Living on the Edge: the Influence of Marginalization on Mental Health Needs and Service Use

by

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A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Doctor in Philosophy
in
Public Health and Health Systems

Waterloo, Ontario, Canada, 2018

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Author's Declaration

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

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Abstract

Background: Persons with severe mental illnesses are a small portion of the population that require a disproportionate amount of health and social services to meet their complex needs. This group is particularly vulnerable to experiencing marginalization and adverse social circumstances such as homelessness and incarceration. The literature recognizes that marginalization is a multidimensional social construct that influences mental health; however, its conceptualization and measurement remain unclear. In the mental health context, evidence suggest that both individual and contextual factors influence the use of services and mental health status of individuals. While most research on this area has focused on studying the individual level, the contextual level evidence is more limited.

Purpose: This dissertation aims to explore how the social context of where persons with mental illness live influences their mental health status and service use. Three distinct studies are employed to examine empirical patterns of area-level marginalization regarding mental health, the measurement and conceptualization of marginalization at the individual-level, and finally, the influence of context on inpatient mental health readmissions among marginalized persons.

Methods: This research linked data from a Canadian Census-derived index of marginalization, the Ontario Marginalization Index (ON-Marg), to clinical data from the Ontario Mental Health Reporting System (OMHRS); a dataset consisting of clinical and administrative data from every person admitted to a psychiatric hospital in Ontario. For the first study, bivariate and multivariate analyses on a sample admitted between January 1, 2006 and December 31, 2016 (N=150,600), examined the likelihood of residing in the most marginalized areas based on demographic, clinical, and service use characteristics using Statistical Analysis Software version 9.4 (SAS). For the

second study, items that reflected the concept of marginalization were manually selected from the Resident Assessment Instrument-Mental Health (RAI-MH). Principal Component Analysis (PCA) and cluster analysis of these items was performed on a sample of patients admitted into psychiatric care between January 1, 2011 and December 31, 2016 (N=81,232) to identify dimensions being measured. Different weights and scoring methods were tested to assess convergent validity on multiple outcomes of marginalization. Receiver Operating Characteristic (ROC) curve analysis was utilized to determine optimal cut-offs for the index by modeling the likelihood of being homeless. For the third study, OMHRS data between January 1, 2006 and December 31, 2015, were used to identify persons with mental health conditions experiencing marginalization and who are at a high risk of homelessness (N=37,852). Standardized readmission rates at different points in time were calculated and mapped using the Forward Sortation Area geographic unit. Proximity to supportive housing services were measured using a 20-km radius buffer in ArcGIS software. Multilevel mixed-effects models were then built to test the influence of the different variables created, on readmissions to inpatient psychiatry in SAS.

Results: The first study found that the majority of persons admitted to inpatient psychiatry lived in the most marginalized areas of the Ontario. Those with little education, involved with the criminal system, on government assistance, diagnosed with schizophrenia, experiencing economic hardships, living alone, and those who lacked social support were the most likely to reside in areas with high marginalization. Patients in northern health regions were most likely to reside in areas with the most material deprivation while persons in resource intensive health regions like Toronto Central, resided in areas with the most residential instability. In the second study, 15 items were identified for the development of the Marginalization Index (MI). PCA and cluster analysis showed that these items measured 5 dimensions. ROC curve analysis for the most marginalized

group, homeless individuals, identified an Area Under the Curve of 0.76 and an optimal cut-off of 5 on the MI. The frequency of homeless individuals, frequent mental health service users, persons with a history of violence and police intervention, and persons with addictions issues increased as scores on the MI increased, further confirming the convergent validity of the index. In the third study, readmission rates for those with high MI scores were 7.4% for short-term (within 30 days), 6.2% for the medium-term (31-90 days) and 13.1% for the long-term (91-365 days). While admissions to inpatient psychiatry occurred in 94% of Ontario's FSAs, short term readmission only occurred in 20% of FSAs, medium-term in 11% of FSAs, and long-term in 41% of FSAs. Intraclass Correlation Coefficients showed that hospitals account for 3.8% of variance in readmissions within 30 days of discharge. Fixed effects β-parameter estimates of the models show that area level marginalization and proximity to supportive housing services increased the logs odds of readmissions.

Conclusion: This research identified factors that differentiated living in areas of low versus high marginalization among psychiatric inpatients. These findings are important for informing the equitable planning and distribution of evidence-based mental health services and supports to create social contexts that enable and support opportunities for improved mental health. Additionally, the Marginalization Index derived as part of this project proved to be a valid measure of marginalization and a strong predictor of risk of homelessness among psychiatric inpatients. The MI increases the visibility of the marginalized in inpatient psychiatry and provides a resource that can be used for supporting social and health policy decisions and evaluation. Finally, this research provided evidence that system structures influence readmissions in a variety of ways, while hospitals account for more variance among short-term readmission, area level marginalization accounts for more variance over longer-term readmissions. The findings contribute to the limited

research that is currently available on the influence of contextual level factors on mental health service use by showing that contextual factors have various effects on readmissions at different points in time from discharge. These findings indicate that psychiatric readmissions may relate to social inequities at the area level and proximity to services.

Keywords:

Mental Healthcare, Psychiatry, Marginalization, Material Deprivation, Residential Instability, Homelessness, Supportive Housing, Readmission, interRAI, Ontario Marginalization Index, Ontario Mental Health Reporting Systems (OMHRS), Principal Component Analysis, Measurement, Behavioural Model for Health Service Use

Acknowledgements

I would like to take this opportunity to express my deepest gratitude to all of those who supported and guided me during my time in graduate school.

First, I would like to thank my supervisor, Dr. Chris Perlman, for his enduring support over the years. Without his invaluable mentorship, I would not have been able to complete this project. I am truly grateful for his expertise and all the opportunities he has provided for me to share my work and learn from others. I am forever thankful for every word of advice and encouragement, and for being a reliable support in my professional development.

I would also like to thank each of my PhD committee members for their support and guidance, each in their own way. I am grateful to Dr. John Hirdes for his extensive knowledge of the data and health services research, to Dr. Samantha Meyer for her insightful guidance on the sociological aspects of this work, and to Dr. Susan Elliott for her mentorship on the geographical aspects of this project and emphasizing the importance of incorporating theory into this research. I would also like to thank my internal/external examiner, Dr. Leia Minaker, and my external examiner, Dr. Sean Kidd, for their interest and time in evaluating my work. I would also like to acknowledge Dr. Ashok Chaurasia for providing his expertise regarding multi-level models, and Dr. Jane Law for offering her expert advice on spatial analysis.

I would also like to acknowledge the many colleagues I met over the years and who made my time in graduate school positive and memorable. I am thankful for having had the opportunity to share, learn, and work with each and every one of them, the SPHHS-Graduate Student Association members, the Canadian Evaluation Society case competition teams, GROUPies,

GRADventure, my fellow classmates, and officemates. I feel extremely fortunate to have been a part of the School of Public Health and Health Systems community.

Finally, one of the things that this dissertation has highlighted for me is the importance of social support in ensuring mental wellness. I feel truly blessed to have the unconditional support of many people in my life. I thank my parents, partner, family and friends, near and far, who have supported and encouraged me at every step of the way.

Thank you!

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List of Abbreviations

ABS	Aggressive Behaviour Scale
ACT	Assertive Community Treatment
AUC	Area Under the Curve
BHPS	British Household Panel Survey
B-SEM	Bristol Social Exclusion Matrix
CAPs	Clinical Assessment Protocols
CASE	Centre for Analysis of Social Exclusion
CI	Confidence Intervals
CIHI	Canadian Institute of Health Information
CIM	Community Integration Measure
CMHTs	Community Mental Health Teams
CPS	Cognitive Performance Scale
CTs	Census Tracts
DAs	Dissemination Areas
DSI	Depression Severity Index
DSM-IV & -V	Diagnostic and Statistical Manual of Mental Disorders Version 4 and 5
FSA	Forward Sortation Area
GTA	Greater Toronto Area
ICCs	Intraclass Correlation Coefficients
ICM	Intensive Case Management
LHINs	Local Health Integration Networks
MD	Material Deprivation
MHQIs	Mental Health Quality Indicators
MI	Marginalization Index
MOHLTC	Ontario Ministry of Health and Long-Term Care
OECD	Organization for Economic Cooperation and Development
OHA	Ontario Hospital Association
OMHRS	Ontario Mental Health Reporting System
ON-Marg	Ontario Marginalization Index
ORs	Odds Ratios
PCA	Principal Component Analysis
PSE	Poverty and Social Exclusion Survey
PSS	Positive Symptoms Scale
RAI-MH	Resident Assessment Instrument- Mental Health
RHO	Risk of Harm to Others scale
RI	Residential Instability
ROC curve	Receiver Operating Characteristic curve
SAS	Statistical Analysis Software
SCI	Self-Care Index
SCIPP	System for Classification of Inpatient Psychiatry
SCOPE	Social and Community Opportunities Profile
SES	Socio-Economic Status

SEU	Social Exclusion Unit
SInQUE	Social Inclusion Questionnaire User Experience
SIS	Social Inclusion Scale
SoS	Severity of Self-Harm scale
SWS	Social Withdrawal Scale

Chapter 1 Introduction

This dissertation is composed of six chapters. This first chapter provides a comprehensive background of the topics and knowledge gaps that this project addresses. The second chapter presents an overview of the methodology to answer the research questions posed by this dissertation. The third, fourth, and fifth chapters consist of individual studies that address related, yet distinct, research objectives and form the basis of manuscripts to be submitted for publication. As such, there may be some overlap in content from chapters one and two in the third to fifth chapter. The final chapter provides a summary of the findings from the three studies, and discusses the overall project's implications regarding clinical practice, policy, and research.

1.1 Mental Illness and the Living Environment

Mental illnesses are a heterogeneous group of conditions that are characterized by alterations in thinking, mood or behaviour associated with distress or impaired functioning (Public Health Agency of Canada, 2015). Population estimates show that 2.8 million Canadians 15 years or older (~10% of the population) reported at least one symptom related to a major depression, generalized anxiety, bipolar disorder, and dependence on alcohol, cannabis or other drugs during a 1-year period (Pearson, Janz, & Ali, 2013). Prevalence of mental illnesses differ by groups; for instance, rates of mood disorders are higher for younger age groups compared to older age groups, and rates of mood and anxiety disorders are higher among females compared to males; while males have higher rates of substance use disorders than females (Pearson et al., 2013). Regardless of their presentation, mental illnesses are often considered leading causes of disability in Canada (Mental Health Commission of Canada, 2014). The costs related to mental illness, including health care

costs, lost productivity, and reductions in health-related quality of life, are estimated to cost the Canadian economy approximately $51 billion per year (Lim & Dewa, 2008; Smetanin et al., 2011).

Severe and persistent mental illnesses typically last a person's entire life and commonly include psychosis, or a loss of reality (i.e., delusions, hallucinations) that impacts the individual's ability to function (Lin et al., 2016). Persons with severe mental illnesses represent a small portion of the population (<1 to 2%); however, individuals with these conditions require disproportionate amounts of health and social services to meet their complex needs (Lin et al., 2016). In Ontario, the top 5% of high cost users account for 89% of the mental health care costs (Rais et al., 2013). This small proportion of persons with mental health conditions incur over 30% more health care cost than other users; these individuals tend to be younger, male, live in low income urban neighbourhoods, and are more likely to have a severe mental illness (i.e., mood disorder or schizophrenia diagnosis) (de Oliveira, Cheng, Vigod, Rehm, & Kurdyak, 2016). Additionally, this group is particularly vulnerable to adverse social consequences; studies from multiple Canadian cities show that anywhere from 23% to 67% of individuals who are homeless report having a mental illness (Canadian Institute for Health Information, 2008; Kim et al., 2007).

Persons with mental health conditions and who are homeless have complex needs. People living in unsheltered situations report poorer physical health and more symptoms of serious mental illness, cognitive disorders, substance use disorders, co-occurring mental health and substance use conditions, chronic health conditions, and higher risk of premature death compared to their sheltered counterparts (Montgomery, Szymkowiak, Marcus, Howard, & Culhane, 2016; O'Connell, 2005). Even though their mental health needs are high, homeless individuals tend to receive acute rather than preventive care and have less frequent outpatient encounters (Hwang, Weaver, Aubry, & Hoch, 2011; O'Toole, Gibbon, Hanusa, & Fine, 1999). For example, research

conducted in Ontario shows that homeless persons and those considered to be "vulnerably housed" are more likely to have unmet health care needs and greater emergency department visits (Jaworsky et al., 2016). Additionally, stigma and social exclusion from both the public and health professionals are commonly experienced by persons who are homeless (Thornicroft, Rose, & Kassam, 2007). Progress toward recovery for homeless persons with a mental illness is difficult to achieve, as any gains made in hospital are put at risk when persons are discharged directly from psychiatric hospitals into shelters; places that are often overcrowded and where individuals are exposed to pressures of alcohol, drug, and sex trade industries (Forchuk, Russell, Kingston-Macclure, Turner, & Dill, 2006).

The effect of the living environment is not unique to homeless individuals; population health outcomes are shaped by aggregate exposures to a variety of factors over the life course, including individual genetics, health behaviours, and socio-environmental conditions (Collins, Hayes, & Oliver, 2009). Differences in social, economic, and environmental circumstances lead to inequalities in health; for instance, lower social status correlates with worse health status (Collins & Hayes, 2010). This social gradient in health is well researched and has been noted across low-, middle-, and high-income countries (Kosteniuk & Dickinson, 2003) and affects entire populations, not only the most disadvantaged but also those in average socio-economic status groups (Allen, Balfour, Bell, & Marmot, 2014).

Regarding mental health, communities experiencing poverty are disproportionally affected by mental illness. In Canada, persons in the lowest income groups are up to four times more likely to report poor mental health than those in the highest income groups (Mawani & Gilmour, 2010). When compared to men, the prevalence of mental health conditions is higher among women at every household income (Campion, Bhugra, Bailey, & Marmot, 2013). The relationships between

social economic status and mental health may be related to a myriad of factors. For instance, those in lower socio-economic status (SES) experience economic hardships, greater perceived discrimination, and have access to fewer supports; this often leads to the accumulation of stress and increases the risk of anxiety and depressive symptoms (Mama et al., 2016). Childhood exposure to challenging living conditions, such as low SES, may also increase risk of future mental health conditions (Jensen, Currie, Dyson, Eisenstadt, & Melhuish, 2012). For instance, research has found that experiencing homelessness at an early age influences high psychological distress and suicide attempts (Kidd, Gaetz, & O'Grady, 2017). Evidence also points to abuse, neglect, abandonment, and trauma as mediating factors in the relationship between low SES in childhood and achieving optimal mental health later in life. These adverse childhood experiences negatively affect social behaviour, educational and employment attainment, and influence depression and substance misuse in adolescents (Bell, Donkin, & Marmot, 2013).

Socio-environmental factors are related to increased prevalence of mental health conditions and variations in health service utilization. The rates of mental health conditions are higher among persons exposed to discrimination, isolation, and social disadvantage (Donisi et al., 2013). Further, socio-environmental factors such as residing in areas of greater income inequality and unemployment are associated with higher health service utilization, even after controlling for individual level characteristics such as demographics and clinical status (A. Durbin, Moineddin, Lin, Steele, & Glazier, 2015; Pickett & Pearl, 2001). Marginalized areas characterized by poverty, high economic inactivity, and social disorganization have been associated with worse mental health status reported by residents of those areas (Agyemang et al., 2007; Galea, Ahern, Rudenstine, Wallace, & Vlahov, 2005; Latkin & Curry, 2003; Weich, Twigg, Holt, Lewis, & Jones, 2003). In terms of service utilization, persons of low SES with mental health conditions

have been found to be more likely to be admitted to psychiatric hospitals against their own will, and to experience longer lengths of stay once admitted, compared to higher SES groups (Lorant et al., 2003). Similarly, area level economic deprivation is associated with higher levels of psychiatric hospital utilization (Curtis et al., 2006) and psychopharmacological prescription for antipsychotic and anxiolytic drugs (Crump, Sundquist, Sundquist, & Winkleby, 2011). Thus, the evidence reviewed supports that adverse socio-environmental conditions negatively impact mental health and increase the need for service use.

1.2 The Evolution of Mental Health Care

The experience of marginalization among persons with mental health conditions may stem from historical gaps in the evolution of mental healthcare. In most high-income countries, mental health care formalized around the 1880s with an increase in public investment for mental hospital beds, and the creation of asylum institutions (Thornicroft & Tansella, 2002). Asylums were often situated far from urban centres, and served to confine and provide for persons with a wide range of social and clinical disorders; however, treatment and quality of care in these settings were extremely poor (Goffman, 1961). The outcomes from the asylum model were detrimental to patients' health and well-being due to inhumane conditions often present in these settings. Beginning in the 1950s, deinstitutionalization began to emerge where persons with mental health conditions were released from large-scale mental hospitals and placed into small-scale settings within the community (Niles, 2013; Simmons, 1989). Deinstitutionalizing these individuals became widely supported as it promised to allow persons with mental illnesses access to healthier living conditions, save governments money, and benefit societies by redistributing resources from mental hospitals to communities (Simmons, 1989). Subsequently, many jurisdictions, including Ontario, deliberately began discharging patients into the community without considering the

quality and functionality of the community services available at the time (Scull, 1977). In fact, community mental health services did not increase at the same rate as persons with mental health conditions were deinstitutionalized and few laws detailing community care and community living existed (Sealy & Whitehead, 2004). Persons with mental health conditions placed in the community were often not successful because many had relied on mental hospitals to serve, support, and shelter them for many years. Consequently, many of these persons ended up living on the streets, reinstitutionalized, or incarcerated (Lamb & Bachrach, 2001).

The absence of a fully developed and funded community-based system made it difficult for deinstitutionalized patients to thrive in the community (Scull, 1977). These persons had to move to areas with lower cost accommodation and services, often residing in the streets or in deteriorating neighbourhoods (Dear & Wolch, 1987). Deinstitutionalization was associated with increased rates of homelessness in much of the western world over the 1980s and 1990s (Nieto, Gittelman, & Abad, 2008). Although shelters for the homeless were provided in communities, these places contributed to the social isolation of ex-hospital patients from the rest of the community (Dear & Wolch, 1987). Instead, successful deinstitutionalization required a patient-centred approach, involving each individual patient in culturally relevant service planning to ensure their continuity of care (Lamb & Bachrach, 2001). As such, in the 1990s the emphasis became empowerment, recovery, consumer choice, and community integration that could be achieved by increasing informal supports, supported employment, and independent housing (Jacobson & Curtis, 2000; Niles, 2013). This coincided with the emergence of acute and community-based mental health services to support persons with mental health conditions through multidisciplinary networks to ensure recovery (Thornicroft & Tansella, 2002). The concept of recovery is about staying in control of one's life, not necessarily full symptom resolution. It

emphasizes resilience and control over problems and life, building resilience of people with mental illness and supporting those in emotional distress (Jacob, 2015).

1.2.1 The Contemporary Mental Health System

In many provinces across Canada, the governance of health care is conducted through regional authorities that plan, coordinate, integrate and fund health services at a local level (Office of the Auditor General of Ontario, 2015). In 2006, Ontario established fourteen of these regions, called Local Health Integration Networks (LHINs), to manage local health services in the province, including: hospitals, community health centres, long-term care homes, mental health and addiction agencies and community support service agencies. LHINs work with residents and health service providers to identify health care needs and develop ways to improve access to services and quality of care (Office of the Auditor General of Ontario, 2015). Figure 1.1 provides an illustration of the locations of Ontario's 14 LHINs and their respective names.

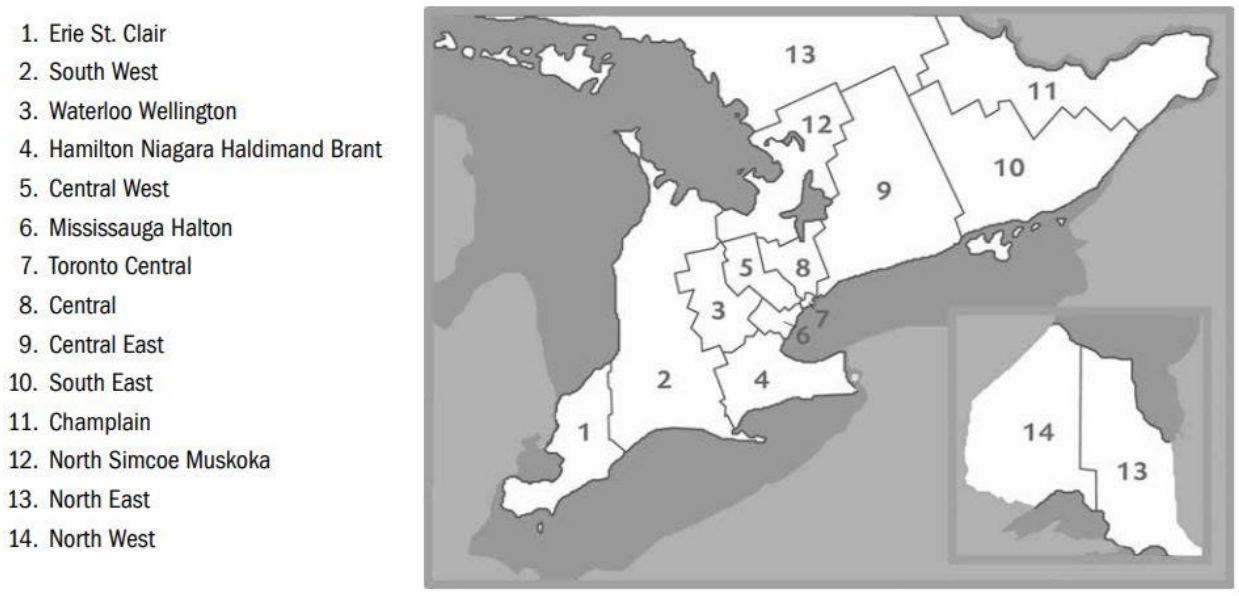

Figure 1.1 Ontario's local health integrated networks locations (from Office of the Auditor General of Ontario, 2015)

LHINs manage the funding and integration of numerous hospital-based and community-based mental health services available in Ontario including: inpatient, outpatient, day hospital, emergency, and educational services, as well as community mental health services such as Assertive Community Treatment (ACT), early intervention, intensive case management, and supportive housing (Ontario Legislative Assembly, 2010). Ideally, primary care consultations can provide assessment, treatment, and depending on the type and severity of a person's illness, referrals to other care providers (Brien, Grenier, Kapral, Kurdyak, & Vigod, 2015). Specialized mental services are provided by a diverse range of health professionals, including: psychiatrists, psychologists, social workers and psychiatric nurses (Lin et al., 2016). However, these services may not be covered by Ontario's publicly funded health system. Extended health insurance plans through the workplace may help cover costs for these services; but unfortunately, many Ontarians do not have access to these plans, or their plans may not have sufficient coverage for their mental health needs (Brien et al., 2015). To receive these types of services at no cost, persons must access outpatient hospital services, Family Health Teams, emergency departments, inpatient hospital stays or other primary health care models (Brien et al., 2015). For instance, in urgent and crisis situations, inpatient care provides intensive observation, diagnosis, and treatment in acute psychiatric units in general hospitals, acute day hospitals, and long-stay community residential care (Lin et al., 2016). Furthermore, to support patients in the community, networks of community mental health teams (CMHTs), which are composed of professionals including psychiatrists, community psychiatric nurses, social workers, psychologists, and occupational therapists, deliver a range of interventions within defined geographic areas (Lin et al., 2016). For example, these interventions may include ACT to support the prevention, self-management, and strategies focused on employment, education, and housing for individuals with severe mental illnesses (Stobbe et al.,

2014); or early intervention programs, targeting individuals at early stages of psychosis with antipsychotics and social support (J. Durbin, Selick, Hierlihy, Moss, & Cheng, 2016).

Despite the wide variety of services, receiving appropriate care may still be challenging for some persons; this is often due to system fragmentation, limited access to health care, and lack of continuity of care and service integration (Lin et al., 2016). For instance, about 1.5 million Ontarians report having a need for mental health and addictions services; however, over a third (~700,000 persons) report that their need was either unmet or only partially met (Brien et al., 2015). Compared to the general population, persons with serious mental illnesses are less likely to have a primary care practitioner (Bradford et al., 2008). Access to primary care practitioners may be challenging for persons with mental health issues; complex issues such as substance use, housing instability and/or criminal records may deter clinicians from rostering some individuals (Ross et al., 2015). Further, adequate mental healthcare may be lacking among those with access to primary care. For instance, up to 40% of homeless individuals with mental illnesses who can access primary care report having unmet health care needs (Skosireva et al., 2014). Lastly, persons who live in rural areas of Ontario and those in the lowest income group are less likely to have a follow-up visit with a doctor within seven days of their discharge from hospital for a mental health need, than those in urban areas or in the highest income groups (Brien et al., 2015).

For persons that have mental health conditions and are at risk of experiencing homelessness, there are services available that offer housing and various forms of support, called supportive housing services. This type of support facilitates independent living for persons with mental illness through rent supplements together with case management, ACT teams, and other professional health service supports (Rog, 2004; Wright & Kloos, 2007). The programs support recovery, community reintegration and psychological well-being (Kloos, 2005). These services

are associated with reduced utilization of health services such as unnecessary emergency department visits and extended hospitalizations, reductions in the severity of psychiatric symptoms, improved access to other services, and improved social ties (Greenwood, Schaefer-McDaniel, Winkel, & Tsemberis, 2005; Gulcur, Stefancic, Shinn, Tsemberis, & Fischer, 2003; Rog, 2004). Recently, a largescale program, "At Home/Chez Soi," provided immediate housing with support for persons with mental illness, rather than the traditional approach of "treatment first and then housing". Using randomized control trials, participants were provided with an apartment, a rent supplement, and either ACT for those with high needs, or Intensive Case Management (ICM) for those with moderate needs through out Canada (Goering et al., 2014). The intervention had a significant impact on housing stability, with 86% of individuals staying in their units after 12 months, and provided cost savings up to $21.72 for every $10 invested (Goering et al., 2014). Cost offsets came from psychiatric hospital stays, home and office visits to health or social service providers, jail or prison stays, and shelter stays. An important outcome, given that the average annual costs that homeless individuals with mental illness impose on the Canadian society has been estimated to be $53,144 per person (Latimer et al., 2017). Additionally, qualitative evidence from the "At Home" intervention suggests improvements in quality of life, community engagement, and social support for those participating (Goering et al., 2014).

In March 2017, the Ministry of Housing of Ontario published a framework to guide Provincial and local programs to better meet the need for supportive housing services (Government of Ontario, 2017). The report highlighted several challenges in the supportive housing system, including: unmet demand, programs inconsistent with best practices, lack of coordination across systems and limited data to support evidence-based policy. This has resulted in a fragmented system where people with complex needs cannot always access appropriate housing and supports

(Government of Ontario, 2017). To address some of these issues, initial investments to create up to 6,000 new supportive housing spaces with better client access and outcome performance measures were outlined. These investments aim to support the provincial goal to end chronic homelessness by 2025, with operating funding of up to $100 million annually beginning in 2019 (Government of Ontario, 2017). These initiatives are extremely important given that each year up to 200,000 people are homeless in Canada, costing the economy approximately seven billion dollars (Gaetz, Donaldson, Richter, & Gulliver, 2013). In Ontario alone, there is an estimated need for approximately 33,000 units of supportive housing for individuals with mental health conditions within the next ten years (Suttor, 2017). As such, there is a clear need for more research in this area in order to help inform these processes.

1.2.2 Mental Health Service Use and Readmissions

One third of persons who access emergency departments in Ontario for a mental illness have not had prior documented outpatient contact; these admissions represent missed opportunities for early prevention of mental health crises through community services (Brien et al., 2015). In fact, up to 89% of mental health hospitalizations are for acute assessment and crisis stabilization (Vigod, Taylor, Fung, & Kurdyak, 2013). The transition from hospital back to the community can be difficult for patients and requires ongoing community support after discharge. Most of the time, inpatient mental health services work with the person to develop discharge plans that include referrals to ongoing community support services (Lin et al., 2016). However, the person is often left with the sole responsibility to engage with community services, or the service left to attempt to connect with the person following discharge (Vigod et al., 2013). This process of engagement is challenging, as some persons may still be experiencing mental health symptoms, leading to instances where some are lost to follow-up (Killaspy, Banerjee, King, & Lloyd, 2000). In Ontario,

less than one-third of these patients have a follow-up visit within seven days of their discharge (Brien et al., 2015), which may be indicative of problems with the transition from the acute care setting in hospital to the community. Unfortunately, Ontario does not systematically collect data on community services and supports; and thus, is not possible to assess the effectiveness, impact, and quality of these community services at this point in time (Brien et al., 2015).

Lack of access to community mental health services following discharge from hospital may contribute to further crises and the need to be readmitted (Vigod et al., 2015). As such, readmission to inpatient care is an important indicator to measure quality of care (Canadian Institute for Health Information, 2008). Based on the data from 15 member countries of the Organization for Economic Cooperation and Development (OECD) it has been estimated that approximately 1 in 7 individuals hospitalized for psychiatric reasons are readmitted within 30 days of their discharge (OECD, 2013). In Ontario, recent studies have identified that the 30-day readmission rate among psychiatric inpatients is approximately 7-9% (S. Chen, Collins, & Kidd, 2018; Vigod et al., 2015). Given that a goal of inpatient mental health care is to stabilize acute symptoms and provide referral to community-based supports (Lin et al., 2016; Ontario Legislative Assembly, 2010), readmissions indicate a negative outcome from a clinical and public health perspective, where it can be interpreted as an outcome of poor coordination and/or quality of services (Canadian Institute for Health Information, 2008). This issue can be addressed; some evidence exists that changes to organizational and service delivery models such as establishing outreach teams to follow up persons after discharge and involving the patient in the care and service plan have demonstrated that it is possible to avoid readmissions (OECD, 2013).

A common theme of research on psychiatric readmissions research has been the identification of risk factors at the individual level; however, proposed statistical models tend to

yield moderate discriminative capacity (Hendryx et al., 2003; Vigod et al., 2015) or are not particularly generalizable given their focus on specific populations (Gearing et al., 2009). Studies attempting to create measures to predict risk of readmissions have identified prior hospitalizations, positive symptoms of psychoses, diagnoses such as bipolar and personality disorders, secondary substance use disorder, medical comorbidity, being at risk of harm to self, having an unplanned discharge, and time in hospital as the most common factors that increase risk of readmission (Perlman, Hirdes, & Vigod, 2015; Vigod et al., 2015). A recent systematic review on psychiatric readmissions found that associations with environmental and health systems characteristics exist; however, the evidence is scarce and not entirely clear (Donisi, Tedeschi, Wahlbeck, Haaramo, & Amaddeo, 2016). For instance, both positive and negative associations between readmissions, population density, and distance to services have been reported (Kalseth, Lassemo, Wahlbeck, Haaramo, & Magnussen, 2016). This highlights the need for more research in this area to generate a better understanding of the link between contextual variables and health system outcomes like readmissions. The Behavioural Model for Health Service Use will be used as guiding framework to better understand the relationship between contexts, individual circumstance, and health service utilization.

1.3 The Behavioural Model for Health Service Use

The Revised Behavioural Model of Health Service Use (Andersen, 2008) is the most commonly applied theoretical framework to understanding patterns of health service use (Babitsch, Gohl, & von Lengerke, 2012). The model, shown in Figure 1.2, describes health care utilization as the point where health need meets the professional health system; it is argued that this is influenced by individual and contextual factors that can be further categorized into predisposing, enabling, and need factors (Andersen, 2008).

At the individual level, predisposing factors are the socio-cultural characteristics of individuals that exist prior to their illness, including: social structure (i.e., education, occupation, ethnicity, social networks, culture), health beliefs (i.e., attitudes, values, and knowledge towards health care), and demographics (i.e., age, gender) (Andersen & Newman, 2005; Andersen, 2008). Enabling factors are the logistics of obtaining care, such as access to health services (i.e., transportation, travel time, income, health insurance, and quality of social relationships). Need factors are the functional and health problems that generate the need for health care services; these can be perceived (i.e., how people view their own general health status) or evaluated (i.e., professional judgment about a person's health status) (Andersen & Newman, 2005; Andersen, 2008).

At the contextual level, factors are measured at an aggregate level and may include healthcare organization, policy, provider-related factors and community characteristics (Babitsch et al., 2012). These are categorized further into factors that "predispose, enable, or suggest need." For example, predisposing factors at the contextual level may include community demographic structures, social compositions of communities, collective values, cultural norms, and political perspective. Factors that enable service use would include variables related to service supply, per capita income, relative price of goods and services, the amount, variety, and distribution of services. Lastly, factors that suggest need for service use may include occupational-, traffic-, and crime-related injury rates, as well as mortality, morbidity, and disability rates (Babitsch et al., 2012).

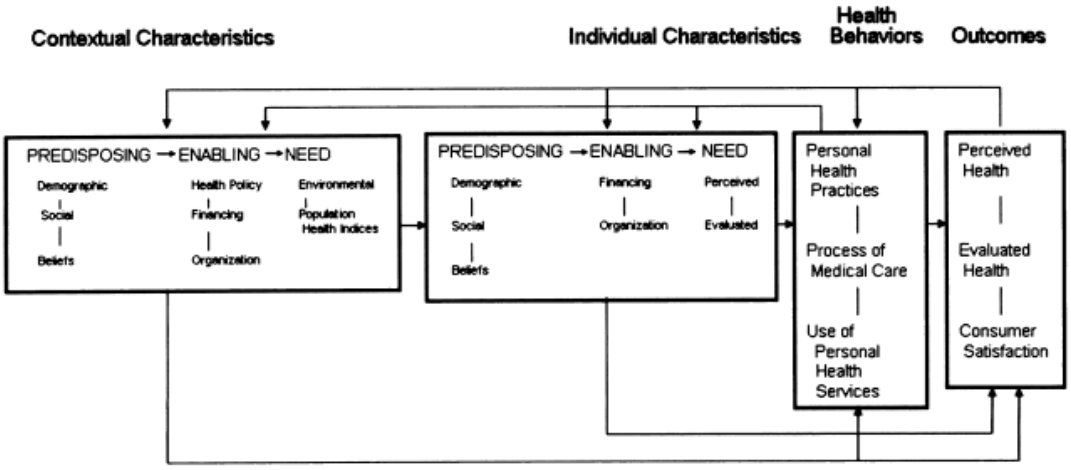

Figure 1.2 The revised behavioural model for health services use (from Andersen, 2008)

The Behavioural Model has been employed to study several areas of the health care system and various diseases. However, it has been recognized that most of the research has focused on the individual level factors, while the study of contextual factors tends to be more complex and, thus, rare (Kalseth et al., 2016). While most studies support individual level associations with health service utilization, the nature of the associations and the variables examined varies across studies. For example, greater mental health service use has been associated with female gender and marital status, where those who are single or separated tend to use mental health services more compared to those who are married (Twomey, Baldwin, Hopfe, & Cieza, 2015). Mental health service use also increases in the middle age and declines again in the older age (Cairney et al., 2014). Education also plays a role in mental health service use, especially when the type of service is addressed; those with higher education have greater utilization of psychologists (Fleury, Grenier, Bamvita, Perreault, & Caron, 2012), while those with lower education have greater utilization emergency resources for mental health reasons (Fleury, Ngui, Bamvita, Grenier, & Caron, 2014). This may be an indication that those with higher education recognize or have the means to access

interventions early on; while those with lower education may experience crisis or not have means to access early intervention or therapeutic services.

Although strong evidence exists for the relationship between individual level factors and utilization of health care services, it is important to note that there have been occurrences where enabling factors produce inconsistent findings (Andersen, 2008). The reasons for these inconsistencies point to differences in the way service use outcomes are defined and variations in how variables are categorized, especially when derived from secondary data (Babitsch et al., 2012). It has been found that in some instances enabling factors influence service use while in others they inhibit service use; for example, when studied under strict sample restrictions, enabling factors (e.g., household size, social support, perceived stigma) exits in the causal pathway for mental health service use, and take on mediating roles between the predisposing (e.g., age, education, marital status) and need-related factors for service use (e.g., number of diagnoses, self-rate mental health, psychological distress) (Ngui, Fleury, Perreault, & Caron, 2011).

At the contextual level, access to health care services may be influenced by policy factors, such as economic, cultural, social issues, and health care organization, as well as structure factors such as environmental context, availability of facilities, public transport and roads (Zulian et al., 2011). For instance, an inverse association has been found between socio-economic context and service utilization for patients with psychosis and for patients with a psychiatric history, while a positive association has been found between service utilization and the resources of the catchment area (Donisi et al., 2013; Tello et al., 2005). Additionally, access to health care services may be influenced by the interaction between geographical proximity to services, socioeconomic conditions in local communities, service provision, and pathways of care (Zulian et al., 2011). For example, Stahler et al. (2009) examined neighbourhood characteristics such as distance to bars,

Alcoholic Anonymous meetings, and density of drug-related crime in relation to readmission following substance use treatment. They found that among persons with mental health conditions, person level factors and neighbourhood characteristics were related to receipt of appropriate follow-up after discharge and readmission (Stahler, Mennis, Cotlar, & Baron, 2009).

At the geographic level, geographic variations in access and availability of mental health services have been identified using spatial analytics (Ngui & Vanasse, 2012; Paez, Mercado, Farber, Morency, & Roorda, 2010). Some of this variation may be related to nature of the geographic context; for instance, mental health services may be more available in urban contexts compared to rural areas (Vasiliadis, Lesage, Adair, & Boyer, 2005). Research points to the lack of mental health care professionals in rural settings resulting in less service utilization, and an increased likelihood of psychotherapeutic prescriptions for mental health issues (Ziller, Anderson, & Coburn, 2010). Studies examining the proximity to mental health services have found that service use related to mental health is increased by the availability of a hospital within the area (Curtis et al., 2006), short distances to services (Donisi et al., 2013), the density of mental health resources and mental health professionals (Rocha, Rodríguez-Sanz, Pérez, Obiols, & Borrell, 2013), and even the satisfaction with availability of services (Fleury et al., 2013). This evidence indicates that the nature of geographic contexts, and the organization of services within these contexts, may relate to the availability or access to services by those in need.

Research on socio-environmental contexts and mental health has explored the relationship between neighbourhood contexts and the epidemiology of mental health and addiction conditions, and patterns of health service utilization primarily in hospitals (Donisi et al., 2013; Ngui & Vanasse, 2012; Stahler et al., 2009). Studies have investigated spatial clusters of specific mental health diseases; for instance, area deprivation and social disorganisation has been found to have

significant neighbourhood variations between the spatial distribution of substance use and neurotic disorders (Chaix et al., 2006). Similarly, spatial distribution of non-affective psychotic disorders has been shown to be related to distribution of economic deprivation (Pignon et al., 2016).

In understanding service use it is also important to examine the location of services related to need at the contextual level. For instance, using a 15-mile service catchment around treatment programs in the United States, Perron and colleagues found services in some states tended to be located in areas of highest need (Perron, Gillespie, Alexander-Eitzman, & Delva, 2010). However, even in instances where mental health services are available these may not be located in areas that are supportive of recovery. For example, research comparing supportive housing services between persons with developmental disabilities and persons with psychiatric conditions found that those in supportive housing with psychiatric conditions are less spatially dispersed, lived in more stressed, more unstable, and less secure, but equally racially/ethnically diverse areas compared to those with developmental disabilities (Wong & Stanhope, 2009).

The research reviewed in this section highlights that area contexts influence the availability and utilization of services, and ultimately, the mental health status of persons. As such, the context and quality of areas are important factors to consider in studying mental health service use and supporting the recovery of persons with mental illnesses (Jacob, 2015). Sociological theory, and Structuration Theory in particular, provides a basis to develop a deeper understanding of the relationships between social context, service use, and inequalities in mental health status.

1.3.1 Theoretical Lens: Structuration Theory

The role of theory in health research is crucial for informing practice and policy, interpreting social processes, designing research, and explaining findings (Meyer & Ward, 2014). There are multiple philosophical approaches to inform and identify risks resulting from social

inequalities in health (Trudeau & McMorran, 2011). In particular, analyses of inequalities in health may be informed using Structuration Theory posited by Anthony Giddens (1984). This theory provides a general framework for understanding the interaction between personal practices, social systems and structure. This theory defines social structure as the virtual rules that persons (actors) draw upon to reproduce social systems as part of regular social practices. These social practices take place in what Giddens calls locales (i.e., homes, schools, neighbourhoods); in turn, locales influence how actors socialize and interact within them. The socialization and/or conflict generated through these interactions are essentially the virtual rules that he refers to as "structures." The theory argues that structures make up social systems and are both the medium and the outcome of the social practices (Giddens, 1984).

Structuration Theory explains that actors not only create the social systems they are part of, but they also influence the structural order itself (virtual rules). For this reason, within this theory neither personal practice nor social structure receive causal primacy; instead, they are mutually interdependent processes that influence social life (Øversveen, Rydland, Bambra, & Eikemo, 2017). As an example of this theory, research points to a tendency for persons with mental illnesses to congregate in inner urban areas and for health services to concentrate resources where there is greatest need, which further influences the influx of persons with mental health issues to deprived, service-rich, inner-city areas (Rukmana, 2011). At the same time, the lack of contact with mentally ill persons in suburban areas further contributes to social structures of prejudice, stigma, and marginalization against mentally ill individuals in suburbs (Dear & Wolch, 1987; Rukmana, 2011). Using Structuration Theory to inform research implies focusing on how health inequalities are created by the interaction between individual action and social structure, without attributing causality to one or the other (Øversveen et al., 2017). Using this theoretical lens,

empirical research should focus on how social practices are embedded in nested social systems, or how they are enabled/constrained by virtual order and rules. Studying how resources relate to social structure make it possible to address if health resources and health policy are influencing health inequality (Øversveen et al., 2017) .

1.4 Marginalization and Social Exclusion

Marginalization describes both a process and a condition that prevents individuals or groups from full participation in social, economic and political life (Alakhunova, Diallo, del Campo, & Tallarico, 2015; Trudeau & McMorran, 2011). The term marginalization is often used interchangeably with the term "social exclusion" to refer to processes through which persons face systematic disadvantages in their interactions with society (Mathieson et al., 2008). Areas in which persons may experience marginalization include: education, private property, economic opportunity, social safety nets, infrastructure, protection from violence, food security, health and sanitation (Alakhunova et al., 2015). In recent decades, human rights and social research has driven governments and institutions like the United Nations to advocate for improvement of conditions for the marginalized by addressing factors such as discrimination, racism, poverty, globalization, immigration, social welfare, health and human rights (C. Fitzpatrick & Engels, 2016; Schiffer & Schatz, 2008).

Marginalization influences the well-being of individuals and groups; as such, it is considered a determinant of health and a factor in causing health inequalities (Marmot et al., 2008; World Health Organization, 2010). These health risks result from environmental dangers, unmet subsistence needs, severe illness, trauma, and restricted access to health care because those facing disadvantage lack resources to participate in community health partnerships, and thereby contributing to inequalities in health (Lynam & Cowley, 2007). Successful strategies to target

these health inequalities focus on policies to promote human development by improving access to education, healthy working conditions, employment, and community inclusion; as well as ensuring access to health care services for the most disadvantaged groups (Marmot et al., 2008; World Health Organization, 2010).

The notion of being marginalized or socially excluded can be traced back to Rene Lenoir in 1974, where he used the term "les exclus" to talk about French citizens who fell through the social insurance system (i.e., lone parents, the uninsured, and the unemployed) (Lenoir, 1974; Silver & Miller, 2003). In response to this, strategies to promote social inclusion began to emerge in the 1980s around Europe. Over time, the term began to be used to describe restricted opportunities for participating in social and cultural activities because of material deprivation; however, the concept's meaning was not clarified, allowing for the expansion of the term and its features (Levitas, 2006). Systematic reviews of the conceptual and methodological literature of the marginalization concept have concluded that the term has multiple features (Burchardt, Le Grand, & Piachaud, 2002; Morgan, Burns, Fitzpatrick, Pinfold, & Priebe, 2007). For instance, marginalization is considered to be "dynamic," meaning that a person's level of social exclusion can vary over time. It is also considered to be "multi-level," meaning that it can happen at the individual, household, community, or even at the institutional level (Morgan et al., 2007). Additionally, experiencing marginalization is "relative" meaning that is highly dependent on the historical and socio-economical context of societies (Mathieson et al., 2008); for example, drug users are more excluded and criminalized in certain countries than they are in others. Another feature of the term relates to "agency," referring to the fact that the excluding is done by someone or something (i.e., institutions, social environments or the individuals) (Silver & Miller, 2003). Lastly, one of the most important features of marginalization is that it is "multi-dimensional,"

meaning that the processes that comprise this concept are complex and are made up of different components (Sealey, 2015).

1.4.1 Mechanisms of Marginalization

Marginalization is considered a product of unequal power relations between people and society, which result in lack of social participation, social protection, and social integration of certain individuals (Sealey, 2015; Trudeau & McMorran, 2011). As a consequence of the economic, political and cultural deprivation, marginalized populations tend to be uneducated and financially insecure. In the mental health context, experiencing marginalization may be both a cause and a consequence of mental illness (Morgan et al., 2007). Different sociological views have attempted to explain these relationships. For example, "Social Causation" suggests that people living in poverty are more likely to develop mental health problems from the stress generated by environmental conditions of deprivation and trauma (Dohrenwend & Levav, 1992). "Social Selection," on the other hand, proposes that genetically predisposed persons are unable to rise from disadvantaged positions becoming vulnerable to mental illness; as shown by evidence indicating that having a mental disorder is associated with increased health expenditure, stigma, and loss of employment (Eaton, 1980). A compromising view of these mechanisms has been articulated by the Social Exclusion Unit (SEU), a government task force dedicated to strategic advice and policy analysis of social exclusion in the United Kingdom, to further illustrate how marginalization plays a role in mental illness. This view outlines that mental health conditions lead to rejection from society manifested by unemployment and homelessness, which leads to declining mental health. In turn, this results in loss of social networks and debt, further influencing mental health problems and negatively impacting social life in a cyclical manner (Social Exclusion Unit, 2004).

The processes for becoming marginalized are complex. Ivanov et al., (2012) argues that individual characteristics (i.e., age, gender, disability, income, health, employment, educational attainment) may put persons at risk of marginalization. However, not all of these individual risks cause social exclusion. As the authors discuss, environments also play a crucial role in leading to or preventing marginalization; these drivers may be structural (e.g., institutions and norms), behavioural (i.e., values and behavioural patterns such as discrimination and cultural practices) or policy-related. Additionally, individual risks are also influenced by the local context, including the characteristics of the local economy (i.e., employment opportunities, local conflict, environmental legacy, infrastructures). In essence, there are multiple factors at play in becoming socially marginalized; it is a complex process where a combination of individual characteristics, drivers of exclusion and specific local conditions act together to create marginalization (Ivanov, Peleah, & Milcher, 2012).

Research on the pathways of marginalization among homeless individuals has demonstrated that the most complex forms of exclusion for this group are associated with childhood trauma (S. Fitzpatrick, Bramley, & Johnsen, 2013). The work has also revealed temporal sequencing of marginalization, with substance misuse and mental health problems identified as occurring first in individual pathways, followed by homelessness and other adverse life events (i.e., divorce, thrown out by parents/caregivers, evicted from rented property) typically occurring later. These events are considered consequences rather than originating causes of marginalization (S. Fitzpatrick et al., 2013). During the process of becoming marginalized, persons lose connections with key institutions of society (i.e., education, housing, and aid agencies). Instead, the person may be surrounded by individuals going through the same situations (i.e., persons experiencing marginalization, persons who abuse drugs and alcohol) and may begin to diminish

ties with mainstream society (Coumans & Spreen, 2003). At the same time economic, psychological, and physical dimensions of the person begin to deteriorate. For example, the person becomes dependent on unemployment benefits, involved in illegal or criminal income activities, and more susceptible to physical and mental conditions, such as depressions, anxiety, and psychosis (Coumans & Spreen, 2003).

Social relations and social networks are core components for fully participating and feeling included in society. As such, it is evident how marginalization may relate to social support (De Silva, McKenzie, Harpham, & Huttly, 2005). For instance, accessing services and resources is often achieved via social networks, such as family and friends, neighbourhood organizations, and charities. However, in the case of mentally ill persons experiencing exclusion, these social supports are inadequate and often overburdened by limited funds and resources. In fact, it is common for the marginalized to also experience isolation and rejection from social supports (Burton & Kagan, 2003). As a result, individuals with mental illness are among the most socially excluded segments of the populations (Social Exclusion Unit, 2004). These persons experience numerous disadvantages because of unjust social structures including: barriers to health care, lack of employment, difficulty accessing and maintaining adequate housing, and discrimination (Benbow, 2009; Csiernik, Forchuk, Speechley, & Ward-Griffin, 2007). These societal challenges present barriers for accessing and utilizing health care services, which in turn negatively impacts the health, self-esteem, quality of life, and sense of self-worth of these individuals (Overton & Medina, 2008). Often times the difficulties these individuals experience are portrayed by society in terms of the individual's own actions; meaning that marginalized individuals start to believe that their situation is a result of their own characteristics, rather than as a result of social structures (Trudeau & McMorran, 2011).

Access to social support has been linked to mortality and illness where those with few social relationships experience higher mortality, morbidity, increased risk of accidents, suicide and cardiovascular disease (McKenzie & Harpham, 2006; Tomaka, Thompson, & Palacios, 2006). In the mental health context, a lack of social support is a major risk factor for depression and neurosis (McKenzie & Harpham, 2006). Persons with psychiatric disorders have fewer social ties and less diverse supportive resources than those never requiring mental health services. The ability to secure and maintain social ties may be hindered by the experience of mental illness, itself. For example, sporadic periods of hospitalization, poor social skills and a general reduction in social engagement, as well as symptoms others may perceive as paranoid behaviour, often leads to stigma and marginalization (Smith & Hirdes, 2009). As such, although psychiatric patients have a high need for social support, they may also lack the personal and social resources needed to receive this support.

Studies looking at both perceived support, and support provided have found that social support increases mental health service use (Bonin, Fournier, & Blais, 2007; Fasoli, Glickman, & Eisen, 2010; Fleury et al., 2014); this effect is augmented when psychological distress is present (Ngui et al., 2011). Living situations, such as living with others, (Bijl & Ravelli, 2000; Fleury et al., 2012; Parslow & Jorm, 2000) and having a higher quality living arrangement (Bonin et al., 2007) have also been found to be related to mental health service use; however, these studies operate under the assumption that persons who share living space offer social support. The most prominent associations with increased mental health service use have been found among those who are homeless (Bonin et al., 2007; Fasoli et al., 2010; Lindamer et al., 2012), living alone (Bijl & Ravelli, 2000), and even for those living in rented housing (Moustgaard, Joutsenniemi, & Martikainen, 2014). Moreover, it has been theorized that social support acts as a buffer to chronic

and acute stress via emotional, informational and instrumental support, which has appeared to be an important link between the mental health and poverty cycle (McKenzie & Harpham, 2006). Poverty and its associated conditions such as low education and material deprivation contribute to poor mental health. At the same time, untreated mental disorders are known to increase risk of suicide, damage family and social relations, and diminish work productivity, which translates into tremendous costs and contributes to a vicious cycle of poverty and mental health issues (Kauye et al., 2011). As such, action for mental health goes beyond the health sector and must include social support sectors like welfare, education, housing, and employment (World Health Organization, 2010).

1.4.2 Measurement Challenges

Measuring social concepts like marginalization is challenging due to its multidimensional nature, the lack of standard data sources, and the fact that there is no universal definition or benchmark for the concept (Sealey, 2015). Overall, marginalization and social exclusion describe the process leading to, and the conditions in which individuals are unable to participate fully in society (Alakhunova et al., 2015; Trudeau & McMorran, 2011). There are three main dimensions to this concept: an economic dimension referring to a lack of material resources, associated with exclusion from the labour market; a social dimension, expressed in a lack of integration into family life and the community; and finally, a personal dimension expressed in an erosion of self worth (Mathieson et al., 2008). For instance, when people lack access to resources, income, employment, housing, or educational and health care their participation in society is hindered. Additionally, lack of social support, agency, control over important decisions, and feelings of alienation also limits their participation (Sealey, 2015). Ideally, a combination of these factors could help measure the different dimensions of marginalization. However, to do so, a compromise between theoretical

considerations and what can be accomplished empirically is required. Given its multidimensional nature, data to measure marginalization generally come from a variety of sources. Most of the time, these data have been developed for different purposes, such as in the case of national population censuses and standardized surveys. For example, the indicators adopted by the European Council are based on the European Community Household Panel Survey, and the European Union Statistics on Income and Living Conditions. These marginalization indicators include: persistent at-risk of poverty rate, relative median poverty risk gap, long term unemployment rate, population living in jobless households, early school leavers not in education or training, employment gap of immigrants, material deprivation, housing, unmet need of care by income quintile, and child well-being (Social Protection Committee, 2015).

Empirical studies attempting to measure marginalization usually preselect some criteria that are known to increase the risk of exclusion, and focus on studying the specific dimensions the data supports (C. Fitzpatrick & Engels, 2016). For instance, at an ecological level, studies have operationalized some aspects of these concepts by reporting on the percentage of population displaying certain characteristics (i.e., living alone, unmarried/separated, in rented accommodation, over 16 years old and unemployed, having a low income, with a disability) (Curtis et al., 2006). Others have operationalized similar constructs using characteristics related to social fragmentation (Omer et al., 2014), proportion of immigrants (Fleury et al., 2014), and Census derived indexes focusing on material deprivation (Polsky, Moineddin, Glazier, Dunn, & Booth, 2014). In addition to these, there are specific multi-dimensional composite measures of marginalization that exist in the literature; for example, the Centre for Analysis of Social Exclusion (CASE) measure, which is based on secondary data from the British Household Panel Survey (BHPS), measures four domains related to consumption (the capacity to participate in the purchase

goods and services), production (the capacity to participate in economically or socially valuable activities), political engagement (participation in local or national decision-making), and social interaction (integration with family, friends and neighbours) (Burchardt et al., 2002). This work has generated a framework that conceptualized social exclusion as a human right, using definitions of equality to create a list of important capabilities that included: physical security, health, education, standard of living, productive and valued activities, individual, family and social life, participation, influence and voice, identity, expression and self-respect, and legal security) (Burchardt & Vizard, 2007). Additionally, there is the Poverty and Social Exclusion (PSE) survey, which uses eight indicators (e.g., poverty, not in paid work, jobless households, service exclusion, non-participation in social activities, socially isolated, poor social support, disengagement) to reflect four dimensions of social exclusion: impoverishment, labour market exclusion, service exclusion, and exclusion from social relations (Gordon et al., 2000). Furthermore, the Bristol Social Exclusion Matrix (B-SEM), consisting of 10 domains across the life course includes items that measure material and economic resources, access to public and private services, education, civic participation, health and wellbeing, harm, and criminalization (Levitas et al., 2007).

More specific to measures that have been used in mental health, individual level measures of marginalization include: the Social Inclusion Questionnaire User Experience (SInQUE), which uses 75 items to measure domains related to productivity, consumption, access to services, political engagement and social integration (Mezey et al., 2013). The Social and Community Opportunities Profile (SCOPE) is a 42-item scale measuring leisure time, housing, work, finances, safety, education, health, and family and friends. There is a 121-item version of this scale that includes quality of life and subjective well-being to show how opportunities and choices relate to material domains and result in participation (Huxley et al., 2012). Moreover, the Social Inclusion Scale

(SIS), a 22-item scale measuring domains related to: building social capital, social acceptance, neighbourhood cohesion, security of housing tenure, engagement in leisure and cultural activities, and citizenship. This measure contains three subscales: social isolation, social relations, and social acceptance, and it has been found to correlate with measures of empowerment and clinical outcomes (Secker, Hacking, Kent, Shenton, & Spandler, 2009). Further, the Social Integration Survey, which is a 62-item scale measuring social functioning activities or behaviours by participants in the past 4 weeks: social and emotional interactions, work interactions, social skills, social activities, and instrumental activities of daily living and self-care (Kawata & Revicki, 2008). Lastly, the Community Integration Measure (CIM), which is a 10-item scale measuring belonging (i.e., living situation, feeling accepted and part of the community, feeling close to people in the community), and independent participation (i.e., having something to do during the main part of the day that is useful and productive, leisure activities, knowing the community and its rules) (McColl, Davies, Carlson, Johnston, & Minnes, 2001).

As reviewed, marginalization as a concept contains multiple features, making it difficult to measure consistently. The various measures presented illustrate the wide range of aspects included in marginalization; depending on the purpose of a study, these measures can be quite broad (e.g., measuring proportions of unemployment), or very specific (e.g., measuring instances of family engagement). Criticisms of the concept mainly focus on its poor conceptualization and a lack of definitional clarity, which have generated confusion in its measurement; for example, it is unclear if the indicators often used are defining features or risk factors (Sealey, 2015). Some studies view marginalization as an objective state, (e.g. counting instances of participation) (Burchardt et al., 2002); other research view it as a subjective experience, and measure individual perception such as “mattering to one’s local setting” (Parr, Philo, & Burns, 2004). Moreover, research attempting

to measure the concept has been criticized for focusing on poverty and material deprivation (Morgan et al., 2007). Instead, it has been argued that marginalization is more of a social process; therefore, its measurement should include a broader analysis of the causes and conditions of disadvantage, encompassing both the social relations and the processes by which people become excluded in society (Sealey, 2015). Regardless of how a study chooses to measure aspects of marginalization, its operationalization typically requires the use of proxies associated with the constructs and subjective interpretation (Claridge, 2004). This highlights a need for developing clear conceptualizations and operationalizations in any attempt of measuring these concepts. As discussed, the measures that have been used in mental health settings have been particularly lengthy and may lack utility for their use in every day clinical practice. Thus, developing a practical measure of marginalization based on standardized assessments used in inpatient psychiatric settings, may help bridge the gaps in the measurement of social constructs.

1.5 Project Rationale

There are multiple gaps in the literature concerning the relationship between social factors, mental health, and service use. The limited research that is available on mental health service use and contextual factors identifies some associations between different components of marginalization, but more research is needed to better understand these relationships. A key challenge is the multidimensionality and breadth of social concepts like marginalization, which are difficult to define and measure. As such, there is a need for continuing efforts to develop empirical ways to measure aspects of marginalization in different settings. The literature surrounding homelessness and mental health identifies these groups as being the most marginalized; therefore, studying these groups offers an opportunity to further understand how

marginalization can be conceptualized and measured in a way that can enhance support to the individual and to policy makers.

Readmission into inpatient mental health care is a common way to evaluate service use and system quality. Research has identified risk factors for psychiatric readmission; however, these have focused on individual level characteristics and their proposed statistical multivariate models only yield moderate discriminative capacity (Hendryx et al., 2003; Perlman et al., 2015; Vigod et al., 2015). On the other hand, studies that investigate how contextual factors impact the risk of psychiatric readmissions are scarce (Kalseth et al., 2016). Such research may help improve the current individual level models. As outlined by the Behavioural Model of Health Service Use, studying contextual level factors may provide new insights and inform risk at the system level that may ultimately inform policy.

1.5.1 Research Questions and Study Objectives

The primary purpose of this dissertation is to explore how the social context of where persons with mental illness live influences their mental health status and service use. Three distinct studies examine empirical patterns of area-level marginalization regarding mental health, measurement and conceptualization of marginalization at the individual-level, and the influence of context on inpatient mental health readmissions among marginalized persons.

Research Question 1: What clinical characteristics are associated with residing marginalized areas among psychiatric inpatients in Ontario?

Objectives:

- To link a publicly available geographically based index that measures area-level marginalization to inpatient mental health data from Ontario.

- To examine how mental disorders and clinical symptoms are clustered among geographic areas in Ontario with different degrees of marginalization.
- To identify differences in the characteristics of areas of residence based on patient demographics, symptoms, function, and service patterns.
- To determine differences in the characteristics of areas of residence in relation to the different health regions of Ontario.

Research Question 2: How can the concept of marginalization be measured empirically using individual level health care data?

Objectives:

- To conceptualize "marginalization" in inpatient psychiatric settings based on data already collected to assess patients as part of everyday practice.
- To develop an index of marginalization and assess its psychometric properties.
- To assess the convergent validity of the index and determine optimal cut-offs for identifying individuals at risk of experiencing marginalization.

Research Question 3: What influence does context (e.g., supportive housing service proximity and geographic level marginalization) have on psychiatric readmissions among marginalized persons?

Objectives:

- To describe how readmissions to inpatient psychiatry at different points in time operate at a geographical level.

- To assess the distribution of supportive housing services and create a proximity measure to these services.
- To determine the effect of hospitals, health regions, and area-level marginalization at explaining variance in readmissions to inpatient psychiatry.
- To examine the effect of living in an area with close access to supportive housing services on readmissions to inpatient psychiatry among marginalized persons.

In summary, the first study links a geographically based index of marginalization to person level psychiatric health data to explore associations between geographic marginalization and mental health. The second study develops a measure to screen for marginalization based on health data and assesses its psychometric properties and convergent validity. The third study focuses on persons at risk of experiencing marginalization and explores the influence of proximity to supportive housing services and area-specific marginalization on psychiatric readmissions. Together these studies may produce a better understanding of the influence that both area- and person-level marginalization may have on mental health need and service use.

Chapter 2 Research Methodology

This chapter provides an integrated and consolidated methodology for the entire project. Additional details regarding each individual study are included in the methods sections of Chapter 3, 4 and 5. This project ensures confidentiality and anonymity of persons represented in the data and has been reviewed and received ethics clearance through a University of Waterloo Research Ethics Committee (ORE# 22466).

2.1 Resident Assessment Instrument for Mental Health (RAI-MH)

The RAI-MH is part of a suite of instruments developed by interRAI, a collaboration between researchers and clinicians from over 30 countries. interRAI aims to promote evidence-based clinical practice and policy decisions by developing instruments to inform multiple levels of decision making and by collecting and interpreting data about characteristics and outcomes of recipients of health and social services. The suite of instruments is designed for a wide range of sectors and populations, including: acute care, assisted living, child and youth, community health, emergency department, home care, hospital systems, intellectual disability, long-term care, palliative care, pediatric home care, post-acute care and rehabilitation, quality of life, wellness, and mental health. The mental health version of the instrument, the RAI-MH, is designed for use in inpatient psychiatry; there are additional versions of the mental health instrument for use in emergency departments, community mental health settings, and for mental health screening (www.interrai.org). interRAI ensures high quality standards with each version of its assessment systems by undergoing extensive research to demonstrate reliability and validity of items, assessment protocols, clinical outcome measures, case-mix systems, and quality indicators (Gray et al., 2009). Even though each version is designed for a specific setting, all the assessments are

compatible with one another, allowing the data to follow the patient across different care settings and throughout the lifespan (www.interRAI.org).

The RAI-MH was developed through a collaboration between the Ontario Ministry of Health and Long-Term Care (MOHLTC), the Ontario Hospital Association (OHA), and interRAI to provide a comprehensive assessment for adults in inpatient mental health settings (Hirdes et al., 2000). In 2005, the MOHLTC mandated that the RAI-MH be completed in all hospitals with designated adult psychiatric hospital beds in Ontario and submit these data to the Canadian Institute of Health Information (CIHI) on a quarterly basis (Canadian Institute for Health Information, 2013). Under this provincial mandate, the RAI-MH is completed upon admission, every 90-days in hospital, as well as upon discharge for every person admitted to an inpatient mental health bed in Ontario. This assessment is completed by clinical staff overseeing the care of the person. Information gathered to complete the RAI-MH comes from clinical observation, chart reviews, referral information, and discussions with the patient and other key informants (i.e., family members, care team) (Hirdes et al., 2010). The assessors receive training from CIHI on how to properly complete and use the assessment. Inter-rater reliability studies show that the average agreement for all RAI-MH items is 83%, and the average weighted Kappa is 0.70 (Hirdes et al., 2002; Hirdes et al., 2008) indicating substantial reliability.

The instrument requires a three-day observation period to provide reliable and valid measures of the information it collects (Hirdes et al., 2010). The 300+ items are grouped into different categories including demographic information, referral information, service history, and mental state. Additionally, items can be used to calculate summary scales and algorithms to identify a person's strengths, needs, and risks in various domains (e.g., behaviour, social, financial, functioning, vocational, and clinical). A number of embedded scales and risk algorithms exist

across most interRAI assessments and have been psychometrically evaluated and validated in different healthcare settings. For instance, the Positive Symptoms Scale (PSS) which measures hallucinations, command hallucinations, delusions, abnormal thought process, inflated self-worth, hyper-arousal, pressured speech, and abnormal/unusual movements; ranges from 0-12, with scores of 3 or more indicating positive symptoms of psychiatry (Perlman et al., 2007). The Depression Severity Index (DSI) which measures sad, pained facial expressions, negative statements, self-deprecation guilt/shame, hopelessness; the scale ranges from 0-12, where a score of 3 or more indicate depressive symptoms (Perlman et al., 2013). The Cognitive Performance Scale (CPS) which measures short-term memory cognitive decision making, ability to make self understood, and eating, on a scale from 0 to 6, where a score of 3 or more indicate moderate to severe impairment (Morris et al., 2016); the CPS was validated in psychiatric settings against other gold standard measures of cognitive performance (Jones, Perlman, Hirdes, & Scott, 2010). The Aggressive Behaviour Scale (ABS) which measures the number and frequency of verbally abusive, physically abusive, socially inappropriate, and aggressive resistance of care behaviours; the scores range from 0 to 12, with higher scores indicating a greater number of behaviours occurring at a greater frequency (Perlman & Hirdes, 2008). The Social Withdrawal Scale (SWS) which measures lack of motivation, reduced interaction, decreased energy, flat affect, anhedonia, and loss of interest, with score of 3 or more indicating moderate to severe social withdrawal (Rios & Perlman, 2017). Lastly, the Severity of Self-harm scale (SoS), the Risk of Harm to Others scale (RHO), and the Self-Care Index (SCI), are based on algorithms that combine symptoms and behaviours producing scores of 0 to 6, with higher scores indicating greater risk.

The RAI-MH contains multiple applications to support care planning, assess quality, and estimate relative resource intensity. For example, in the care planning process, it combines

individual's strengths, preferences, and needs to generate Clinical Assessment Protocols (CAPs)(Hirdes et al., 2011; Martin et al., 2009). In the creation of Mental Health Quality Indicators (MHQIs), it provides information to support accountability for funding, service delivery, effectiveness, and improvement of health services (Perlman et al., 2013). In informing funding, it provides information for the recommended case-mix classification system in the province, System for Classification of Inpatient Psychiatry (SCIPP) (Daniel, 2008).

The provincial implementation of the RAI-MH was managed by CIHI, who established a data repository based on the instrument called the Ontario Mental Health Reporting System (OMHRS). To ensure data quality, CIHI works with representatives from the hospitals with inpatient mental health beds to provide training in the completion of the RAI-MH and the use of the information generated by the assessment (Canadian Institute for Health Information, 2013). In addition, CIHI employs data submission controls that will reject inappropriate data; and in the case that data is rejected, the hospital must correct the data in time to avoid penalties imposed by provincial ministries of health. CIHI also publishes de-identified comparison reports of indicators of quality of care to provide incentives to ensure data quality. The reports include results for CAPs, summary scales, and quality indicators such as rehospitalization, prevalence of physical restraint and acute control medication use, and prevalence of self-injury (Canadian Institute for Health Information, 2013). OMHRS data are a reliable source of data for health services research in the province. Access to these data is available for research purposes to graduate students in the School of Public Health and Health System at the University of Waterloo.

2.1.1 Measures

The OMHRS data contain multiple variables to measure demographics, clinical status, and service utilization. Demographics include age, gender, marital status, living arrangements

(i.e. alone, with family, with others), education, employment, and sources of income. The health region (LHIN) is also included along with the first three digits of the person's postal code. These postal code digits refer to the Forward Sortation Area (FSA), a code that corresponds to the general geographic area of residence. In addition to the clinical and functional scales already described, the OMHRS also contains clinical characteristics such as use of substances (i.e. cocaine, opioids, cannabis) in the prior year, psychiatric diagnoses based on Diagnostic and Statistical Manual (DSM)-IV (and now DSM-V) codes, mental status, behaviours, as well as cognitive and physical functioning (Hirdes et al., 2010).

Furthermore, OMHRS contains information to measure social relations and social support, using variables that assess the presence of potential problems with social relations, interpersonal conflict, relationships with family members, friends, and staff, participations in social activities of long lasting interests, and telephone or email contacts with social relations (Hirdes et al., 2010). Indicators are also available for social isolation, living arrangements, presence of a confidant, available supports for discharge, contact with community mental health services, indicators of trauma, abuse, and neglect. There are indicators of socially inappropriate behaviours, harm to self or others, self-care and personal hygiene, as well as information on financial need, such as having to make trade-offs to purchase medications, food or adequate shelter (Hirdes et al., 2010). Variables in the assessment are coded in different ways. Most variables are coded based on observation, self-report, or from key informant information using defined observation period. For instance, mental state indicators are coded based on their observed frequency over the 3 days prior to the assessment, with 0 being "indicator not exhibited in the last 3 days," 1 being "indicator not exhibited in the last 3 days but it is reported to be present," 2 being "indicator exhibited on 1 or 2 of the last 3 days," and finally, 3 being "indicator

exhibited daily in the last 3 days" (Hirdes et al., 2010). Details on how variables were recoded are provided in the methods section of each study. A limitation to note in using the RAI-MH is that although it collects sufficient information to assess economic and social aspects of marginalization, there are types of marginality that it does not address, such as its cultural and political aspects. Similarly, the assessment does not collect self-report information that specifically asks the person's views or experience with marginalization. As such, this project is only able to generate conclusions based on the information that is available, while recognizing that there may be aspects of marginalization that are missed.

2.2 Ontario Marginalization Index

The Ontario Marginalization Index (ON-Marg) is an area-based index that aims to show differences in marginalization between areas in the province to understand inequalities in various measures of health and social well-being (Matheson, Dunn, Smith, Moineddin, & Glazier, 2012b). The index was developed using theoretical frameworks linking neighbourhood marginalization and poor health, and was based on previous research regarding area-based deprivation indices (Matheson, Dunn, Smith, Moineddin, & Glazier, 2012a). Given the multidimensionality of the concept of marginalization, this geographical index measures multiple domains based on variables available from the Canadian Census. Its empirical development employed principal components factor analysis of 42 variables to derive four principal components made up of 18 variables (Matheson et al., 2012a). Table 2.1 presents a list of the variables that are contained in each domain of the index. ON-Marg has been demonstrated to remain stable across time and among different geographic areas. The index has been shown to be associated with various health outcomes including self-reported health status, depression, and alcohol use (Matheson et al., 2006;

Matheson, White, Moineddin, Dunn, & Glazier, 2012; White, Matheson, Moineddin, Dunn, & Glazier, 2011).

Table 2.1 Variables that comprise the Ontario Marginalization Index

Residential instability	
1	% of living alone
2	% of youth population aged 5–15
3	Crowding: average number of persons per dwelling
4	% of multi-unit housing
5	% of the population that is married/common-law
6	% of dwellings that are owned
7	% of residential mobility (same house as 5 years ago)
Material deprivation	
8	% 25+ without certificate, diploma, or degree
9	% of lone-parent families
10	% of government transfer payment
11	% of unemployment 15+
12	% of below low-income cut-off
13	% of homes needing major repair
Dependency	
14	% of seniors (65+)
15	Dependency ratio [(0–14) + (65+)]/(15–64)
16	Labor force participation rate (aged 15+)
Ethnic Concentration	
17	% of 5-year recent immigrants
18	% of visible minority

The dimensions identified by the index contribute to the process of marginalization; these dimensions include: material deprivation, ethnic concentration, residential instability, and dependency. Each dimension is a standardized scale that applies to areas, not individuals. As such, the index provides a continuous score for each of the four dimensions, which can be converted into an ordinal scale from 1 (least) to 5 (most) marginalized to represent quintiles, with each

score/group containing a fifth (20%) of the geographic units (Matheson et al., 2012b). The residential instability domain relates to neighbourhood quality, cohesiveness and support by measuring rates of family and housing instability, types of residential accommodations, and family structure. The material deprivation domain is related to poverty and measures income, educational attainment and quality of housing. The dependency domain measures the proportions of persons not in the labour force and includes concentrations of seniors and children. Lastly, the ethnic concentration domain refers to proportion of recent immigrants or belonging to visible minority groups, defined as non-Caucasian in race. The combination of related variables into a single, broader dimension at the geographical level allows for planning and needs assessments, resource allocation, as well as research to monitor inequities regarding health status, risk factors, and rates of disease. Additionally, the scores can also be used as a proxy to individual-level SES when data is not available, by assigning individuals a score based on the geographic unit that the person resides in (Matheson et al., 2012a; Matheson et al., 2012b).

ON-Marg dimensions can be used separately or combined into a composite index. For this dissertation, the focus is placed on the residential instability and the material deprivation domains. These two domains offer a greater number of variables that reflect important characteristics identified by the marginalization theory such as social support, cohesiveness, and family structure. Additionally, with the intent to model area level marginalization based on individual level characteristics, it was determined that it would be inappropriate to include the ethnic concentration and dependency domains because RAI-MH does not collect information on race and ethnicity and the study population is adults. Therefore, the residential instability and material deprivation domains of the index were considered as two separate measures. However, an additional operationalization for “high marginalization” was created where the quintile version of these two

domains were combined such that individuals residing in areas classified in quintiles 4 or 5 were coded as residing in an area of "high marginalization." Access to the ON-Marg index is publicly available for download in Excel format from the Toronto Health Profiles website (http://www.torontohealthprofiles.ca/onmarg.php#userGD).

2.2.1 Data Linkage

There was a mismatch between the geographic units utilized in OMHRS and ON-Marg. To protect privacy of health data, the smallest geographic unit available in OMHRS is the FSA. However, the data in ON-Marg is available for Dissemination Areas (DAs), which are smaller geographic units than FSAs. As a result, it was necessary to upscale the ON-Marg data, before linking it to OMHRS. To do this, a geospatial directory with information on all the different Canadian geographic units was used to match DAs to their corresponding FSAs. This directory was available through the University of Waterloo Geospatial Laboratory and included information on the composition of Canadian geographic units to allow for easy conversion between different units.

As per the ON-Marg user guide, once the geographic units were matched, average weighted scores based on the DAs were created for the FSAs (Matheson et al., 2012b). This required each DA score value to be multiplied by the population within that DA. These values were then summed to generate a numerator. The population values from each DA were also summed to obtain a total population count, which became the denominator. Finally, total numerator was divided by the total denominator to generate the weighted average for the FSA. At this point, the weighted averages were also converted into an ordinal scale that represent FSA quintiles, where the numbers 1 to 5 represents a marginalization score relative to each other, from least to most marginalized

(Matheson et al., 2012b). The ON-Marg scores were then merged to patients' records using their common identifier geographic unit, the FSA. As a result, each psychiatric inpatient in the study period was assigned a residential instability score and a material deprivation score based on their area of residence. The data linkage was performed on Statistical Analysis Software version 9.4 (SAS) using the MERGE statement, while PROC SQL was used for the creation of the average weighted scores.

2.3 Connex Ontario Data

ConnexOntario is an organization funded by MOHLTC to monitor the availability of mental health, addictions, and problem gambling services in the province. ConnexOntario provides free and confidential health services information for people experiencing mental illness and problems with alcohol and drugs or gambling. At the same time, this organization maintains a database of mental health and addictions service information, which is used for planning by healthcare professionals, and health system managers. The dataset includes information regarding different organizations administering services, including: the names, addresses, and the types of services offered at each site (ConnexOntario, 2013).

There are 24 different service types in the ConnexOntario database; however, for the purpose of this project, only service types related to housing were investigated. Focusing on these service types allowed the project to focus on the population of interest, which are persons experiencing mental illness, at risk of becoming homeless, and experiencing marginalization. These are also the individuals who would potentially benefit from receiving services pertaining to housing support. ConnexOntario groups these services into three types. First, "Support Within Housing" services, which refers to centres that provide housing support within accommodation for

individuals with serious mental illness living either in congregate or individual accommodation requiring varying levels of support. This includes up to 24-hour support to recipients through individualized assessment and planning, hands-on assistance with activities of daily living, co-ordination and support, ensuring a stable housing environment, crisis management, facilitating peer and group support and resident input to their housing environment (ConnexOntario, 2013). Second, the "Rent Supplement" programs included ministry-managed funding to house clients in privately owned buildings through either head lease or referral agreements. Lastly, the "Housing Bricks and Mortar" programs provide operating and rent subsidy based on operating costs, taxes, rent or mortgage payment (ConnexOntario, 2013). Access to these data were directly requested from ConnexOntario.

2.4 Research Design

This project was framed within a broader philosophy to inform and identify risks resulting from social inequalities in health, structuration theory, as well as a framework to understand health services use, Andersen's Behavioural Model. As such, this project aims to explore individual and contextual drivers of the need and use for psychiatric services. A detailed account of the methods is presented in each chapter; however, a summarized overview is presented here to clarify the logical flow of the methodology used for this dissertation.

The three studies that encompass this project used retrospective designs with analyses of observational data. Descriptive statistics were employed to describe the samples in each study in terms of their demographics, admission status, and diagnoses. The specific analytical procedures employed address separate research objectives within a broad research goal. Figure 2.1 depicts a general framework showing the research plan and how connecting the data relates to the purpose of each study. The first study links individual data from inpatient psychiatry to area level

marginalization to assess the relation between individual characteristics and living in marginalized areas. Based on these results, the second study explores how these individual characteristics can be converted into an index to identify persons at risk of marginalization in inpatient psychiatry. The index is then used in the third study to select a sample of persons at risk of marginalization and test the effects of other systems structures (e.g., hospitals, health regions, geographic marginalization and proximity to supportive housing) on readmissions to inpatient psychiatry.

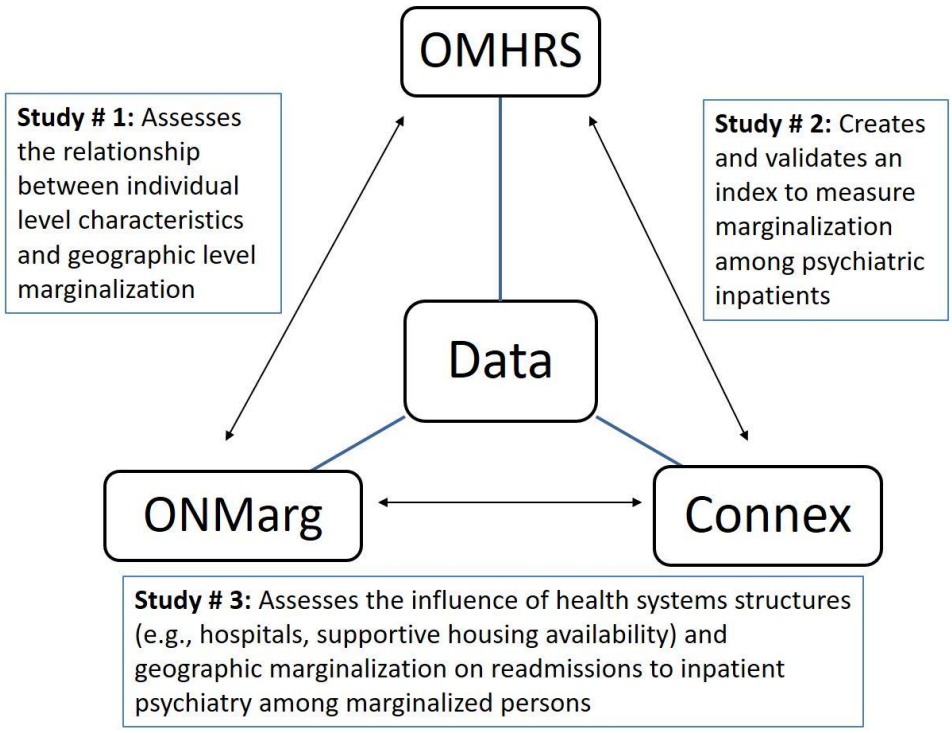

Figure 2.1 Research plan relating data to studies' purpose

A number of analytic procedures were used to address the distinct research objectives outlined in Chapter 1. For instance, frequency and chi-square tests were used to assess bivariate relationships. Multivariate analysis using logistic regression models was employed to identify the

associations between independent and dependent variables. Principal Component Analysis (PCA) was used to create an index to measure marginalization; the psychometric properties of the index were studied using techniques such as ROC Curve Analysis and Youden's J formula. Lastly, multilevel models were employed to test hierarchical clustering of different system structures on the outcome of interest. Further details regarding these methods are described in each of the studies presented in Chapter 3, 4 and 5.

Chapter 3 Characteristics Associated with Living in Marginalized Areas among Psychiatric Patients in Ontario

3.0 Abstract

Purpose: Socio-environmental conditions influence the mental health status and well-being of individuals. This study examined the clinical profile and needs of psychiatric inpatients living in areas of high residential instability and high material deprivation.

Methods: The study linked data from a Canadian Census-derived index of marginalization to clinical data from the Ontario Mental Health Reporting System (OMHRS). The dataset consisted of clinical and administrative data from every person admitted to a psychiatric hospital between January 1, 2006 and December 31, 2016 in Ontario, Canada. Bivariate and multivariate analyses examined the likelihood of residing in the most marginalized areas based on demographic, clinical, and service use characteristics.

Results: The majority of persons admitted to inpatient psychiatry lived in the most marginalized areas of the Ontario. Those with little education, involved with the criminal system, on government assistance, diagnosed with schizophrenia, experiencing economic hardships, living alone, and those who lacked social support were the most likely to reside in areas with high marginalization. Patients in northern health regions were most likely to reside in areas with the most material deprivation while persons in resource intensive health regions like Toronto Central, resided in areas with the most residential instability.

Conclusion: This study identified factors that differentiated living in areas of low versus high marginalization among psychiatric inpatients. These findings are important for informing the

equitable planning and distribution of evidence-based mental health services and supports to create social contexts that enable and support opportunities for improved mental health.

3.1 Background

Marginalization describes both a process and a condition that prevents individuals or groups from full participation in social, economic and political life (Alakhunova et al., 2015; Trudeau & McMorran, 2011). Marginalization is considered a determinant of health and a factor in causing health inequalities; where health risks result from environmental dangers, unmet subsistence needs, severe illness, trauma, and restricted access to health care (Marmot et al., 2008; World Health Organization, 2010). As such, persons facing marginalization lack resources to participate in community health partnerships, and thereby are subject to inequalities in health (Lynam & Cowley, 2007). These inequalities may be driven by social, economic, and environmental circumstances (Allen et al., 2014; Collins & Hayes, 2010).

Mental disorders, in particular, are highest in economically marginalized populations (Campion et al., 2013; Saxena, Thornicroft, Knapp, & Whiteford, 2007). Low education, social disorganization and poverty have been identified as the key drivers behind these associations (Lund et al., 2010; Lund et al., 2011). For instance, people living in unsheltered situations report poorer physical health and more symptoms of serious mental illness, cognitive disorders, substance use disorders, chronic health conditions, as well as higher risk of premature death compared to their sheltered counterparts (Montgomery et al., 2016). Those in lower social hierarchies experience economic hardships, greater perceived discrimination, and have access to fewer supports; this often leads to the accumulation of stress and increase the risk of anxiety and depressive symptoms (Mama et al., 2016). Thus, persons of low socio-economic status (SES) experience higher rates of mental illness and use of psychiatric services compared to those in high SES groups (Donisi et al., 2013; Mawani & Gilmour, 2010). On the other hand, job security, personal safety, social support and cohesion are positively associated with mental wellbeing (Van

Dyck, Teychenne, McNaughton, De Bourdeaudhuij, & Salmon, 2015). For instance, longitudinal studies have shown that moving to affluent neighbourhoods leads to long-term improvements in mental health and subjective well-being (Ludwig et al., 2012).

Research on neighbourhood characteristics, where persons with severe mental illness tend to reside, identifies areas with concentrated poverty and close access to health services as predominant areas of residence (Metraux, Brusilovskiy, Prvu-Bettger, Wong, & Salzer, 2012; Zippay & Thompson, 2007). Despite these associations between context and mental health, research examining how mental disorders and clinical symptoms are clustered among areas with different degrees of marginalization is limited. To help address this gap, the present analysis examines patterns of area level marginalization among psychiatric inpatients. More specifically, this study links area level contextual data and individual level health care data to identify and understand the clinical profile and needs of those living in the most marginalized areas of the province. This study aims to identify how different patient demographics, symptoms, function, and service patterns relate to different aspects of area-level marginalization.

3.2 Methods

3.2.1 Design and Data

This study employed a retrospective cross-sectional analysis of data available from the Ontario Mental Health Reporting System (OMHRS) of the Canadian Institute for Health Information (Canadian Institute for Health Information, 2013). The OMHRS includes data from every person admitted to an inpatient mental health bed across 82 units or hospitals in Ontario, Canada. The sample included 150,600 patients admitted between January 1, 2006, and December 31, 2016. Patients with lengths of stay of less than 72 hours were excluded because these patients were not assessed with the complete RAI-MH assessment. Additionally, forensic patients were

excluded from the dataset due to the system factors that determine access to care for this population.

3.2.2 Assessment Instrument

The OMHRS is based on information from the Resident Assessment Instrument-Mental Health (RAI-MH). The RAI-MH was mandated in October 2005 by the Ontario Ministry of Health and Long-Term Care for use with each person admitted to an inpatient mental health bed (Perlman et al., 2013). All patients are assessed with the RAI-MH after 72 hours of hospital stay, at 90-days (if applicable), and at discharge. The assessment is completed by trained clinical staff based on observation, interviews with the patient, key informants, and other clinical staff (Hirdes et al., 2000). The RAI-MH has strong interrater reliability with an average agreement for all RAI-MH items of 83% and an average weighted kappa across items of 0.70 (Hirdes et al., 2002; Hirdes et al., 2008).

3.2.3 Independent Variables

The RAI-MH includes items that can be grouped into different categories including demographic information (i.e., age, gender, marital status, living arrangements, employment), referral information, service history, mental status, substance use, cognitive performance, behaviours and violence, harm to self, interventions as well as social, financial, and vocational functioning (Hirdes et al., 2000). The assessment also includes psychiatric diagnoses based on the DSM-IV and V provided by the psychiatrist overseeing the care of the person. Items assessing symptoms, behaviours, and functioning tend to include a 3-day observation period. Others, such as substance use, are based on patterns over specified time periods (e.g., within the prior 3 days to 1 year). The RAI-MH also contains a number of validated summary scales, such as the Positive Symptoms Scale which ranges from 0-12, with scores of 3 or more indicating hallucinations and

delusions (Perlman et al., 2015); the Depression Severity Index which ranges from 0-12, where a score of 3 or more indicate depressive symptoms (Perlman et al., 2013); the Risk of Harm to Others Scale that ranges from 0 to 6 with scores of 3 or more being predictive of inpatient assaults (Neufeld, Perlman, & Hirdes, 2012); the Cognitive Performance Scale that measures the severity of cognitive impairment on a scale from 0 to 6, where a score of 3 or more indicate moderate to severe impairment (Jones et al., 2010); and the Social Withdrawal Scale where scores of 3 or more indicate moderate to severe social withdrawal (Rios & Perlman, 2017). Additionally, health region was examined using the Local Health Integrated Networks (LHINs), the geographical health region where patients received services. There are fourteen LHINs in Ontario that plan, integrate and fund local health care (Office of the Auditor General of Ontario, 2015).

3.2.4 Dependent Variable: Marginalization Indicators

The contextual level data utilized in this study are based on the Ontario Marginalization Index (ON-Marg) (Matheson et al., 2012b). This geographical index is based on 18 different variables that measure multiple dimensions of marginalization using data from the Canadian Census. The index provides a continuous score for four different aspects of marginalization and can be converted into an ordinal scale from 1 (least) to 5 (most) based on the quintile distribution across geographic units (Matheson et al., 2012a). This dataset also contains the population counts per geographic unit based on Census estimates for 2006. In building an operationalization of area level marginalization for this study, the domains of "residential instability" and "material deprivation" were chosen (Refer to Table 2.1 in Chapter 2 for a list of the variables that make up the ON-Marg Index). The inclusion of these two domains allowed for a comprehensive depiction of area-level marginalization that considers social problems relevant to the individual level data available from OMHRS. In addition to the quintile scores, a combined and dichotomized version

of these measures was created; where scores of 1, 2 or 3 in "residential instability," or "material deprivation," represented "low marginalization," while scores of 4 or 5 in either domain represented "high marginalization."

3.2.5 Statistical Analyses

The geographic unit used for this study was the Forward Sortation Area (FSA), which is identified by the first 3 digits of the postal code of a person's residence. The 2011 Canadian Census indicated that there were 526 FSAs in Ontario. The FSA was available for all individuals in the OMHRS data; however, to link to ON-Marg data, FSA scores for the ON-Marg were calculated by taking the weighted average of Dissemination Areas scores within each FSA, as per the ON-Marg User Manual (Matheson et al., 2012b). To examine the geographic distribution of patient characteristics, bivariate relationships between individual characteristics and the FSA quintile scores for material deprivation and residential instability were assessed using frequency and chi-square statistics (significance level p-value <0.0001).

Multivariate logistic regression models were developed to examine factors that are related to residing in areas of high "residential instability," "material deprivation," and a combination of these two domains to represent "marginalization." Variables selected for these models were determined based both on variables reported to have clinical relevance in the scientific literature and statistical significance presented by the bivariate analysis results. The models were built in stages, testing the effect of variables grouped by demographics, diagnoses, symptoms, social support, and so on. Non-significant variables were deleted sequentially from the models until only significant variables remained. The selection of variables was done manually, omitting one variable each time and reviewing how the coefficients and their relevant standard errors changed, rather than using automated methods, to avoid potential problems with multicollinearity (Graham,

2003). Similarly, different combinations of the remaining independent variables were examined to rule out collinearity and deletion effects (Hosmer Jr, Lemeshow, & Sturdivant, 2013). P-value of less than 0.001 were considered statistically significant, and odds ratios with 95% confidence intervals were used to assess effect sizes of each variable. The c-statistics (area under the ROC curve) of the models was used to interpret the strength of the models, with a value of 0.70 or higher indicating good model discrimination between those residing in areas of high marginalization versus those living in areas of low marginalization (DeSalvo, Fan, McDonell, & Fihn, 2005). Regarding the categorical variables that were tested in the models, the reference group of "18 years old or less" was selected for the variable measuring age groups and "grade 8 or less" for the variables assessing levels of education. To assess the number of marginalized areas per health region, the Toronto Central LHIN was chosen as the reference group as it was the region with the highest density of resources and services. All analyses were conducted using SAS software version 9.4 using PROC FREQ and PROC LOGISTIC statements.

3.3 Results

3.3.1 Descriptive Statistics

Table 3.1 shows demographic, service history, clinical characteristics of adults admitted to inpatient psychiatry in Ontario during the study period. Most patients were aged 25-44 years old, had secondary or less as the highest level of education achieved (60%), were not employed (53%), and did not have a partner/spouse (68%). Diagnoses are consistent with what would be expected in inpatient psychiatry settings, with mood disorders and schizophrenia being the most prevalent. Furthermore, a quarter of individuals had a substance use disorder in addition to their mental health diagnoses. The majority (78%) of these patients were rated as having limited to no insight into

their own mental health status, and close to half (48%) were admitted due to threat or danger to themselves.

The distribution of area level marginalization was not equal across the study sample. When comparing the distribution of marginalization quintile scores for patients' area of residence, it was found that 63% of them lived in areas with the highest marginalization scores (ON-Marg scores of 4 and 5). The analysis showed that 13.1% of the sample lived in areas with a score of low residential instability (quintile 1) compared to 24.3% who lived in areas scoring in the 5^{th} quintile. Similarly, 12.8% lived in the least materially deprived areas, while 24.5% lived in areas with a material deprivation quintile score of 5. Compared to the general population, the distribution of psychiatric inpatients was higher in the most marginalized area quintiles, and lower among the least marginalized. Details on comparisons with the general population can be found in Appendix A.

Table 3.1 Demographic, service history, clinical characteristics, and neighbourhood characteristics of the sample (N=150,600)

	Total Sample	
	%	N
Age (years)		
< 18	2.3	3397
18-24	15.2	22847
25-44	34.0	51149
45-64	32.6	49106
65+	16.0	24101
Female	49.6	74757
Highest level of education		
Unknown/None or less than grade 8	18.4	27700
Secondary	42.1	63392
Post-Secondary	35.9	54129
Graduate	3.6	5379
Unemployed	52.6	79269
Reports having no confidant	14.7	22199
Has a Partner/Spouse	32.8	49365
Homeless	1.6	2342
Lives alone	28.3	42607
DSM-IV Diagnostic Categories		
Mood	54.1	81501
Schizophrenia and other psychotic disorders	27.4	41273
Neurocognitive[1]	8.5	12759
Anxiety	14.0	21004
Substance Use	25.6	38585
Secondary Substance Use Diagnosis	25.1	37739
Reason for Admission:		
Threat or danger to self	48.0	72274
Threat or danger to others	18.2	27406
Involuntary admission	10.9	16398
Limited or no insight into his/her mental health	77.6	117902
Prior Psychiatric Admissions		
3+ times over the last 2 years	3.7	5527
6+ times over lifetime	6.0	9019
Area-level Residential Instability (RI) Score		
1 (Least)	13.1	19683
2	20.6	31089
3	17.8	26860
4	24.1	36362
5 (Most)	24.3	36606

[1] Delirium, dementia and amnestic and other cognitive disorders

Table 3.1 Continued

	Total Sample	
	%	N
Area-level Material Deprivation (MD) Score		
1 (Least)	12.8	19313
2	16.5	24886
3	20.1	30343
4	25.9	39054
5 (Most)	24.6	37004
Marginalization: Dichotomized Score		
Low (Quintile 1, 2 or 3 in either RI or MD)	36.8	55389
High (Quintile 4, or 5 in either RI or MD)	63.2	95211

3.3.2 Individual and Contextual Relationships

Table 3.2 shows results for the bivariate analyses of the different individual-level characteristics available from OMHRS considered in relation to area level marginalization. In terms of demographic characteristics, the proportion of individuals residing in areas of high marginalization was greater among individuals of older age, with less educational attainment, and those who identify as Aboriginal. However, there are no differences in area of residence marginalization by gender[2]. A greater proportion of persons experiencing indicators of potential poverty (i.e., receiving government assistance, homeless, experiencing economic hardships, having to make trade offs to purchase necessities, unemployed) resided in areas of high marginalization compared to those who are not experiencing potential poverty. Additionally, rates of living in the most marginalized areas were also higher for persons who lack social support (i.e., those who report having no partner, no confidant, no support for discharge, severed relationships, no visits, friends and family that are overwhelmed by their illness). Persons with more prior hospitalizations, who are admitted involuntarily, having psychotic symptoms, who are at risk of

[2] In addition to male and female, 33 individuals in the sample were categorized as "other" for gender. However, patterns of area marginalization were not reported for this group to ensure privacy, due to the small sample size.

harm to others, and who have police and criminal system involvement also reside in areas of higher marginalization. On the other hand, persons who are at risk of harm to self more commonly reside in the least marginalized areas.

There are significant differences regarding substance use and area level marginalization. For instance, higher rates of inhalants, cocaine/crack, stimulants, and opiates and lower rates of alcohol use occur among persons residing in highly marginalized areas compared to least marginalized areas. In the case of cannabis and hallucinogens use, the rates are not significantly different when comparing area of high versus low marginalization. In terms of diagnoses, schizophrenia, mood disorders, anxiety, and neuro-cognitive disorders are significantly higher for the most marginalized areas compared to the least. On the other hand, prevalence of depression and eating disorders are significantly higher among those in the least marginalized areas. Rates for other disorders (e.g., neuro-developmental, personality disorder, impulse disorder, sexual identity disorder, substance use and concurrent disorders, multiple diagnoses) do not significantly differ when it comes to area level marginalization. Lastly, as measured by the different scales embedded in the RAI-MH, higher rates of aggressive behaviour, cognitive impairment, psychotic symptoms, inability to care for self, and risk of harm to others are found among those living in highly marginalized areas compared to those living in low marginalized areas. However, higher rates of depressive symptoms, and substance related addictions exist among those living in the least marginalized areas compared to those in the most marginalized areas.

Table 3.2 Proportion of persons in inpatient psychiatry in Ontario residing in an area of high marginalization by demographic and clinical characteristics (N=150,600)

		Residing in Area of High Marginalization			
Characteristic	**Level**	**N**	**%**	**Chi-Square**	**P-Value**
Personal Characteristics					
Gender				0.97	0.32
	Male	48041	63.3		
	Female	47170	63.1		
Age Group				435.6	<0.0001
	<18 years	1870	55.1		
	18-24 years	13266	58.1		
	25-44 years	32822	64.2		
	45-64 years	31620	64.4		
	65+ years	15633	64.9		
Education				1066.6	<0.0001
	< Grade 8	19439	70.2		
	Secondary	40621	64.1		
	Post-Secondary	31792	58.7		
	Graduate	3359	62.5		
Does Not Have a Partner/Significant Other				1334.7	<0.0001
	Yes	67211	66.4		
	No	28000	56.7		
Receiving Government Assistance				2000.2	<0.0001
	Yes	54725	68.4		
	No	40486	57.3		
No Income				237.6	<0.0001
	Yes	10989	58.2		
	No	84222	64.0		
Aboriginal Origin				311.6	<0.0001
	Yes	3083	76.4		
	No	92128	62.9		
Lives Alone				2676.3	<0.0001
	Yes	31297	73.5		
	No	63914	59.2		
Homeless				166.1	<0.0001
	Yes	1779	76.0		
	No	93432	63.0		

Table 3.2 Continued

		Residing in Area of High Marginalization			
Characteristic	**Level**	**N**	**%**	**Chi-Square**	**P-Value**
Unstable/Temporary Residence				10.6	0.001
	Yes	23206	62.5		
	No	72005	63.5		
Severed Relationships				11.0	0.0009
	Yes	40388	63.7		
	No	54823	62.9		
Dropped out of Education Program				224.0	<0.0001
	Yes	26659	66.3		
	No	68552	62.1		
Experiences Economic Hardships				324.3	<0.0001
	Yes	23453	67.3		
	No	71758	62.0		
Victim of Physical, Emotional, or Sexual Abuse				22.0	<0.0001
	Yes	14025	64.6		
	No	81186	63.0		
Dysfunctional/Disturbed Relationship(s) Family				204.4	<0.0001
	Yes	30877	60.7		
	No	64334	64.5		
Does Not Have a Confidant				31.5	<0.0001
	Yes	14407	64.9		
	No	80804	65.0		
Family/Friends are Overwhelmed by Person's Illness				702.2	<0.0001
	Yes	37088	59.3		
	No	58123	66.0		
Unemployed				293.7	<0.0001
	Yes	51716	65.2		
	No	43495	61.0		
Makes Trade Offs to Purchase Necessities				87.6	<0.0001
	Yes	5173	68.3		
	No	90038	63.0		
No Phone/Email/Visits within Last Month				446.9	<0.0001
	Yes	10209	71.3		
	No	85002	62.4		
No Support Person				215.5	<0.0001
	Yes	11749	68.3		
	No	83462	62.6		

Table 3.2 Continued

		Residing in Area of High Marginalization			
Characteristic	**Level**	**N**	**%**	**Chi-Square**	**P-Value**
No Supports for Discharge				452.4	<0.0001
	Yes	24708	67.9		
	No	70503	61.7		
3+ Recent Admissions to Hospital				65.0	<0.0001
	Yes	3778	68.4		
	No	91433	63.0		
6+ Lifetime Admissions to Hospital				512.4	<0.0001
	Yes	6707	74.4		
	No	88504	62.5		
Admitted to Hospital Involuntary				122.8	<0.0001
	Yes	11013	67.2		
	No	84198	62.7		
Clinical Characteristics					
No Decision Capacity				158.6	<0.0001
	Yes	12725	67.4		
	No	84486	62.6		
Police Intervention				107.0	<0.0001
	Yes	28009	65.3		
	No	67202	62.4		
No Insight into Own Mental Health Status				4.3	0.03
	Yes	74056	63.4		
	No	21155	62.7		
Threat to Self				39.3	<0.0001
	Yes	45106	62.4		
	No	50105	64.0		
Danger to Others				29.7	<0.0001
	Yes	17720	64.7		
	No	77491	62.9		
Unable to Care for Self due to Symptoms				72.0	<0.0001
	Yes	35531	64.6		
	No	59680	62.4		
Addiction Problem				81.3	<0.0001
	Yes	24131	61.3		
	No	71080	63.9		
Psychotic Symptoms				2.1	0.15
	Yes	68576	63.1		
	No	26635	63.5		

Table 3.2 Continued

		Residing in Area of High Marginalization			
Characteristic	**Level**	**N**	**%**	**Chi-Square**	**P-Value**
Contact with Criminal System				127.8	<0.0001
	Yes	4945	69.5		
	No	90266	62.9		
History of Violence				189.0	<0.0001
	Yes	28502	65.9		
	No	66709	62.1		
History of Sexual Violence				51.6	<0.0001
	Yes	2922	68.5		
	No	92289	63.1		
Delirium				275.4	<0.0001
	Yes	38568	65.8		
	No	56643	61.6		
Cognitive Decline				191.2	<0.0001
	Yes	18088	66.9		
	No	77123	62.4		
Not Understood by Others				55.0	<0.0001
	Yes	6370	66.8		
	No	88841	63.0		
Poor Health				96.6	<0.0001
	Yes	11327	60.0		
	No	83884	63.7		
Recent Falls				0.4	0.51
	Yes	389	61.9		
	No	94822	63.2		
Experiences Pain				55.4	<0.0001
	Yes	23039	64.9		
	No	72172	62.7		
Stopped Taking Psychotropic Medication				0.52	0.47
	Yes	10985	63.5		
	No	84226	63.2		
Misuses Medications				0.005	0.94
	Yes	12542	63.2		
	No	82669	63.2		
Experienced Control Interventions				76.8	<0.0001
	Yes	55292	64.2		
	No	39919	62.0		

Table 3.2 Continued

		Residing in Area of High Marginalization			
Characteristic	**Level**	**N**	**%**	**Chi-Square**	**P-Value**
Substance Use					
5+ Alcoholic Beverages within Last 14 days				63.8	<0.0001
	Yes	14373	60.9		
	No	80838	63.7		
Use of Inhalants Over Past Year				26.4	<0.0001
	Yes	1014	69.7		
	No	94197	63.2		
Use of Hallucinogens Over Past Year				1.4	0.24
	Yes	3136	64.0		
	No	92075	63.2		
Use of Crack Over Past Year				46.7	<0.0001
	Yes	10090	65.7		
	No	85121	63.0		
Use of Stimulants Over Past Year				35.0	<0.0001
	Yes	4006	66.8		
	No	91205	63.1		
Use of Opiates Over Past Year				51.0	<0.0001
	Yes	7036	66.5		
	No	88175	63.0		
Use of Cannabis Over Past Year				3.2	0.07
	Yes	23376	63.6		
	No	71835	63.1		
Diagnoses					
Schizophrenia				767.1	<0.0001
	Yes	28405	68.8		
	No	66806	61.1		
Mood Disorder				194.6	<0.0001
	Yes	50225	61.6		
	No	44986	65.1		
Anxiety				73.5	<0.0001
	Yes	12723	60.6		
	No	83488	63.7		
Depression				47.2	<0.0001
	Yes	2570	58.3		
	No	92641	63.4		

Table 3.2 Continued

		Residing in Area of High Marginalization			
Characteristic	**Level**	**N**	**%**	**Chi-Square**	**P-Value**
Dissociative Disorder				2.9	0.08
	Yes	238	67.6		
	No	94973	63.2		
Eating Disorder				81.3	<0.0001
	Yes	1326	54.4		
	No	93885	63.3		
Sleep Disorder				0.009	0.93
	Yes	603	63.1		
	No	94608	63.2		
Sexual Identity Disorder				9.6	0.002
	Yes	233	71.5		
	No	94978	63.2		
Impulse Disorder				0.3	0.61
	Yes	1377	62.7		
	No	93834	63.2		
Substance Use Disorder				3.1	0.08
	Yes	24250	62.9		
	No	70961	63.4		
Neuro Cognitive Disorder				35.8	<0.0001
	Yes	8378	65.7		
	No	86833	63.0		
Neuro Developmental Disorder				8.2	0.004
	Yes	1960	60.8		
	No	93251	63.3		
Personality Disorder				0.7	0.34
	Yes	6575	63.6		
	No	88636	63.2		
Multiple Diagnoses				7.8	0.005
	Yes	2562	61.2		
	No	92649	63.3		
Concurrent				1.4	0.23
	Yes	23762	63.0		
	No	71449	63.3		
Scales					
ABS 3+ (Aggressive Behaviour)				161.1	<0.0001
	Present	15506	66.9		
	Not Present	79705	62.6		

Table 3.2 Continued

		Residing in Area of High Marginalization			
Characteristic	**Level**	**N**	**%**	**Chi-Square**	**P-Value**
DRS 3+ (Depressive Symptoms)				33.5	<0.0001
	Present	51458	62.6		
	Not Present	43753	64.0		
CPS 3+ (Cognitive Impairment)				47.1	<0.0001
	Present	9876	65.8		
	Not Present	85335	62.9		
ADL 3+ (Difficulties with Activities of Daily Living)				14.7	0.0001
	Present	8841	64.7		
	Not Present	86370	63.1		
PSS 3+ (Psychotic Symptoms)				402.4	<0.0001
	Present	33372	66.8		
	Not Present	61839	61.5		
Pain 3+ (Experiencing Pain)				2.9	0.09
	Present	2398	64.6		
	Not Present	92813	63.2		
SCI 3+ (Inability to Care for Self)				392.6	<0.0001
	Present	26904	67.3		
	Not Present	68307	61.7		
SoS 3+ (Risk of Self Harm)				21.1	<0.0001
	Present	37974	62.5		
	Not Present	57237	63.7		
RHO 3+ (Risk of Harming Others)				246.6	<0.0001
	Present	26729	66.5		
	Not Present	68482	62.0		
Cage 2+ (Substance Related Addiction)				135.6	<0.0001
	Present	23276	60.7		
	Not Present	71935	64.1		
SWS 3+ (Social Withdrawal Symptoms)				0.2	0.65
	Present	61825	63.3		
	Not Present	33386	63.1		

Additional bivariate analysis results are presented in the figures included in Appendix B to illustrate how these individual characteristics are distributed in terms of residential instability and material deprivation quintiles. For instance, out of the individuals who were homeless at the time of admission, only 7.7% reported living in an area with a residential score of 1, compared to

a 39.1% who lived in areas with a residential instability score of 5. Similarly, only 9.7% of homeless patients reported living in an area with a material deprivation score of 1, compared to 32.6% who lived in a material deprivation area score of 5. This increasing trend is also found among other characteristics such as not having a partner, being a recipient of government assistance, living alone, having to make trade-offs to purchase necessities, not receiving visits or calls for more than a month, not having a support person, or being admitted involuntarily into inpatient psychiatry.

3.3.3 Factors Associated with Residing in Marginalized Areas

Table 3.3 provides multivariate logistic regression results predicting the odds of residing in areas of "high residential instability," "high material deprivation," and "high marginalization." Across all three models, factors associated with residing in areas of high ON-Marg Quintiles (quintiles 4 and 5) include: insufficient education, receiving government assistance, living alone, and having a diagnosis of schizophrenia. Factors associated with residing in areas of high residential instability include: being admitted six or more times over one's lifetime, being admitted involuntarily, experiencing control interventions (e.g. physical/mechanical restraints, confinement to room, seclusion room), being homeless, unemployed, experiencing psychosis, using crack within the last year, not receiving emails/calls/visits within the past month, and not having a partner/spouse or supports for discharge. Regarding material deprivation, factors that increased the odds of residing in these areas included opiate use and history of violence while factors that decreased the odds included lacking capacity to make decisions and having family or friends that are overwhelmed by the person's psychiatric condition. Lastly, the model for high marginalization, which is a combination of the other two domains, showed increased odds for being involved with

the criminal system, having dropped out of an educational program, experiencing economic hardships, and being unable to care for one's self due to psychiatric symptoms.

Individuals were less likely to reside in areas of high residential instability in all other health regions compared to Toronto Central. However, for the models testing the likelihood of residing in areas with high material deprivation, the health regions of Erie St. Clair, Hamilton Niagara, Central East, North East and North West showed increased odds. This is particularly noticeable for the most northern health regions, where the odds of residing in an area of high material deprivation are 4.6 (North East) and 6.1 (North West) times more likely compared to Toronto Central. Geographically, these northern regions are the most rural and remote regions in Ontario. Furthermore, regarding the total marginalization scores, the odds remain lower for all other regions compared to Toronto Central, except for the North East and North West, with odds ratios of 2.0 and 1.4 respectively.

Table 3.3 Logistic regression models for residing in areas of high "residential instability," "material deprivation" and "marginalization" among psychiatric inpatients (N=150,600)

	Odds Ratio (95% Confidence Interval)		
	Residential Instability	**Material Deprivation**	**Marginalization**
C-Statistic	**c=0.71**	**c=0.70**	**C=0.71**
Variable			
Age Group **(ref=<18 years)**			
18-24	1.23 (1.13, 1.33)	1.17 (1.08, 1.26)	1.21 (1.11, 1.30)
25-44	1.50 (1.39, 1.63)	1.38 (1.28, 1.49)	1.42 (1.31, 1.53)
45-64	1.49 (1.38, 1.62)	1.29 (1.19, 1.39)	1.32 (1.22, 1.43)
65+	1.51 (1.38, 1.64)	1.04 (0.96, 1.13)	1.21 (1.11,1.31)
Education **(ref=<grade 8)**			
Secondary	0.87 (0.84, 0.89)	0.88 (0.86, 0.92)	0.87 (0.84, 0.90)
Post-Secondary	0.86 (0.83, 0.88)	0.66 (0.64, 0.69)	0.73 (0.70, 0.75)
Graduate	1.01 (0.95, 1.08)	0.56 (0.52, 0.59)	0.78 (0.73, 0.84)
Government Assistance	1.26 (1.23, 1.29)	1.39 (1.36, 1.43)	1.36 (1.33,1.40)
6+ Lifetime Admissions	1.32 (1.26, 1.38)		1.25 (1.19, 1.32)
Involuntary Admissions	1.11 (1.07, 1.15)		
Experience Control Interventions	1.16 (1.13, 1.19)		1.06 (1.03, 1.32)
Involved with Criminal System			1.15 (1.09, 1.22)
Lives Alone	1.58 (1.54, 1.62)	1.28 (1.25, 1.32)	1.65 (1.60, 1.69)
No Partner/Spouse	1.29 (1.26, 1.33)		
Homeless	1.54 (1.40, 1.69)		1.42 (1.29, 1.58)
Unemployed	1.11 (1.08, 1.13)		
Dropped Out of Education Program			1.07 (1.04, 1.10)
Experiences Economic Hardships			1.05 (1.02, 1.08)
No Emails/Calls/Visits from Social Relations in Past Month	1.15 (1.11, 1.20)		1.16 (1.11, 1.20)
No support for discharge	1.14 (1.10, 1.18)		1.13 (1.10, 1.16)
Schizophrenia diagnosis	1.19 (1.16, 1.23)	1.26 (1.23, 1.29)	1.32 (1.28, 1.35)

Table 3.3 Continued

	Odds Ratio (95% Confidence Interval)		
	Residential Instability	**Material Deprivation**	**Marginalization**
Positive Symptom Scale (PSS)[3]	1.10 (1.07, 1.12)		
Self Care Index (SCI)[4]			1.11 (1.08, 1.14)
Lacks capacity for daily decisions		0.92 (0.89, 0.96)	
History of violence		1.13 (1.10, 1.15)	
Family is overwhelmed by person's illness		0.89 (0.87, 0.91)	
Crack use within the last year	1.09 (1.05, 1.13)		
Opiates use within the last year		1.15 (1.10, 1.20)	
Health Region **(ref= Toronto Central)**			
Erie St. Clair	0.21 (0.19, 0.22)	1.45 (1.37, 1.53)	0.31 (0.30, 0.33)
South West	0.15 (0.14, 0.16)	0.90 (0.86, 0.94)	0.32 (0.30, 0.34)
Waterloo Wellington	0.23 (0.22, 0.24)	0.50 (0.48, 0.52)	0.27 (0.26, 0.28)
Hamilton Niagara Haldimand Brant	0.32 (0.30, 0.33)	1.64 (1.57, 1.72)	0.47 (0.45, 0.50)
Central West	0.05 (0.05, 0.05)	0.78 (0.73, 0.83)	0.18 (0.17, 0.19)
Mississauga Halton	0.13 (0.13, 0.14)	0.22 (0.21, 0.24)	0.11 (0.10, 0.11)
Central	0.17 (0.16, 0.18)	0.54 (0.51, 0.57)	0.17 (0.16, 0.18)
Central East	0.22 (0.21, 0.23)	1.37 (1.30, 1.43)	0.31 (0.30, 0.33)
South East	0.41 (0.39, 0.44)	0.72 (0.67, 0.76)	0.36 (0.33, 0.38)
Champlain	0.29 (0.28, 0.31)	0.77 (0.74, 0.80)	0.30 (0.28, 0.31)
North Simcoe Muskoka	0.11 (0.10, 0.11)	0.55 (0.52, 0.59)	0.13 (0.12, 0.14)
North East	0.37 (0.35, 0.40)	4.66 (4.36, 4.97)	1.95 (1.80, 2.13)
North West	0.45 (0.41, 0.49)	6.12 (5.52, 6.79)	1.37 (1.23, 1.53)

[3] PSS score of 3 or more, indicative of hallucinations and delusions

[4] SCI score of 3 or more, indicative of inability to care for self due to psychiatric symptoms

3.4 Discussion

This study identified differences in the characteristics of psychiatric inpatients in Ontario who reside in areas of high marginalization. The sample was consistent with what is expected in inpatient psychiatric settings, where persons are commonly experiencing severe psychiatric symptoms including hallucinations and psychosis, have little to no insight into their own mental health status, and are often admitted due to risk of harm to themselves. Most importantly, this study showed that the majority of psychiatric inpatients in this study period resided in areas grouped as the most marginalized, further confirming research linking the associations between socioeconomic deprivation, mental health need, and higher levels of psychiatric hospital utilization (Allen et al., 2014; Curtis et al., 2006; Donisi et al., 2013; Lund et al., 2011).

The results provide support that the symptomology of mental illness differs among groups experiencing various levels of marginalization at the contextual level. Evidence from this study suggests that persons in the least marginalized areas tend to have conditions that are consistent with internalizing symptoms or behaviours, as shown by their higher rates of self-harm and depressive symptoms. They also used alcohol at a higher rate, which could be a coping mechanism to deal with their psychiatric symptoms (Sterling, Chi, & Hinman, 2011). On the other hand, persons in the most marginalized groups posed a greater threat and danger to others and had higher involvement with the criminal system. Perhaps the higher rates of lack of social support among these marginalized groups found by this study may be contributing to the differences in these behaviours. For instance, these persons may lack trusted companions that can recognize symptoms early and ensure they receive appropriate treatments before these escalate into more serious psychiatric episodes (Molarius et al., 2009). Furthermore, persons residing in marginalized areas in this study had higher rates of illicit drug use, which are known to exacerbate psychotic

symptoms (Sterling et al., 2011), further explaining this group's higher rates of positive psychiatric symptoms (i.e., hallucinations and delusions), where aggression is likely related to the nature of the psychosis the person is experiencing (Molarius et al., 2009).

This study also highlights that the interplay between adverse individual and contextual circumstances may be cyclical. The results across the three logistic regression models offer evidence that persons that live in these highly marginalized areas also experience greater social isolation (i.e., lack partners, confidants, overall social support), lack resources necessary to sustain themselves (i.e., education and employment), and deal with the most severe mental illnesses (e.g., schizophrenia, psychotic symptoms). At the same time, highly marginalized areas are composed of higher family and housing instability, decreased opportunities for employment, and economic deprivation. This creates conditions of adversity, where any gains made in hospitals are put at risk when persons are discharged to places that may hinder psychiatric recovery. This further creates a greater need and utilization of psychiatric services; as demonstrated by previous research showing that residential instability increases unmet health care needs and emergency department utilization among homeless and vulnerably housed persons in Ontario (Jaworsky et al., 2016). Furthermore, there were two variables in the material deprivation models that decreased the odds of residing in these areas: "lacking capacity for decision making" and "having family and friends that are overwhelmed by the person's illness." This finding may be indicative of persons who possibly have complex physical needs, developmental disabilities, or geriatric patients with dementia.

Multiple theories exist to understand the impact of social inequalities; Structuration Theory by Anthony Giddens provides a framework for understanding the interaction between personal practices and social systems (Giddens, 1984). Within Structuration Theory, individuals create the social systems and the structural order (virtual rules) of these systems, through their social

interactions in locales (i.e., homes, schools, neighbourhoods) (Øversveen et al., 2017). As such, inequalities in health must be conceptualized in relation to the institutions and policies, as well as of neighborhoods and cities, and social conditions that determine health related resources (Metzl & Hansen, 2014). Studying the effects of areas make it possible to address if health resources and health policy are influencing health inequality (Øversveen et al., 2017). Since the Toronto Central LHIN is the health region of Ontario with the highest density of services and resources, this part of the analysis helped determine if the system is responding to need. In fact, this study found that the likelihood of residing in areas s with high residential instability are higher for those receiving treatment in the Toronto Central health region. This supports findings from prior research suggesting that the effects of mental illness drive persons with need to become concentrated in deprived, service-rich, inner-city areas (Rukmana, 2011). However, further research is needed to explore the contexts within and between each health region given that funding and administration of health services are unique in each region.

When exploring only areas with high material deprivation, it became apparent that persons were at highest risk in health regions located in the most remote and northern regions of Ontario. This finding indicates that persons in these regions may have stable residence but are experiencing greater material deprivation at the contextual level. Since this finding was not consistent for residential instability or the total marginalization models, it may not be advisable to combine the different marginalization domains as doing so may mask some of these differences when measured at the geographical level. The fact that northern communities are more rural poses different challenges that mediate these relations. For instance, persons in rural communities in Canada have significantly less access to health care, require transportation to access basic necessities, and have less education and more unemployment compared to persons in urban areas (Lammam &

MacIntyre, 2016). This is particularly important given research has identified that the root causes of persistent poverty in Canada include having a physical or mental disability, being part of a lone-parent family, and having less than a high school education (Lammam & MacIntyre, 2016).

Studying individual level characteristics of psychiatric inpatients and their relation to contextual level measures of areas of residence may allow for the identification of mental health need, inform the planning for services, and find upstream solutions to these mental health problems. Understanding the context of where a person lives may help ensure that services and programs are available to those who need it most, and reduce inequities through appropriate targeted care (Diaz-Granados, Georgiades, & Boyle, 2010). This study's findings support that interventions should focus on psychosocial services. These services include psychoeducation, social skills training, arts, occupational, exercise therapies, multi-disciplinary team-based psychiatric community care, case management, vocational rehabilitation, participation in labour force, and residential care interventions. These types of interventions are effective at addressing social issues to provide a supportive environment conducive of the recovery for individuals with mental health needs (Gühne, Weinmann, Arnold, Becker, & Riedel-Heller, 2015). Additionally, health regions can use the information provided by this study to advocate for relevant social services that pertain to their region's needs. For example, evidence presented in this study suggests that Toronto Central LHIN may benefit from more options for affordable housing, while the northern health regions may benefit more from options for employment and education opportunities.

By modeling the social context, this study supports the notion that mental illness may be a symptom of societies as much as it is result of individual circumstance. This highlights a need to create social contexts that enable and support opportunities for improved mental health. Solutions

must go beyond upscaling services to target illness at the individual level, but most important, continue advocating for the human rights of the mentally ill (Lund et al., 2011; Patel et al., 2011). For instance, an expansion of the role and funding for grassroots communities that focus on mental health supports and services may help meet this challenge (Campbell & Burgess, 2012). This analysis helps narrow the gap between social and health policy by reinforcing the evidence linking social context and mental health. As such, policy efforts should consider increasing the mental health literacy of communities and building neighbourhoods that support mental health well-being. This entails generating and distributing knowledge for resources and treatments, encouraging and developing the skills of the average citizen to help support mental health conditions in the workplace, schools, and community at large (Jorm, 2012). It also highlights the importance of social determinants of health in determining individual and population health (Allen et al., 2014); as such it is important to invest in poverty reduction, adequate housing, employment, social support and increasing opportunities for all members of society regardless of their mental health status or addictions issues.

The results from this study are informative for the conceptualization of an individual level measure of marginalization. Many of the variables related to the odds of residing in a marginalized are consistent with factors identified in the literature. For example, this study highlights that in the inpatient psychiatric context, variables measuring social support such as "not having a support person for discharge" and "not having email, telephone, or visits from social relations in past month" also play an important role in determining the likelihood of residing in areas of high marginalization, residential instability and material deprivation. These variables, and others, are important to consider in measuring risk of marginalization at the individual level.

3.4.1 Limitations

Although the clinical data available were extensive, no data were available across other variables that may have been important to consider such as racial/ethnic groups, or income level. In addition, data for the geographic unit (FSA) are only collected at time of admission and thus, it was not possible to assess if the areas of residence are the same areas patients are discharged to. Similarly, the cross-sectional nature of the study does not allow for addressing change over time or establish causality. There is a compatible version of the RAI-MH for community mental health, however the instrument is not yet implemented in Ontario at a wide scale. Such information would help in further establishing the relationship between a person's individual status and the contexts where the person resides once in the community in a longitudinal way.

Some of the findings, particularly related to high alcohol use rates among those living in the least marginalized areas, may be confounding data from a private mental health and addictions service that existed in the dataset. One organization that offers private, out-of-pocket, residential addictions treatment reports data to OMHRS. The catchment for this program is from across Canada (although only residents with an Ontario FSA were included in this study). High costs of these programs limit their access to persons with sufficient means, who are perhaps more likely to live in affluent neighbourhoods. Since the OMHRS data does not contain specific hospital identifiers, data from this organization were not excluded.

Given the data covers the years 2006 to 2016, there are considerations to be made for the generalizability of the older data. It is important to note that the approach of this study utilized individual level data to predict an aggregate score at the contextual level. Thus, there is a possibility that variabilities in the scores of smaller sub-regions within FSAs are masked when scores are aggregated. Even though smaller geographic units exist for the area index scores, the smallest

geographic unit available for OHMRS is the FSA. This presents a limitation known as the "ecological fallacy," where general information about an area may incorrectly characterize individuals (Piantadosi, Byar, & Green, 1988). It is recognized that this might be the case in this study; although general and aggregate terms are presented, living in a marginalized area does not necessarily mean each person in that area is experiencing marginalization. To address this limitation, the next chapter of this dissertation explores the development of a marginalization measure based on these individual level data.

3.4.2 Conclusion

The majority of persons admitted to inpatient psychiatry reside in the most marginalized areas of is Ontario. This study highlighted important differences in the way clinical symptoms and social challenges are presented among groups residing in areas with different levels of marginalization at the contextual level. The models suggest that individuals that reside in the most marginalized areas are also experiencing the most severe psychiatric illnesses, economic hardships, and most important, lack social support. The variation in these distributions suggests that perhaps contextual level factors such as residential instability and material deprivation of areas play an important role in limiting the person's recovery from their mental illnesses. This research supports that social and health policy should work in integrated ways, to help persons recover from their psychiatric episodes and ensure their communities foster mental health wellbeing.

Chapter 4 The Development and Validation of a Marginalization Index for Inpatient Psychiatry

4.0 Abstract

Purpose: Marginalization is a multidimensional social construct known to influence mental health. This study aims to create an index for screening marginalization based on a comprehensive assessment system currently used in inpatient psychiatry in Ontario.

Methods: Items that reflected the concept of marginalization were manually selected from the Resident Assessment Instrument-Mental Health (RAI-MH). Principal Component Analysis (PCA) and cluster analysis of these items was performed on a sample of 81,232 patients admitted into psychiatric care between January 1, 2011 and December 31, 2016 to identify dimensions being measured. Different weights and scoring methods were tested to assess convergent validity on multiple outcomes of marginalization. Receiver Operating Characteristic (ROC) curve analysis was utilized to determine optimal cut-offs for the index by modeling the likelihood being homeless.

Results: Based on literature and empirical findings, 65 items were identified as potential items for the development of a marginalization measure. PCA and cluster analysis results identified that 15 of these items measured 5 dimensions, which became the basis of the Marginalization Index (MI). ROC curve analysis for the most marginalized group, homeless individuals, identified an Area Under the Curve of 0.76 and an optimal cut-off of 5 on the MI. As scores on the MI increased the prevalence individuals who were homeless, frequent mental health service users, persons with a history of violence and police intervention, and persons with addictions issues also increased, further confirming the convergent validity of the index.

Conclusions: The MI is a valid measure of marginalization and is a strong predictor of risk of homelessness among psychiatric inpatients. MI increases the visibility of the marginalized in inpatient psychiatry and provides a resource that can be used for social and health policy, decision-support and evaluation.

4.1 Background

Marginalization is a product of unequal power relations between people and society, which result in lack of social participation and social protection for individuals (Sealey, 2015; Trudeau & McMorran, 2011). As such, marginalized persons are blocked out from systems that support social integration, including economic, political, social and cultural systems (Alakhunova et al., 2015; Trudeau & McMorran, 2011). The processes of marginalization are complex; for instance, certain demographics (i.e., income, education) combined with the local context (i.e., societal norms, value, cultural practices, policies, local economy) may increase or decrease the risk of experiencing marginalization (Ivanov et al., 2012). As a determinant of health, marginalized persons experience restricted access to health care because they lack the resources necessary to participate in community health partnerships; in turn generating inequalities in health (Lynam & Cowley, 2007; Marmot et al., 2008; World Health Organization, 2010). A growing body of literature has shown that adverse health effects are influenced through social processes and structural inequalities such as reduced opportunities for education and income (Collins & Hayes, 2010; Ludwig et al., 2012; Lund et al., 2010; Lund et al., 2011; Saxena et al., 2007).

Regarding the mental health context, it has been found that the prevalence of mental illnesses are highest in economically marginalized populations (Campion et al., 2013; Saxena et al., 2007). At the same time, marginalized persons experience numerous disadvantages because of unjust social structures, including: lack of employment, vocational skills and social support, difficulty accessing and maintaining adequate housing, and discrimination (Benbow, 2009; Csiernik et al., 2007). These societal challenges present barriers for accessing and utilizing health care services, which in turn negatively impacts the health, self-esteem, quality of life, and sense of self-worth of these individuals (Overton & Medina, 2008). For example, higher rates of mental

illness and use of psychiatric services are present among persons of low socio-economic status (SES) compared to those in high SES (Donisi et al., 2013; Kim et al., 2007; Mawani & Gilmour, 2010; Tischler, Rademeyer, & Vostanis, 2007). Homeless persons, in particular, report poorer physical health, more symptoms of serious mental illness, and are at greater risk of premature death (Montgomery et al., 2016), alcoholism and drug dependency (Fazel, Khosla, Doll, & Geddes, 2008), and incarceration (Greenberg & Rosenheck, 2008) compared to the general population. Recovery is often challenging for persons with mental illnesses experiencing marginalization; for instance, gains made in hospitals for homeless persons are put at risk when they are discharged to shelters, where overcrowding and exposures to high risk health behaviours such as alcohol and drug use, and the sex trade are prominent (Forchuk et al., 2006).

The measurement of marginalization is challenging due to its multidimensional nature, inconsistencies in the definitions, and the lack of standard data sources to measure this construct at the population level (Sealey, 2015). Broadly speaking, marginalization encompasses three main dimensions: an economic dimension referring to a lack of material resources, a social dimension referring to a lack of integration into family life and the community, and a personal dimension referring to a lack of self-worth (Mathieson et al., 2008). Empirical studies attempting to measure marginalization usually preselect some criteria that are known to increase the risk of social exclusion, and focus on studying the specific dimensions the data supports (C. Fitzpatrick & Engels, 2016). For example, lack of access to income, employment, housing, education, social support, agency, and feeling alienated are often found in marginalization measures, as these characteristics are known to limit a person's ability to participate in different societal aspects (Sealey, 2015). Various composite measures exist in the literature to assess different aspects of this concept. At the contextual level, these measures rely on data that have been collected for

different purposes, such as national population censuses and standardized surveys (Burchardt et al., 2002; Matheson et al., 2012a; Social Protection Committee, 2015). On the other hand, measures intended to be used at the individual level, specifically in mental health settings, are often lengthy, and thus lack utility for use in clinical settings (Huxley et al., 2012; Kawata & Revicki, 2008; McColl et al., 2001; Mezey et al., 2013; Secker et al., 2009).

The primary purpose of this study is to develop and validate a measure to screen for marginalization in inpatient psychiatry using standardized health assessment data. By utilizing a standardized assessment system mandated in several jurisdictions to assess recipients of inpatient mental health services, this study aims to develop a practical measure that will be easily incorporated as part of every day clinical practice. This research identifies items in the assessment, converts these into a risk index, and assesses its convergent validity by determining how the measure performs among groups known to experience marginalization. Lastly, this study assesses how this individual level measure relates to marginalization measured at the geographic level.

4.2 Methods

4.2.1 Assessment Instrument

The data are derived from the Resident Assessment Instrument- Mental Health (RAI-MH), which has been used to assess every person admitted to an inpatient psychiatric bed in Ontario, Canada since October 2005. The instrument contains over 300 items measuring socio-demographic information, referral information, service history, mental status, substance use, cognitive performance, behaviours and violence, interventions, as well as social, physical, financial, and vocational functioning (Hirdes et al., 2000). Psychiatric diagnostic information is based on the Diagnostic and Statistical Manual versions IV and V (DSM IV and V) as assigned by

the psychiatrist or physician overseeing the care of the person. Patient assessment is completed over a 3-day period by staff overseeing the care of the person using observation, interviews with patients and other key informants, and consultation with clinical staff (Hirdes et al., 2000). The inter-rater reliability of the RAI-MH is well established with an 83% average agreement for all items and an average weighted Kappa among all items of 0.70 (Hirdes et al., 2002; Hirdes et al., 2008). Items from the assessment can be combined into a number of subscales that measure different clinical and functional characteristics, such as the Aggressive Behaviour Scale (ABS) (Perlman & Hirdes, 2008), Depression Severity Index (DSI) (Perlman et al., 2013), Cognitive Performance Scale (CPS) (Jones et al., 2010), and the Social Withdrawal Scale (SWS) (Rios & Perlman, 2017).

4.2.2 Sample

The sample was drawn from the Ontario Mental Health Reporting System (OMHRS) of the Canadian Institute for Health Information (Canadian Institute for Health Information, 2013). The OMHRS contains RAI-MH data from every admission to an inpatient mental health bed across 82 units or hospitals in Ontario, Canada. The sample included 81,232 patients admitted between January 1, 2011, and December 31, 2016. Patients with short lengths of stay (less than 72 hours) were excluded, as these persons are not assessed with the complete RAI-MH. Descriptive characteristics of the sample can be found in Table 4.1.

4.2.3 Conceptualization

An inventory of potential RAI-MH items (i.e., demographics, service history, clinical status, social support) to measure marginalization was developed based on theoretical frameworks, domains identified in prior literature, and results from the first study (Chapter 3), which found

specific variables in this data that increased the risk of living in areas of high marginalization. A full list these 65 candidate variables is presented in Appendix C. Conceptually, this inventory focused on ensuring marginalization remained a multidimensional construct in this study. This included items measuring social aspects related to family life, and support; as well as personal characteristics related to material resources, and items that may influence an individual's self worth were included (Mathieson et al., 2008). Additionally, it was important that the items measured factors that were extrinsic to the individual, meaning that the person had little control over the issue or domain. In doing so, this study views indicators of marginalization as factors that are imposed on the individual rather than factors resulting solely from the individual's actions; it attempts to take the blame away from the person for his/her circumstances and maintain the view that marginalization is a consequence of multiple factors, done by someone or something outside of the individual's control (Silver & Miller, 2003).

4.2.4 Analyses

4.2.4.1 Multidimensionality

To identify viable dimensions being measured by the items selected, a Principal Component Analysis (PCA) was performed. PCA is an item reduction technique that assumes variance is shared, and thus, appropriate in the creation of multidimensional measures (Hatcher & O'Rourke, 2014). This technique is widely used in the development of multidimensional indexes, as it assumes that all the variance is common or shared versus Common Factor Analysis, where the model assumes variability among common and unique factors (Hatcher & O'Rourke, 2014). The principal axis method was employed to extract the components, as well as a varimax (orthogonal) rotation to determine the factor loading of each item onto each component. These specifications convert a set of observations of possibly correlated variables into a set of values of

linearly uncorrelated variables called principal components (Jolliffe, 2011). The first principal component accounts for the most variance in the data, and under the assumption that the components are uncorrelated (orthogonal rotation), each succeeding component has the highest variance possible (Jolliffe, 2011). Eigenvalues greater than 1, which measure the amount of variation in the total sample accounted for by each component, were used as criteria to retain and rotate components, and help determine the number of factors to be extracted (Jolliffe, 2011). The component loadings, or correlations between the original variables and the components were used to determine the underlying nature of each component. Items with loadings lower than 0.40 were removed and the analysis re-run until only items with at least 0.40 loading were represented in the final analysis (Hatcher & O'Rourke, 2014). Moreover, since all the variance is accounted for in PCA, the prior communality estimate for each variable was set to a value of one (1), and an unadjusted correlation matrix was used. This communality estimation represents the proportion of the variance of a variable that is shared with other variables in the analysis (Goldberg, 1997). These analyses were conducted in Statistical Analysis Software (SAS) version 9.4 using the PROC FACTOR statement.

In an effort to confirm the dimensions (components) identified by the PCA, a "cluster analysis" was conducted. This procedure clusters numeric variables starting with one big cluster of all the items, then splitting them into smaller clusters, until all clusters have an eigenvalue (variation explained) greater than 1 (Nelson, 2001). As a result, the variables in a cluster are correlated among themselves, and as uncorrelated as possible with variables in other clusters (Nelson, 2001). To serve as a confirmatory step, the grouping of clusters generated by this procedure were expected to be similar to the components generated by the PCA. This analysis was conducted using the PROC VARCLUS statement in SAS.

4.2.4.2 Scoring

Four different ways of scoring the index were examined: a simple sum of scores version, a weighted version using component loadings for each item as weights, a component score version, and a quintile version of the component score based on the distribution among the sample. Component scores are the scores for a given observation case (row) on each component (column); to compute these, the case's standardized (normalized) score on each variable is multiplied by the corresponding component loading of the variable for the given factor, and then the products are summed (Hatcher & O'Rourke, 2014). In addition, Pearson correlations were calculated to examine the relationship between the different versions of the index scores (Benesty, Chen, Huang, & Cohen, 2009).

4.2.4.3 Convergent Validity

A number of items were identified as outcomes of experiencing marginalization given prior literature has identified these groups as marginalized. Under this premise, it is expected that these groups would have higher marginalization scores. These criterion measures include: homeless individuals, frequent inpatient mental health service users, persons with a history of violence and police intervention, and persons with addictions issues. As such, the association of MI scores with these characteristics were assessed using the chi-square test where statistical significance was determined using P-value < 0.001.

4.2.4.4 Psychometric Properties

Receiver Operating Characteristic (ROC) curve analysis was employed to aid in the assessment of the accuracy and cut-off point selection of indices (Cook, 2007). This procedure plots sensitivity (false positives) on the vertical axis and 1-specificity (true positives) on the

horizontal axis of the ROC curve using the PROC LOGISTIC procedure in SAS for the outcome (Cook, 2007). In this study, homelessness was chosen as the key outcome given that the literature identifies homeless individuals as one of the most marginal groups of society (Kim et al., 2007; Social Exclusion Unit, 2004). In addition, the parameter estimates derived from the procedure were used to find the optimal cut-off point, where specificity and sensitivity are maximized using the formula "Youden's J = (sensitivity+ specific) – 1" (Ruopp, Perkins, Whitcomb, & Schisterman, 2008). The highest value of Youden's J corresponds to the point on the curve, where sensitivity and specificity is maximized (Ruopp et al., 2008). Lastly, univariate analyses using the PROC MEANS statement in SAS were used to report the mean, standard deviation, and 95% confidence intervals of the MI. These analyses assess how the sample performs among different groups stratified by gender, diagnoses, service history and clinical characteristics.

4.2.4.5 Comparison to Geographical Marginalization

To assess how the individual level index derived from this study relates to contextual level measures of marginalization, the data was linked to the Ontario Marginalization Index (ON-Marg) (Matheson et al., 2012b), a geographical index measuring multiple dimensions of marginalization using data from the Canadian Census. The index provides an ordinal scale from 1 (least) to 5 (most) marginalized based on the quintile distribution across geographic units (Matheson et al., 2012a). In building an operationalization of area level marginalization for this study, the domains of "residential instability" and "material deprivation" were chosen (Refer to Table 2.1 in Chapter 2 for a list of the variables that make up the ON-Marg Index). Additionally, a combined and dichotomized version of these measures was created where scores of 1, 2 or 3 in "residential instability," or "material deprivation," represented "low marginalization," while scores of 4 or 5 in either domain represented "high marginalization." Frequency analysis using Chi-square tests

was performed to assess the relationship between the individual level scores and ON-Marg index for both the quintiles and the dichotomized versions.

4.3 Results

4.3.1 Descriptive Statistics

Table 4.1 shows demographic, service history, and clinical characteristics of the sample. The majority of the sample were aged 25-44 years old and most had a mood disorder, schizophrenia, and/or substance use disorder. A quarter of the sample had a concurrent substance use disorder in addition to their primary mental health diagnosis. Furthermore, 78% have limited or no insight into their own mental health, about half were admitted due to being a danger to themselves, and 17% were admitted involuntarily. A small percentage of the patients in the sample are considered to be high mental health service users, with 3% having three or more admissions in the past two years, and 4% having six or more admission in their lifetime. Approximately 3% of the sample were homeless at the time of admission. Lastly, about a third had been involved with the police or had a history of violence, and about a quarter had a presence of behavioural indicators of potential substance-related addiction in the last 3 months.

Table 4.1 Demographic, service history, and clinical characteristics of the sample (N=81,232)

	Total Sample	
	%	N
Age (years)		
< 18	2.6	2100
18-24	17.9	14564
25-44	32.0	25990
45-64	31.5	25544
65+	16.0	13034
Female	48.8	39650
DSM-IV Diagnostic Categories		
Mood	53.6	43522
Schizophrenia and other psychotic disorders	26.3	21345
Neurocognitive[5]	8.4	6786
Anxiety	15.9	12939
Substance Use	26.7	21719
Secondary Substance Use Diagnosis	25.6	20778
Multiple Diagnoses	5.8	4677
Reason for Admission:		
Threat or danger to self	49.5	40193
Threat or danger to others	17.8	14450
Involuntary admission	16.5	13431
Limited or no insight into his/her mental health	78.1	63418
Items used for Index Validation		
Homeless	3.4	2776
Receives Government Assistance	50.7	41182
History of Violence	27.7	22466
Police Intervention	31.9	25945
Substance-related Addictions	25.6	20816
Excessive Alcohol Consumption	15.7	12717
Drug Use	30.3	24644
3+ Admissions over the last 2 years	2.9	2364
6+ Admissions over lifetime	3.9	3158

[5] Delirium, dementia and amnestic and other cognitive disorders

4.3.2 Items

Table 4.2 shows the description of the items that remained in the final version of the Marginalization Index after multiple iterations of PCA; where only items with at least 0.40 component loadings were represented in the final analysis. A full list of the candidate items that were considered from the RAI-MH in the development of the index can be found in Appendix C.

Table 4.2 Marginalization index item description

Item	Description
Lived Alone	Lived alone at the time of admission
Residential Instability	Prior to admission, most recent residence was temporary (e.g. shelter)
Up to grade 11 education	Measures highest level of education achieved (includes: No schooling, unknown, 8-grades or less, 9-11 grades)
Unemployed	Measures employment status (includes: unemployed, seeking employment; unemployed, NOT seeking employment; and persistent unemployment or fluctuating work history over the last 2 years)
Trade offs	During the last month, because of limited funds, made trade-offs to purchase any of the following: prescribed medications, sufficient home heat, necessary health care, adequate food
No confidant	Reports not having a confidant
Severed relationships	Measures life events (stressors) includes: conflict-laden or severed relationship, including divorce
Victim of a crime	Measures life events (stressors) includes: victim of a crime (e.g. robbery). Excludes assault.
Sexual, physical, emotional abuse	Measures life events (stressors) includes: victim of sexual assault/abuse, or victim of physical assault/abuse, or victim of emotional abuse
Abused family	Any history of physical/emotional/sexual assault experienced by family members
Fears others	Fear of family member, friend, caregiver or staff
Dysfunctional family	Belief that relationship(s) with immediate family members is disturbed or dysfunctional
Overwhelmed family	Family/close friends report feeling overwhelmed by person's illness
No contact in the past month	Visit by long-lasting social relation/family member last occurred more than 1 month ago, or Telephone or email contact with long-lasting social relation/family member last occurred more than 1 month ago
No support for discharge	Does not have a support person who is positive towards discharge/maintaining residence in the community

A simple sum of these items was used to create a summary Marginalization Index score. Figure 4.1 shows the sample distributions of each of the items by the different scores in to summary Marginalization Index. The distributions have been arranged in such a way that the most frequent items among the sample are on the left and the least on the right. Thus, the items on the left "unemployed," "severed relationships," and "dysfunctional family" are more common among the sample than items on the right "no contact in the last month", "victim of a crime" or "fearing other persons." As a composite measure, the items on right hand side tend to be the items that are putting persons at the higher end of marginalization scores according to this measure.

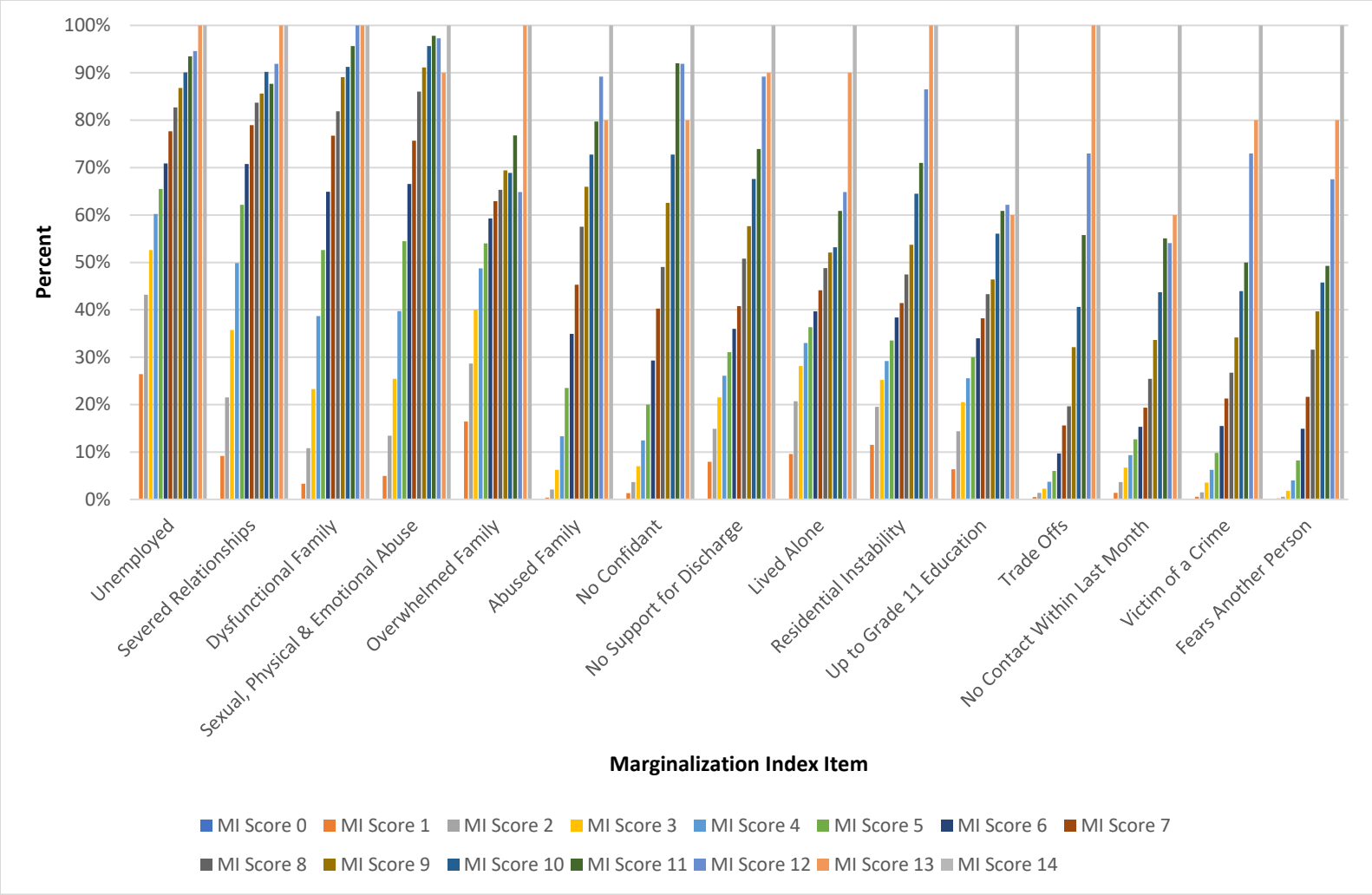

Figure 4.1 Sample distributions of each item by score in the marginalization index (N=81,232)

4.3.3 Components

The Principal Component Analysis of the 15-items showed that five components had eigenvalues greater than 1.00. The scree test also suggested that only 5 components were meaningful. As such, these components were retained for rotation, items and their corresponding component loadings are presented in Table 4.3. Based on these criteria, four items were found to load on the first component, to describe "Victimization", four items were found to load on the second component to describe "Lack of Social Support", three items loaded on the third component describe "Isolation", two items were found to load on the fourth component to describe "Lack of Resources," and lastly, two items loaded on the fifth component to describe "Deprivation." The communality estimates for each item indicate the proportion of variation in that item explained by the five factors combined. As such, the highest variation explained by the factor model was found for the item measuring "trade offs" at 65%.

Similarly, the cluster analysis summary presented in Table 4.4 resulted in five groupings of items, identical to the PCA results. The variation explained by these clusters includes contributions from only the variables in that cluster rather than from all variables, as in the component analysis. The consistency between the identified clusters and components from PCA confirm the multi-dimensionality of the items for the index.

Table 4.3 Rotated factor pattern and final communality estimates from principal component analysis of the marginalization index

Item	Victimization	Social Support	Isolation	Resources	Deprivation	Explained Variance*
Sexual, Physical & Emotional Abuse	0.78					0.63
Abused Family	0.77					0.60
Fears Another Person	0.54					0.31
Victim of a Crime	0.49					0.25
Dysfunctional Family		0.73				0.58
Severed Relationships		0.68				0.40
No Confidant		0.52				0.39
Overwhelmed Family		0.41				0.58
Lived Alone			0.70			0.55
No Contact Within Last Month			0.56			0.33
No Support for Discharge			0.43			0.40
Up to Grade 11 Education				0.73		0.60
Unemployed				0.58		0.39
Residential Instability					0.80	0.60
Trade Offs					0.50	0.65

Note. *Explained variance: based on communality estimate (h^2), interpreted as a percentage

Table 4.4 Cluster analysis groupings

Cluster	Variation Explained	Proportion Explained	Item	R-squared with Own Cluster
1	1.82	0.46		
			Victim of Crime	0.24
			Sexual, Physical & Emotional Abuse	0.62
			Abused Family	0.62
			Fears Another Person	0.34
2	1.23	0.41		
			Lived alone	0.28
			No contact within Last Month	0.42
			No Support for Discharge	0.52
3	1.53	0.38		
			No confidant	0.29
			Severed Relationships	0.31
			Dysfunctional Family	0.60
			Overwhelmed Family	0.32
4	1.06	0.53		
			Residential Instability	0.53
			Trade Offs	0.53
5	1.09	0.54		
			Up to grade 11 education	0.54
			Unemployed	0.54

4.3.4 Scoring

Descriptive statistics of the Component Scores showed this version of the index having a mean of 0.00, standard deviation of 2.24, and a range (-3.55 to 14.16). These component scores were also converted into an ordinal scale ranging from 1 to 5, the mean was 3 and the standard deviation was 1.41, with each quintile containing 20% of the sample (n=16,246) representing the degree of marginalization relative to the other groups. Factor Based Scores, which used the component loadings as weights, ranged from 0 to 8.52, with a mean of 2.19 and standard deviation of 1.33. Lastly, the Summed Scores version of the index had a mean of 3.47 and standard deviation of 2.06, and a range of 0 to 14. Table 4.5 shows the correlation matrix between the different versions of the scales, and demonstrates that all the versions are highly correlated, especially the summed version and the factor based scores (weights).

Table 4.5 Correlation matrix for different scoring methods of the marginalization index

	Summed	**Factor Based Score**	**Component Score**	**Component Quintile**
Summed	1			
Factor Based Score	0.99	1		
Component Score	0.91	0.89	1	
Component Quintile	0.86	0.84	0.90	1

Given the high correlations between the different ways of scoring, it was determined that the summed version of the index would have better utility for use across multiple jurisdictions as part of the RAI-MH. As opposed to the other scoring methods which require weights and are sample dependent. Figure 4.2 shows the distribution of final Marginalization Index (summed scores). The figure shows a negatively skewed distribution, where 44.1% of the sample scored 4 or more, while 27.8% scoring 5 or more.

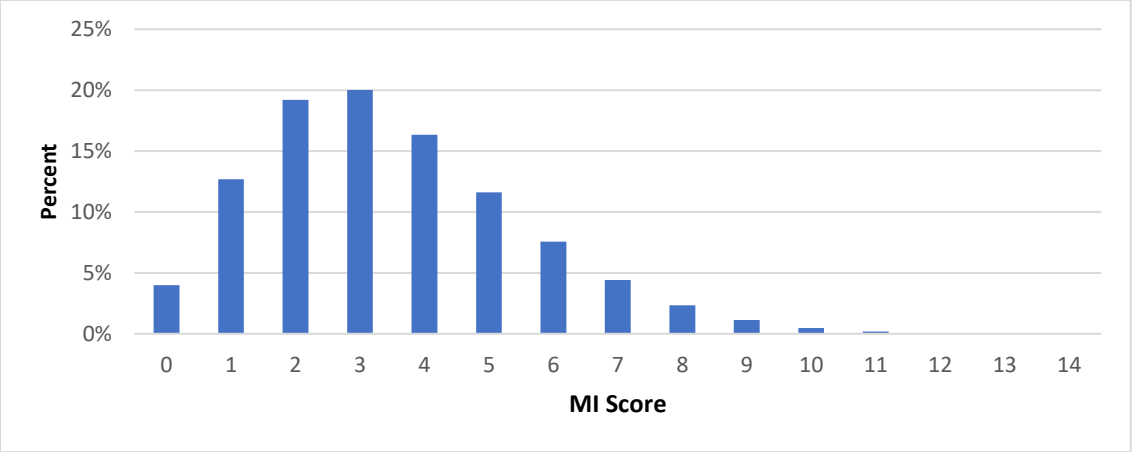

Figure 4.2 Marginalization index distribution (N=81,232)

4.3.5 Convergent Validity

Figure 4.3 to 4.7 show the index performance using the summed version of the MI among the variables that were determined to be outcomes of marginalization. Overall, these figures illustrate statistical significant positive relationships based on Chi-square tests (P< 0.0001) between the marginalization outcome and the MI score. Given the low distributions of response among high scores, MI scores of 11 to 14 have been collapsed into the score of 10 resulting in 576 persons scoring 10+.

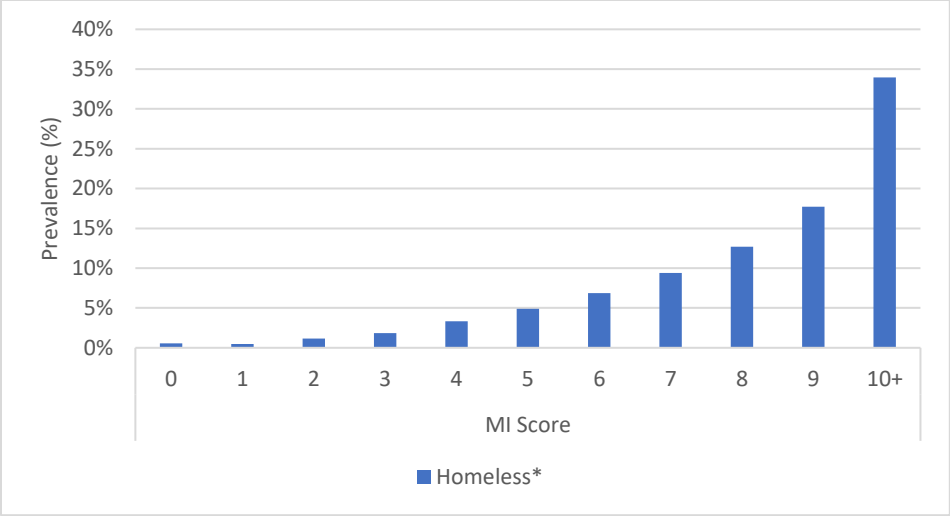

Figure 4.3 Prevalence of homelessness by marginalization index score (N=81,232)

Note. ***** Homeless X^2 (DF)= 3608.2 (14) p <0.0001

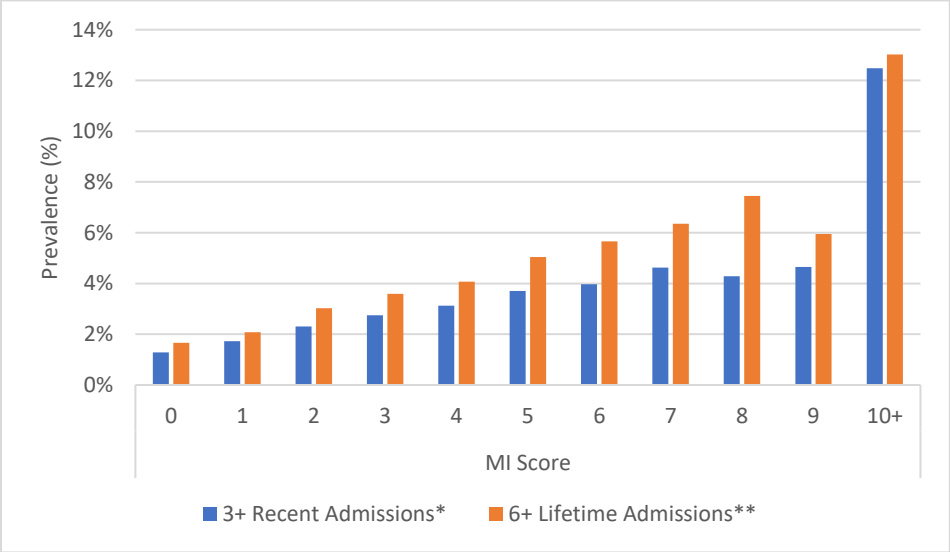

Figure 4.4 Prevalence of prior admissions to inpatient psychiatry by marginalization index score (N=81,232)

Note. *3+ Recent Admissions X^2 (DF)= 265.3 (14) p<0.0001; **6+ Lifetime Admissions X^2 (DF)= 428.0 (14) p<0.0001

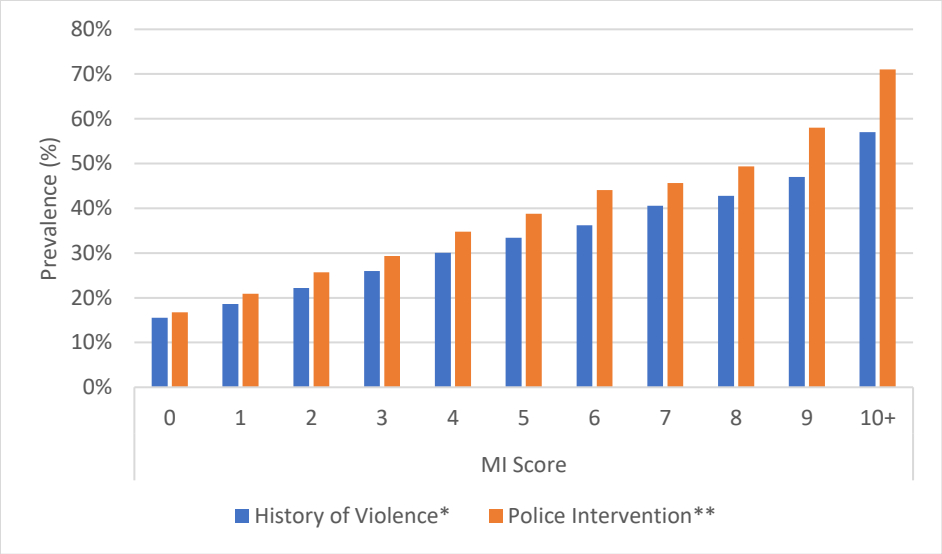

Figure 4.5 Prevalence of criminal behaviour by marginalization index scores (N=81,232)

Note. * History of Violence X^2 (DF)= 2181.4 (14) p<0.0001; **Police Intervention X^2 (DF)= 3082.7(14) p<0.0001

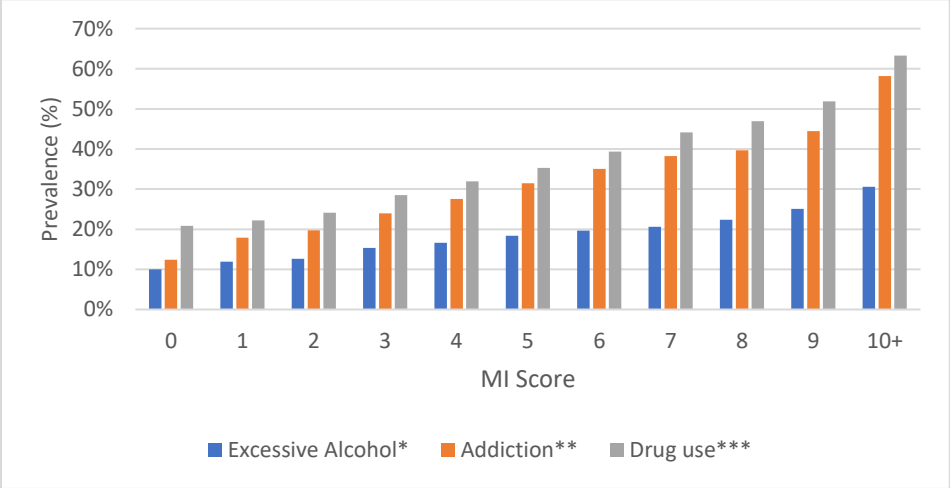

Figure 4.6 Prevalence of substance use and related addictions by marginalization index scores (N=81,232)

Note. *Excessive Alcohol X^2 (DF)= 686.3 (14) p<0.0001; ** Addiction X^2 (DF)= 2258.7 (14) p<0.0001; ***Drug Use X^2 (DF)= 2164.7 (14) p<0.0001

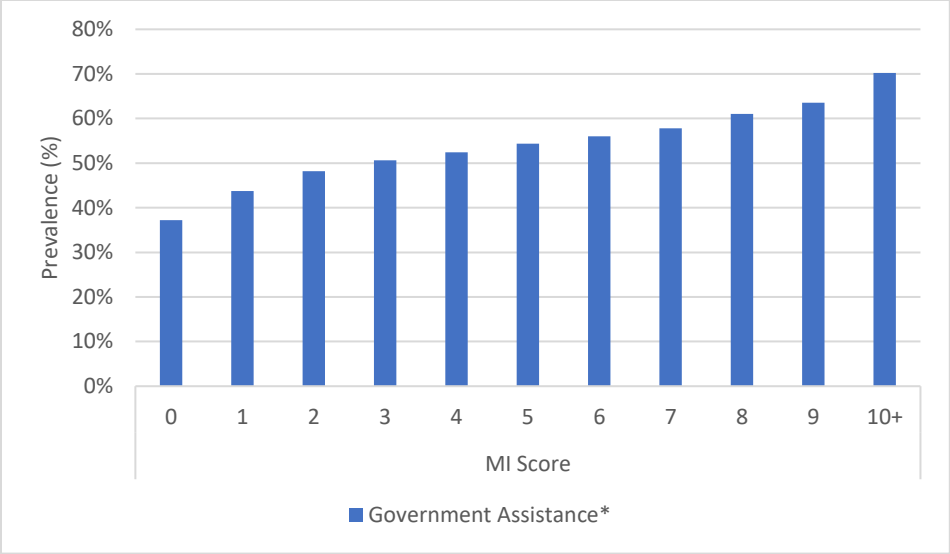

Figure 4.7 Prevalence of government assistance by marginalization index scores (N=81,232)

Note. *Government Assistance X^2 (DF)= 870.1 (14) p<0.0001

Convergent validity results for the other scoring methods demonstrated that each scoring method led to consistent results. For instance, Figure 4.8 illustrates the same positive relationship between the Component Score quintile version of the MI and the outcomes of marginalization. This trend holds true for persons who are homeless, high mental health service users, have substance-related addictions, and are involved in criminal system. For example, 60% of homeless individuals in the sample scored in quintile 5 on the MI (the most marginalized); while 21.5% of homeless are in quintile 4, 10.2% in quintile 3, 5.3% in quintile 2, and 3.0% in quintile 1. Further confirming the convergent validity of the index.

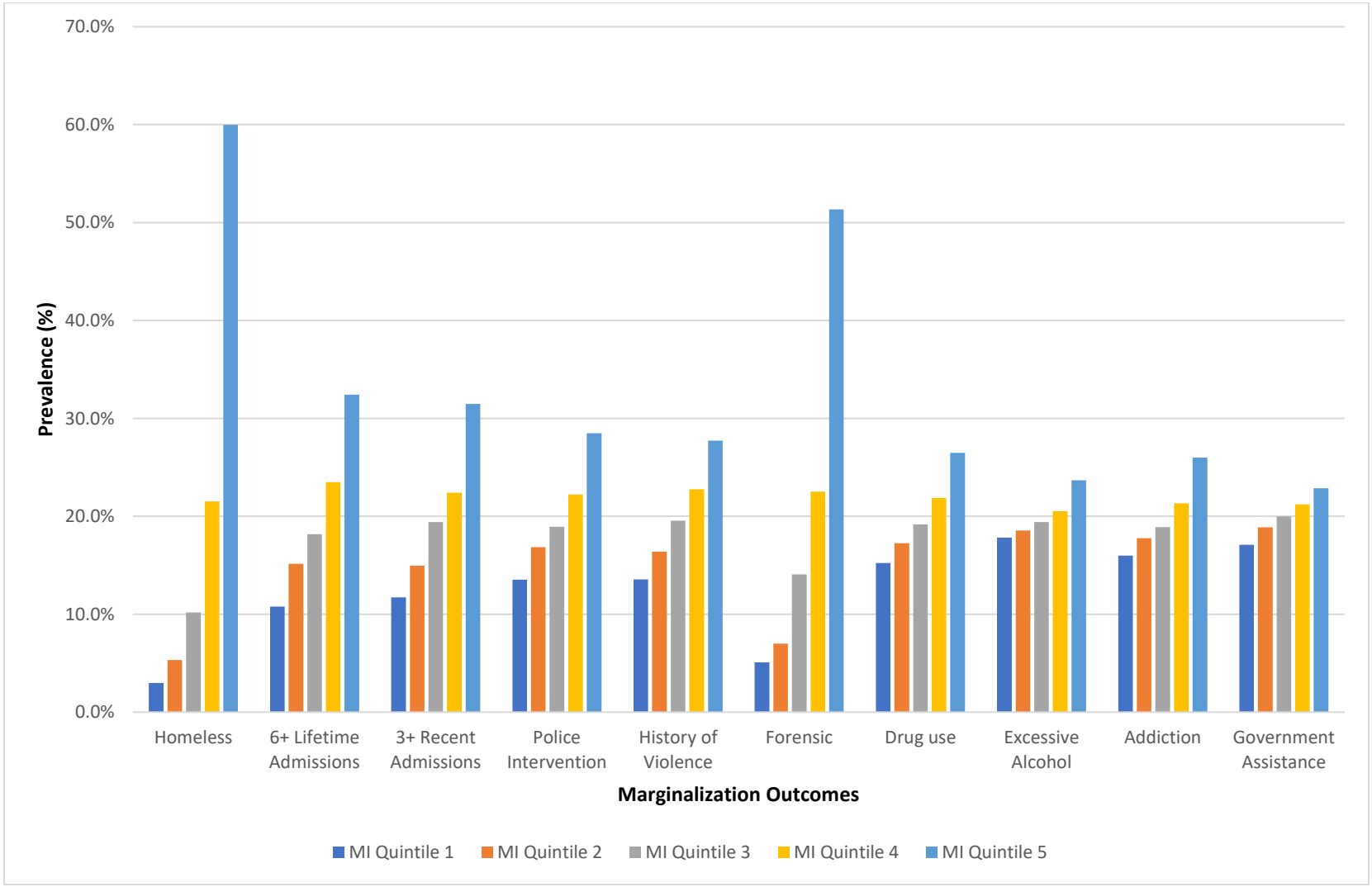

Figure 4.8 MI component scores quintiles by outcomes of marginalization (N=81,232)

4.3.6 Cut-Off Scores

Figure 4.9 illustrates the ROC curve predicting "homelessness" based on the summed and weighted versions of the MI. The Area Under the Curve (AUC) for the summed MI scores was 0.76, indicating that the summed MI score is able to distinguish between homeless and non-homeless individuals; similar results were found for the "weighted" MI score at 0.75. In applied psychology and prediction of future behaviour, AUC values of 0.70 and higher are considered strong effects (Rice & Harris, 2005). Each point on the ROC curve represents a sensitivity/specificity pair corresponding to a decision threshold of the marginalization index scores. Youden's J statistic indicated that the point at which specificity and sensitivity is maximized corresponds to a summed MI Score of 5.

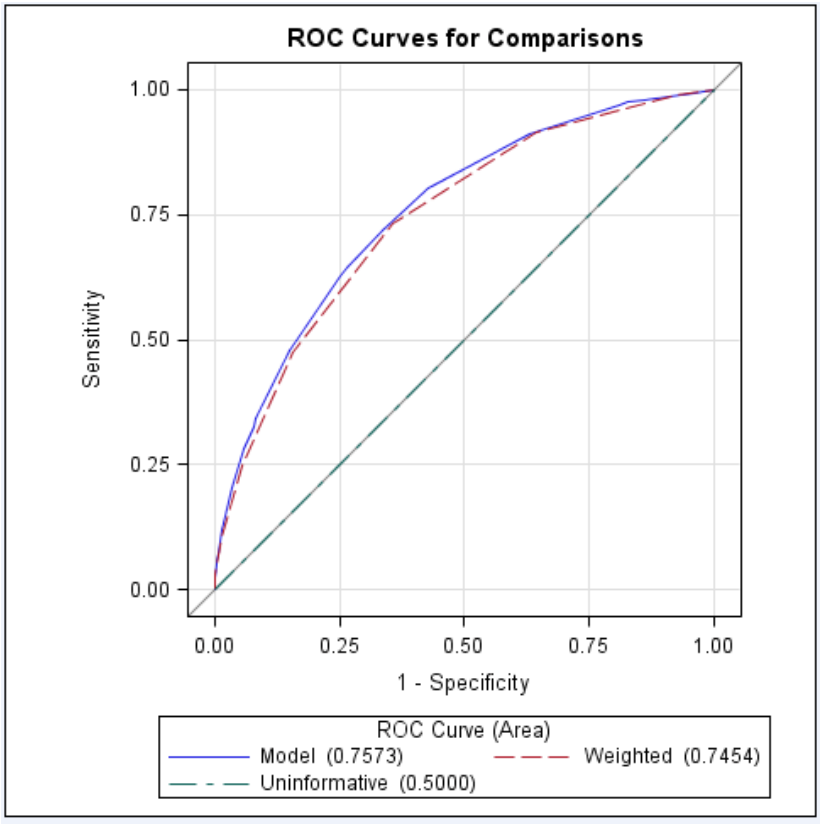

Figure 4.9 Receiver operating characteristic curve of the outcome of "homelessness" as predicted by the summed and weighted MI scores

Note. "Model" indicates MI summed version scoring, "Weighted" indicates MI Factor Based Scoring using component loadings as weights.

Descriptive statistics of the summed MI scores across demographic, clinical, and service characteristics are presented in Table 4.6, sorted by mean in descending order. As per the negative skewed distribution, the means for the total sample was around 3.47. However, there are groups that show higher degrees of marginalization; compared to males, females show slightly higher mean scores. Among the diagnoses, substance use and concurrent (e.g. both mental health and substance use diagnoses) disorders show higher degrees of marginalization compared to other diagnoses. Similar to the convergent validity analysis, compared to other groups, homeless

individuals, forensic patients, and high service users show the highest degrees of marginalization in the sample.

Table 4.6 Marginalization index descriptive statistics among different groups (N=81,232)

	Marginalization Index Summed Score		
	N	**Mean (SD)**	**95% Confidence Intervals**
Homeless	2776	5.55 (2.35)	(5.46, 5.64)
Forensic Patient	1301	4.62 (2.11)	(4.51, 4.74)
6+ Lifetime Admissions	3158	4.20 (2.16)	(4.12, 4.27)
3+ Recent Admissions	2364	4.12 (2.17)	(4.03, 4.21)
Police Intervention	25945	4.06 (2.17)	(4.03, 4.08)
History of Violence	22466	4.02 (2.16)	(3.99, 4.04)
Concurrent	20778	3.96 (2.17)	(3.93, 3.99)
Substance	21719	3.94 (2.16)	(3.92, 3.97)
Danger to others	14450	3.67 (2.05)	(3.63, 3.70)
Multiple diagnoses	4677	3.71 (2.12)	(3.65, 3.77)
Threat to self	40193	3.58 (2.10)	(3.56, 3.60)
Little to no insight	63418	3.52 (2.05)	(3.50, 3.53)
Anxiety	12939	3.59 (2.13)	(3.56, 3.63)
Females	39650	3.53 (2.09)	(3.51, 3.55)
Schizophrenia	21345	3.45 (2.02)	(3.43, 3.48)
Total Sample	81232	3.47 (2.06)	(3.46, 3.49)
Males	41582	3.42 (2.03)	(3.40, 3.44)
Mood	43522	3.43 (2.08)	(3.41, 3.45)

4.3.7 Relation to Geographical Marginalization

Figure 4.10 illustrates the relationship between the individual level measure created in this study, and area-level marginalization as measured by the Ontario Marginalization Index. The graph presents two trends; first, the percentage of people living in the least marginalized areas of Ontario decrease as MI Score increases. Second, the percentage of living in the most marginalized areas increase as MI score increases. Additional figures are presented in Appendix D to illustrate the relationship between individual level marginalization and the quintile versions of ON-Marg, where each score contains 20% of the geographic units of Ontario. These figures also show a

negative relation between MI score and area marginalization Quintiles 1, 2 and 3, and a positive relationship between MI scores and area marginalization Quintiles 4 and 5.

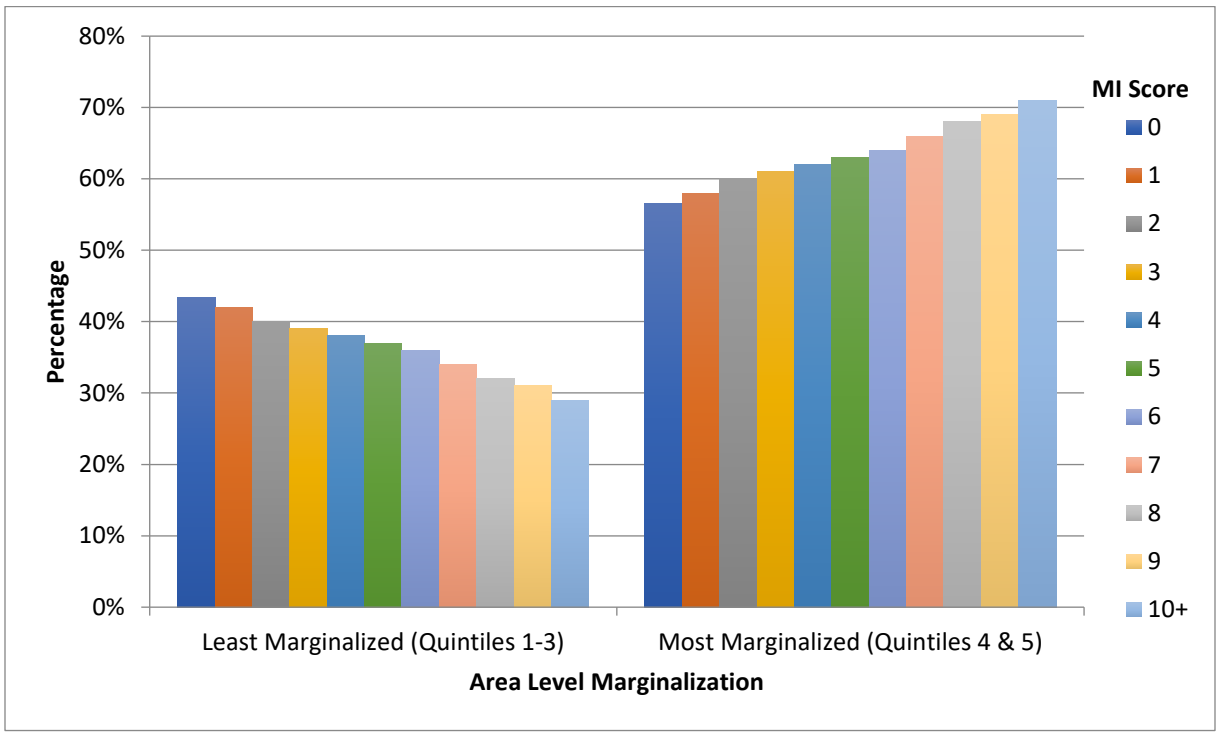

Figure 4.10 Relationship between MI scores and degree of area-level marginalization (N=81,232)

Note. Area Level Marginalization X^2 (DF)= 247.6 (14) <0.0001

4.4 Discussion

This study derived an index to measure the construct of marginalization in inpatient psychiatry. The selection of items was based on a conceptualization that took into account the theoretical definitions of marginalization, research identifying highly marginalized persons, and measures that have been used in its assessment at the geographic level. Including these different layers allowed the measure to remain multi-dimensional and ensure that the items selected captured the idea of how society treats the person, conditions that individuals have little control over, as well as risk factors and consequences of experiencing marginalization. As such, this study contributes to the body of literature in this topic by explicitly describing a conceptualization that others may be able to use in studying this social construct.

The five components identified by PCA and the cluster analysis are consistent with what others have measured to address concepts related to marginalization, such as material deprivation, residential instability, and lack of social support (Matheson et al., 2012a; Social Protection Committee, 2015). Thus, the results of the present research demonstrate multidimensionality of this social construct (e.g., victimization, lack of social support, isolation, lack of resources and deprivation). These dimensions are consistent with models that attempt to describe marginalization as a combination of social, economic, and personal processes (Ivanov et al., 2012; Mathieson et al., 2008). The cyclical nature of marginalization, poverty, and mental health need (Social Exclusion Unit, 2004) is well reflected in this study's findings, as presented by the fact that those with the highest MI scores were also those with the highest mental health service use as measured by their excessive number of admissions to inpatient psychiatry. Similarly, the findings from this study also identified substance use and addictions as prevalent problems among the most marginalized populations, which aligns with previous research outlining substance use as a crucial

factor in the pathways of marginalization (Coumans & Spreen, 2003). As with virtually every measure of marginalization, this study also confirms the influence of the economic dimensions related to poverty, as shown by the positive relations presented between MI scores and geographical level material deprivation and prevalence of persons receiving government assistance in this study's sample.

Most available instruments to screen patients for risk of marginalization are impractically long for comprehensive assessment, lack meaningful cut-offs points for intervention, and lack construct validity (Huxley et al., 2012; Kawata & Revicki, 2008; McColl et al., 2001; Mezey et al., 2013; Secker et al., 2009). This presents major challenges for the mental health system in identifying marginalized persons. Moreover, the assessments reviewed are not compatible with assessment tools already in widespread use for assessment of psychiatric inpatients. On the other hand, a screener derived from a comprehensive assessment already used in every day practice has the potential to help health care institutions identify marginalization and flag risk of adverse social outcomes without requiring additional time and effort for assessment; this will allow timely implementation of interventions to support persons. For instance, these findings support the use of applications that already exist in these data such as the Clinical Assessment Protocol (CAPs), which have important implications for decision support in every day clinical practice. CAPs identify key health care issues, goals of care to support recovery, triggers that reduce risk or provide opportunities for improvement, and provide guidelines and resources to organize and prioritize services with the person (Hirdes et al., 2011). A number of existing CAPs could be used to address certain components of the MI. For example, the "victimization" component could be addressed using the Trauma CAP that provides guidelines for supporting persons who may be abuse victims. The Support Systems for Discharge CAP addresses issues related to "lack of social

support" or "isolation", such as promoting referral to social support groups or receiving help to reconnect with family and friends. The Personal Finances CAP or Education and Employment CAP may provide supports for persons who "lack of resources" or are experiencing "material deprivation". Additionally, the study findings that support the validity of the MI, could also provide a basis for potential interventions. For example, individuals with high MI scores tended to be forensic patients and have a history of violence and contact with the police. As such, prevention of criminal involvement could be a focus of interventions for these persons that should be explored further using the Criminal Activity CAP. The MI also presents an opportunity for new CAPs to be developed. In particular, the cut-off score of 5 may be a good indicator to develop a new CAP focused on housing with supports and could be used as a basis for referral to social assistance programs and supportive housing services.

Item distributions among the MI scores provided various insights into the nature of the items that make up the index. For instance, this analysis highlighted that the items that are putting individuals in the higher ends of the measure are items related to being a "victim of crime" and "fearing others." This speaks to the vulnerability to experiencing abuse for persons with mental illness (Benbow, 2009). On the other hand, as theory explains, contextual influences play an equally important role in the experience of marginalization; since the Canadian society benefits from less crime rates than other regions around the world (Dijk, Kesteren, & Smit, 2007), this observation might just be a product of the Canadian context. For future research, it will be worth investigating how these items are distributed in other societies such as in low and middle-income countries, where perhaps lacking social support may be less common and experiencing crime more common (Dijk et al., 2007). Additionally, "not receiving any contact in the form of visits, calls, or emails within the last month" and "having to make trade offs to purchase necessities" were also

less common items being triggered by persons at the very high end of the index score; thus, supporting the role of isolation and poverty in the experience of marginalization and mental illness (De Silva et al., 2005; Morgan et al., 2007). Perhaps these less common characteristics could be a starting point in risk reduction among this population. These items could be used to flag the high-risk patients to prioritize further assessment and target interventions that match these individuals' unique needs.

Developing different versions of scoring the MI allowed for the consideration of multiple ways of measurement. Item distributions and correlation analysis concluded that the four versions of the index were practically identical. As a result, it was decided that the summed version of the index would be the most appropriate for embedding into the larger assessment system of interRAI. Even though component scores and factor-based scores are also useful, they required more sophisticated statistical techniques and are sample dependent, which would add difficulty and reduce its utility in real-world practice. On the other hand, the summed version will not require additional algorithms to specify weights and would only require simple aggregation of data already collected. Nonetheless, using the component score quintile version of the index was an excellent way to assess convergent validity. In fact, the frequency analysis between the quintiles and the marginalization outcomes were more prominent than the other versions of the index at illustrating the relationship between them. Future research could focus on studying if this method of scoring changes drastically when used among different samples.

Distributions of the MI score for the sample were shown to be negatively skewed. Theoretically, this is what was expected, as marginalization should be the exception rather than the norm, and thus should only be experienced by a few. An important advantage of this distribution is that it serves well at identifying persons in greatest need. This is a crucial theme of

this entire dissertation in order to better serve those persons living in the margins. In systems where resources are limited, identifying those with greatest need may be required to provide the greatest benefit. As such, this tool may be used to aid processes for deciding admission criteria that may be required for programs addressing aspects of marginalization but that may have limited resources and capacity, such as supportive housing services. For example, a program choosing a MI score of 8 or more would make 4.2% or 3,412 persons eligible based on this sample; on the other hand, choosing a MI Scores of 5 or more would make 27.8% or 22,583 persons of this sample eligible.

From the sample distribution in Figure 4.2, it is somewhat clear that persons in the margins would be somewhere along the score of 4, 5 or 6. However, the ROC curve analysis and Youden's J statistic provided an empirical way to determine a cut-off point for maximal sensitivity and specificity, which identified a score of 5 as optimal. In addition, the ROC curve comparisons supported the notion of choosing the summed version of the index as it had a slightly better AUC than the weighted version of the index. Choosing and modeling homelessness as the primary outcome of marginalization made the most sense, as there is a general consensus that homeless individuals are highly vulnerable to marginalization (Kim et al., 2007; Montgomery et al., 2016). For the most part, items in the proposed index were distinct from this "homelessness outcome" with the exception of the item "residential instability." For this reason, a second ROC curve analysis was performed on an MI that excluded the item residential instability. In this case, there is minimal AUC drop to 0.72, and an optimal cut-off value equivalent to a MI score of 4. Additionally, it was found that 65.9% of homeless have residential instability, but only 8.7% of residentially instable are homeless. Therefore, it was decided that keeping residential instability as part of the index is crucial as it seems to be an important item that puts someone at a very high risk of marginalization.

As shown by the relationship between the MI and the ON Marg scores, when psychiatric inpatients are at risk of marginalization, they are also more likely to reside in areas of high marginalization. This finding is important in confirming that marginalization at the contextual and individual levels may influence each other. If these places do not foster recovery, then any progress made in hospital may be difficult to maintain when their living environment does not support mental wellness. Similarly, since marginalized persons often experience severe mental illness and are high users of inpatient psychiatric services (Social Exclusion Unit, 2004), this measure has the potential to be used in hospital discharge planning. Identifying these individuals early and providing appropriate supports may prevent them from experiencing the adverse social consequences often associated with marginalization such as homelessness, incarceration, and higher use of mental services (i.e., readmission, long inpatient stays).

Further, this work illustrates how use of clinical data may help inform social policy and programming at aggregate levels. For instance, measures of marginalization can contribute to the monitoring and assessment of policies and programs, which may serve as a benchmark for the effectiveness of policy in reducing poverty and inequality. This particular measure may draw attention to the diverse causes and consequences of marginalization, particularly in terms of poverty, access to resources, social participation and quality of life. Combined with other interRAI instruments, such measures allow for regional and global comparisons, trends over time, as well as the identification of disparities globally. Combined with contextual level measures, this measure enables the assessment of the actual processes of marginalization; which are known to be a product of both person level indicators combined with the local context (i.e., societal norms, value, cultural practices, policies, local economy) (Ivanov et al., 2012). As such, this measure provides another option to assess risk of adverse social outcomes and help inform changes in policies that address

these issues, such as guaranteed income, eradication of homelessness, and increasing supportive housing services (Forget, 2011; Government of Ontario, 2017).

4.4.1 Limitations

Further research is required in order to address some of the limitations of this study. For example, data were not available to measure some of the items that are included in other measures of marginalization, particularly across racial/ethnic groups or by income level. Similarly, data were not available to examine the reliability and validity of the MI on the interRAI Community Mental Health, an instrument used in the community that is compatible with the RAI-MH. As such data becomes available, it will be important to validate the MI within community settings to examine the sensitivity to change of the MI over time in the community. Further, interRAI assessments are used in different healthcare settings, such as home care, long-term care, child and youth mental health, complex continuing care, and acute care. Therefore, it will be important to assess if similar marginalization indexes can be created and used in these settings. As such, the performance of this index should be tested among other groups to capture a larger variation among persons with less severe mental health problems and distinct demographic characteristics than those in inpatient psychiatry.

The MI scores were different across distinct demographic, and diagnostic groups; these differences can be a starting point for further research into the risk factors and outcomes of marginalization. Additionally, it is recognized that marginalization cannot be fully captured in quantitative measures alone. Given the complexity of the concept of marginalization, its multidimensional nature including both objective and subjective elements, future research should incorporate qualitative evidence to maximize the effectiveness of these measures in policy and action at a systems level.

4.4.2 Conclusion

The index derived in this study measures a multi-dimensional construct experienced across individuals with mental health issues. It also highlights the importance of victimization, lack of social support, isolation, lack of resources, and deprivation in fostering the recovery of mental illness. These findings have important implications for mental health, social policy, and service delivery given that the MI will be able to serve as a concise instrument that is already embedded in a comprehensive assessment system. Since the RAI-MH is part of everyday practice in inpatient psychiatry, the index has the potential to be used for screening, clinical decision support, and research in these settings. For instance, it can be used to identify individuals who may benefit from interventions targeted at social engagement, addiction counselling, supportive housing, and socio-emotional support. Most importantly, the MI can identify persons at risk of adverse social outcomes (i.e., homelessness, criminal behaviour, high mental health service use, substance use and addiction) using a small number of items that could be implemented in a relatively straightforward manner. These persons would likely benefit from further assessment and extra care, with the goal of improving their quality of life and supporting them in the community after discharge from inpatient psychiatry.

Chapter 5 The Influence of System Structures on Psychiatric Readmissions for Persons Experiencing Marginalization

5.0 Abstract

Purpose: Individual risk factors for readmissions to inpatient mental health services have been extensively identified but there is limited evidence about risks associated with contextual variables. This study explores geographical patterns of readmissions, and the effect of hospitals, health regions, area level marginalization and proximity to supportive housing services on inpatient psychiatry readmissions.

Methods: Using data from the Ontario Mental Health Reporting System between 2006 and 2015, this study identified persons with mental health conditions experiencing marginalization and who are at a high risk of homelessness (N=37,852). The data were linked to the Ontario Marginalization Index to assess residential instability and material deprivation of areas of residence. Standardized readmission rates at different points in time were calculated and mapped using the Forward Sortation Area geographic unit. Proximity to supportive housing services were measured using a 20-km radius buffer in ArcGIS software. Multilevel mixed-effects models were then built to examine the impact of individual and contextual variables on readmissions to inpatient psychiatry.

Results: Readmission rates for this sample were 7.4% for short-term (within 30 days), 6.2% for the medium-term (31-90 days) and 13.1% for the long-term (91-365 days). While admissions to inpatient psychiatry occurred in 94% of Ontario's FSAs, short term readmission only occurred in 20% of FSAs, medium-term in 11% of FSAs, and long-term in 41% of FSAs. Intraclass Correlation Coefficients show that hospitals account for 3.8% of variance in readmissions within 30 days of discharge. Fixed effects β-parameter estimates of the models show that area level

marginalization and proximity to supportive housing services increased the logs odds of readmissions.

Conclusion: System structures influence readmissions in a variety of ways, while hospitals influence short-term readmission, area level marginalization have a stronger influence in long-term readmission. Differences in geographical patterns of readmission at different points in time, illustrate that these are a more common in urban areas and least common among readmissions occurring after a month and within 3 months of discharge. However, more research is needed for continuing to fully understand the contextual level influences on psychiatric readmissions.

5.1 Background

Persons with severe mental illnesses account for less than 2% of the population but require disproportionate amounts of health and social services to meet their complex needs (Lin et al., 2016). For instance, 89% of inpatient mental health care costs are accounted by the top 5% of high cost users (Rais et al., 2013). These individuals tend to live low income urban neighbourhoods (de Oliveira et al., 2016) and are particularly vulnerable to adverse social consequences such as homelessness (Kim et al., 2007). Furthermore, the vast majority of inpatient psychiatry hospitalizations in Ontario are for acute assessment and crisis stabilization (Vigod et al., 2013). Once discharged, to prevent further crises and the need to be readmitted to inpatient psychiatry, care and support are often required through outpatient and community programs (Lin et al., 2016; Vigod et al., 2015). For example, for persons with mental health conditions and experiencing homelessness, supportive housing services provide shelter, rent supplements, together with case management, and other professional mental health service supports. These services are associated with reduced utilization of health services such as unnecessary emergency department visits and extended hospitalizations, reductions in the severity of psychiatric symptoms, improved access to other services, and improved social ties (Greenwood et al., 2005; Gulcur et al., 2003; Rog, 2004). Since adequate community mental health services are known to prevent readmissions to inpatient psychiatric care, then as an indicator, readmission is a negative outcome from a clinical and public health perspective, indicative of poor continuity of services after discharge (Canadian Institute for Health Information, 2008). Readmissions rates are widely variable in the literature, ranging from 5% to 50% depending on the characteristics of the sample, and how readmissions are operationalized (Rumball-Smith & Hider, 2009). In inpatient psychiatry, it is estimated that 1 in 7

individuals hospitalized for mental health reasons are readmitted within 30 days of their discharge (OECD, 2013).

The most commonly applied theoretical framework to understand patterns of health service utilization is the "Behavioural Model of Health Service Use," which articulates that service use is influenced by both individual and contextual factors that predispose, enable and suggest need for health care (Andersen, 2008). This framework has been employed to study several areas of the health care system and various diseases; however, most research has focused on the individual level factors (Babitsch et al., 2012). For instance, research on psychiatric readmissions has commonly focused on identifying risk factors at the individual level in efforts to inform care planning (Gearing et al., 2009; Hendryx et al., 2003; Perlman et al., 2015; Vigod et al., 2015). These studies have identified prior hospitalizations, positive symptoms of psychoses, diagnoses such as bipolar, schizophrenia, and substance use, being at a risk of harm to self, and having an unplanned discharge as the strongest predictors of readmissions (Perlman et al., 2015; Vigod et al., 2015). In contrast, due to its complexity, research on contextual factors that influence mental health service use is limited with some seemingly contradictory findings. For example, both positive and negative associations between inpatient psychiatry readmissions, population density, and distance to services have been reported (Donisi et al., 2016; Kalseth et al., 2016). To address some aspects of this gap, the present analysis describes geographical patterns of readmissions to inpatient psychiatry among persons with mental illness at risk of experiencing homelessness. Additionally, this study determines the effect of systems structures like hospitals, health regions, and area-level marginalization, at explaining variance in readmissions at different points in time and assesses the influence of supportive housing service proximity on psychiatric readmissions.

5.2 Methods

5.2.1 Design and Data

This study employed a retrospective cross-sectional analysis of inpatient psychiatry data available from the Canadian Institute for Health Information (Canadian Institute for Health Information, 2013). The sample included 37,582 patients who were experiencing marginalization, had a high risk of homelessness, and admitted to an inpatient mental health bed between January 1, 2006, and December 31, 2015. The sample selection was based on the marginalization index (MI), which was developed and validated as part of this dissertation (refer to Chapter 4). Thus, only psychiatric inpatients who scored 5 or more on the MI were considered in this study. Patients with lengths of stay of less than 72 hours were excluded because they are not assessed with the complete RAI-MH assessment. Additionally, forensic patients were excluded from the dataset due to the system factors that determine access to care for this population.

5.2.1.1 Ontario Mental Health Reporting System (OMHRS)

The OMHRS is based on information from the Resident Assessment Instrument-Mental Health (RAI-MH). The RAI-MH was mandated in October 2005 by the Ontario Ministry of Health and Long-Term Care for use with each person admitted to an inpatient mental health bed (Perlman et al., 2013). The assessment is completed by trained clinical staff based on observation, interviews with the patient, key informants, and other clinical staff after 72 hours of hospital stay, at 90-days (if applicable), and at discharge (Hirdes et al., 2000). The RAI-MH has strong interrater reliability with an average agreement for all RAI-MH items of 83% and an average weighted kappa across items of 0.70 (Hirdes et al., 2002; Hirdes et al., 2008). The RAI-MH includes items that can be grouped into different categories including demographic information, diagnoses, referral

information, service history, mental status, substance use, cognitive performance, behaviours and violence, harm to self, interventions, social, financial, and vocational functioning (Hirdes et al., 2000). As well as a wealth of administrative information, including facility numbers, health regions, and patients' area of residence (Hirdes et al., 2010).

5.2.1.2 Ontario Marginalization Index

The Ontario Marginalization Index (ON-Marg) is a geographical index based on 18 different variables that measure multiple dimensions of marginalization using data from the Canadian Census. The index provides a continuous score for four different aspects of marginalization and can be converted into an ordinal scale from 1 (least) to 5 (most) based on the quintile distribution across geographic units (Matheson et al., 2012a).

5.2.1.3 Connex Ontario Data

ConnexOntario maintains a database of mental health and addictions service information, which is used for planning by healthcare professionals, and health system managers. The dataset includes information regarding organizations administering services in the province, including their location, and are categorized into 24 different types of services (ConnexOntario, 2013). For this project, only the location of service types related to housing were considered; these include: "support within housing," "rent supplement" and "brick and mortar" services. The decision to focus on supportive housing services was because the population of interest for this study are persons who are at risk of homelessness; naturally, these persons would be potential benefactors of the supportive housing services.

5.2.2 System Structures

5.2.2.1 Hospitals

The OMHRS includes data from every person admitted to an inpatient mental health bed across 82 distinct facilities/units in Ontario. These are situated in psychiatric wards in general hospitals, or in specialty psychiatric hospitals treatment centres.

5.2.2.2 Health Regions

The OMHRS also contains information regarding the health region where persons receive inpatient psychiatric services in. Ontario has 14 of these regions, called Local Health Integration Networks (LHINs), that plan, coordinate, integrate, fund, and manage local health services in the province, including: hospitals, community health centres, mental health and addiction agencies and support service agencies (Office of the Auditor General of Ontario, 2015).

5.2.2.3 Geographic Marginalization

As described in Chapter 2, OMHRS was linked to the ON-Marg index using a geographic unit knows as the Forward Sortation Area (FSA), which is composed of the first three digits of a Canadian postal code. For this study, area level marginalization was operationalized based on the average of the continuous ON-Marg score for the domains of "residential instability" and "material deprivation" and then converted into quintiles (Refer to Table 2.1 in Chapter 2 for a list of the variables that make up the ON-Marg Index). As a result, each person in the dataset was assigned an area-level marginalization score ranging from 1 to 5, based on their FSA. Under the Andersen Behaviour Model for Service Use, the ON-Marg index can be categorized as a predisposing factor of service use at the contextual level, given it helps measure social compositions of communities.

5.2.2.4 Proximity to Supportive Housing Services

Locations of supportive housing services from ConnexOntario were mapped using x and y coordinates in ArcGIS software. Using a buffer tool in ArcGIS, a 20-kilometre buffer radius from the centroid of each FSA was used to determine whether an FSA was in close proximity to at least 1 supportive housing service (Masoodi & Rahimzadeh, 2015). The data was then linked to the OMHRS via FSA, resulting in a binary variable indicative of a person's proximity to a supportive housing service (e.g., "person lives within 20 km or supportive housing service" versus "person lives more than 20 km away from a supportive housing service"). According to the Behavioural Model for Service Use, proximity to services can be categorized as a factor that would enable service use at the contextual level. A map of Ontario that illustrates these 20-km buffer zones around centroids of the FSA and locations of services can be found in Appendix E.

5.2.3 Independent Variables: Predictors of Readmission

Previous research to predict readmission into inpatient psychiatry using OMHRS data have identified prior hospitalizations, positive symptoms of psychoses, diagnoses such as schizophrenia or bipolar disorders, secondary substance use disorder, being at risk of harm to self, unplanned discharge, and time in hospital as the most important predictors of readmission at the individual level (Perlman et al., 2015; Vigod et al., 2015). This study builds upon this research and adjusts for these variables to identify the effects of systems structures in the predictive model.

5.2.4 Dependent Variable: Readmissions

Readmissions to inpatient psychiatry were operationalized based on the number of days between a person's discharge from their first hospitalization and their next admission; where "next admission" could have been a short (< 3 days) or long (3+ days) stay. Four categories of

readmission were created: “no readmission,” “short-term,” “medium-term,” and “long-term.” A “short-term” readmission would have occurred within 30 days of a person’s discharge. A “medium-term” readmission would have occurred between 31 and 90 days of a patient’s discharge. A “long-term” readmission would have occurred between 91 and 365 days of the patient’s discharge. Transfers between psychiatric hospitals were excluded in assigning readmissions to avoid overestimation of these rates.

5.2.5 Statistical Analysis

To describe the dependent variable at the geographic level, rates of readmissions were mapped using ArcGIS software by FSA. These rates were created by dividing the counts of readmissions by the total number of admissions per FSA. To allow for comparisons between admissions and readmission at the geographic level, a standardized admission rate was created by dividing the total number of admissions by total population counts of persons 18 years and older based on the 2011 Canadian Census per FSA.

To explore the effect of systems structures on readmissions, multilevel mixed-effects models were used to conduct maximum likelihood logistic regressions using PROC GLIMMIX in SAS. The model building process involved creating three models. In Model 1, no predictors were tested, only a random effect for the intercept was included. As such, this model provided information to test how much variation in the outcome exist between the different system structures (Bolker et al., 2009). In this case, hierarchical clustering of readmissions within hospitals, health regions, and marginalization quintiles were tested. Intraclass Correlation Coefficients (ICCs) were calculated to determine the percentage of variance of the readmission indicators that are attributable to each system structure. The system structure with the highest ICC (in this case hospitals) was then chosen to build two additional models. In Model 2, level-2 fixed

effects (e.g., supportive housing proximity and area marginalization) were added to indicate the relationship between these predictors and the outcome. While in Model 3, variables that are known to influence readmission from previous research were added to Model 2. These two-level logistic models predict the probability of psychiatric readmission for each individual, while adjusting for random intercepts between hospitals, and controlling for all other independent variables. "Type 3 Test of Fixed Effects" were used to test the significance of each of the fixed effects specified in the model. The final model (Model 3) was built as follows:

Level 1	$$\boldsymbol{\eta_{ij}} = log\frac{\pi_{ij}}{1-\pi_{ij}} = \beta_{0i} + \beta_{1ij}\, Hospital_{1ij}$$
Level 2	$$\boldsymbol{\beta_{0i}} = \gamma_{00} + \gamma_{01}\, recent\ admissions_i + \gamma_{02}\, lifetime\ admissions_i + \gamma_{03}\, threat\ to\ self_i + \gamma_{04}\, danger\ to\ others_i + \gamma_{06}\, schizophrenia_i + \gamma_{07}\, mood\ disorder_i + \gamma_{08}\, unplanned\ discharge_i + \gamma_{09}\, positive\ symptoms_i + \gamma_{010}\, unemployed_i + \varphi_{0i}$$ $$\boldsymbol{\beta_{1i}} = \gamma_{10} + \gamma_{11}\, Supportive\ Housing\ Proximity_i + \gamma_{12}\, Marginalization\ Quintile_i + \varphi_{1i}$$

Notation:

- $\boldsymbol{\eta_{ij}}$ denotes the log odds of triggering the outcome (e.g., "short-," "medium-," and "long-," term readmission) for the ith person at the jth hospital.
- $\boldsymbol{X_{ij}}$ (where X= independent variables) denotes the ith person's (repeat admissions (e.g., recent and lifetime admissions), emergent admissions (e.g., harm to self and others), diagnoses (e.g., schizophrenia, mood, and concurrent disorders), unplanned discharge (e.g., discharge against advice), psychosis (e.g., positive symptoms) and unemployment) measured at the jth hospital.

- $\boldsymbol{\gamma_{00}}$ shows the population average log odds for readmission when the independent variables are zero.
- The parameter $\boldsymbol{\gamma_{01}}$ through $\boldsymbol{\gamma_{010}}$ shows the change in log odds for readmission when each independent variable attached to the parameter increases by one unit, while all others remain constant.
- $\boldsymbol{\gamma_{10}}$ shows the population average log odds for readmission across hospitals for the independent variable's reference category. In this case, when person lives in an FSA without supportive housing services; or lives in the least marginalized (quintile 1) FSA.
- The parameter $\boldsymbol{\gamma_{11}}$ shows the change in log odds for readmission across hospitals when Supportive Housing Proximity increases by one unit, while other variables remain constant. As well as when Area Marginalization Quintile increases by one unit, while other variables remain constant.
- $\boldsymbol{\varphi_{0i}}$ represents the variances for the random intercept.
- $\boldsymbol{\varphi_{1i}}$ represents the variances for the random slope.

5.3 Results

5.3.1 Descriptive Statistics

Descriptive statistics of the sample are presented in Table 5.1, most patients were aged 25-44 years old, 65% had secondary or less as the highest level of education achieved, 70% were not employed, 75% did not have a partner/spouse, 66% lived in the most marginalized FSAs of Ontario, and 2.8% of the sample were homeless at time of admission. The majority of these patients were diagnosed with a mood disorder (56%); while 33% were diagnosed with a substance use disorder, and 25% with schizophrenia. 78% of these patients were rated as having limited to no

insight into their own mental health status, and the reason for admission among 53% of patients was threat to themselves. Approximately 10% of the sample were admitted to inpatient psychiatry involuntarily, and 8% had over six admissions in their lifetime. Lastly, readmission rates for this sample were 7.4% for short-term (within 30 days), 6.2% for the medium-term (31-90 days) and 13.1% for the long-term (91-365 days). The total 1-year readmission rate was 26.7%, and the total 3-month readmission rate was 13.6%.

Table 5.1 Demographic, service history, clinical characteristics, and neighbourhood characteristics of the sample (N=37,582)

	Total Sample	
	%	N
Age (years)		
< 18	3.1	1158
18-24	13.5	6218
25-44	37.2	13988
45-64	35.6	13387
65+	10.6	3993
Female	54.0	20285
Highest level of education		
Unknown/None or less than grade 8	17.0	6379
Secondary	47.8	17953
Post-Secondary	32.6	12236
Graduate	2.7	1014
Unemployed	69.6	26159
Reports having no confidant	34.0	12759
Has a Partner/Spouse	25.0	9406
Homeless	2.8	1069
Lives alone	41.2	15492
DSM-IV Diagnostic Categories		
Mood	56.0	21057
Schizophrenia and other psychotic disorders	24.8	9334
Neurocognitive[6]	5.8	2196
Anxiety	16.1	6060
Substance Use	32.8	12319
Reason for Admission:		
Threat or danger to self	52.5	19728
Threat or danger to others	16.7	6281
Involuntary admission	9.6	3516
Limited or no insight into his/her mental health	77.7	29201
Prior Psychiatric Admissions		
3+ times over the last 2 years	4.7	1783
6+ times over lifetime	8.0	3005
Area-level Residential Instability (RI) Score		
1 (Least)	10.5	3918
2	20.1	7509
3	18.1	6775
4	24.6	9229
5 (Most)	26.8	10025

[6] Delirium, dementia and amnestic and other cognitive disorders

Table 5.1 Continued

	Total Sample	
	%	N
Area-level Material Deprivation (MD) Score		
1 (Least)	11.0	4126
2	15.2	5699
3	21.0	7869
4	26.8	10049
5 (Most)	25.9	9713
Marginalization: Dichotomized Score		
Low (Quintile 1, 2 or 3 in either RI or MD)	34.1	12827
High (Quintile 4, or 5 in either RI or MD)	65.9	24759
Readmission		
Short-term (within 30 days)	7.4	2773
Medium-term (31-90 days)	6.2	2313
Long-term (91-365 days)	13.1	4904
Readmission within 3 months	13.6	5111
Readmission within 1 year	26.7	10034

Persons that were admitted to inpatient psychiatry lived in 486 FSAs out of the 516 FSAs in Ontario (94% of FSAs) and rates were as high as 43 admissions per 1,000 adults. In contrast, as shown in Figure 5.2, persons that were readmitted to inpatient psychiatry within 1 month of the index discharge lived in 102 FSAs out of the 516 FSAs in Ontario (20% of FSAs). The FSAs with the highest short-term readmission rates had up to 138 readmissions per 1,000 admissions. Readmissions occurring after 30 days and up to 3 months were less common, occurring in 59 FSAs out of the 516 FSAs (11% of FSAs) with the highest medium-term rates being 85 readmissions per 1000 admissions (Figure 5.3). Finally, readmissions to inpatient psychiatry after 3 months, but within a year of discharge, occurred in 211 FSAs out of the 516 FSAs in Ontario (41% of FSAs). As illustrated in Figure 5.4 the FSAs with the highest long-term readmission rates had up to 195 readmissions per 1,000 admissions. Magnified portion of the maps of the Southern Ontario Region and the Greater Toronto Area can be found in Appendix F, G, and H.

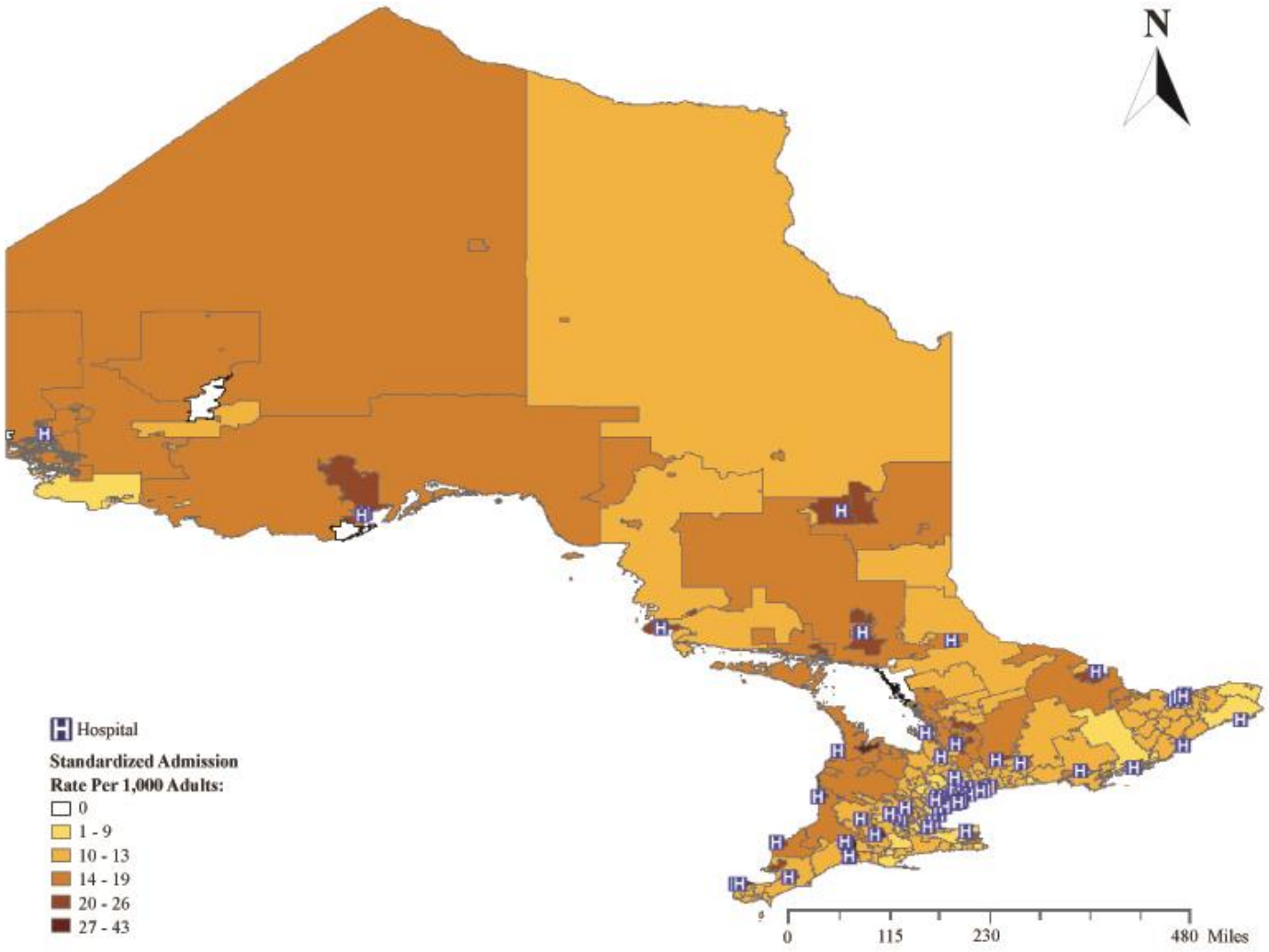

Figure 5.1 Standardized admission to inpatient psychiatry rates among marginalized persons by Ontario FSAs (N=37,582)

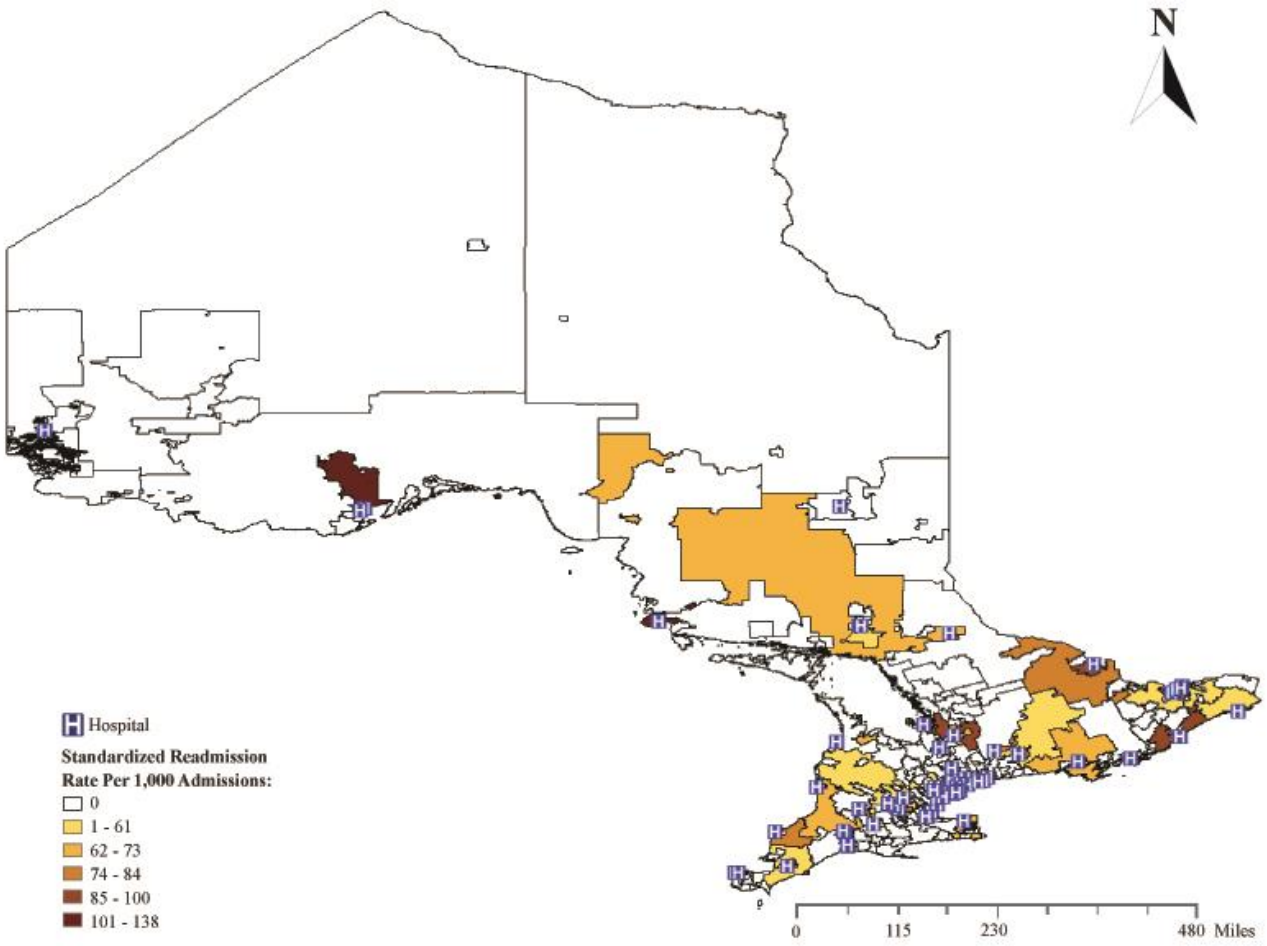

Figure 5.2 Standardized short-term readmission to inpatient psychiatry rates among marginalized persons by Ontario FSAs (N=37,582)

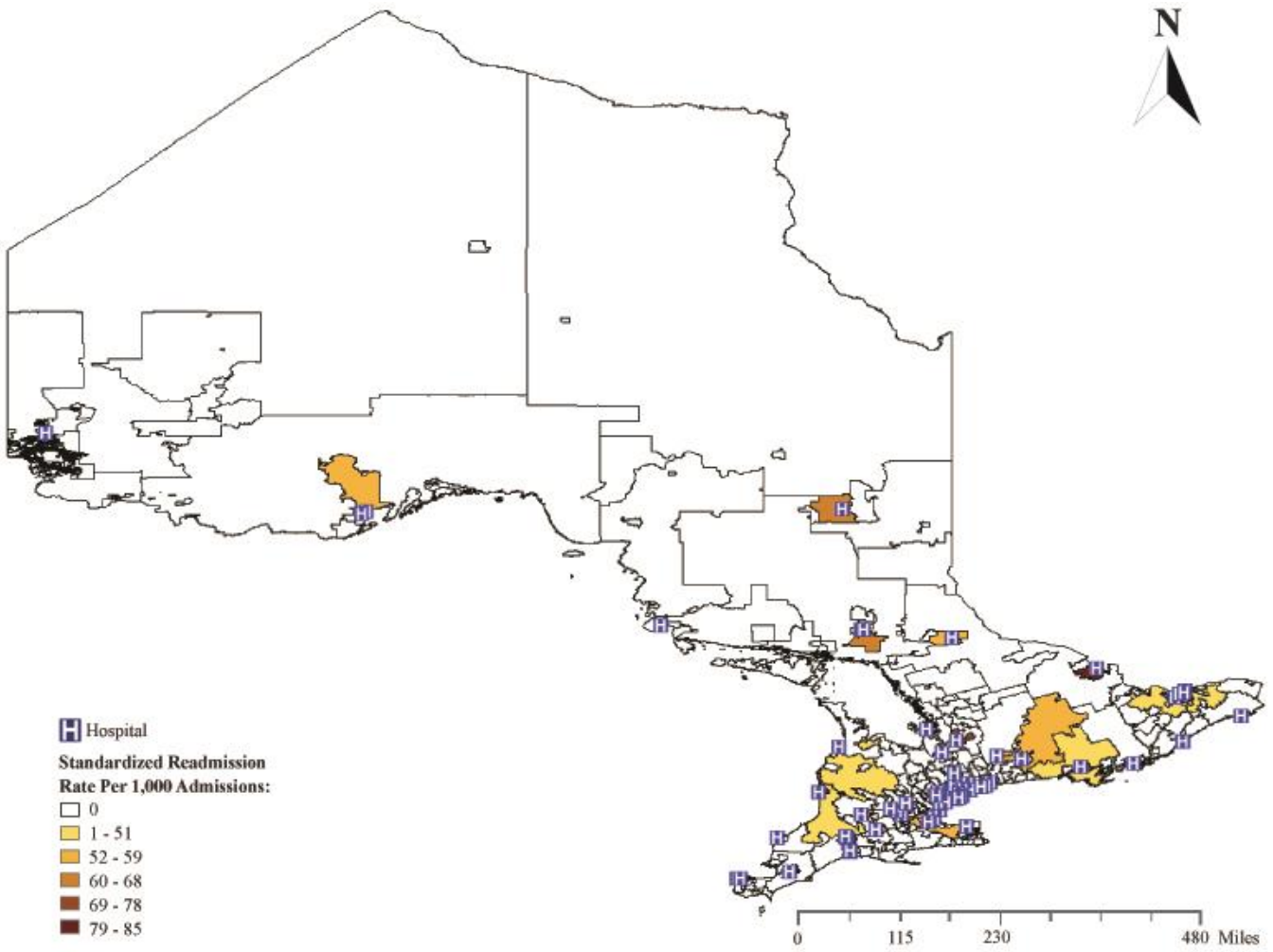

Figure 5.3 Standardized medium-term readmission to inpatient psychiatry rates among marginalized persons by Ontario FSAs (N=37,582)

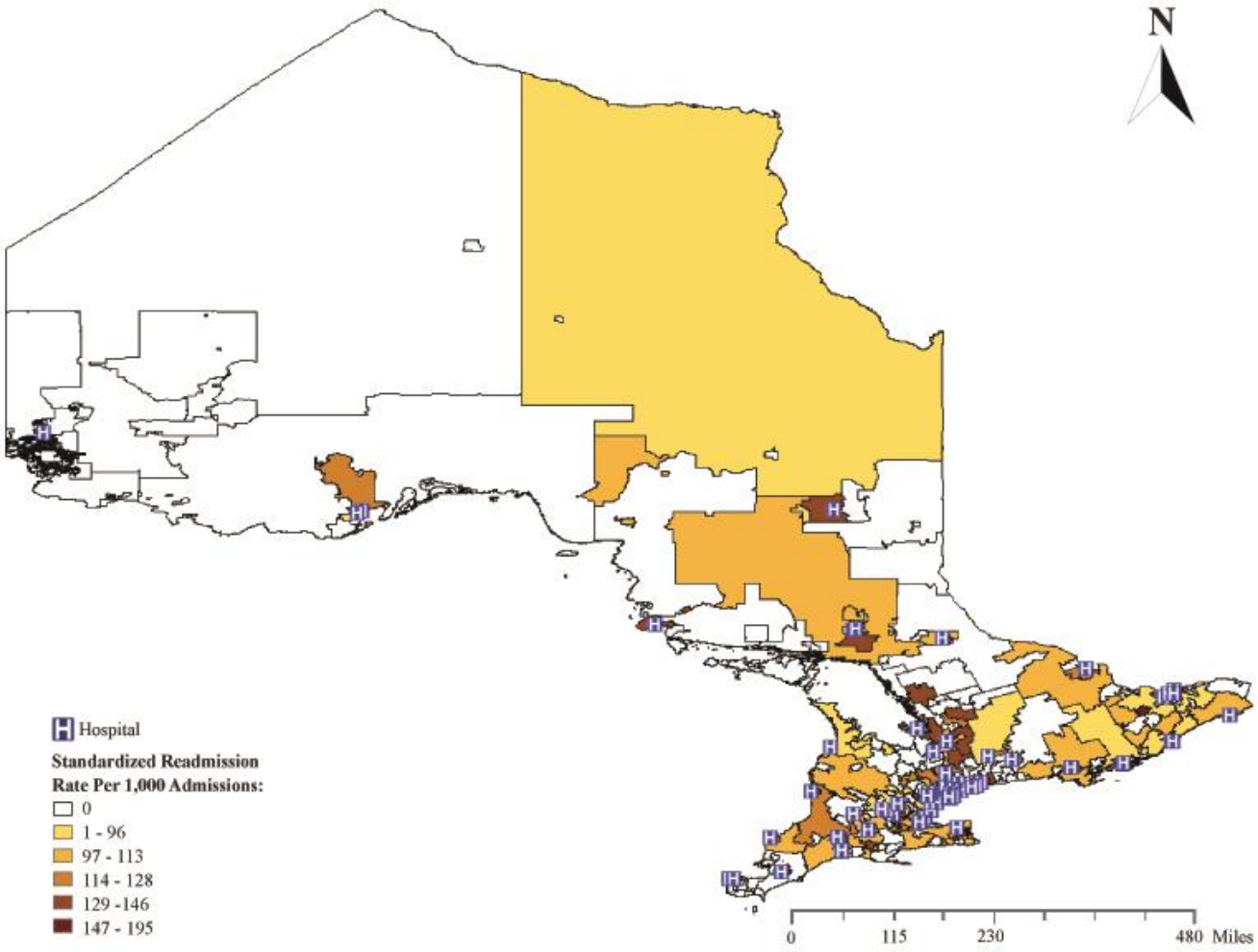

Figure 5.4 Standardized long-term readmission to inpatient psychiatry rates among marginalized persons by Ontario FSAs (N=37,582)

5.3.2 Multi-level Model Results

As illustrated in Figure 5.5 ICC comparisons between geographic area marginalization quintiles, health regions, and hospitals, determined that hospital clusters explain the most variance in readmissions. The strongest ICCs were found for short-term readmissions where hospitals accounted for 3.8% of the variance in 30-day readmissions. In contrast, hospital clusters accounted for 1.2% of the variance for medium-term, and 0.9% of long-term readmissions. Regarding health region, LHINs accounted for 1.5% of variance for readmission within 30 days, and 0.6% of variance for both medium- and long-term readmission. Clustering by area marginalization quintiles accounted for the least amount of variance with 0.18% for short-term and 0.09% for both medium- and long-term readmission. Additional ICC results among non-marginalized persons are presented in Appendix I. These also show that hospitals account for the most variance in readmission, compared to LHINs or ON-Marg quintiles.

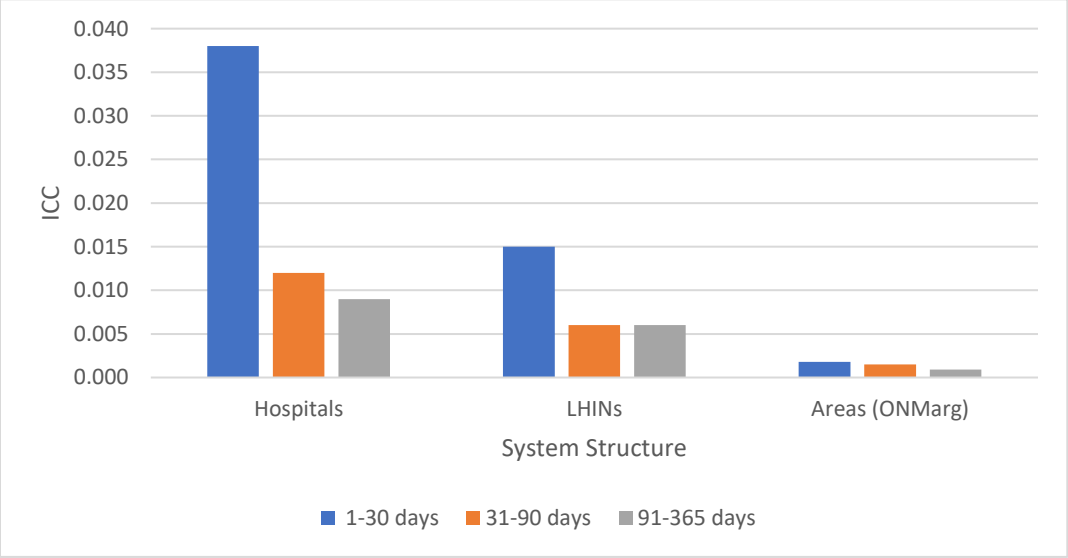

Figure 5.5 Intraclass correlation coefficients of hierarchical clustering by different system structures (N=37,582)

Note. Hospitals (N=82); LHINs (N=14); Area Marginalization (N=5); ICC: intraclass correlation coefficients

Multi-level model results from Table 5.2 presents fixed effects coefficients (β parameters), which estimate the log odds of the outcomes (short-, medium-, long-term readmission) versus the reference (no readmissions) of independent variables for the individual, while adjusting for random intercepts between hospitals. The results from Model 2 indicate that living in an FSA with less than 20 km distances to supportive housing services significantly increases the likelihood of readmission of short-term and long-term readmissions, but not on medium term readmissions. Regarding area level marginalization, the model shows that compared to the least marginalized FSAs of Ontario, risk of short-term readmission increases for every quintile of marginalization. For medium and long-term readmission, the most marginalized FSAs (quintiles 4 and 5) of Ontario were significant compared to the least marginalized.

In model 3, controlling for covariates that are known to influence risk of readmission, FSAs with less than 20 km proximity to supportive housing remain significant for short- and long-term readmission. However, the effect of area level marginalization is diminished, and certain quintiles remain statistically significant, quintile 2 for short-term readmission and quintile 4 for medium- and long-term readmission. Furthermore, the "Type 3 Test of Fixed Effects" indicate in Model 2 that both proximity to supportive housing as well as area-level marginalization are significant predictors of readmission. For Model 3, neither "area marginalization" nor "danger to others" remain significant. Nonetheless, the measure to test model fit, the -2 Log Likelihood, indicated that the best fit was provided by Model 3, as shown by its lower deviance in comparison to Model 2.

Table 5.2 Multi-level models for predicting readmissions to inpatient psychiatry at different points in time (N=37,582)

Cluster= HOSPITAL	**Model 1**	**Model 2**	**Model 3**
Fixed Effects		*β - parameter estimates (SE)*	
Readmission 0-30 days (ref=no readmissions)			
Intercept	-2.23(0.05) **	-2.53(0.11) **	-2.06(0.18) **
Less than 20km to Supportive Housing		0.17(0.07) *	0.14(0.07) *
ON-Marg (ref=1 Least marginalized neighbourhood)			
1 vs. 2		0.19(0.08) *	0.17(0.08) *
1 vs. 3		0.14(0.09)	0.1(0.09)
1 vs. 4		0.17(0.08) *	0.12(0.08)
1 vs. 5		0.15(0.08)	0.07(0.08)
Variables known to influence readmissions:			
Recent admissions			-0.48(0.08) **
Lifetime admissions			-0.39(0.07) **
Threat to self			0.38(0.04) **
Danger to others			0.04(0.05)
Schizophrenia			0.27(0.06) **
Mood			0.31(0.05) **
Concurrent			-0.02(0.05)
Discharged against advice			1.01(0.09) **
Positive Symptom Scale			0.38(0.05) **
Unemployed			0.18(0.04) *
Fixed Effects		*β - parameter estimates (SE)*	
Readmission 31-90 days (ref=no readmission)			
Intercept	-2.43(0.04) **	-2.64(0.11) **	-1.66(0.18) **
Less than 20km to Supportive Housing		0.06(0.08)	0.04(0.07)
ON-Marg (ref=1 Least marginalized neighbourhood)			
1 vs. 2		0.12(0.09)	0.10(0.09)
1 vs. 3		0.14(0.09)	0.11(0.09)
1 vs. 4		0.26(0.09) *	0.20(0.09) *
1 vs. 5		0.17(0.09) *	0.1(0.08)
Variables known to influence readmissions:			
Recent admissions			-0.43(0.09) **
Lifetime admissions			-0.54(0.07) **
Threat to self			0.26(0.05) **
Danger to others			-0.05(0.04)

Table 5.2 Continued

Cluster= HOSPITAL	**Model 1**	**Model 2**	**Model 3**
Schizophrenia			0.32(0.06) **
Mood			0.22(0.05) **
Concurrent			0.10(0.05) *
Discharged against advice			0.36(0.12) *
Positive Symptom Scale			0.17(0.05) *
Unemployed			0.07(0.05)
Fixed Effects	*β - parameter estimates (SE)*		
Readmission 91-365 days (ref=no readmissions)			
Intercept	-1.68(0.03) **	-1.92(0.08) **	-1.10(0.18) **
Less than 20km to Supportive Housing		0.14(0.06) *	0.12(0.06) *
ON-Marg (ref=1 Least marginalized neighbourhood)			
1 vs. 2		0.1(0.06)	0.08(0.06)
1 vs. 3		0.08(0.06)	0.03(0.06)
1 vs. 4		0.19(0.06) *	0.13(0.06) *
1 vs. 5		0.12(0.06) *	0.03(0.06)
Variables known to influence readmissions:			
Recent admissions			-0.27(0.07) **
Lifetime admissions			-0.51(0.06) **
Threat to self			0.11(0.03) *
Danger to others			-0.001(0.04)
Schizophrenia			0.46(0.05) **
Mood			0.21(0.04) **
Concurrent			0.08(0.04) *
Discharged against advice			0.22(0.09) *
Positive Symptom Scale			0.15(0.04) **
Unemployed			0.09(0.04) *
Random Effects	*Covariance Parameter Estimates (SE)*		
Level-2 Intercept (Readmission 0-30 days)	0.13(0.03) **	0.13(0.03) **	0.08(0.02) **
Level-2 Intercept (Readmission 31-90 days)	0.04(0.01) **	0.04(0.01) **	0.03(0.001) *
Level-2 Intercept (Readmission 91-365 days)	0.03(0.009) **	0.03(0.009) **	0.02(0.006) *
Model Fit	*(-2LL)*		
-2 Log Likelihood	63991.9	63756.4	62899.9

Note. * P-value <0.05; **P-value <0.0001; SE: Standard Error

Table 5.3 Type 3 test of fixed effects for multi-level models (N=37,582)

Model 2	
Variable	**F-value**
Less than 20-km to Supportive Housing	3.22*
ON-Marg Quintiles	1.97*
Model 3	
Variable	**F-value**
Less than 20-km to Supportive Housing	2.83*
ON-Marg Quintiles	1.38
Recent admissions	16.71**
Lifetime admissions	43.59**
Threat to self	32.21**
Danger to others	0.43
Schizophrenia	39.75**
Mood	23.23**
Concurrent	3.01*
Discharged against advice	45.04**
Positive Symptom Scale	24.48**
Unemployed	6.47**

Note. * P-value <0.05; **P-value <0.0001

5.4 Discussion

This study explored relationships between health system structures, community characteristics, and person-level factors to develop a greater understanding of inpatient psychiatry readmissions among marginalized persons. First, the readmission rates found by this study are closely related to what other studies based in Ontario have reported. For example, the rate of 30-day readmission among acute psychiatry patients in Ontario has been reported to be 7.2% (S. Chen et al., 2018). While the rate of 90-day readmission among homeless psychiatric inpatients in Ontario has been reported to be 14.3% (Perlman et al., 2015). Compared to the OECD average, the 30-day readmissions found in Ontario and this study is about half that of their "1 in 7" (14%) estimate (OECD, 2013). This difference in rates may be due to variations in health systems in other

countries, which further supports the notion that several contextual factors at the health system and societal levels may influence the risk of readmissions to psychiatric inpatient care.

The Intraclass Correlation Coefficients revealed that health systems structures, especially hospitals, account for some variance in short-term readmissions. As such, the longer time before a readmission occurs, the less variance these system structures can explain. Additionally, the β parameters estimates of the models indicated that area level marginalization tends to have a stronger influence in long-term readmission. These findings add to the discussion surrounding whether readmissions are the hospital's responsibility or the that of community providers. The results of this study point out that the hospital has a strong role for 30-day readmission; while longer term readmissions are perhaps more of an indicator of illness relapse or community issues. There are multiple factors that could influence this observation; for instance, service design and delivery, internal policies regarding discharge, supply and demand for psychiatric beds, wait times and availability of programs to support person after discharge. To further explain these findings and develop ways to prevent short term readmissions at the provider level, further research should focus on exploring differences between provider characteristics, such as hospital capacity, policies, practices, and procedures.

This study tested the effects of two contextual factors that, according to the Behavioural Model of Health Service Use, "predispose" (e.g. area level marginalization) and "enable" (e.g., proximity to supportive housings services) use of services. As such, the analysis highlighted the role that areas with high level of marginalization play in predisposing individuals to being readmitted to inpatient psychiatry. When tested without other covariates, living in areas of high marginalization significantly increased the odds of medium- and long-term readmissions, but not short-term readmissions. This suggests that residing in highly marginalized areas has a stronger

influence in the need for readmission in the future. This may be, as presented in Chapter 3 of this dissertation, due to the fact that marginalized areas do not seem to help foster supportive recovery environments following psychiatric care. This is also in line with previous research showing that health care service use is influenced by socioeconomic conditions in local communities (de Oliveira et al., 2016; Zulian et al., 2011).

This study also supports that the proximity to supportive housing services enabled inpatient short- and long- term psychiatric readmission but had no effect on medium-term readmission for this sample. This was surprising as prior evaluation studies of supportive housing programs provide evidence that shows that these services can decrease risk of unnecessary hospitalization (Greenwood et al., 2005; Gulcur et al., 2003; Rog, 2004). However, the difference may be related to how the timeframes for readmissions were defined as there may be different factors mediating the relationship between supportive housing supply and time to readmission, such as enrollment capacity or variations in the availability, and coordination of community mental health clinicians and other community support programs (Kurdyak et al., 2014; Vigod et al., 2013).

Structuration theory may provide insights into the potential mechanisms underlying the relationship between marginalization, proximity to services and increased odds of service use noted by this study. The theory explains that persons operate within the context of rules produced by social structures. These structures are socially constructed, reinforced when persons act in compliance with these structures and modified when persons act outside the constraints of these social structures. Thus, persons create social systems and influence structural order of these systems (Giddens, 1984). For example, marginalized persons with mental illnesses tend to reside in inner urban areas, and services tend to concentrate where there is greatest need, further influencing the influx of persons in need into these areas. As a result, areas with the most need

also have the most resources. This observation is supported by this study's findings that indicate the FSAs with the highest readmission rates were near city centres such as the Greater Toronto Area (GTA); these are areas with higher population densities, and greater number of hospitals and community services. This is also in accordance with previous research that has found a positive association between mental health service utilization and the resources of the catchment area (Tello et al., 2005), availability of a hospital within the area (Curtis et al., 2006), short distances to services (Donisi et al., 2013), the density of mental health resources and mental health professionals (Rocha et al., 2013). Therefore, this study presents evidence that there should be more community and social services such as supportive housing in these high need areas. The theory helps support the argument that the structuration of mental health services is still in flux and that there is an ongoing need for more supportive housing services in these areas. Perhaps the Marginalization Index (MI) created in Chapter 4 may help inform decision makers about the areas where these services are needed most. For instance, future research could focus on mapping the averages of these scores at the population level to identify specific FSAs with particularly high scores.

It is important to note that the individual level variables that were tested have been derived from research using the same data used in this study, with these prior studies only examining individual characteristics as risk factors for readmission (Perlman et al., 2015; Vigod et al., 2015). This research responds to calls from these previous studies to examine contextual factors related to psychiatric readmissions. The strength of the relationship between contextual factors and readmissions from this study were modest in comparison to the effects of individuals factors. However, several important insights arise about the contextual relationship with readmissions. For instance, the comparison between standardized rates of admissions versus readmissions

highlighted that although admissions happen virtually everywhere in the province of Ontario, readmissions occurred in substantially fewer FSAs. The maps show that northern and more remote FSAs tend to have less readmissions. Explanations as to why this might be the case point to potential limitations in access to services. For instance, persons in rural communities in Canada require transportation to access even the most basic necessities, including health care (Lammam & MacIntyre, 2016). When admitted to inpatient care, these persons might need to travel long distances, which may be particularly challenging for persons experiencing mental health symptoms. Once discharged, persons need to travel long distances back to their area of residence. If symptoms come back, and the person requires inpatient care soon after their discharge; it is perhaps more challenging and more unlikely for these persons to seek inpatient care again, as opposed to persons who live close to mental health services. This aligns with previous research showing that mental health service use is significant higher among urban compared to rural settings (Vasiliadis et al., 2005), where lack of mental health care professionals is a great need that results in less service utilization in these rural settings (Ziller et al., 2010).

This study mapped patterns of readmissions and identified specific FSAs with higher standardized rates. Identifying these areas geographically could be useful in system evaluation and in program and policy development by informing processes for serving planning based on need. Furthermore, this study showed that merging population data and health systems data allowed for the examination of how both individual and contextual level factors influence services use. These findings may help decision makers understand the context of where individuals in inpatient psychiatry live, to ensure programs are available for those who need it most and inform government initiatives like the eradication of homelessness by 2025 (Government of Ontario, 2017). For instance, this study revealed that short- and long-term readmissions are more common

than readmissions occurring after a month and within 3 months of discharge. As such, to deal with readmissions within 30 days, resources and policies should focus on the provider-level (e.g., hospitals and LHINs). On the other hand, to prevent readmissions occurring after 3 months of discharge, investments and policy should focus on increasing the mental health literacy of communities and building families and neighbourhoods that foster psychiatric recovery and contribute to mental health well-being of everyone. Lastly, the results for medium-term readmissions indicate that they are least common at the geographic-level, but the individual-level rate is similar to that of the short-term readmissions. Further research is required to understand this observation; but perhaps it may be an indicator related of inadequate community support systems available in those FSAs displaying a medium-term readmission rate (11% of Ontario's FSAs).

5.4.1 Limitations

This study is cross-sectional in nature; as such, the meaning of the word "influence" for this study and the dissertation as a whole, refers to the associations and relations highlighted by the results. To be able to assess causality, future studies would have to follow persons as they transition from and to different system structures. Perhaps these studies could focus on persons whose area-level ON-Marg quintile scores have changed over the years and if these changes have any effect on mental health status and service use. Furthermore, although standardized rates for the outcomes were created and mapped, the study was unable to produce a meaningful assessment of spatial autocorrelation or perform spatial analysis because at the geographic level, the outcome was quite rare (e.g., less than half of the geographic units reported the outcome, even as low as 11% of FSAs in the case of 31-90-day readmission). Another limitation of this approach is that the geographical unit available to study mental health data is very large. As a result, variability is lost in aggregating the smaller geographic units that make up these bigger areas. To assess these

limitations, it will be important to obtain health care data at a smaller geographic level. Presently, this is not a possibility due to risks of privacy and confidentiality of the data. However, if made possible, this would present multiple opportunities for future research where perhaps other health services outcomes can be studied using similar methods attempted by this study.

Moreover, this study was unable to assess whether or not persons in the sample were discharged to a supportive housing service because this information was not available in the dataset. There is information on living arrangement at discharge, however, this variable was missing among 15,637 (42%) of the sample. Among those with data regarding this variable (n=18,310), the majority 83.4% were discharged to private homes; while very few were discharged to services with supports (e.g., 205 (0.9%) were discharged to board and care, 383 (1.7%) discharged to assisted living, 26 (0.1%) discharged to a mental health residence, 48 (0.2%) discharged to a group home for physical disabilities, 425 (1.9%) to a nursing home, 87 (0.4%) to a rehabilitation unit, 15 (0.07%) to palliative care, and 52 (0.2%) to a correctional facility). As such, this study is not intended to be an evaluation of supportive housing services. Rather, this is a health systems study to test contextual factors such as the proximity to supportive housing services for persons at risk of homelessness and experiencing marginalization. The analysis was also attempted on persons who were homeless at time of admissions (N=1,069), but unfortunately the sample size was not large enough to be able to assess hierarchical clustering around hospital, as performed with the multilevel model.

Furthermore, it is possible that the service locations mapped for this study offer multiple programs besides supportive housing. Thus, even though the study provides a general idea as to where locations of services are, it is hard to solely attribute the results to supportive housing services. Nonetheless, since these locations coincide with population density, where city centres

had more services and more hospitals than rural areas, it may be more appropriate to view this variable as simply a general proximity to community service measure. Moreover, there is a version of RAI-MH for community mental health, however, it is not fully implemented in Ontario. As such data becomes available, future research may be able to address some of the limitations of this study. For instance, data on community mental health that is linkable to inpatient data, may help address reasons for the influence of context on inpatient service use and begin to evaluate the effect of specific services, such as supportive housing at the systems level.

5.4.2 Conclusion

This study contributes to the limited research that is currently available on the influence of contextual level factors on mental health service use. It shows that contextual factors have different effects on readmissions at different points in time from discharge. For instance, while hospitals and LHINs play a stronger role in influencing readmissions within 30 days, area level marginalization seems to have a stronger influence for readmissions that occur longer than 30 days from discharge. Further highlighting that psychiatric readmissions relate to social inequities at the area level and proximity to services. Additionally, the geographical patterns of readmission distinguish that these are more common in urban areas, where number of hospitals and supportive housing services are higher. These patterns also illustrate that readmissions are less common when they occur after a month and within 3 months of discharge; which presents implications for how policies can tackle the issue of short- versus long- term readmission. Nonetheless, the analysis points out that the influence of individual level factors is far stronger than any of the contextual factors tested at predicting risk of readmissions. However, more research is needed for continuing to understand the contextual influences on service use including availability of community mental

health supports; as well as, the practices and procedures of systems structures that are influencing the variance in readmission noted by this study.

Chapter 6 General Discussion

The principal objective of this dissertation was to explore how the social context may be associated with the mental health status and utilization of psychiatric inpatient services by persons in Ontario. The first chapter provided an overview of existing literature pertaining to the social environment and mental health, the mental health system and service use, and the conceptualization and measurement of marginalization. The second chapter provided an overview of the methodology used in the three studies that make up this dissertation. The third chapter was an exploration of marginalization measured at the contextual level and the relationships among its various dimensions and inpatient psychiatry outcomes. The fourth chapter examined the development and convergent validity of a multi-dimensional measure of marginalization at the individual level. The fifth chapter focused on individuals experiencing high levels of marginalization to test how contextual effects influenced readmissions to inpatient psychiatry. In this sixth chapter, the results of each study are summarized as an integrated whole in relation to the dissertation objectives and discussed in terms of their clinical and policy relevance and directions for continued research.

6.1 Research Summary

This body of work assessed, developed, and tested marginalization in relation to the mental health of recipients of inpatient psychiatric services. While the mental health impact of social factors has previously been studied, the literature was unclear in the conceptualization and measurement of marginalization. The literature was also limited in assessing how clinical factors related to area level marginalization and the effects of context on mental health service use. Therefore, this thesis aimed to develop and explore a measure of marginalization that would

embrace the complexity of multiple social circumstances and used it to study contextual factors and their effects on mental health status and service use.

The first study (Chapter 3), found that the majority of persons admitted to inpatient psychiatry reside in the most marginalized areas of the province. The results highlighted differences in the way clinical symptoms and social challenges are presented among groups residing in areas with different levels of marginalization. For instance, individuals living in the most marginalized areas were also more likely to experience severe psychiatric illnesses and symptoms (e.g., schizophrenia), economic hardships, police interventions, illicit drug use, and lacked social support. In contrast, persons residing in the least marginalized areas were more likely to experience depressive symptoms, risk self harm, use alcohol at potentially problematic levels. The study also found that persons living in northern health regions were more likely to reside in areas characterized by material deprivation while persons urban health regions like Toronto Central, resided in areas with the most residential instability. Given the findings in this study, it was determined that developing a person level measure of marginalization based on these data would prove useful in clinical practice to identify persons at risk of marginalization and for health service planning to identify clusters of risk.

The second study (Chapter 4), focused on empirically measuring the concept of marginalization, resulting in a 15-item measure composed of 5 dimensions (e.g., victimization, lack of social support, isolation, lack of resources, and deprivation). The study found strong associations with marginalization outcomes (e.g., homeless individuals, forensic patients, high mental health service users, persons with a history of violence and police intervention, substance use disorders, and marginalization measured at the contextual level) confirming its convergent validity. Given the index's accuracy at predicting risk of homelessness, it was determined that it

would be useful to select a sample of marginalized individuals to test the effect of context on the service use outcome of readmissions to inpatient psychiatry.

The third study (Chapter 5) explored the influence of contextual level factors (e.g., supportive housing service proximity and geographic level marginalization) on psychiatric readmissions among marginalized persons. The analysis described how readmissions to inpatient psychiatry at different points in time operate at a geographical level. The study identified that although admissions occur in 94% of FSAs of Ontario, short-term readmissions (within 30 days) only happen in 20% of FSAs, medium-term readmissions (31-90 days) happen in 11% of FSAs, and long-term readmissions (91-365 days) happen in 41% of FSAs. This study demonstrated that system structures may play a role in short term, but not be as strongly associated over medium and long-term readmissions. While area-level marginalization increased the risk of readmissions after 30 days, proximity to supportive housing services also increased risk short and long-term readmission but had no effect on medium-term readmissions. Despite these contextual relationships, the study identified that individual level factors continue to show predominant effects at predicting readmissions to inpatient psychiatric care.

As a whole, the findings suggest that marginalization measured at the contextual and individual level is related to poor mental health status and increased service use for recipients of inpatient psychiatric services. It adds to existing literature on marginalization by accounting for multiple dimensions and emphasizes the importance of considering marginalized persons in inpatient psychiatry as a distinct group, a group that is highly vulnerable to adverse social circumstances such as homelessness, criminality, and lack of social support. These circumstances may continue to negatively impact persons' mental health status and diminish their chance to recover from mental illness.

6.1.1 Strengths and Limitations

A major strength of this dissertation is that it uses population-based data from every adult receiving inpatient psychiatric services for longer than 72 hours in Ontario, which supports the generalizability of the findings to the entire long stay inpatient psychiatry population of the province. This large sample size allowed for the study of differences between area measures based on clinical characteristics. Additionally, this dissertation is rooted in high quality practice-based clinical data that are based on extensive research, proven to be reliable and valid, and supported by the Canadian Institute of Health Information. Similarly, this dissertation also makes use of a publicly available index to measure contextual marginalization, a valid and reliable measure used in multiple research initiatives in the province and is available across Canada.

A strength of this research is that it does not present clinical staff with extra assessments that require time and effort to complete. Instead the measure created in this project provides clinicians who already collect the data as part of every day practice, with information that will facilitate identification of persons at risk of adverse social outcomes. Another strength of using OMHRS data is the comprehensive nature of the data, that included a multitude of individual characteristics that go beyond demographics such as clinical, social, and functional characteristics. This is an important advantage over smaller scale studies that are sometimes unable to assess multiple dimensions given the challenges that exits in gathering information using lengthy assessments and collecting sufficient data to ensure generalizability of findings. Moreover, since the RAI-MH is part of a larger suite of assessments that are used in various national and international jurisdictions, the data used allow for replicability of findings and possibility of generating comparisons between jurisdictions.

This dissertation employed various statistical techniques to assess multiple gaps in the literature concerning social context, mental health, and service use. Currently there is limited research available on contextual factors and mental health service use. To address this, this current research employed multi-level models to develop a greater understanding between system structures and inpatient psychiatry readmissions. Similarly, research on marginalization identifies multiple challenges in its conceptualization and measurement. To address this gap, this research tested marginalization at the contextual level. It also developed a conceptualization and measure of marginalization using advanced statistical methods that considered multiple dimensions based on theoretical constructs.

There are also some limitations to consider for this research. First, the studies were cross-sectional in nature; as a result, changes over time were not examined. It will be important to consider longitudinal studies in the future to examine how changes in residence or risk factors at the clinical level affect marginalization. Perhaps this could be achieved using data from the compatible version of the RAI-MH for community mental health. For instance, once the data becomes available, the assessments from inpatient psychiatry may be linked to community mental health to study the characteristics addressed by this study and assess changes as the person transitions into the community. Other limitations surround the information that was not available in the RAI-MH assessment. For instance, no data were available on variables that may have been important to consider in studying marginalization, such as racial/ethnic groups, or income level. Thus, it is recommended that future versions of the assessment consider incorporating these variables.

Additionally, data on area of residence is only collected at time of admission and the studies were not able to assess if areas of residence at admission are the same areas at discharge. A related

limitation is that the geographic unit available for these studies, the FSA, vary considerably in geographic size. This may affect the generalizability of information about an FSA to all areas within that FSA (e.g., there may be smaller geographic areas within that FSA that vary in marginalization relative to the FSA's average). As such, this may present instances where general information about the entire FSA may incorrectly characterize the specific area where a person lives. Even though this is a possibility, analysis presented in Figure 4.10, indicate a prominent positive relationship between the contextual and individual level measures of marginalization used in this project. Furthermore, the service use outcome that this research focused in, readmissions to inpatient care, did not occur in sufficient numbers of FSAs to be able to assess spatial autocorrelation or perform spatial analysis. Even when the three time periods of readmissions were combined, there were still not sufficient FSAs displaying the outcome. Thus, the study was only able to analyze descriptive geographic patterns of readmissions to inpatient psychiatry at different points in time.

6.2 Implications

6.2.1 Clinical

The line of inquiry for this dissertation began with the observation that social factors influence patient outcomes, with those who are fully integrated and supported in society generally achieving better mental health status that those who are socially excluded and marginalized. The results of this research confirmed this and identified specific diagnostic, symptom, and functional characteristics that are associated with risk of marginalization. The results go a step further to operationalize marginalization based on data collected in inpatient care. This is important given that the few studies that examined the measurement of marginalization and social exclusion in

clinical settings lack utility for real world practice, as they are composed of lengthy assessments that are designed for a single purpose. On the other hand, the measure created by this dissertation provides a practical way to identify individuals experiencing different aspects of marginalization using a standardized assessment that is routinely available in clinical practice.

The index created in this research provides meaningful cut-offs points that may be used to develop or direct interventions. For example, as discussed in Chapter 4, the measure identifies individuals that may benefit from services specialized in emotional counselling for abuse victims, social support groups, social assistance programs and supportive housing services. The study also provides evidence of the measure's construct and convergent validity by highlighting groups of individuals that experience greater levels of marginalization such as those experiencing homeless, substance use, and criminal activity. As such, this research provides a solution to the challenge of identifying marginalized persons in the mental health system. The measure identifies key aspects of marginalization and flags risk of adverse social outcomes without requiring additional time and effort for assessment. This will allow clinicians to implement or refer patients to interventions that address these adverse social factors and tackle each individual's unique needs. This approach is rooted in measurement-based care, or the practice of basing clinical care on client data collected throughout treatment (Scott & Lewis, 2015). Recently, the interest in this topic has been increasing in psychiatry and has been shown to reduce psychiatric symptoms and improve patient functioning and satisfaction with life (Fortney et al., 2016).

This dissertation provided evidence showing that the majority of persons in inpatient psychiatry live in areas that compromise their recovery from mental illness. At the same time, these persons deal with various social challenges, such as isolation and lack the social support, which further hinders their mental health. This observation provides a clear indication that there

is a need for programs to support caregivers, to facilitate informal interaction with other members of the community, counselling for family and friends to better support marginalized individuals, and support for community groups to help persons develop their social support networks (F. Chen & Greenberg, 2004). Another key factor in addressing marginalization among this group is to adapt a recovery-oriented practice that considers the person's goals and context (Kidd, McKenzie, & Virdee, 2014). In doing so, services can orient beyond the treatment of symptoms to the support of a person's functional and social context. This can include interventions that focus on providing supported employment and educational opportunities (Bond, Drake, & Becker, 2008; Ringeisen et al., 2017), support for obtaining and maintaining adequate housing (Goering et al., 2014), case-management and community psychiatric care to ensure persons are well supported in their communities after discharge from psychiatric care. At the same time, empower and help recipients of inpatient psychiatry build self-management skills.

In highlighting these recommendations, it is acknowledged that there are complexities in addressing marginalization in inpatient settings that stem from the limited financial and service resources that are available in real-world practice. The implementation of the services that go beyond medical treatment and include social supports and resources are dependent on political will, public funding, and capacity of the health and social systems of communities. Since community mental health services are significantly under-funded (Bartram & Lurie, 2017), existing programs are often unable to organize activities, maintain and renew their organizations to provide adequate services.

6.2.2 Policy

The results of these studies offer information for support decision-making and evaluation in psychiatric care contexts. The relationship between the clinical characteristics and

marginalization measured at the contextual level confirm the theoretical frameworks of marginalization reviewed in Chapter 1 and provide evidence for the role of social context in achieving mental wellness. As such, policies should focus on upstream solutions to create environments that help foster recovery from mental illness. These include ensuring advocacy for the human rights of the mentally ill (Patel et al., 2011), expanding the role and funding for grassroots communities that focus on mental health supports and services (Campbell & Burgess, 2012). For example, organizations like "Basic Needs," have pioneered approaches to addressing mental illness through improving livelihoods and opportunities for social inclusion (www.basicneeds.org). Policy can focus on increasing the mental health literacy of communities by promoting support for mental health conditions in the workplace, schools, and community at large (Jorm, 2012). Most importantly, continuing to invest in social determinants of health, which would include funding strategies aimed at poverty reduction, adequate and affordable housing, and increasing opportunities for education and employment for everyone (Allen et al., 2014).

This dissertation showed that social factors, societal circumstance, and mental health are inter-connected. As such, the use of clinical data may help shape social policy and programming at aggregate levels. In designing the types of policies mentioned above, it may in fact be possible to target several factors at once. For instance, if the province builds policies that aim to eradicate homelessness, this will have a profound effect on all the other mental health and social outcomes highlighted by this research. In creating an index to measure marginalization, this research provides a tool to use as an outcome-screening tool for use in evaluating interventions and policies. For instance, this research also highlighted variables in the RAI-MH that could may be useful in measuring outcomes of marginalization (e.g., homelessness, substance use, high service use). Given that the assessment is widely used, it may be possible to report on these kinds as indicators

in the assessment of programs and policies that deal with marginalization among recipients of mental health services. In essence, the measure of marginalization developed in this dissertation may contribute in supporting accountability and monitoring future policies and programs that focus on the reduction of poverty and inequality.

6.2.3 Research

This research showed that inequalities in mental health status were related to a combination of social structure and individual level characteristics, without attributing causality to either of these as prescribed by structuration theory (Øversveen et al., 2017). As such, this project demonstrated that different aspects of marginalization were embedded in social systems, as shown by the differences in marginalization scores among various health regions of Ontario. In doing so, this project builds on previous literature by uncovering differences in area rurality, educational and employment opportunities, family composition, and quality of housing in determining where psychiatric inpatients resided. Further, the project highlighted that standardized rates of service use correlated with inner urban areas, proving that these areas are places where most marginalized individuals reside. In other words, the areas with the most mental health need for services also tended to have the most resources and the most marginalization measured at the contextual level. Furthermore, this project also contributes to the discussion surrounding the limited research regarding context and its influence on health system service use outcomes like readmissions. Using the Behavioural Model for Health Service Use as a guiding framework, the findings confirm that poor socio-economic contexts increase the availability and ultimately, the utilization of mental health services. This information could be useful in developing plans for service allocation and research regarding utilization of services.

This project makes an important contribution for informing how others can conceptualize and operationalize marginalization as described in Chapter 4. As such, this study ensured that the proposed measure was composed of multiple dimensions incorporating both social and economic variables. Additionally, in assessing the convergent validity of the index, the measure supports the cyclical relationship between social life and mental health (Social Exclusion Unit, 2004). In further assessing this social concept, both individual and contextual measures were considered, and the findings highlighted multiple factors at play in becoming socially marginalized among persons with mental health conditions. Thus, this research supports what others have theorized regarding marginalization as a complex process where a combination of individual characteristics, drivers of exclusion and specific local conditions act together to create marginalization (Ivanov et al., 2012). The findings also confirmed that homeless individuals were the most marginalized group among psychiatric inpatients, which proves that the needs for this particular group should be studied further to better serve this population.

This dissertation lays the groundwork for numerous research directions in the areas of marginalization and well-being of persons with mental illnesses. The distinctions in marginalization between different demographic and diagnostic groups provides a starting point to investigate reasons for these associations. For instance, the research highlighted that persons with a history of violence, crime, and even forensic patients experienced disproportionately high levels of marginalization compared to other groups. Further investigating these associations may help identify individuals with mental health conditions who are at a high risk of committing criminal offences to provide them with appropriate supports early on, and hopefully prevent more serious criminal behaviour from happening. This research could be developed further using qualitative evidence in order understand specific social circumstances that certain groups experience. Doing

so might provide a better understanding of the causes of social exclusion for different groups to develop solutions and create a more equitable context for everyone. As such, research relating to clinical relevance could focus on studying interventions that may help lessen the impact of marginalization on mental health. For instance, investigating different interventions could inform the process for the developing additional Clinical Assessment Protocols (CAPs) to aid in decision support, and provide opportunities to improve the factors leading to and that result from marginalization for psychiatric inpatients.

Given that RAI-MH data exists for other national and international jurisdictions, another logical next step to this research is to begin comparing between other provinces and/or countries. Thus, research on marginalization may need to consider cultural differences where, for instance, issues of social support may be less common in low and middle-income countries while exposure to crime is higher compared to the Canadian context (Dijk et al., 2007). This type of research will highlight important differences in contexts, and how these might influence mental health status and marginalization. Analyzing these patterns using standardized assessments will provide a wealth of information that can be used to further understand the influence of context on mental health. Similarly, future research should focus on developing similar measures of marginalization for the different health care settings served by interRAI assessments, such as home care, long-term care, child and youth mental health, complex continuing care, and acute care (Gray et al., 2009). Such research will highlight differences in marginalization among clinically distinct groups to offer a better understanding of the effects that marginalization may have in other health care settings. Similar multi-level approaches to assess the influence of system structures of different service use outcomes will be appropriate to continue to develop a stronger understanding of the role of context on health status and health service utilization.

6.3 Conclusion

This research identified factors that differentiated living in areas of low versus high marginalization among psychiatric inpatients. In doing so, it highlighted important differences in the way clinical symptoms and social challenges are presented among groups residing in areas with different levels of marginalization at the contextual level. The variation in distributions of clinical characteristics by area of residence suggested that contextual level factors such as residential instability and material deprivation of areas play an important role in limiting the person's recovery from their mental illnesses. When measured at the individual level, this research highlights the importance of victimization, lack of social support, isolation, lack of resources, and deprivation in identifying persons in inpatient psychiatry that are at risk of adverse social outcomes (i.e., homelessness, criminal behaviour, high mental health service use, substance use and addiction). These persons may benefit from interventions and supports directed at improving quality of life in the community after discharge from inpatient psychiatry. Furthermore, the findings contributed to the limited research that is currently available on the influence of contextual level factors on mental health service use by outlining the different effects that contextual factors have on readmissions at different points in time from inpatient psychiatry discharge. Overall, this research supports that social and health policy should work in integrated ways, to help support recovery among persons with mental health conditions and ensure communities foster mental health wellbeing. As such, these findings are important for informing the equitable planning and distribution of evidence-based mental health services and supports to create social contexts that enable opportunities for improved mental health.

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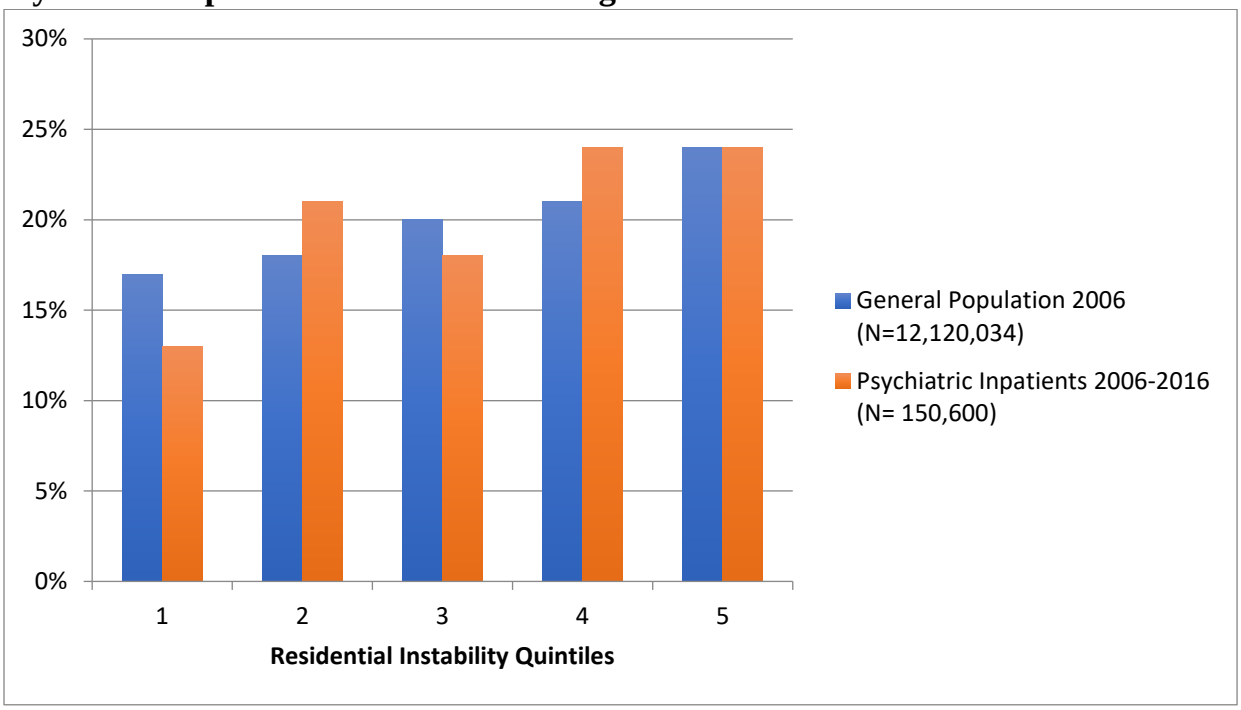
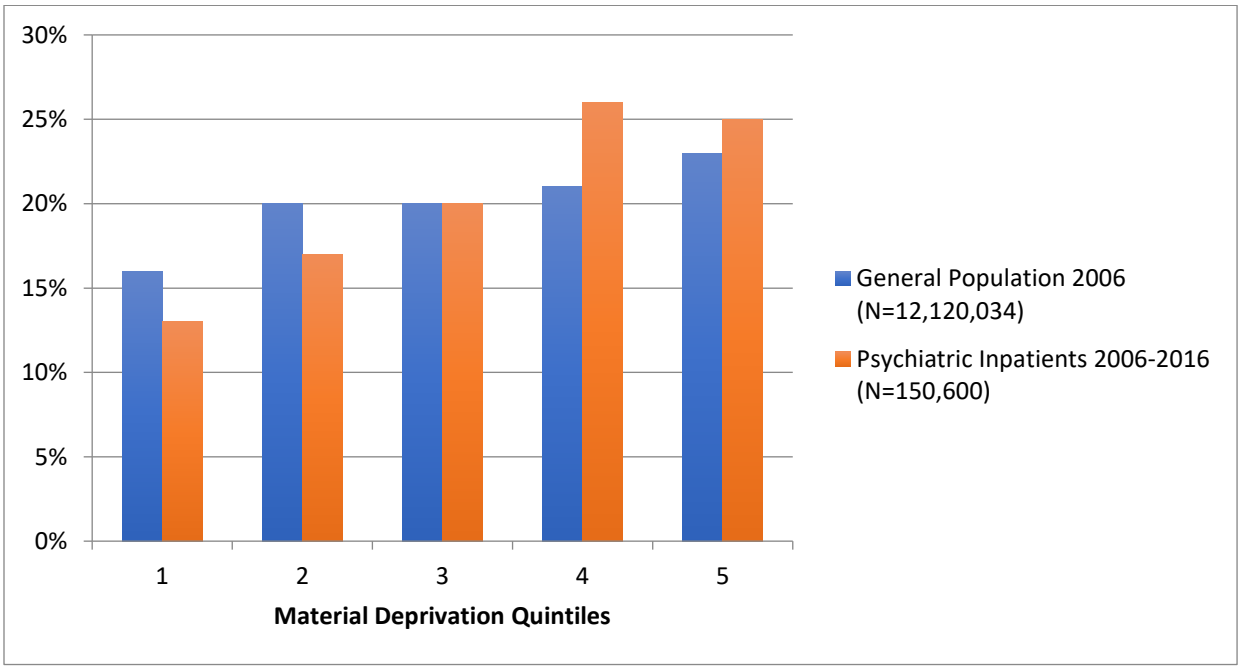
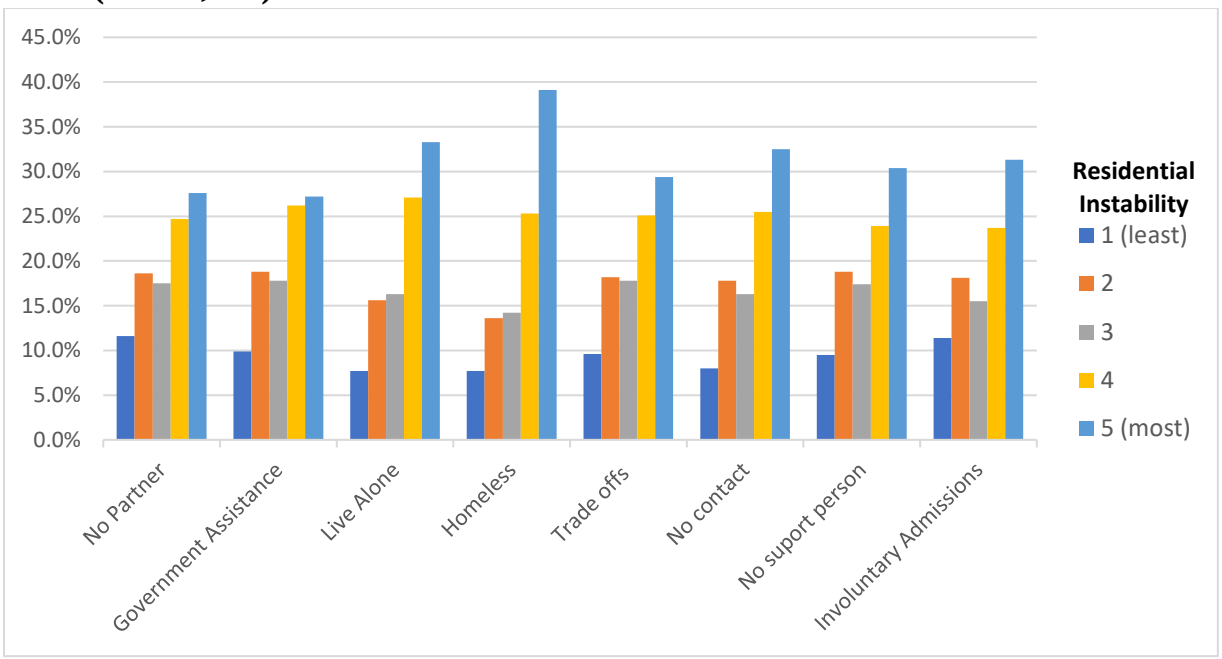
Appendices

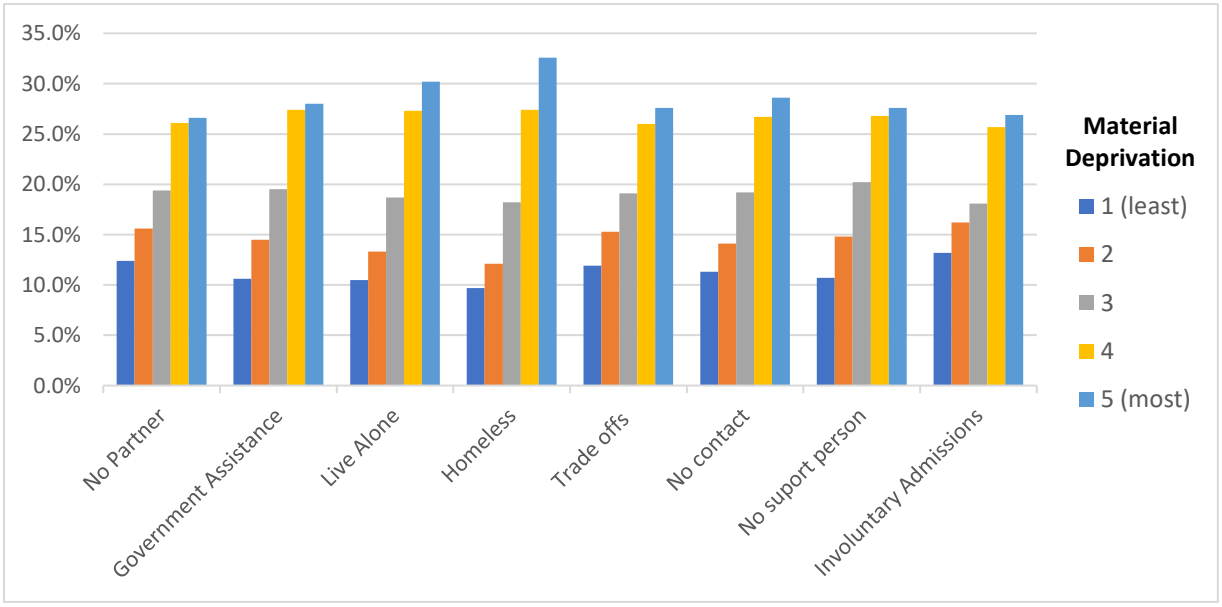
Appendix A: Distribution Comparisons between General Population and Psychiatric Inpatients based on ON-Marg Scores





Appendix B: Distribution of Individual-Level Variables by Area-Level ON-Marg Scores (N=150,600)





Legend: "No partner" refers to not having a spouse or a partner; "Government" refers to being in some form of government assistance (i.e. social assistance, employment insurance, disability insurance); "Live alone" refers to living alone at time of admission; "Homeless" refers to not having a home or being in a shelter at time of admission; "Trade offs" refers to having to do trade-offs because of limited funds to purchase prescribed medications, adequate food, and health care; "No support person" refers to not having family or friends willing to provide different types of support after discharge from formal care; and "Involuntary" refers having been admitted against own will into inpatient psychiatry.

Appendix C: Inventory of items that reflect the concept of marginalization based on RAI-MH

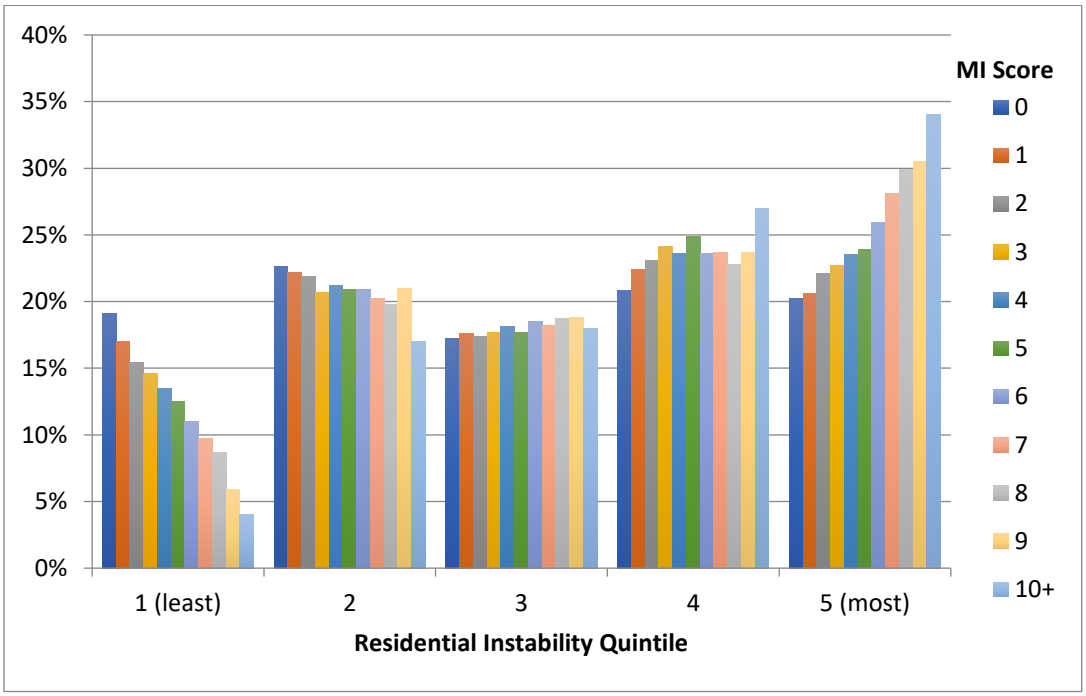
Variable No.	Variable Name	Code
BB3	Marital Status	1. Never married 2-3. (married, partnered) 4-6. (Widow, Separated, divorced)
BB5	Education	1. None 2-4. High school or less 5-8. Post-secondary
BB6a-g	Sources of income	a. Employed b-e. Social/govt g. None
CC5	Residential Stability	0. Not temporary 1. Temporary (Yes)
DD1	Number if recent psychiatric admissions	0. None 1. 1 to 2 2. 3 or more
DD2	Number of lifetime psychiatric admissions	0. None 1. 1 to 3 2. 4 to 5 3. 6 or more
DD5	Contact with community MH	0. None in past year 1. 31 days+ in past year 2. 30 days or less in past year
A3	Inpatient Status: Involuntary admission	4. Involuntary
A5	Most recent instance of police intervention	0. Never 1-5. Within a year
B1cc	Repetitive health complaints	0. Not exhibited in last 3 days 1. Not exhibited in last 3 days, but present 2. Exhibited 1 to 2 out of last 3 days 3. Exhibited daily in last 3days
B1dd	Persistent anger with self or others	0. Not exhibited in last 3 days 1. Not exhibited in last 3 days, but present 2. Exhibited 1 to 2 out of last 3 days 3. Exhibited daily in last 3days

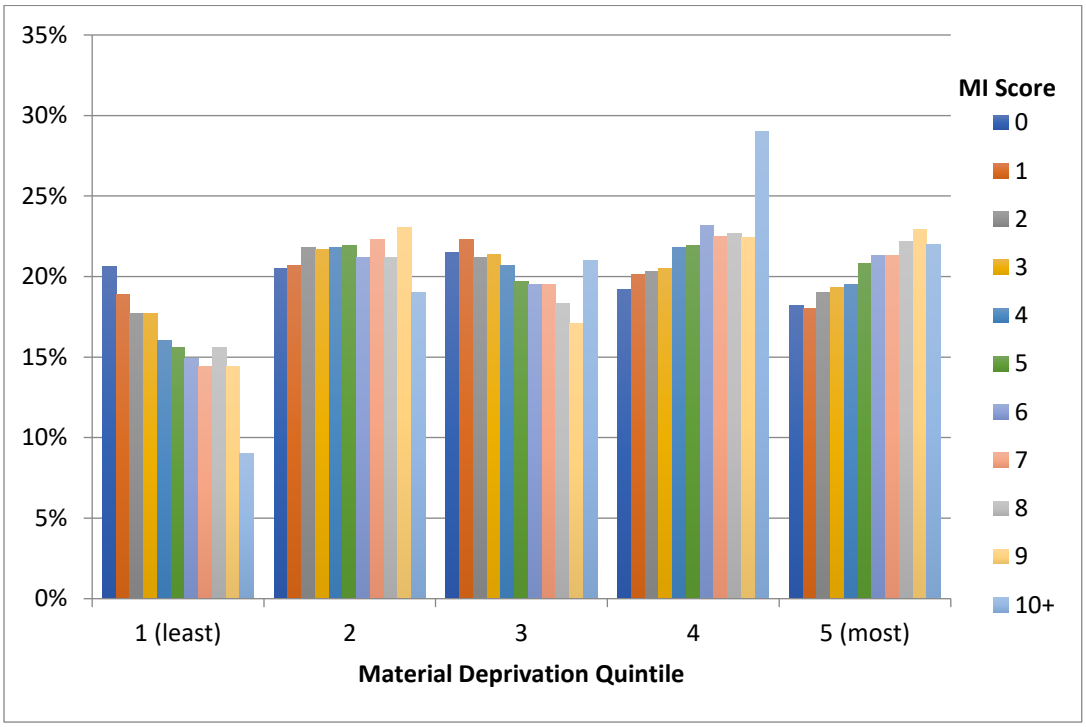
B1ff	Unusually poor hygiene	0. Not exhibited in last 3 days 1. Not exhibited in last 3 days, but present 2. Exhibited 1 to 2 out of last 3 days 3. Exhibited daily in last 3days
C1	Alcohol	0. None 1. 1 drinks 2. 2 to 4 drinks 3. 5 or more drinks
C2 a-f	Substance use: Inhalants Hallucinogens Cocaine and crack Stimulants Opiates Cannabis	0. Never or more than 1 year ago 1. Within the last year 2. Within the last 3 months 3. Within the last month 4. Within the last 7 days 5. Within the last 3 days
C4	Behaviour of substance-related addictions in last 3 months based on: Cutting down on substance use, being Angered by criticisms from others, feelings of Guilt about substance use and having an "Eye-opener" (drinking/using substances in the morning).	0. No 1. Yes
D2a-c	Violence to others Intimidation of others Violent ideation	0. Never 1-5 Within a year
D3	History of sexual violence	0. No 1. Yes
E1a-g	Wandering Verbal abuse Physical abuse Socially inappropriate/disruptive behaviour Inappropriate public sexual behaviour Resistance to care Elopement attempts/threats	0. Not exhibited in last 3 days 1. Not exhibited in last 3 days, but present 2. Exhibited 1 to 2 out of last 3 days 3. Exhibited daily in last 3days
E2	Extreme behaviour disturbance	0. No 1. Yes, but not exhibited in last 7 days 2. Yes, exhibited in last 7 days
H3	Difficulty making self understood	0. No 1-4. Difficulty present
I4	Poor physical health in last 3 days	0. No 1. Yes

J1e	Conflict-laden severed relationship	0. Never 1. More than a year ago 2. 31 days to a year ago 3-5. Less than 31 days ago
J1i	Immigration include refugee	0. Never 1. More than a year ago 2. 31 days to a year ago 3-5. Less than 31 days ago
J1j,k	Lived in war, witness terrorism violence	0. Never 1. More than a year ago 2. 31 days to a year ago 3-5. Less than 31 days ago
J1l-o	Victim of crime, sexual, emotional, physical abuse	0. Never 1. More than a year ago 2. 31 days to a year ago 3-5. Less than 31 days ago
J3a	Family experienced abuse	0.No 1. Yes
J3b	Fearful of family, caregiver	0. No 1.Yes
K1	History of medication adherence	0. Always adherent 1. Adherent 80% of time 2. Adherent less than 80% of time 3. No medication prescribed 8. unknown
M1	Control interventions	0. Not used 1-5 Used
O1	Believe relationship with family is dysfunctional	0. No 1-3. Yes
O2a	Has no confidant	0. No 1. Yes
O2b	Family/friends overwhelmed by person's illness	0. No 1. Yes
O2c	Is persistently hostile towards or critical of family/friends	0. No 1. Yes
O2e	Family/friends are hostile towards person	0. No 1. Yes
O3	Employment status	0. Yes 1-2. No 3-4. Unkown
O4a-d	Risk of unemployment/disrupted education	0. No 1. Yes
O5	Trade-offs	0. No 1. Yes

O6a	Participation in social activities	0-2. Occurred less than a month ago 3. Occurred more than a month ago
O6b	Visits from social relations	0-2. Occurred less than a month ago 3. Occurred more than a month ago
O6c	Telephone/email contact with social relations	0-2. Occurred less than a month ago 3. Occurred more than a month ago
P1a-d	Available social supports: a. Help with other dependents b. Personal safety c. Crisis d. ADL or IADL	0. No need 2,3. Yes 4. No
P2b	Has support person in community	0. No 1. Yes
Q1a-p	Psychiatric diagnostic information: DMS-IV diagnostic categories	1. Most important 2. Second most important 3. Third most important
CC4a	Admitted from	8.homeless (with or without shelter)
CC4b	Usual residence	8.homeless (with or without shelter)
P5	Living arrangement at discharge	8.homeless (with or without shelter)

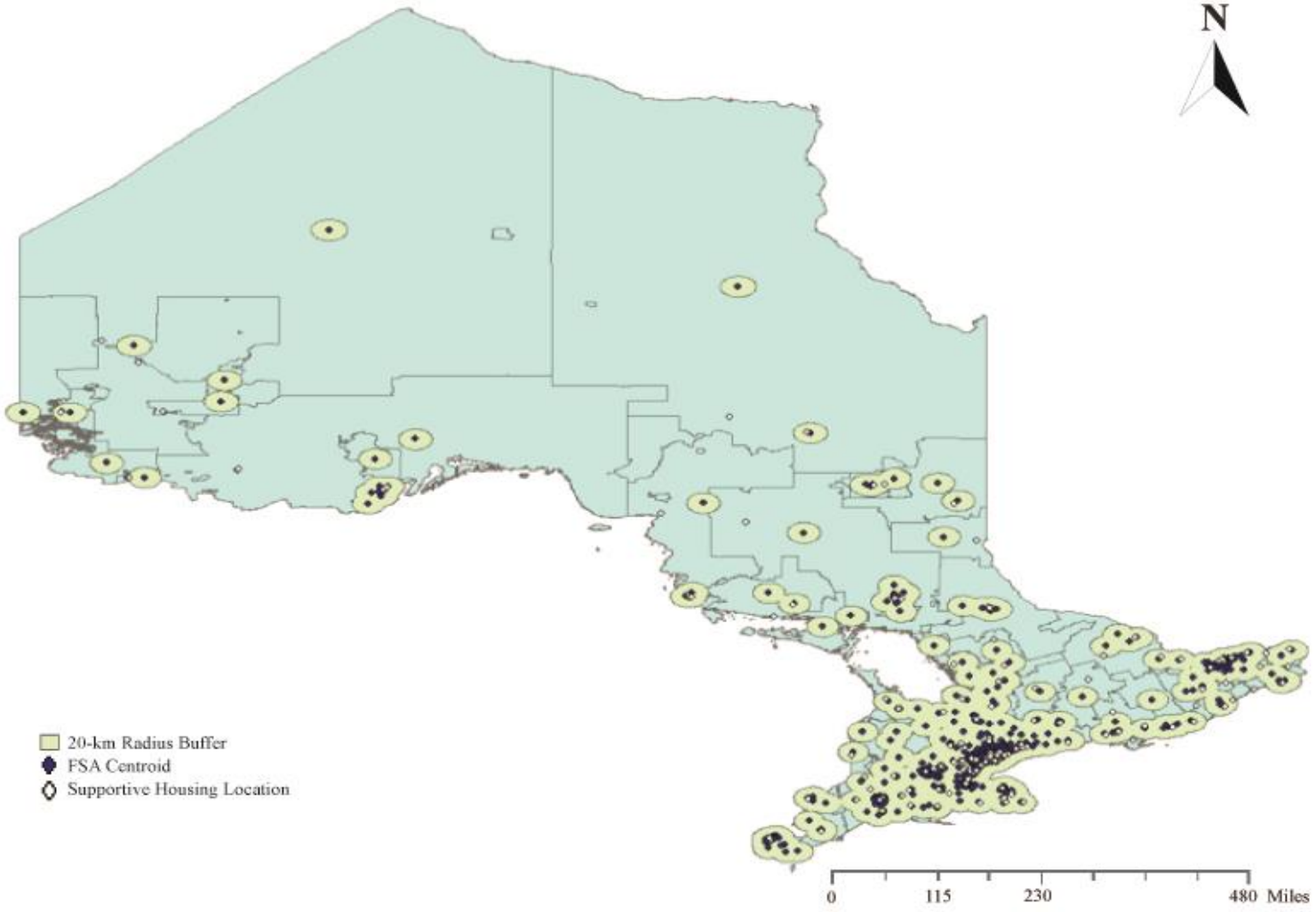
Appendix D: Relationship between MI Scores and ON-Marg Scores (N=81,232)



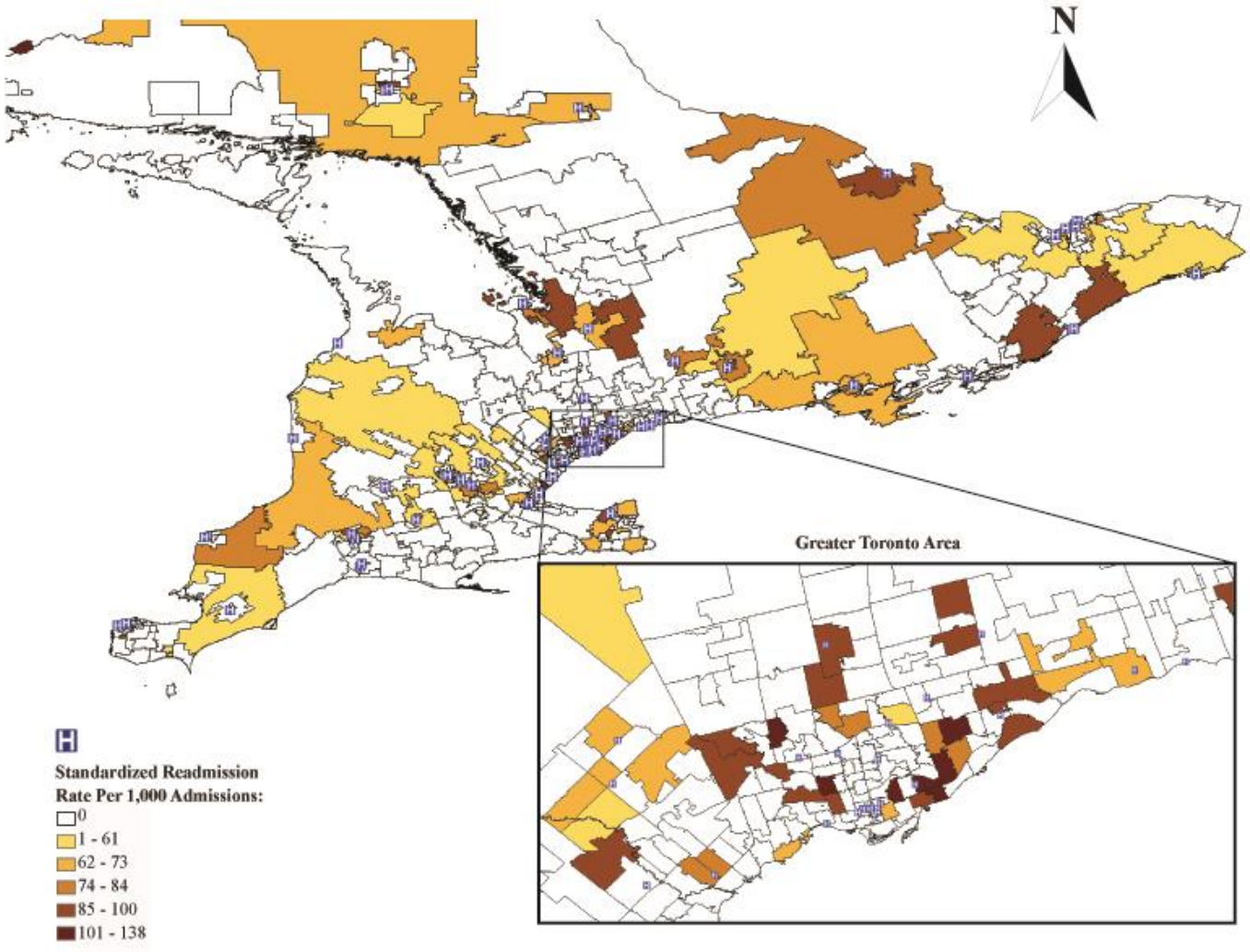


Note. Area Level Residential Instability Quintiles X^2 (DF)= 563.1 (14) <0.0001; Area Level Material Deprivation Quintiles X^2 (DF)= 240.7 (14) <0.0001

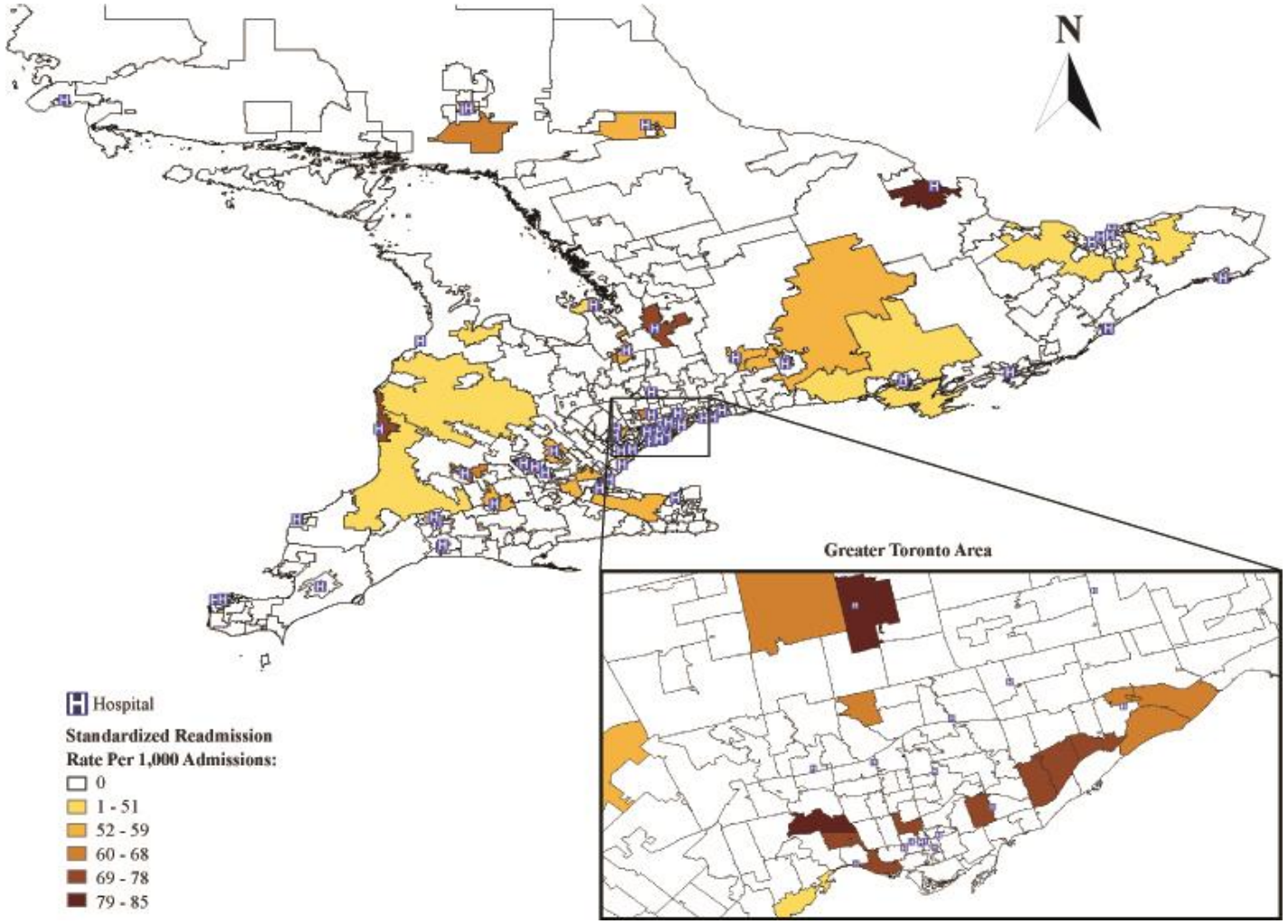
Appendix E: Proximity to Supportive Housing Services from FSA Centroids in Ontario



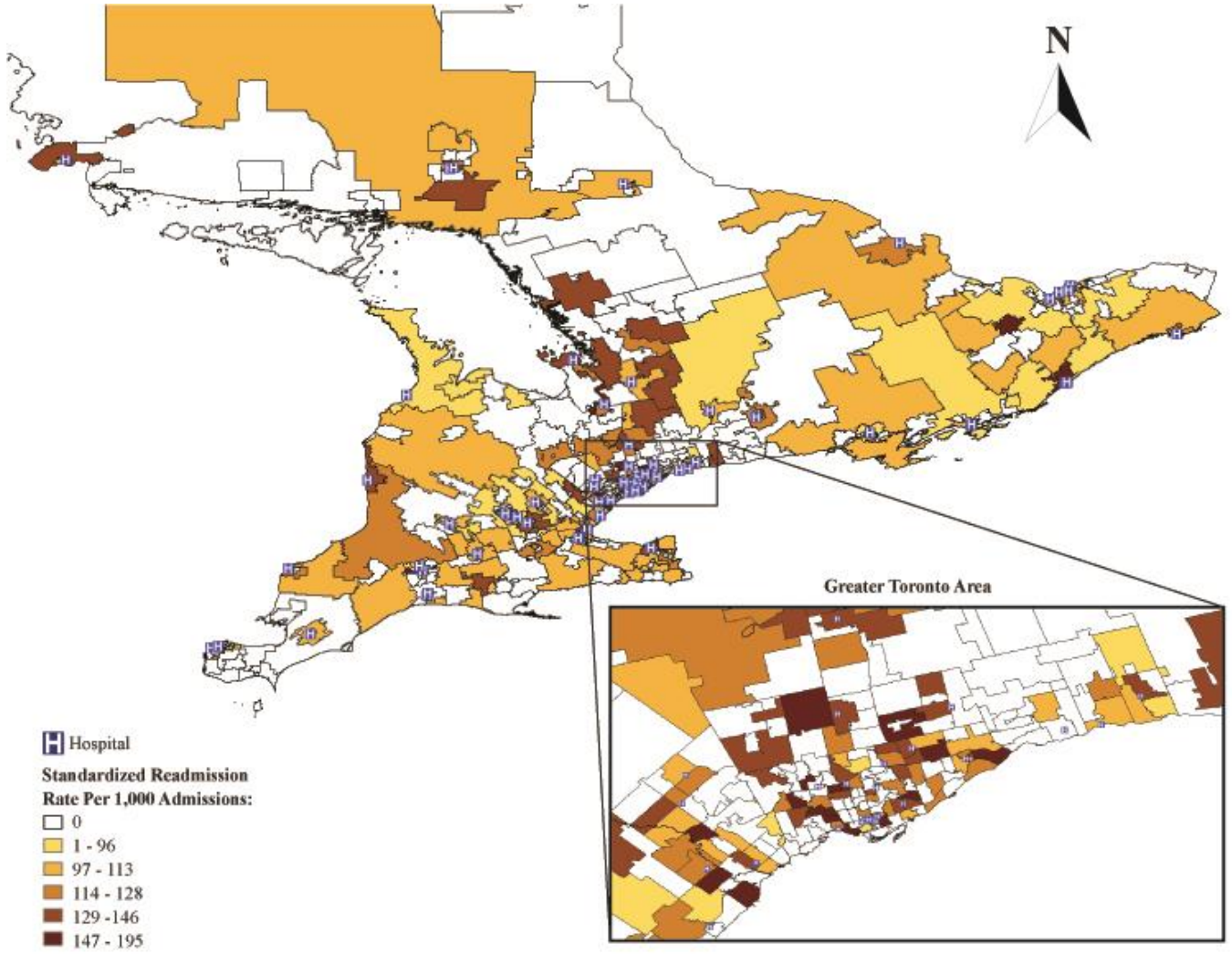
Appendix F: Standardized Short-term Readmission Rate among Marginalized Persons in Southern Ontario



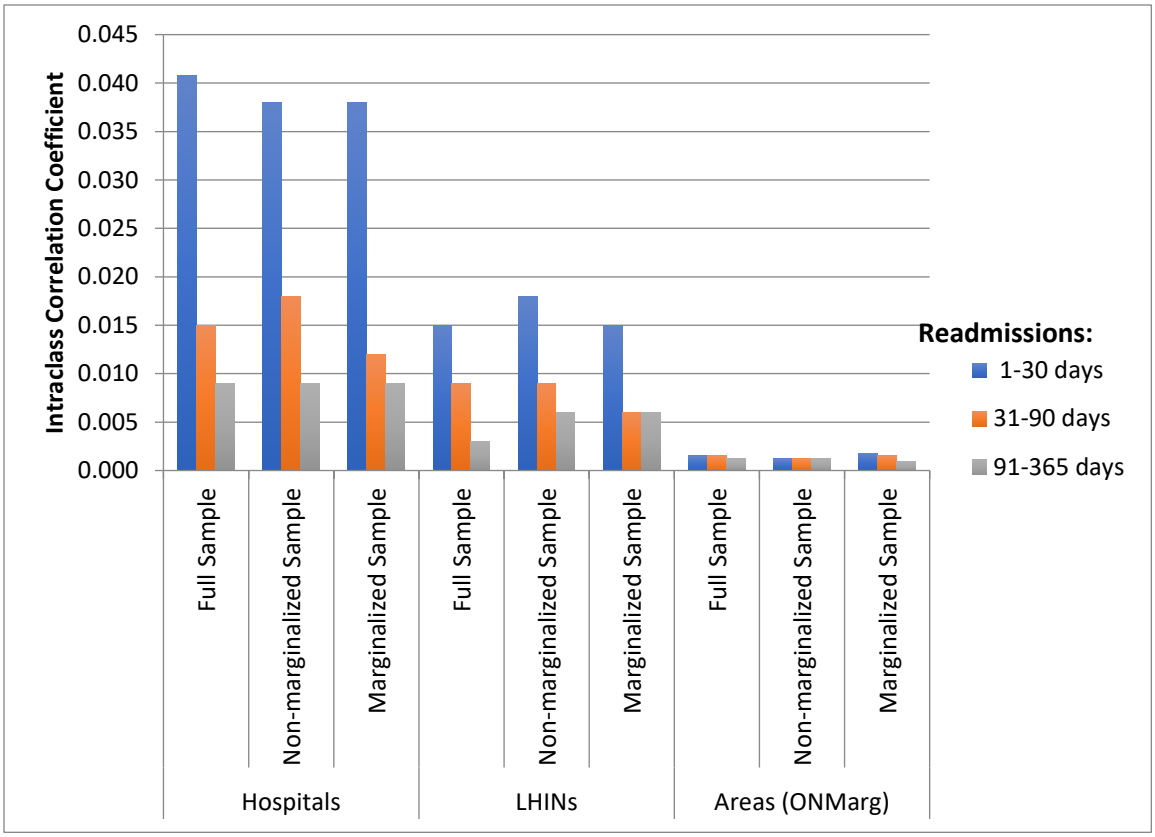
Appendix G: Standardized Medium-term Readmission Rate among Marginalized Persons in Southern Ontario



Appendix H: Standardized Long-term Readmission Rate among Marginalized Persons in Southern Ontario



Appendix I: Comparison of Intraclass Correlation Coefficients of Hierarchical Clustering by Different System Structures Among Various Samples



Note. Full sample (N=126,013); Non-Marginalized (MI score < 5) Sample (N=88,431); Marginalized (MI score 5+) Sample (N= 37,582); Hospitals (N=82); LHINs (N=14); Area Marginalization (N=5)