population of patients who have high disability and functioning and who have a recent history of frequent psychiatric ED use.

5.4.5   Socio-demographic correlates of psychiatric ED recidivism

As mentioned previously, people who are unemployed are a heterogeneous group, and, thus, the results of study 3 are not easily interpretable. Therefore, future research should examine the link between unemployment and the reduced hazard of recidivism to a psychiatric ED, as well as the link between unemployment and an increased number of subsequent psychiatric ED visits among recidivists who are unemployed. Specifically, future research should examine these relationships by subgroups of people who are unemployed, such as the homeless [197], chronically unemployed, and people with short-term unemployment.

5.4.6   Disability, functioning and the number of previous psychiatric ED visits as a predictor of psychiatric ED recidivism

To be able to reduce recidivism to psychiatric EDs, there needs to be an understanding of why people at higher risk, particularly people with high disability and low functioning, and who have a history of psychiatric ED use, are returning to the psychiatric ED to seek further treatment.

Therefore, there is a need for qualitative research to determine why people with high disability and low functioning return to a psychiatric ED for additional treatment, and why people with a past history of psychiatric ED use have a higher rate of psychiatric ED recidivism.

5.4.7   Other correlates of psychiatric ED recidivism

As treatment prescribed and treatment received during a psychiatric ED visit are hypothesized to have an impact on health trajectories after a psychiatric ED visit, the results presented in study 3 are limited when predicting psychiatric ED recidivism as they do not account for the treatments prescribed and accessed after a patient's baseline psychiatric ED visit. Therefore, an analysis of people's characteristics which influence and/or predict (i) what treatment is received and prescribed in the psychiatric ED, (ii) whether or not the person will access treatment after their psychiatric ED visit, and (iii) how the factors in (i) and (ii) are related to recidivism to a psychiatric ED would allow for a better understanding of the pathway by which baseline characteristics are related to psychiatric ED recidivism. Therefore, a longitudinal study is needed to investigate how baseline correlates are associated with the treatment received and prescribed during a psychiatric ED visit, with the treatment accessed after a psychiatric ED visit, and, furthermore, how these factors are correlated to psychiatric ED recidivism.

5.4.8   Improvements in disability and functioning after an ED visit as an outcome measure

In addition to psychiatric ED recidivism, there are other outcomes, such as changes in disability and functioning after a psychiatric ED visit, which are also important measures of the treatment prescribed and received during the psychiatric ED visit. Thus, to assess changes in mental health among people who access psychiatric EDs, a longitudinal follow-up study that involves follow-up assessments is required; however, as people who access psychiatric ED are more likely to be homeless [182, 198], previously incarcerated [182, 199] or previously hospitalized [182], they are generally highly mobile and typically harder to monitor longitudinally than is the general population. Furthermore, the expected low follow-up rate of people who seek treatment at a psychiatric ED would limit the conclusions reached as a result of a longitudinal follow-up study, as the expected loss to follow-up would result in a decrease in power and may be correlated to various predisposing factors, thereby biasing the analysis of data from the population sample (even after correcting for non-random loss to follow-up through multiple imputation methods

[200]). Therefore, a longitudinal study using up-to-date methods to maximize follow-up among all participants, minimize participation attrition, minimize systematic bias and prevent loss of statistical power [318-320] is needed to assess the feasibility of following this population. Furthermore, if a longitudinal study of this population is deemed to be feasible, longitudinal outcomes other than recidivism to a psychiatric ED would be needed to assess whether baseline disability and functioning and changes in a person's disability and functioning after the baseline psychiatric ED visit are correlated with access to and compliance with various mental health interventions and treatments.

5.4.9   Extension of the research findings to the general hospital ED

As outlined in study 2 (see Chapter 3), a systematic search of PubMed revealed that, to date, no peer-reviewed study has used the WHODAS to measure disability and functioning in the EDs of hospitals. Thus, study 2 examined the disability and functioning differences by diagnosis for a population of patients who sought treatment in a psychiatric ED; however, the external validity of these results is limited to the population that visits EDs for mental and behavioural disorders, and, accordingly, it is unknown if an absence of observed disability and functioning boundaries would result for all diagnoses that present to a general hospital ED. Therefore, future research should examine the characteristics of patients who seek treatment in general hospital EDs in terms of their disability and functioning profiles by diagnosis.

The external validity of the results presented in study 3, which results demonstrate a need to separate analyses of psychiatric ED recidivism into the hazard of psychiatric ED recidivism and the number of subsequent psychiatric ED visits among recidivists, is limited to recidivism to the ED for mental and/or behavioural disorders. Therefore, it is currently unknown if there is a need to examine separately the correlates of the hazard of recidivism and the number of subsequent visits among recidivists as opposed to the correlates of frequent ED use for all people who seek treatment at a general hospital ED. Thus, future research is required to determine if, for studies of recidivism to a general ED, there is a need to separate analyses of recidivism into (i) the hazard of recidivism, and (ii) the number of subsequent ED visits among recidivists.

5.5   Conclusions

The studies presented in this thesis represent a substantial contribution to addressing current knowledge gaps in the literature with respect to measuring mental health in the general population and in psychiatric EDs, and in predicting recidivism among people who seek treatment at psychiatric EDs. The main conclusions of this study are multi-fold. First, measures of disability and functioning and of non-specific psychological distress are required to describe the mental health of the general population, even after removing people suspected of having somatic illnesses. Second, measures of disability and functioning together with scales of non-specific psychological distress may increase the sensitivity and specificity of non-specific psychological distress screening instruments for mental and behavioural disorders. Third, disability and functioning did not differ by diagnosis among people who attended a psychiatric ED, and, therefore, a measure of disability and functioning in addition to diagnosis could be collected in psychiatric EDs to triage and align people with the appropriate intensity of treatment resources. Fourth, we observed that disability and functioning, past psychiatric ED visits, and employment status were correlated with recidivism to a psychiatric ED. Therefore, future research should examine if taking into account employment status, disability and functioning, and the number of past ED visits when treating psychiatric ED patients and prescribing aftercare will decrease ED recidivism. Lastly, across all studies presented in this thesis, we observed that more than one measure of mental health might be required to screen for mental illnesses, to triage and align people who seek help at a psychiatric ED with the appropriate intensity of treatment resources, and to predict recidivism among people who seek treatment at a psychiatric ED.

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Appendices

Appendix to Chapter 2

Latent Class modelling statistics

Both the Akaike information criterion (AIC) and Bayesian information criterion (BIC) were used to determine the optimal number of latent classes present within the database [288]. The BIC statistic indicated that 3 classes were sufficent to describe the underlying class structure, while the AIC statistic indicated that 6 classes were necessary to describe the underlying class structure (giving an average number of classes of 4.5). Based on the modelling strategy of Mihalopoulos et al [288], in our analysis, more weight was given to the BIC statistics due to the total sample size available for the analysis, and the fact that the accuracy of the AIC statistic does not increase with the total sample size while the accuracy of the BIC statistic does increase with the total sample size [321]. Furthermore, based on the disability, functioning and non-specific psychological distress profiles of people who are well, who have a somatic illness, or who have a mental and/or behavioural disorder, we hypothesized that the population would have at least three classes [42]; however, more than three classes were possible given that subgroups of people with mental and/or behavioural disorders could be present (based on the different levels of non-specific psychological distress, disability and functioning caused by mental and/or behavioural disorders) [42]. Accordingly, based on giving the BIC statistics more weight, while at the same time giving consideration to the AIC statistics, we determined that 4 classes would be sufficient to describe the underlying class structure of the sample population. Figure A-1 provides the AIC and BIC values by the number of latent classes which were modelled using the World Health Organization Disability Assessment Schedule (WHODAS) domain scores and the 12 item General Health Questionaire (GHQ-12) scores.

The χ^2 statistic and the likelihood ratio χ^2 statistic were not used to determine fit. Both of these statistics are accurate measures of fit of a latent class analysis in situations where there is a large sample size and there are a small number of variables [288]. Thus, as there were small cell counts towards the upper limit of both the WHODAS domain scores and the GHQ-12 scores, neither the χ^2 statistic or the likelihood ratio χ^2 statistic was considered to be a valid measure of fit [288]. Additionally, entropy was not used to assess the fit of the latent class models. Specifically, the use of entropy as a fit statistic for the latent class model was not possible as the

statistical software program R [264] mathematically requires each variable used in the latent class analysis to have an equal number of values [265] in order to estimate the entropy statistic.

Thus, to determine the fit of the latent class models, we used conditional probabilities. Figures A-2 to A-8 illustrate the conditional probabilities by the variables that were modelled. As observed in figures A-2 to A-8, there is a good separation between latent groups. Table A-1 presents the unweighted point estimates of the WHODAS domain and GHQ-12 scores by population class. Table A-2 outlines the correlations between the WHODAS domain and GHQ-12 scores. Futhermore, Table A-3 presents the conditional probabilities by the variables which were modelled for a 3, 4 and 5 class model. A large separation was observed between classes within each model, and therefore a model with 4 unique classes was determined to best describe the underlying latent stucture of the population.
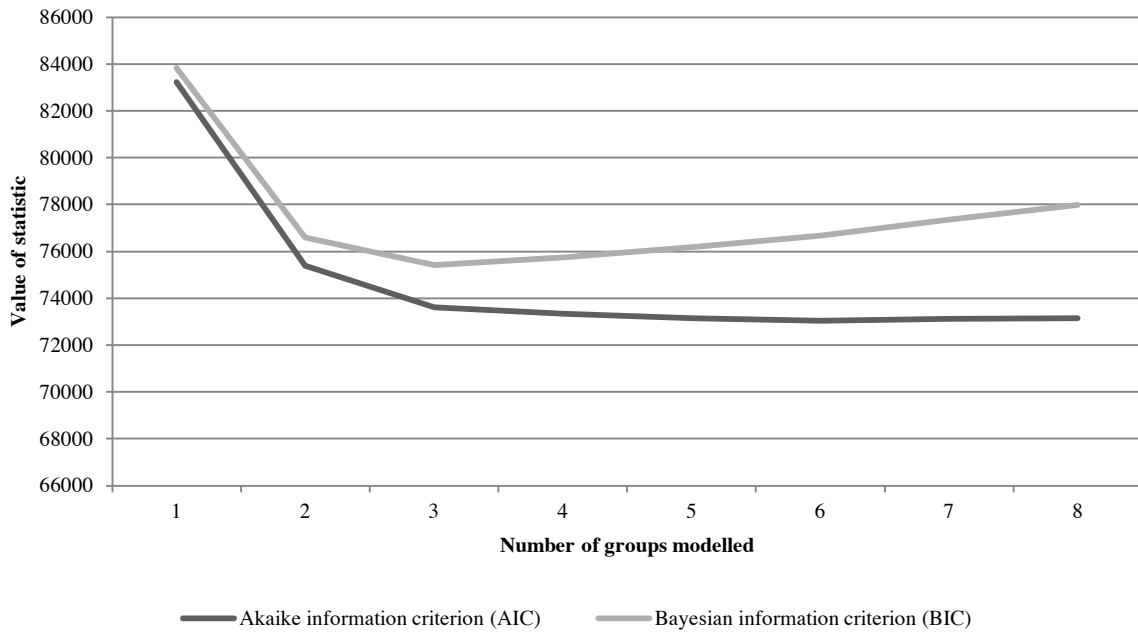
Figure A-1. Akaike information criterion (AIC) and Bayesian information criterion (BIC) for latent class analyses by class number
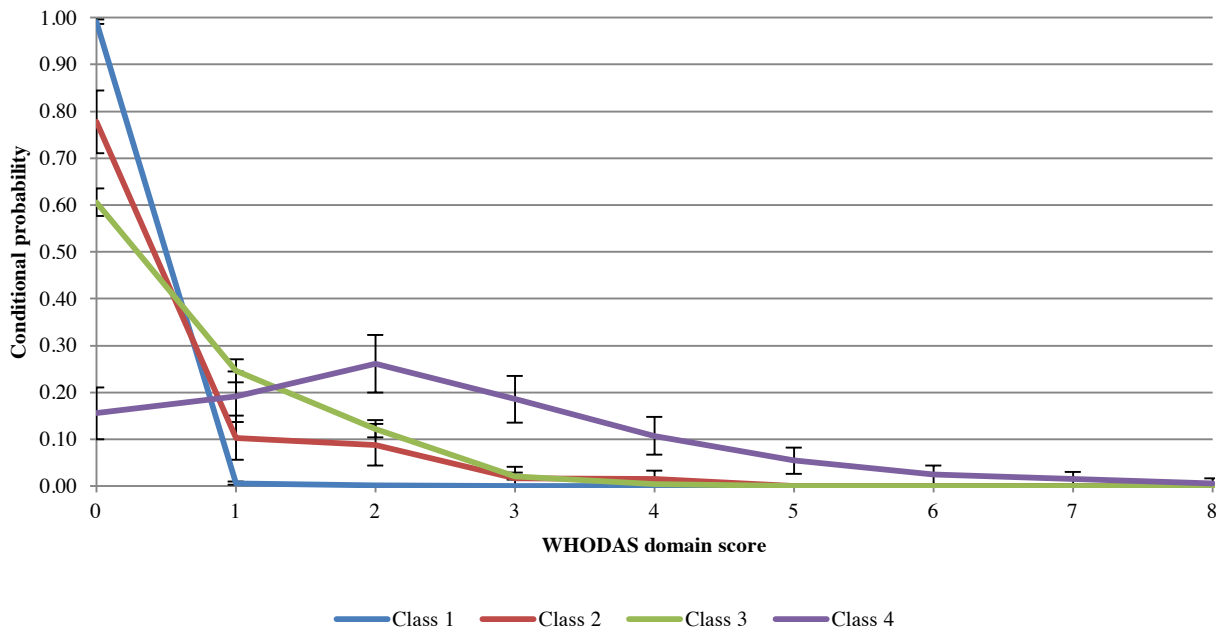
Figure A-2. Conditional probabilities (and 95% Confidence Intervals) by WHODAS scores for questions measuring domain 1 (cognition) and by class
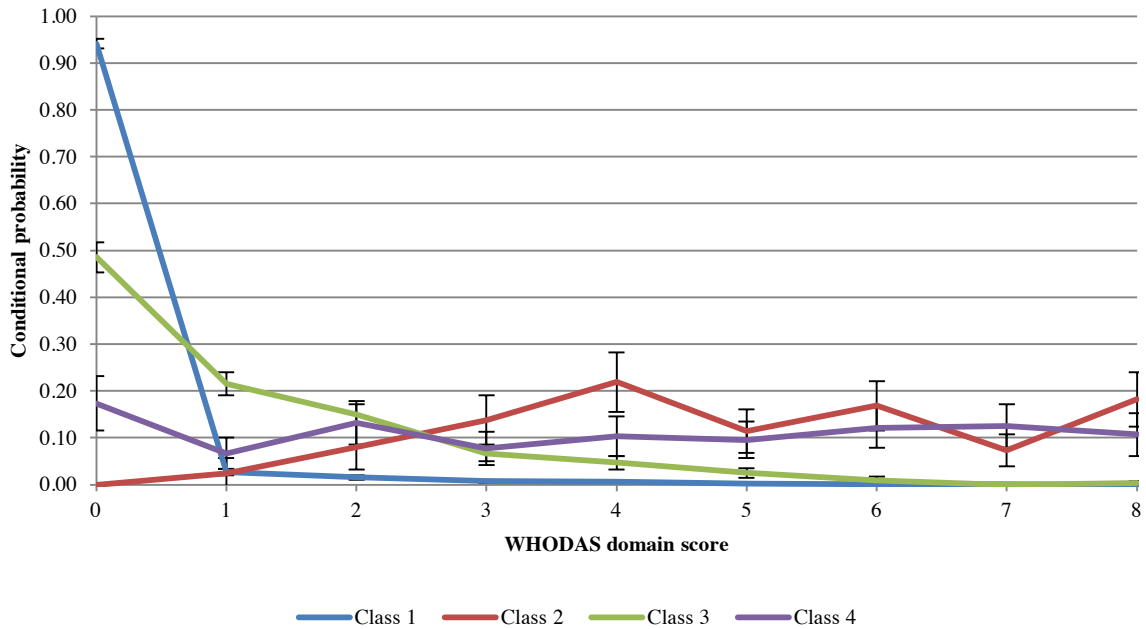
Figure A-3. Conditional probabilities (and 95% Confidence Intervals) by WHODAS scores for questions measuring domain 2 (mobility) and by class
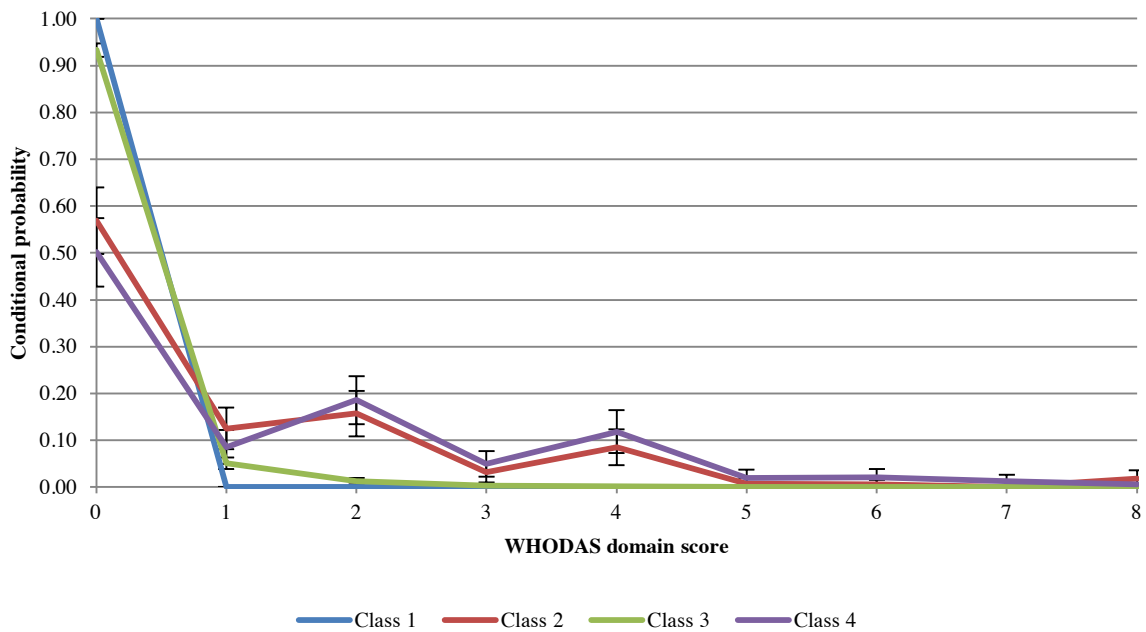
Figure A-4. Conditional probabilities (and 95% Confidence Intervals) by WHODAS scores for questions measuring domain 3 (self care) and by class
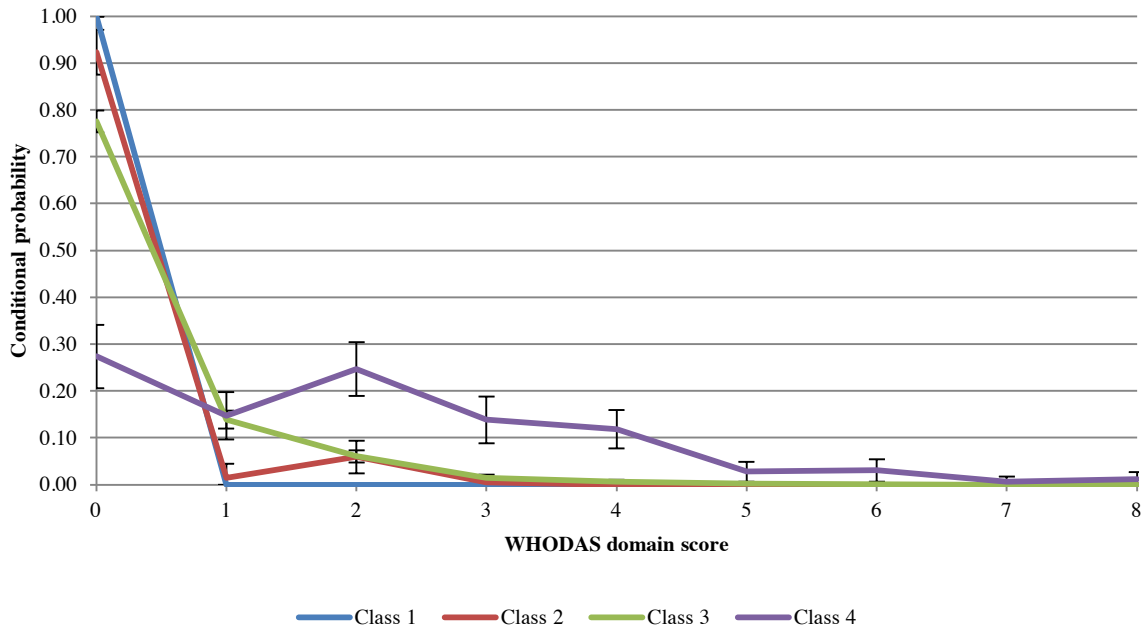
Figure A-5. Conditional probabilities (and 95% Confidence Intervals) by WHODAS scores for questions measuring domain 4 (getting along) and by class
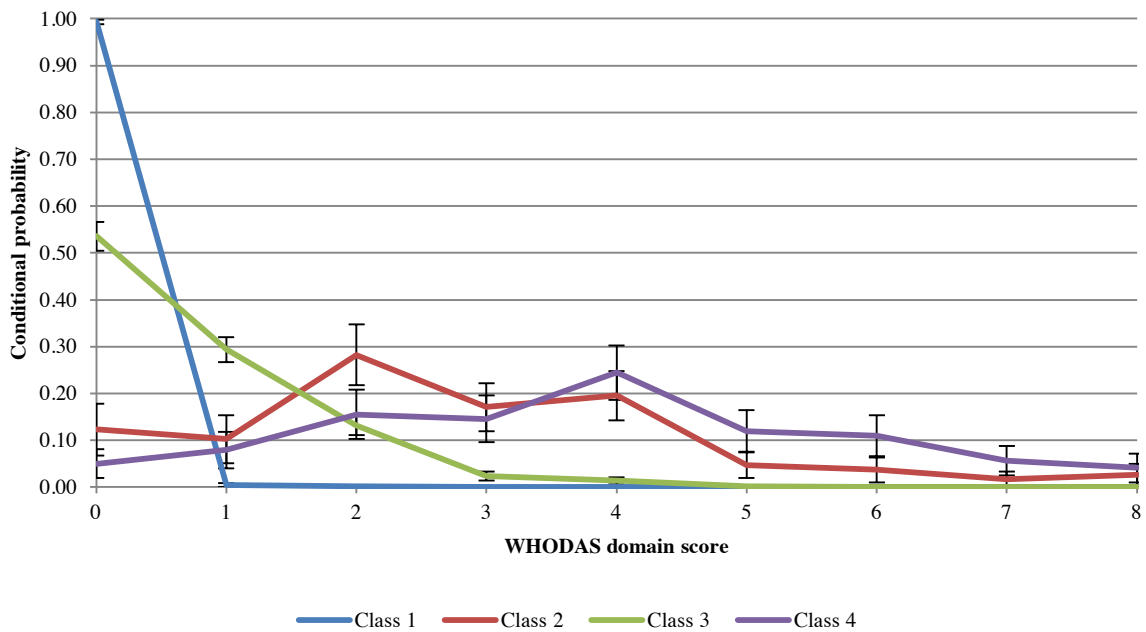
Figure A-6. Conditional probabilities (and 95% Confidence Intervals) by WHODAS scores for questions measuring domain 5 (life activities) and by class
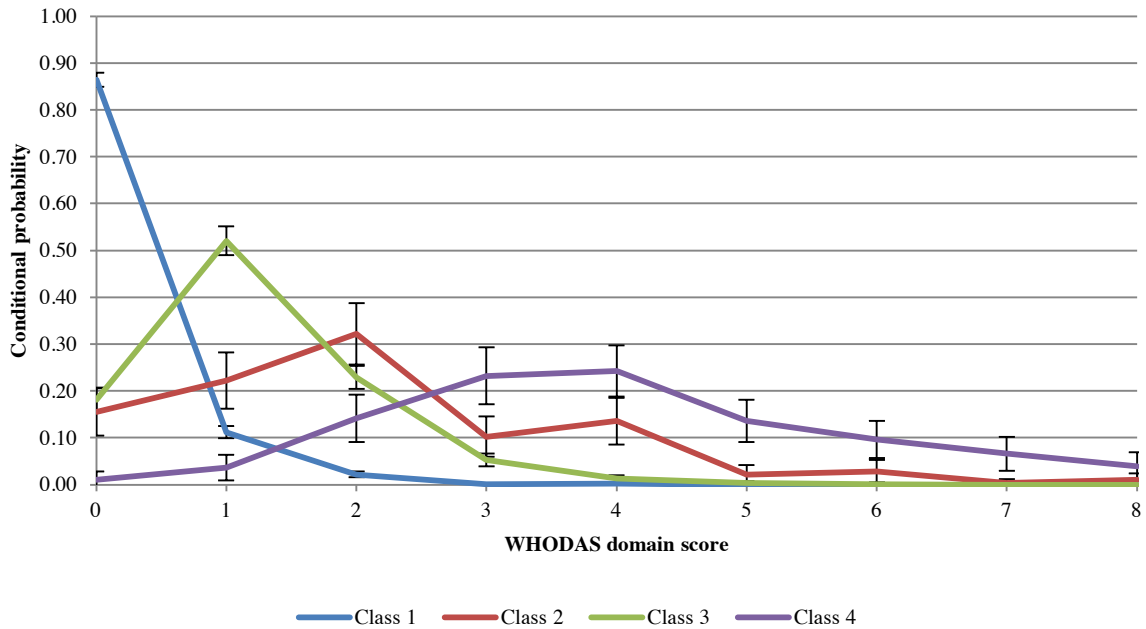
Figure A-7. Conditional probabilities (and 95% Confidence Intervals) by WHODAS scores for questions measuring domain 6 (participation in society) and by class
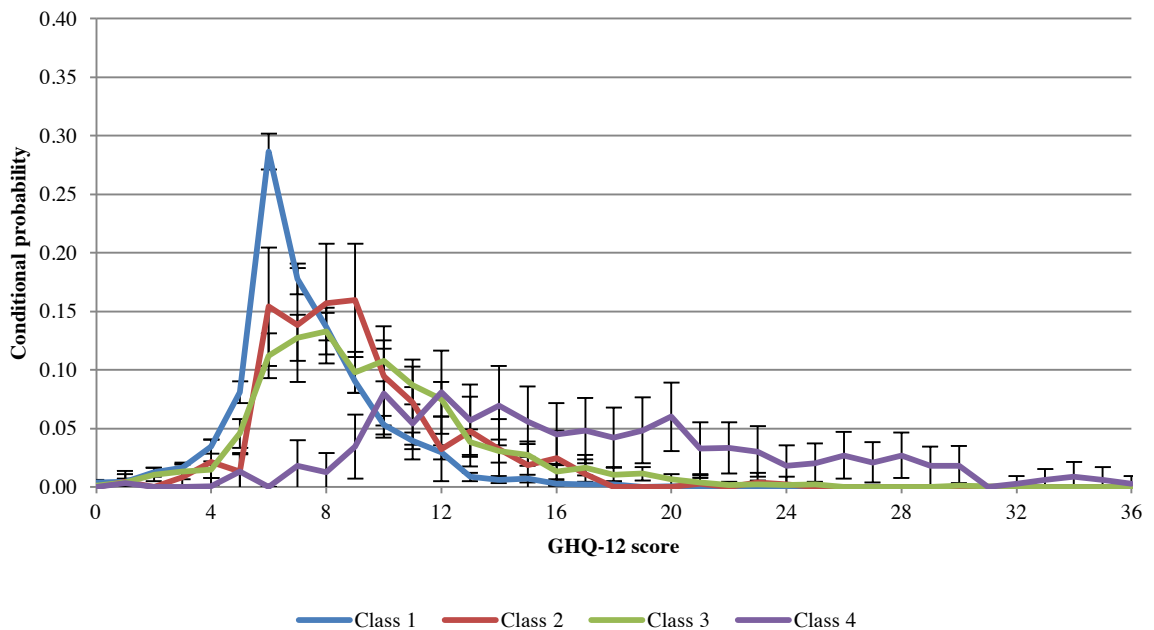
Figure A-8. Conditional probabilities (and 95% Confidence Intervals) by General Health Questionnaire (GHQ) scores and by class

Table A-1. Unweighted point estimates for World Health Organization Disability Assessment Schedule (WHODAS) domain scores and the General Health Questionnaire (GHQ-12) scores by population class

Measure	Class 1		Class 2		Class 3		Class 4	
	Point estimate	SD	Point estimate	SD	Point estimate	SD	Point estimate	SD
WHODAS*								
Domain 1 - cognition	2.01	0.14	2.34	0.78	2.61	0.83	4.34	1.68
Domain 2 - mobility	2.11	0.55	7.22	1.93	3.22	1.46	5.97	2.69
Domain 3 - self care	2.00	0.00	3.16	1.69	2.09	0.37	3.50	1.84
Domain 4 - getting along	2.00	0.00	2.14	0.53	2.37	0.79	4.04	1.77
Domain 5 - life activities	2.01	0.16	4.90	1.81	2.73	0.90	5.85	1.95
Domain 6 - participation in society	2.17	0.46	4.19	1.65	3.26	0.86	6.08	1.71
Total score	0.61	1.49	24.92	8.57	8.90	4.55	37.06	13.70
GHQ-12 score	8.34	2.57	9.98	3.13	10.62	3.96	18.28	6.60

* WHODAS domain scores range from 0 to 8 (i.e. a summation of the two questions in each domain).

Table A-2. Spearman's correlations between World Health Organization Disability Assessment Schedule (WHODAS) domain scores and the General Health Questionnaire (GHQ-12) score

Measure	1	2	3	4	5	6	7
1) GHQ-12 score	1.00	-	-	-	-	-	-
2) WHODAS domain 1: cognition	0.32	1.00	-	-	-	-	-
3) WHODAS domain 2: mobility	0.22	0.35	1.00	-	-	-	-
4) WHODAS domain 3: self care	0.19	0.24	0.43	1.00	-	-	-
5) WHODAS domain 4: getting along	0.28	0.46	0.27	0.24	1.00	-	-
6) WHODAS domain 5: life activities	0.33	0.44	0.58	0.45	0.41	1.00	-
7) WHODAS domain 6: participation in society	0.38	0.46	0.50	0.35	0.42	0.56	1.00

Correlations are all significant, with a $p < 0.001$.

Table A-3. Conditional probabilities by WHODAS scores and General Health Questionnaire (GHQ) scores for a 3, 4, and 5 class model

Measure	3 class solution			4 class solution				5 class solution				
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3	Class 4	Class 1	Class 2	Class 3	Class 4	Class 5
Domain 1 (cognition)												
0	0.99	0.63	0.36	0.99	0.78	0.61	0.16	0.99	0.76	0.66	0.18	0.21
1	0.01	0.23	0.16	0.01	0.10	0.25	0.19	0.00	0.11	0.22	0.32	0.09
2	0.00	0.12	0.21	0.00	0.09	0.12	0.26	0.00	0.09	0.10	0.31	0.19
3	0.00	0.02	0.13	0.00	0.02	0.02	0.19	0.00	0.02	0.01	0.13	0.19
4	0.00	0.00	0.07	0.00	0.02	0.00	0.11	0.00	0.01	0.00	0.03	0.18
5	0.00	0.00	0.04	0.00	0.00	0.00	0.05	0.00	0.00	0.00	0.02	0.07
6	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.03
7	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.02
8	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
Domain 2 (mobility)												
0	0.94	0.44	0.12	0.94	0.00	0.49	0.17	0.95	0.04	0.50	0.38	0.05
1	0.03	0.20	0.05	0.03	0.02	0.22	0.07	0.02	0.03	0.22	0.13	0.05
2	0.01	0.15	0.11	0.02	0.08	0.15	0.13	0.01	0.09	0.14	0.20	0.04
3	0.01	0.08	0.07	0.01	0.14	0.07	0.08	0.01	0.13	0.06	0.09	0.05
4	0.01	0.07	0.13	0.01	0.22	0.05	0.10	0.01	0.20	0.04	0.09	0.10
5	0.00	0.03	0.10	0.00	0.11	0.02	0.10	0.00	0.11	0.02	0.05	0.12
6	0.00	0.02	0.14	0.00	0.17	0.01	0.12	0.00	0.17	0.01	0.03	0.19
7	0.00	0.00	0.12	0.00	0.07	0.00	0.12	0.00	0.08	0.00	0.01	0.20
8	0.00	0.01	0.15	0.00	0.18	0.00	0.11	0.00	0.16	0.00	0.02	0.20
Domain 3 (self care)												
0	1.00	0.92	0.48	1.00	0.57	0.93	0.50	1.00	0.56	0.95	0.79	0.30
1	0.00	0.06	0.10	0.00	0.13	0.05	0.09	0.00	0.13	0.04	0.08	0.08
2	0.00	0.02	0.19	0.00	0.16	0.01	0.19	0.00	0.16	0.01	0.08	0.22
3	0.00	0.00	0.05	0.00	0.03	0.00	0.05	0.00	0.03	0.00	0.03	0.05
4	0.00	0.00	0.13	0.00	0.08	0.00	0.12	0.00	0.08	0.00	0.02	0.21
5	0.00	0.00	0.02	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.04
6	0.00	0.00	0.02	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.04
7	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03
8	0.00	0.00	0.01	0.00	0.02	0.00	0.01	0.00	0.01	0.00	0.00	0.02
Domain 4 (getting along)												
0	1.00	0.79	0.49	1.00	0.92	0.78	0.27	1.00	0.93	0.83	0.26	0.34
1	0.00	0.13	0.10	0.00	0.01	0.14	0.15	0.00	0.01	0.11	0.26	0.05
2	0.00	0.06	0.19	0.00	0.06	0.06	0.25	0.00	0.05	0.04	0.26	0.21
3	0.00	0.01	0.09	0.00	0.00	0.02	0.14	0.00	0.01	0.01	0.11	0.14
4	0.00	0.01	0.08	0.00	0.00	0.01	0.12	0.00	0.00	0.00	0.08	0.12
5	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.05

Measure	3 class solution			4 class solution				5 class solution				
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3	Class 4	Class 1	Class 2	Class 3	Class 4	Class 5
6	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.05
7	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
8	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.03
Domain 5 (life activities)												
0	0.99	0.51	0.05	0.99	0.12	0.54	0.05	1.00	0.12	0.61	0.12	0.03
1	0.00	0.28	0.07	0.00	0.10	0.29	0.08	0.00	0.10	0.27	0.26	0.00
2	0.00	0.15	0.18	0.00	0.28	0.13	0.16	0.00	0.28	0.10	0.28	0.04
3	0.00	0.04	0.16	0.00	0.17	0.02	0.15	0.00	0.18	0.01	0.15	0.07
4	0.00	0.02	0.26	0.00	0.20	0.01	0.24	0.00	0.20	0.00	0.16	0.23
5	0.00	0.00	0.11	0.00	0.05	0.00	0.12	0.00	0.05	0.00	0.03	0.19
6	0.00	0.00	0.09	0.00	0.04	0.00	0.11	0.00	0.04	0.00	0.00	0.23
7	0.00	0.00	0.05	0.00	0.02	0.00	0.06	0.00	0.02	0.00	0.00	0.11
8	0.00	0.00	0.04	0.00	0.03	0.00	0.04	0.00	0.02	0.00	0.00	0.10
Domain 6 (participation in society)												
0	0.86	0.19	0.04	0.86	0.16	0.18	0.01	0.88	0.15	0.21	0.05	0.00
1	0.11	0.50	0.06	0.11	0.22	0.52	0.04	0.10	0.23	0.56	0.10	0.03
2	0.02	0.23	0.21	0.02	0.32	0.23	0.14	0.02	0.34	0.19	0.34	0.00
3	0.00	0.05	0.20	0.00	0.10	0.05	0.23	0.00	0.10	0.03	0.30	0.12
4	0.00	0.02	0.22	0.00	0.14	0.01	0.24	0.00	0.14	0.01	0.15	0.25
5	0.00	0.00	0.10	0.00	0.02	0.00	0.14	0.00	0.02	0.00	0.04	0.22
6	0.00	0.00	0.08	0.00	0.03	0.00	0.10	0.00	0.03	0.00	0.02	0.16
7	0.00	0.00	0.05	0.00	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.14
8	0.00	0.00	0.03	0.00	0.01	0.00	0.04	0.00	0.00	0.00	0.00	0.09
GHQ-12 scores												
0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
2	0.01	0.01	0.00	0.01	0.00	0.01	0.00	0.01	0.01	0.01	0.00	0.00
3	0.02	0.01	0.00	0.02	0.01	0.01	0.00	0.02	0.01	0.01	0.01	0.00
4	0.03	0.01	0.01	0.03	0.02	0.01	0.00	0.04	0.02	0.01	0.01	0.00
5	0.08	0.04	0.01	0.08	0.01	0.05	0.01	0.08	0.01	0.05	0.02	0.01
6	0.29	0.12	0.04	0.29	0.15	0.11	0.00	0.29	0.15	0.13	0.01	0.00
7	0.18	0.13	0.05	0.18	0.14	0.13	0.02	0.18	0.14	0.14	0.02	0.01
8	0.14	0.14	0.05	0.14	0.16	0.13	0.01	0.14	0.15	0.14	0.03	0.02
9	0.09	0.10	0.09	0.09	0.16	0.10	0.03	0.09	0.15	0.10	0.06	0.04
10	0.05	0.10	0.09	0.05	0.09	0.11	0.08	0.05	0.10	0.10	0.11	0.05
11	0.04	0.08	0.07	0.04	0.07	0.09	0.05	0.04	0.08	0.09	0.07	0.04
12	0.03	0.07	0.06	0.03	0.03	0.08	0.08	0.03	0.03	0.07	0.09	0.07
13	0.01	0.04	0.06	0.01	0.05	0.04	0.06	0.01	0.05	0.04	0.04	0.06
14	0.01	0.03	0.06	0.01	0.03	0.03	0.07	0.01	0.03	0.02	0.08	0.07
15	0.01	0.03	0.05	0.01	0.02	0.03	0.06	0.01	0.03	0.02	0.06	0.04

Measure	3 class solution			4 class solution				5 class solution				
	Class 1	Class 2	Class 3	Class 1	Class 2	Class 3	Class 4	Class 1	Class 2	Class 3	Class 4	Class 5
16	0.00	0.01	0.04	0.00	0.02	0.01	0.05	0.00	0.02	0.01	0.05	0.04
17	0.00	0.02	0.04	0.00	0.01	0.02	0.05	0.00	0.01	0.01	0.05	0.04
18	0.00	0.01	0.03	0.00	0.00	0.01	0.04	0.00	0.00	0.01	0.04	0.04
19	0.00	0.01	0.03	0.00	0.00	0.01	0.05	0.00	0.00	0.01	0.04	0.06
20	0.00	0.01	0.04	0.00	0.00	0.01	0.06	0.00	0.00	0.00	0.04	0.07
21	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.04
22	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.04
23	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.03	0.03
24	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.03
25	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.02	0.02
26	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.02	0.02
27	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.04
28	0.00	0.00	0.02	0.00	0.00	0.00	0.03	0.00	0.00	0.00	0.01	0.05
29	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.03
30	0.00	0.00	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.00	0.01	0.02
31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
33	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
34	0.00	0.00	0.01	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
35	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.01
36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01

Appendix to Chapter 3

Table A-4. Results of survey χ^2 tests comparing those who accessed psychiatric ED to the general population

Variable	F value	Degrees of freedom	p-value
Gender	2.33	4104	0.097
Age	48.16	4100	<0.001
Marital status	152.0	4102	<0.001
Employment status	88.2	4099	<0.001

Table A-5. Prevalence ratios comparing the prevalence of socio-demographic factors in a psychiatric ED to the general population

Measure	Count Ratio	95% confidence interval	p-value
Gender			
Male	REF	-	-
Female	0.8	(0.7, 1.0)	0.057
Transgender**	8.4	(7.7, 9.2)	<0.001
Age (years)			
15 to 24	REF	-	
25 to 34	0.7	(0.5, 0.9)	0.012
35 to 44	0.5	(0.4, 0.7)	<0.001
45 to 54	0.5	(0.4, 0.7)	<0.001
55 to 64	0.3	(0.2, 0.4)	<0.001
65 plus	0.1	(0.1, 0.2)	<0.001
Marital status*			
Currently married	REF	-	-
Cohabiting	3.6	(2.3, 5.4)	<0.001
Previously married	3.5	(2.3, 5.3)	<0.001
Never married	11.6	(8.7, 15.4)	<0.001
Missing			
Employment status*			
Employed	REF	-	-
Self employed	2.1	(1.3, 3.4)	0.003
Student	3.0	(2.0, 4.3)	<0.001
Keeping house/Homemaker	0.8	(0.3, 2.0)	0.690
Retired	1.1	(0.5, 2.3)	0.748
Unemployed	11.0	(8.8, 13.8)	<0.001
Other	8.6	(6.5, 11.4)	<0.001
Missing	10.5	(3.9, 28.0)	<0.001

* Prevalence ratios were controlled for age and gender.
** Only one person in the psychiatric ED sample indicated that they were transgender, while no one in the general population sample identified as transgender.

Appendix to Chapter 4

Table A-6. Logit portion of the zero-inflated negative binomial model for the number of visits in the year following baseline

Measure	Logit model		
	Odds ratio	95% confidence interval	p-value
Number of CAMH ED visits in the six months prior to the baseline interview	0.54	(0.33, 0.86)	0.009
WHODAS score (per 10 point increase)	0.77	(0.62, 0.96)	0.020
Baseline diagnosis (ICD-10)			
F10 to F19	0.58	(0.17, 1.91)	0.366
F20 to F29	0.29	(0.07, 1.31)	0.108
F30 to F39	REF	-	-
F40 to F49	0.93	(0.24, 3.66)	0.918
F60 to F69	13.48	(0.65, 277.65)	0.092
Other ICD codes	2.08	(0.39, 11.08)	0.390
Gender			
Male	REF	-	-
Female	0.90	(0.36, 2.21)	0.811
Age (per 5 year increase)	1.01	(0.84, 1.23)	0.881
Marital status			
Currently married	REF	-	-
Cohabiting	0.57	(0.07, 4.38)	0.587
Previously married	0.33	(0.03, 3.32)	0.347
Never married	0.44	(0.10, 2.03)	0.294
Employment			
Employment	REF	-	-
Student	6.60	(0.61, 70.92)	0.120
Unemployed	8.04	(1.08, 59.96)	0.042
Other	2.92	(0.40, 21.04)	0.288

Copyright Acknowledgements

None