Patterns of health service use among people experiencing homelessness and mental illness in British Columbia

by

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Abstract

Background: The burden of illness faced by people experiencing both homelessness and mental illness is staggering. When the needs of this population go unmet, it is often the healthcare system that is criticized. The aim of this thesis was to examine patterns of medical service use among people experiencing homelessness and mental illness, and to identify factors associated with high-levels of use, health outcomes and opportunities for intervention. It was hypothesized that people with the highest objective needs would access more medical services and that those who access care in a timely and continuous fashion would have better outcomes, including lower risk of hospitalization.

Methods: Data were drawn from both the baseline interviews of Vancouver At Home (VAH) study participants and the Inter-Ministry Research Initiative database. All analyses were retrospective using both self-report and administrative data to examine factors associated with low vs. high health service use, continuity of care following hospitalization, and timeliness of community-based medical service use following detention in provincial custody.

Results: Among VAH participants, we found that those with lower assessed need were accessing more health services that those with higher needs (i.e., schizophrenia). When continuity of care was examined, we found that our sample was accessing community-based outpatient services in both a timely and ongoing manner, however, it was not conferring a protective benefit against rehospitalization. Finally, when studying the impact of timely community medical service use following release from provincial custody, we found that those who accessed services in both a timely and continuous manner were more likely to be hospitalized than those not using services in this manner.

Discussion: These findings highlighted the overwhelming burden of illness among people experiencing homelessness and mental illness. Contrary to our hypotheses, those with the greatest needs were not accessing the most health services, and for those who did access services frequently, these contacts did not offer protection against further negative health outcomes including hospitalization. Collectively these findings suggest looking beyond the healthcare system and underscore the importance of structural and systemic failings within our social, justice and healthcare systems as perpetuating the morbidity within this population.

Keywords: homelessness; mental illness; social determinants of health; medical service use; continuity of care; unmet need

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Table of Contents

Declaration of Committee ii
Ethics Statement iii
Abstract iv
Acknowledgements vi
Table of Contents vii
List of Tables x
List of Figures xi
List of Acronyms xii
Glossary xiii
Preface xiv

Chapter 1. Introduction 1
1.1. Theoretical Frameworks 2
1.1.1. Social Constructionism 2
1.1.2. Social Ecological Approach 3
1.1.3. Political Economy 4
1.1.4. Health Equity and Social Justice 5
1.2. Social Determinants of Health 6
1.2.1. Understanding Social Determinants of Health 7
1.2.2. Income inequality as a determinant of health 8
Vulnerable populations 9
Access to resources 10
Income inequality, homelessness and health disparities in Canada 10
Empirical Evidence of Income Inequality and Shortcomings 12
1.3. Homelessness in Canada 12
1.3.1. Historical context of homelessness in Canada 12
Canadian Housing Policy: Post Depression to Present 13
Neoliberalism and Homelessness 15
Deinstitutionalization of Mental Illness 15
1.3.2. Present day homelessness in Canada 17
1.3.3. Interventions for people experiencing homelessness and mental illness 19
Continuum of Care 20
Housing First Approach 21
1.4. Homelessness Research in Canada 22
1.4.1. Foundations of Homelessness Research in Canada 22
1.4.2. Research Areas and Methodologies 23
Estimating Prevalence 24
Cross-Sectional Studies 25
Intervention Studies 26
1.5. Rationale for current study 27
1.5.1. Study Aim and Objectives 28

Chapter 2. Examining the relationship between health-related need and the receipt of care by participants experiencing homelessness and mental illness 30
2.1. Abstract 30
2.2. Background 31
2.3. Methods 33
2.3.1. Data Source and Sample 33
2.3.2. Predisposing, Enabling and Need Factors 34
Predisposing Factors 34
Enabling Factors 34
Need Factors 35
2.3.3. Definition of High and Low Health Service Use 35
2.3.4. Statistical Analysis 35
2.4. Results 36
2.4.1. Sample Characteristics 36
2.4.2. Health Service Use – Past Month 37
2.5. Discussion 44
2.5.1. Primary Health Care Visits 46
2.5.2. Specialist Health Care Visits 46
2.5.3. Strengths and Limitations 47
2.5.4. Conclusion 48
2.6. List of Abbreviations 48
2.7. Competing Interests 49
2.8. Authors' Contributions 49
2.9. Acknowledgments 49

Chapter 3. Continuity of care among people experiencing homelessness and mental illness: Does community follow-up, reduce rehospitalization? 50
3.1. Abstract 50
3.2. Introduction 51
3.3. Methods 52
3.3.1. Participants: 52
3.3.2. Data Sources 53
3.3.3. Variables 53
3.3.4. Statistical Analysis 53
3.4. Results 54
3.5. Discussion 59
3.5.1. Strengths and Limitations 61
3.6. Conclusion 62
3.7. Statement of Ethics 62
3.8. Funding 62
3.9. Acknowledgments 63
3.10. Conflict of Interest 63
3.11. Supplemental Materials 64

Chapter 4. Schizophrenia and provincial corrections: Does timely community medical service use following custody release improve health outcomes? 69
4.1. Abstract 69
4.2. Introduction 70
4.3. Methods 72
4.3.1. Data Sources 72
4.3.2. Measures 73
4.3.3. Analysis 74
4.4. Results 75
4.5. Discussion 84
4.5.1. Strengths & Limitations 87
4.5.2. Conclusion 87
4.6. Supplemental Materials 88

Chapter 5. Conclusions and Implications 93
5.1. Summary & Findings 93
5.2. Implications for Policy & Practice 96
5.3. Future Research 99
5.4. Strengths & Limitations 100
5.5. Conclusions 102

References 103

List of Tables

Table 2-1 Univariate comparisons of predisposing characteristics, by primary and specialist health service use. 38

Table 2-2 Univariate comparisons of enabling characteristics, by primary and specialist health service use. 40

Table 2-3 Univariate comparisons of need-related characteristics, by primary and specialist health service use. 41

Table 2-4 Associations between predictor variables and high primary health service use (≥ 3 visits). 43

Table 2-5 Unadjusted and adjusted odds ratios for associations between predictor variables and levels of service use for specialist health care visits (≥ 3 visits). 44

Table 3-1 Socio-demographic characteristics of study participants. 55

Table 3-2 Re-hospitalization over a period of 1 year among eligible study participants (N=318) 56

Table 3-3 Comparisons of outpatient services between participants who were re-hospitalized and who were not 57

Table 3-4 Logistic regression analysis to estimate the association between outpatient services and re-hospitalization 58

Table 3-5 Comparisons of outpatient services (over four weeks) between participants who were re-hospitalized and who were not. 64

Table 3-6 Logistic regression analysis to estimate the association between outpatient services (over four weeks) and re-hospitalization. 65

Table 3-7 Logistic regression analysis to estimate the association between psychiatric outpatient services and re-hospitalization (psychiatric reason). 67

Table 4-1 Socio-demographic, community care, service utilization and offence related characteristics of people with schizophrenia in BC Provincial custody, 2007 to 2014 (n=3,750) 77

Table 4-2 Rate of hospitalization and estimates of hazard ratio for socio-demographic, community care, and offence related characteristics among people with schizophrenia in BC Provincial custody, 2007 to 2014 (n=3,750) 80

Table 4-3 Continuity of community services and hospitalization during 1-year post-release (follow up) period among people released from custody with schizophrenia in BC, 2007 to 2014 (n=3,750) 82

Table 4-4 GEE logistic to estimate the association between continuity of community service and re-hospitalization 83

Table 4-5 Summary of variables/information available from the Ministry of Health dataset 89

Table 4-6 Summary of Variables/information available from the Ministry of Justice. 90

Table 4-7 Description of variables included in the multivariable Cox regression. 91

List of Figures

Figure 4-1 Flow chart of individuals in judicial custody of British Columbia (BC) between 2007 and 2014 included in the study 76

Figure 4-2 Biweekly community services (%) during 1-year post-release (follow up) period among people released from custody with schizophrenia in BC, 2007 to 2014 (n=3,750) 83

List of Acronyms

ACT	Assertive Community Treatment
AHR	Adjusted Hazard Ratio
BC	British Columbia
CI	Confidence Interval
CIHI	Canadian Institute of Health Information
CMHC	Canadian Mortgage and Housing Corporation
DAD	Discharge Abstract Database
DSM	Diagnostic and Statical Manual of Mental Disorders
HR	Hazard Ratio
ICD-10	International Classification of Diseases and Related Health Problems 10th Revision
ICD-9	International Classification of Diseases and Related Health Problems 9th Revision
ICM	Intensive Case Management
IMRI	Inter-Ministry Research Initiative
IQR	Interquartile Range
MSP	Medical Services Plan
NSMD	Non-Substance related Mental Disorder
PY	Person Year
SD	Standard Deviation
SDH	Social Determinants of Health
SES	Socioeconomic Status
SMI	Severe Mental Illness
SRO	Single Room Occupancy Hotel
SUD	Substance Use Disorder
TAU	Treatment As Usual
UHR	Unadjusted Hazard Ratio
US	United States
VAH	Vancouver At Home

Glossary

British Columbia Inter-Ministry Research Initiative (IMRI)	A database linking administrative records from publicly funded departments responsible for delivering health, justice and social welfare services to the population of British Columbia. Academic leadership provided by the Somers Research Group with collaborators in multiple provincial ministries.
Continuity of Care	Continuity is the degree to which a series of discrete healthcare events is experienced as coherent and connected and consistent with the patient's medical needs and personal context. [1] (Haggerty, et al., 2003)
Housing First (HF)	Housing First involves providing people experiencing homelessness with immediate access to subsidised housing, together with supports. [2]
Schizophrenia	Disorder Class: Schizophrenia Spectrum and Other Psychotic Disorders. *Characteristic Symptoms*: Two (or more) of the following each present for a significant portion of time during a 1-month period (or less if successfully treated). At least one of these must be: (1) delusions, (2) hallucinations, or (3) disorganized speech (e.g., frequent derailment or incoherence). May also include (4) grossly disorganized behaviour or catatonic behaviour, or (5) negative symptoms (i.e., diminished emotional expression or avolition). [3] (*for full diagnostic criteria see Diagnostic and Statistical Manual of Mental Disorders: 5th Edition*)
Vancouver At Home (VAH)	The Vancouver At Home (VAH) study was a pragmatic randomized controlled trial conducted in Vancouver BC (2008-2013) to study the impact of applying Housing First among people experiencing homelessness and mental illnesses. VAH was part of a larger national multi-site study know at the At Home/Chez Soi project funded by the Mental Health Commission of Canada with additional sites in Winnipeg, MB, Toronto ON, Montreal QC, and Moncton, NB. [4]

Preface

This thesis has been developed in the 'three manuscript format' outlined by the Faculty of Health Sciences at Simon Fraser University. At the time of writing, the first and second manuscripts included in this thesis have been published in peer-reviewed journals and the third manuscript is under review. Brief details are provided below.

The first manuscript is (presented in Chapter 2 of this thesis) "*Examining the relationship between health-related need and the receipt of care by participants experiencing homelessness and mental illness*" was published (2014) in BMC Health Services Research with co-authors Patterson ML, Moniruzzaman A, McCandless LC, and Somers JM. This study used baseline data from the Vancouver At Home (VAH) study and investigated patterns of medical service use among people experiencing both homelessness and mental illness in Vancouver, BC.

> Currie LB, Patterson ML, Moniruzzaman A, McCandless LC, Somers JM. Examining the relationship between health-related need and the receipt of care by participants experiencing homelessness and mental illness. BMC Health Serv Res. 2014;14(1):404. doi:10.1186/1472-6963-14-404

The second manuscript (presented in Chapter 3 of this thesis) "*Continuity of Care among People Experiencing Homelessness and Mental Illness: Does Community Follow-up Reduce Rehospitalization?"* was published in (2018) Health Services Research with co-authors Patterson ML, Moniruzzaman A, McCandless LC, and Somers JM. This study used a combination of administrative data from the Inter-Ministry Research Initiative (IMRI) and baseline data from VAH study participants to examine the effect of continuity of care between inpatient and outpatient medical services, on rehospitalization.

> Currie LB, Patterson ML, Moniruzzaman A, McCandless LC, Somers JM. Continuity of Care among People Experiencing Homelessness and Mental Illness: Does Community Follow-up Reduce Rehospitalization? Health Serv Res. 2018;53(5):3400-3415. doi:10.1111/1475-6773.12992

The final manuscript (presented in Chapter 4 of this thesis) "*Schizophrenia and provincial corrections: Does timely community medical service use following custody release improve health outcomes?*" is under review with co-authors Moniruzzaman A, and Somers JM. This study used administrative data from the IMRI to examine the role of continuity of care between BC Provincial custody release and community-based

medical service use among people with schizophrenia and the likelihood of subsequent hospitalization.

Chapter 1.

Introduction

In nearly every wealthy developed nation, this prosperity is contrasted with the pervasive issue of homelessness, and Canada is no exception. The poverty experienced by those who are homeless has existed among low-income groups for centuries; however, over the past several decades, homelessness has emerged as a significant social, economic, and public health problem that has yet to be addressed in a truly effective manner on a large scale. [5–7] Homelessness is an ever-increasing problem in Canadian cities and is often associated with a wide variety of social and health problems including crime, illicit drug use, public intoxication, infectious disease spread, costly health service use, and increased demands on law enforcement and criminal justice system services. [8] The extreme poverty, housing insecurity and social exclusion faced by people experiencing homelessness and mental illness increases their vulnerability for communicable and chronic disease morbidity, premature mortality, negative health outcomes, victimization, police contacts, and overall poor quality of life. [6]

Questions regarding how to intervene and allocate public resources towards this issue are recurring topics among policy and decision makers in all levels of government. In recent years, political responses to homelessness including municipally oriented actions to address the lack of affordable housing and reduce street homelessness, as well as the funding of large-scale homelessness intervention studies, suggests that there is a public and political will to respond to this issue. [2] In order to effectively address the issue of homelessness we must ensure that such actions are coordinated across service sectors and supported by all levels of government.

This thesis seeks to examine some of the unmet needs of those experiencing homelessness and severe mental illness (SMI) in Canada. While homelessness is a risk and a reality faced by many people including men, women, youth, and families across diverse ethnic and cultural backgrounds, issues as they specifically relate to adults with mental illnesses will be highlighted. The overrepresentation of mental illness within homeless populations points to a failing of our healthcare, justice and social welfare systems, and highlights an important area for intervention. Structured upon a public

health foundation, the discussion of homelessness will be developed through an understanding of the social determinants of health (SDH) and their relationship to homelessness and mental illness in the Canadian context. A historical perspective on Canadian public policy as it relates to housing and social assistance will be used to contextualize the emergence of homelessness as a public health crisis requiring the attention of service providers, researchers and decision makers at the municipal, provincial and federal levels. [9,10] Research has sought to characterize the experience of homelessness, evaluate existing responses and develop new interventions for coping with and addressing the problems associated with homelessness. As such, the existing field of research on homelessness in Canada will be critically assessed and future directions will be considered.

1.1. Theoretical Frameworks

The manner in which we study, discuss and intervene on issues such as homelessness and health is strongly influenced by the theoretical frameworks that are applied to such issues. Historically, health research has been largely situated in the realm of medicine, which often focuses on individual biology and behavioural characteristics. The interdisciplinary field of public health attempts to explain the many factors necessary to achieve and maintain health. As much of the research on homelessness has emerged from the public health field, it derives its theoretical underpinnings largely from the disciplines of psychology, sociology, medicine, economics, urban studies, and policy studies. [11] The area of homelessness research has been criticized for often lacking an explicit theoretical approach, and rather emerges from an area of political concern where research is empirically driven. [12,13] The following section discusses different theoretical perspectives that have applicability in the study of homelessness.

1.1.1. Social Constructionism

Framing homelessness through a social constructionist lens is one way in which researchers have attempted to understand and explain homelessness. This theory was developed based upon earlier conceptions of the constructivist theory of knowledge. [5] Social constructionism explains that the way we interpret the world around us is

influenced by the interaction between our individual perceptions within a social context. [14] This idea expands upon earlier theories by underscoring the importance of acknowledging social context. [5] Social constructionism is useful in attempting to understand how homelessness has evolved to become the problem that persists today, and why we face considerable difficulty in attempting to effectively intervene.

The understanding of individualism versus structuralism is fundamental to social constructionism. An individualist perspective views homelessness as the responsibility of the individual, and something that results from personal choice and deviant behaviour. A structuralist view considers homelessness to be the result of poverty, socioeconomic factors and political conditions. [5] In recent years social science researchers have come to promote the belief that both individual and structural factors have interacted to produce homelessness as it exists today. [5] This view, however, is often at odds with public opinion as evidenced by how political and economic decisions have been made over the past several decades with respect to taxation, social assistance and affordable housing. As is discussed further in a subsequent section, neoliberal ideals encourage and perpetuate individualism, limiting our capacity to respond to social problems at a structural level. Social constructivism asserts that individual experiences occur within a social context; therefore, we cannot simply blame the individual and ignore the structural factors that shape the social context. [5] Acknowledging the role of different levels of influence from the individual to the structural level provides a useful framework for developing policy relevant research with the potential for affecting change beyond what focusing on one level alone would allow. [14]

1.1.2. Social Ecological Approach

A social ecological approach is similar to social constructionism as is focuses on the environmental context in which people experiencing homelessness live, and emphasizes the importance of personal histories, social, economic and material resources. [12] To conceptualize the relationship between homelessness and mental illness, a socio-ecological approach integrates the social aspects of health and wellness within the larger structural and environmental context and creates opportunities for health promotion and intervention. By the same token, it acknowledges that individual experiences are highly variable and multifaceted and as such interventions or approaches that only focus on one aspect of need will miss the bigger picture. A social-

ecological approach considers the interactions of risk factors and everyday processes from the level of the individual (microsystems) through interpersonal (mesosystems) and community level influences (exosystems), and finally structural or societal level influences (macrosystems). [15,16]

The social-ecological approach to examining the relationship between homelessness and mental illness does not dichotomize the levels of influence into individual or structural factors, but recognizes that there are levels of influence between them that play a role in shaping the experience of the individual. [16] By recognizing these different levels of influence, this framework highlights the opportunity for implementing mental health promotion and prevention interventions within each level of influence. It has been argued that a social ecological perspective may not be helpful in conceptualizing testable hypotheses, but as a model it provides a practical template for research design and intervention. [12]

1.1.3. Political Economy

In the prevailing neo-liberal political climate of Canada, marginalized persons face significant barriers to accessing health and social services, and experience overall poorer health outcomes. Neo-liberalism promotes free-market enterprise, with the belief that individuals are their own products and that free-trade policies will promote the greatest good, as individuals will be freed from constraints. [17] The critical political economy perspective argues that such policies undercut investment in publicly funded programs and contribute to deterioration of the social infrastructure that promotes health. This critical perspective asserts that neo-liberal ideology is unconcerned with income inequality and essentially promotes it. [17]

In order to understand the driving political influences in Canada that shape health inequities, it is useful to consider the situation in relation to other democratic capitalist nations. Norway, Sweden and Finland are considered to be the least neo-liberal among democratic capitalist nations and are referred to as social democratic welfare states. [17] These states highlight citizen rights and de-commodification, which deemphasizes reliance on the market as the source of wellbeing. In contrast the United States, United Kingdom, Australia and Canada are considered to be the most neo-liberal. Described as liberal welfare states, these nations emphasize the centrality of the market. [17,18] The

income gap in social democratic welfare states tends to be narrower compared to liberal welfare states. A wide income gap, as has been documented in liberal welfare states, is associated with poor health outcomes. [17,18] As this gap increases so does health inequity. [19,20]

1.1.4. Health Equity and Social Justice

Definitions of health inequity vary between jurisdictions and are influenced by distinct forces depending on existing social, economic and political drivers. The accepted definition of health inequity in Canada refers to disparities of concern between groups that can be attributed to "systematic differences in health status between different socioeconomic groups", that exist due to social processes – which are therefore modifiable, and as such are considered to be unjust (Whitehead & Dahlgren, 2006, p.2). [21] Health *inequity* is not to be confused with health *inequality*, which simply refers to differences between groups that may or may not be of concern; while inequality is a statement of mathematical difference, inequity is a statement of injustice. [22,23] Associated with various different factors, health inequities are linked to poverty, homelessness, inadequate social support, and unemployment, and in Canada these factors are attributable to staggering income inequality. [24]

With the Lalonde Report A New Perspective on the Health of Canadians in 1974 and the Ottawa Charter for Health Promotion in 1986, Canadian scholars and policy makers have been instrumental in shaping our understanding of the social determinants of health and have been leaders at bringing non-medical and social inequities to the forefront of discussions about population health. [25] Despite this legacy, there has been little uptake of these ideas in the Canadian policy arena, and population health policy in Canada remains primarily grounded in medicine and lifestyle factors of illness. [18,22,26] A general consensus among academics asserts that the most effective means of addressing health inequities would be through improving the socioeconomic conditions of daily life as was originally suggested by the Ottawa Charter, however, at this time political support and public spending remains focused on clinical care and behaviour modification. [22,25]

Our understanding of what shapes health and illness within and between populations has evolved over time. With the advent of technologies to detect infectious

contagions, through the implication of lifestyle factors, and most recently with the recognition that health and illness are multifaceted and causally dependant on a variety of socially determined factors, we have made critical advancements in our understanding of what creates health and illness. [27] In Canada, we are uniquely poised to address health disparities in a meaningful way; however, this requires a commitment to address the role that socially determined factors, such as housing, income inequality, and social exclusion, play in shaping health. [28]

The manner in which we are able to address health inequities is implicitly influenced by economic and political ideology. [18] In order to locate the root causes of inequities and work to ameliorate them, it is necessary to understand the political and economic context in which decisions are made. [27] These factors dictate the allocation and distribution of material resources, such that investment in public infrastructure including health care and social services is determined not necessarily based on need, but on political agendas, dominant public interest groups, the influence of commercial and industrial enterprises, and advocacy. [22]

1.2. Social Determinants of Health

Public health seeks to understand and address health related issues from a population-level perspective and considers the broader conditions of daily life as they affect health outcomes. This discipline extends our understanding beyond individual behavioural and biomedical determinants of disease and gives credence to the role of structural, social, economic and political factors in shaping health. This practice of a comprehensive approach to understanding health is grounded in the concept of SDH.

It is argued that health is primarily determined by economic and social factors. [22] While individual biology does play a significant role in shaping our health, structural forces such as resource distribution, societal organization and governance directly and indirectly shape how we experience our biology and determine how our health is manifested. The notion of SDH represents a paradigm shift away from traditional biomedical and behavioral notions of illness and disease, towards an understanding of health from a population perspective, which recognizes that individuals are not solely responsible for shaping their health, but that social, political and economic forces have an important role to play. [22]

1.2.1. Understanding Social Determinants of Health

The origin of the SDH concept grew out of a search to define mechanisms that might describe differences in health (disease/illness) between groups of differing socioeconomic status. [27] Teasing apart these differences among individuals was difficult and therefore required examination at the population level. Researchers were curious about how to explain apparent differences, and sought to understand, why, for example, a formidable, developed country like the United States ranks poorly on indicators such as life expectancy, infant mortality and death by childhood injury, compared to other developed countries. [22]

The current definition of social determinants has evolved over time and the constituent parts included in the definition vary depending on the location in which they are applied. A seminal document, The Ottawa Charter for Health Promotion was born as a response to this movement towards defining the scope of public health to include economic and social factors. The Charter defines health promotion as follows:

> "Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realize aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector but goes beyond healthy life-styles to well-being." - World Health Organization, 1986 [29]

Additionally, the Charter contains a list of "prerequisites for health" including peace, shelter, education, food, income, a stable eco-system, sustainable resources, social justice, and equity. [29] Our understanding of the role of social determinants was further developed by important contributions made by Wilkinson and Marmot (2003) [30] who showed drastic differences in health and disease incidence among individuals of different socioeconomic status, and by Navarro et al. (2004) [31] who demonstrated population level differences in mortality and morbidity between economically developed countries as a result of socioeconomic inequalities. [20]

In Canada, the composition of the list of key determinants has evolved overtime to reflect both changes in knowledge and with the recognition that living conditions and their relative impact on health changes overtime. [32–35] The most recent list of seventeen determinants includes the following: disability; early childhood development; education; employment and working conditions; food insecurity; gender; geography; globalization; health services; housing; immigration; income and income distribution; Indigenous ancestry; race; social exclusion; social safety net; and unemployment and job security. [35] While all of the determinants play their own important role in effecting health outcomes, it is often difficult to disentangle the significance of a deficit in one determinant over another. The social determinants as listed above are often highly correlated with one another and therefore certain determinants arguably weigh more heavily on individual health outcomes due to their cascading effects on other determinants. Housing and income are two key determinants that are both correlated with one another and can have a significant impact on health outcomes. It is notable, however, that while multiple Canadian professional organizations including the Public Health Agency of Canada, [36] the Canadian Medical Association, [37] the Canadian Nurses Association, [38] BC Ministry of Health, [39] and the BC Health Coalition [40] all include housing as a determinant of health on their websites, it is conspicuously absent from the list that is posted on the Government of Canada website which was updated as of October 2020. [41]

1.2.2. Income inequality as a determinant of health

Since the early 1990's, the ever-widening income gap between low- and high-income Canadians has contributed to profound disparities in the distribution of resources and opportunities. [26] This inequality has a marginalizing effect that is felt most acutely by those in the lowest income groups. The issues of unemployment, food insecurity and housing instability exemplify the consequences of income inequality. As a developed country, the income disparity between low- and high-income Canadians is the distinction of interest and not necessarily the absolute income of those living in poverty. A relative comparison between developed and developing countries might lead to the assumption that even the lowest income individuals in a developed country are sufficiently wealthy to meet their own needs, however, this comparison would not be accurate as the experience of poverty with respect to income in a developed country is objectively

different than that in a developing country. [42] Income inequality in Canada will be considered relative to other Western developed nations and in the context of changing policies related to taxation and income redistribution.

Many population health researchers have argued that wealthier is healthier. [43] The size of the income gap between the rich and the poor in wealthy economies, has been shown to have a measurable effect on population health – where the wider the income gap, the poorer overall health of the population. [43] Standard economic theory suggests that by increasing the income level of the poor while marginally decreasing that of the wealthiest people, will contribute to improved health among the lowest income groups. [44] The value of increased income and subsequent improved health among low-income individuals will confer greater population health benefits than the potential marginal decreased health status of those at higher income levels that may follow reduced income. [45] The connection between income and other determinants of health including access to basic necessities such as food and shelter is implicit. Employment generally is a prerequisite for having the income to be able to provide oneself with the basic necessities, therefore when these systems break down, are absent, or are insufficient to meet basic needs, health deteriorates. [18]

Vulnerable populations

Certain circumstances place individuals at increased risk of experiencing the effects of income inequality. Low socioeconomic status, lone parent household status (specifically single women with children), racialized people, and new immigrants typically have a greater likelihood of experiencing poverty. [46] Similarly, these same populations are at higher risk of experiencing housing instability, food insecurity and unemployment. [46,47] In Canada low-income status is associated with poor health outcomes. [48] Several adverse health outcomes have been highlighted as disproportionately effecting low-income Canadians. In the poorest neighbourhoods of Canada infant mortality rates have been observed to be two-thirds higher than in the wealthiest; chronic health conditions are more prevalent among low-income households; and a higher prevalence of diabetes among Canadians aged 45-64 is observed among low- or lower middle-income individuals compared to middle- or high-income individuals. [26]

Access to resources

Despite the presence of a universal health care system, many are unable to access adequate health services due to poverty, discrimination and perceptions of stigma – particularly among those who are homeless. [49–51] Inequalities in service access and utilization among groups of differing socioeconomic status (SES) leads to problematic inequities in health and social circumstance. [21] Canadian Institute of Health Information regularly releases population data illustrating age-standardized rates of hospitalization by SES. They report that individuals in low-SES groups are hospitalized at higher rates across all surveyed physical and mental health conditions as compared to individuals at middle- and high-SES. [52] The observed high hospitalization rates among low-SES Canadians has been interpreted as an indicator of a failing of primary health care system and overall poorer health status. [43,52,53] If poorer individuals had better access to health services at a primary care level, the deleterious effects of many health conditions could be prevented or treated on an outpatient basis without needing to access hospital-based services. [52]

Income inequality, homelessness and health disparities in Canada

Since the early 1990s Canada has seen a steady rise in income inequality, after having remained relatively stable through the late 1970s and 1980s. [54] An examination of income data in Canada shows that from 1989 to 2004, after-tax income decreased among low-income families, while it increased for middle- and high-income families. [55] As such, the range of absolute income increased significantly between those with income in the lowest 10% versus those in the highest 10% of the Canadian population – thus widening the income inequality gap. [55] This inequality has been primarily attributed to changes in taxation, changes in eligibility requirements and dispensation level of social assistance and employment insurance. Since the 1980s social assistance and employment insurance benefits have become more conservative and difficult to qualify for. Further, changes in income redistribution policies from the trend of increased taxation in the 1980s followed by reductions in the 1990s is likely to have played a role in the observed increasing income gap more recently. [55] By decreasing taxes, there are decreased funds available to be spent on social and income assistance programs that would most benefit those in lower-income groups, it is therefore not surprising that we have observed this widening income inequality gap. [42] Compared to other Western developed nations, Canada sits approximately in the middle with countries like Norway

and Sweden experiencing a narrower income gap, and conversely the United States with a wider income gap. [42]

Housing is an important determinant of health and prerequisite for an individual to meet their basic needs and higher order needs. Maslow's hierarchy of needs conceptualizes the arrangement of needs that can be used to illustrate the role that income plays in determining health. The hierarchy ranges from a position of 'deficit needs' through five levels of 'being needs' that contribute to an individual's overall health and wellbeing. If needs at any level of the pyramid are unmet, individuals will not be able to realize the next level until they meet the needs specified by their current position. [56] The bottom level of the pyramid, 'physiological needs', includes those basic needs deemed necessary for survival such as water, food and shelter. Poverty hampers an individual's ability to meet these basic needs and creates significant barriers towards the potential of reaching higher order 'being needs' including personal safety needs, social inclusion and belonging that create wellbeing. [56]

A specific by-product of income inequality is housing instability and homelessness. Having the means to afford housing is necessary for acquiring appropriate housing, avoiding homelessness and maintaining health. Low-income Canadians face the distinct reality of unstable housing and are at considerable risk of homelessness. The Canadian Mortgage and Housing Corporation (CMHC) defines acceptable and core housing needs by the adequacy, suitability and affordability of the housing available to Canadians. [57] For housing to meet these conditions it must not be in need of major repairs, must be safe, not crowded and must not require individuals to pay greater than 30% of before tax household income. [57] Individuals whose housing situations fails any one of these conditions are considered to be in core housing need, and at increased risk of homelessness. [57]

In cities like Vancouver BC, homelessness is a highly visible consequence of poverty, and the increased morbidity and mortality among homeless individuals is fundamentally unjust. [23,58] Homelessness is often viewed on a continuum, with individuals living in varying degrees of housing instability including, temporary and substandard housing such as shelters, vehicles and other areas not meant to be inhabited by humans; as well as living rough on the street. [49] Housing instability is

associated with increased negative outcomes due to factors including stigma, structural and financial barriers to health care, and pre-existing physical and mental illness. [24,26]

Empirical Evidence of Income Inequality and Shortcomings

Research in Canada consistently acknowledges the importance of income inequality as a determinant of health; however, there are expressed concerns about the methodologies used, the continued focus on 'lifestyle' factors, and the likelihood of being able to affect progressive policy change. Canadian reviews of income inequality related studies conducted by both Ross (2004) [54] and Macdonald et al. (2009) [18] argue that while the available evidence suggests that income inequality is definitively a determinant of health, many such studies lack the methodological strength to make this assertion. The majority of studies have been conducted using cross-sectional analyses, for which it is impossible to establish the temporality of the association between cause (income inequality) and effect (negative health outcomes); furthermore, these studies are unable to control for all of the variables that may be confounding the observed associations with morbidity and mortality. [18,22,54,59] Given that health conditions generally develop over time, it is suggested that in order to improve the validity of such studies, longitudinal analyses are necessary. [18]

1.3. Homelessness in Canada

1.3.1. Historical context of homelessness in Canada

Homelessness as it exists in Canada today is a relatively new phenomenon. Further, use of the term "homelessness" has only been part of our discourse since the 1980s. [9] "Homelessness" is sometimes used as an abstract concept to describe an often-ill-defined set of social and economic problems, associated with individuals who are without permanent housing. [60] Historically, poverty forced people into cheap accommodation including rooming houses, flop houses and other forms of poor-quality and crowded living situations; however, those who were labeled "homeless" were typically transient men who were detached from a family home, but who were not necessarily without shelter. [9] Over the past several decades, political, economic and social changes both in Canada and globally, have transformed the experience of poverty

in wealthy developed countries to a situation where losing one's housing is a reality faced by many people. [7]

Canadian Housing Policy: Post Depression to Present

In the post-depression era of the 1930s the Canadian Federal government engaged in housing policy development through a series of housing acts as a way to create jobs, fuel the private housing market, and increase overall housing stocks. These Acts aimed to improve housing availability and quality, in both the private and public sectors. In particular, the National Housing Act of 1938 encouraged home ownership, new construction and the revitalization of existing homes through subsidized loans and interest rates and provided for the creation of low-rent housing. [61] World War II created the opportunity for homeless men to enlist in the war effort and helped alleviate unemployment as vacated positions required filling by those who remained at home. During this period, the federal government created the Wartime Housing Corporation to build and renovate homes. This corporation was renamed after the war the Canada Mortgage and Housing Corporation (CMHC) and still exists today as the federal agency responsible for housing policy administration. The end of WWII signaled the revitalization of the Canadian housing market. [61] While housing programs implemented leading up to and during WWII had helped increase and refresh the Canadian housing supply, the post war efforts had the greatest impact on housing availability during this era. These post war housing policies increased the housing supply by insuring mortgages, subsidizing rental housing, and financing social housing. [7,9]

Until the 1970s housing policy was largely centralized in the Canadian federal government. Beginning at this time, housing departments were created within provincial governments and as such, individual provinces started playing a more significant role in determining the direction of local housing policy. To once again stimulate the housing market, incentives in the form of tax exemptions including the Income Tax Act, which "excluded principal residences from capital gain tax" (Begin, 1999, p. 2), were passed and federal funds were allocated to assist homeowners and landlords in modernizing and improving over 300 000 homes between 1974 and 1986. [61] While the housing policy that existed prior to the 1970s made advances in increasing the housing supply, revitalizing and updating existing homes in both the private and public spheres, the public housing created had been completely income oriented, the result of which was the

ghettoization of poverty within cities. [9] In an effort to better integrate people of different income levels the National Housing Act was amended in 1973 to provide financial incentives for the purchase of new homes, cooperative housing loans, and reduced interest loans for municipal and private non-profit housing. [61] The trouble with this legislation, however, was that the vast majority of the housing this amendment allowed for went to middle-income families, thus many families in greater financial need were unable to access this housing. [61]

A common criticism of Canadian housing policies is that they disproportionately favour and incentivize home ownership and exclude and fail to protect those who rent and may not have the resources to enter the home ownership market. [7,62] An example of this was in the early 1980s where three federal programs were established on a short-term basis to help middle-income families to own homes and manage mortgage payments at a time when interest rates were prohibitively high. Also, during this decade, overall federal spending on housing decreased, and in 1986 social housing program delivery was delegated to the provincial and territorial governments, while still being financially supported by the federal government. [47] Throughout the 1980s and into the 1990s federal spending on affordable social housing progressively decreased and the scope of who could qualify for social housing narrowed to only include those in “core housing need”. [7,61] These reductions came to a head in 1993 when federal spending on new social housing projects was cancelled. Further, in 1996, full programming and fiscal responsibility for social housing was transferred to provincial and territorial governments, eliminating the federal commitment to national housing. [7]

While, the overall housing supply has increased in the past several decades, this has primarily occurred in the private ownership sector. The deterioration of social housing that began in the 1980s continues today and is further exacerbated by the deterioration of the rental market. [7] Rather than our provincial or federal governments promoting the upgrading and revitalization of rental properties such as rooming houses or rental apartments, a process of gentrification has led these buildings to be systematically converted to condominiums. [7,63] With a diminishing supply of rental accommodation and limited government intervention, the demand for such housing has increased, and as such housing has become unaffordable for many Canadians.

Neoliberalism and Homelessness

These changes in Canadian housing policy and the rise of homelessness are intimately linked. Many of the changes in public spending on housing over the last several decades have been attributed to the rise of neoliberal economic policies within Canada, as influenced by global political and economic conditions. [7] The decentralization of Canadian housing policy and reduced spending on social housing in the face of increased private ownership are indicative of this neoliberal shift. By encouraging privatization, reducing taxes and cutting spending on social programs, the onus was placed on the free market to increase prosperity for all with the expectation that downstream effects of these changes would benefit those in need. [17] It was believed that with the necessary incentives, a prosperous free market society would enable the private sector to create affordable housing, independent of government mandates. [5,7] This has not been the case. Coupled with changes in housing policy, there have been detrimental changes in income patterns among Canadians. As a country, overall wealth has increased, however this increased wealth has primarily occurred among individuals in the upper income quintile. [7,64] Wages for middle income Canadians have plateaued and, in some cases, decreased, attributed to wage suppression, benefits reduction, growth of part time work, and the shift from a large industrial to service sector workforces. [7] Additionally, through restructuring of welfare policies nationally and provincially, social assistance rates were reduced in the 1990s and have not increased at rates that are commensurate with the increased cost of living. [7] All of these policies have contributed to growing income inequality and the increased prevalence of homelessness in Canada. [64]

Deinstitutionalization of Mental Illness

The deinstitutionalization of psychiatric services has been criticized for contributing to the homelessness problem in Canada – in particular as it relates to the disproportionate prevalence of mental illness experienced within homeless populations. Like many of the policy changes discussed previously, the motivations behind deinstitutionalization were not inherently nefarious, however, it is difficult to ignore the fact that homelessness among people with mental illnesses has increased since deinstitutionalization began. Deinstitutionalization represents a transition in psychiatric service delivery from one of tertiary institutionalized care in long-term asylums or psychiatric hospitals, to community-based service delivery. Starting in the 1950s the

process began whereby residents of psychiatric institutions began being released to community services, and new admissions were similarly redirected to community mental health services. [65] This shift from institutional to community-based care took place under the assumption that community-based care would be more humane and therapeutic, that quality of life would improve outside of institutional walls, and that community services would be less costly. [66,67]

Sealy and Whitehead have suggested that deinstitutionalization includes the following processes: "1) The shift away from dependence on mental hospitals; 2) 'transinsitutionalization', or an increase in the number of mental health beds in general hospitals; and 3) the growth of community-based outpatient services for people with mental illness" (2004, p. 250). [65] In communities where all three processes have been implemented concurrently, quality of life is shown to improve considerably, many have been able to move from dependent to independent living, and many report achieving "normalization" in terms of having autonomy over activities of daily living, finding meaningful employment and maintaining relationships – all of which would rarely be realized in an institutional setting. [66,68] The difficulty is, in situations where not all steps of the deinstitutionalization process have occurred simultaneously, the reality is quite different. In many situations the deinstitutionalization process of moving people out of psychiatric hospitals has occurred in communities where the mental health services and social structures are insufficient to meet the needs of individuals with complex needs. [68] Furthermore, as mental disorders are highly heterogeneous, even in communities where services have been thoroughly designed and fully funded to accommodate a variety of needs, some are still poorly served. [66]

The shift to community-based mental health care has increased the visibility of mental illness, most strikingly in marginalized and impoverished neighborhoods. [69] Where community-based resources are inadequate and fragmented, people with mental illnesses are forced to the margins of society, increasing their risk of homelessness and of coming into contact with the criminal justice system. People with mental illnesses are more likely than the general population to come into contact with police, have a greater number of offences, have higher recidivism rates and cycle rapidly through the criminal justice system. [70,71] With insufficient availability of inpatient beds for acute psychiatric care, those in need of intensive supervision are often incarcerated. [72] As such, jails and prisons have become surrogate psychiatric inpatient facilities despite lacking the

capacity to adequately meet the needs of these individuals. [72] Stigma associated with mental illness is believed to result in higher rates of police contact through street checking and complaints from neighbours. [70] It is believed that people with mental illness are disproportionately sought out or targeted in their communities by both civilians and the police. [69]

As the needs of individuals with mental disorders are not only limited to psychiatric care, effective community-based services need to be comprehensive and consider the housing, income and social support required to promote effective community living. [66] Where community-based services have fallen short, we often see individuals succumbing to homelessness. It is this scenario where deinstitutionalization has been associated with the increased prevalence of homelessness. No one policy decision is solely responsible for homelessness as many different factors have contributed to the present-day situation, however, understanding the impact of these different factors may help to better conceptualize the problem and improve our response to it. [73] An important consideration in the deinstitutionalization debate is that the nature of living with a mental illness in a community is fundamentally different than in an institutionalized setting. Where psychiatric hospitals offered stability, supervision and protection from the outside world, community living, if unchecked, may result in inconsistent treatment compliance, exposure to unsafe situations, and easy access to illicit drugs and alcohol. [74] Additionally, service fragmentation, stigmatization and inadequate housing availability pose significant barriers to residential placement and stability for people with mental illnesses. [66]

1.3.2. Present day homelessness in Canada

Barriers to accessing health, housing and social services, poor physical and mental health outcomes, frequent justice system contacts, and social exclusion characterize the experience of homelessness in Canada. Compared to the general population, individuals experiencing homelessness are at greater risk of contracting communicable diseases, having more than one comorbid condition, experience premature mortality, and are more likely to be victimized. [58] The prevalence of mental illness, substance use and concurrent disorders is higher among those experiencing homelessness compared to the general population. [75,76] Without reliable prevalence estimates of mental illness and substance use in the Canadian homeless population it is

difficult to respond appropriately to the needs of this population; however, in British Columbia it has been estimated that over half of the homeless population is affected by mental illness and among these individuals between 50% to 70% have substance use disorders. [75] Mental illness and substance use are associated with longer durations of homelessness and these individuals are more likely to experience chronic homelessness and housing instability. [77,78] The risk of these negative outcomes has important implications for not only service and intervention planning, but for quality of life. [79]

One of the challenges in studying homelessness and attempting to intervene, is the lack of definitional consistency between studies, among researchers and policy makers. The experience of homelessness is heterogeneous, as are the individuals it affects and as such our approach to researching and designing interventions ought to take this into consideration. [6] Homelessness in Canada is frequently associated with mental illness and substance use; however, historically these issues have been treated as separate, unique phenomena, and as such approaches to health promotion, prevention, and service delivery have been and largely remain fragmented.

Lack of consistency in how homelessness is defined challenges our ability to reliably measure the problem and compare results from studies across jurisdictions. Previous reviews have identified these definitional issues, but at present there has been no consensus on standard definitions of homelessness. In addition, many studies rely on non-standardized self-reported mental health status. [49,80,81] The distinction between those who are *absolutely homelessness* versus those who are at high risk of homelessness or *precariously housed* is often not made or is poorly defined. If we consider that absolute homelessness and precarious housing situations are points along a housing continuum it is important to acknowledge these distinct groups so as not to obscure the needs of those at the extreme ends of the continuum. [61] By not distinguishing between different degrees of homelessness, we risk underestimating the severity of those with the most complex needs and potentially overestimating the needs of those requiring less intensive support. Moreover, many people living in precarious housing (i.e., rooming houses and single room occupancy hotels (SRO)) live in very dire conditions. [82,83]

Operational definitions of homelessness vary considerably between studies, from having no fixed address or living in unstable or transitional housing situations, [84] to

having been absolutely homeless at least once in the past six months, [85] or most stringently having spent a minimum of 15 of the last 30 days living on the street or in some other public space and a history of homeless for at least the past six months. [86] The measurement of mental illness is particularly important when considering our ability to understand the burden of mental illness within the homeless population. As this population has been shown to be less likely to seek services or supports for mental illness, it is difficult to accurately estimate the demand for services and the diversity of needs within this population. [87] While some studies use standardized clinical diagnostic measures to assess mental health status (primarily those conducting homeless intervention trials), many rely on unqualified self-reported mental health status, which is considered an unreliable means of assessment. [88] The use of standardized diagnostic measures and assessment of mental illness by clinically trained interviewers has been shown to yield more accurate assessments and lower prevalence estimates of mental illness in comparison to non-clinical forms of assessment including self-report. [81] As such, additional standardized research is needed, and researchers across jurisdictions (both nationally and internationally) should agree on some shared metrics in order to sustain a coherent body of evidence.

1.3.3. Interventions for people experiencing homelessness and mental illness

A myriad of community-based and publicly funded services exist in most Canadian cities to help those experiencing homelessness. These services include everything from emergency shelters, meal programs, drop-in and community centres, health clinics, needle exchange programs, street nursing and outreach programs. These types of services are essential in helping to manage immediate everyday needs of people experiencing homelessness; however, these types of programs are generally unable to offer permanent or long-term solutions. While significant barriers to service access and engagement among this population do exist, practical approaches that help people to meet their immediate needs, with a longer-term aim of improving the circumstances of everyday living have shown promise.

Previous work that has focused on homeless populations in Canada and Vancouver specifically has highlighted the heterogeneity of homeless populations as an important consideration for planning, service delivery and policy development. [75] This

diversity among homeless populations presents complex challenges to designing both comprehensive and tailored interventions to meet the needs of homeless individuals. Homelessness is shown to exacerbate mental health problems, increase the risk of physical health problems, [49] and often results in disaffiliation and disengagement from services - specifically primary health care services. [51,75,89] In order to effectively design and implement interventions that improve service engagement and health outcomes, it is necessary to understand objective patterns of service use, housing status, and substance use, along with individual perceptions of the accessibility and availability of adequate housing and health and human services.

Examples of types of interventions targeted towards people experiencing homelessness and mental illness have evolved overtime, however, there is still a considerable gap in the services and supports available for this population. The increased number of people experiencing homelessness and mental illness in North America has often been attributed to changes in economic policies, the legacy of deinstitutionalization, and the subsequent lack of community capacity to adequately care for and support those facing considerable mental health challenges. [86] Approaches to delivering housing interventions to the homeless mentally ill typically begin with outreach and end in permanent supportive housing; however, the steps in between these two points are what differentiates between approaches.

Continuum of Care

The continuum of care approach to service delivery is the traditional model of housing intervention that has been employed to serve people who are homeless with mental illnesses. This model has several different staged components and is largely grounded in the medical model of service delivery. [86] Individuals who enter a continuum of care model enter into treatment and transitional housing before progressing to permanent supportive housing. The transitional housing phase is akin to residential treatment where participants are generally expected to comply with treatment protocols and abstain from alcohol and substance abuse, during which time their “housing readiness” is assessed. [90] This model assumes that individuals with mental illnesses need to be psychiatrically stabilized prior to being able to maintain independent housing. Housing in this approach, is therefore leveraged on treatment compliance and restricts housing access to those who are willing to conform to a treatment regime. [90] Only once

an individual is deemed to be “housing ready” will they be transitioned into permanent housing.

Housing First Approach

In contrast to the continuum of care approach, Housing First (HF) emphasizes consumer choice and places the necessity of stable housing ahead of treatment. [86] The HF model was developed in New York by the Pathways to Housing organization and aims to meet the needs of people experiencing chronic homelessness and mental illness. HF is consumer centered and promotes the belief that housing is a human right. [91] Clients of a HF intervention are recruited through outreach or referral from community/institutional services and are presented with options for permanent housing. Once housing is established, along with the support of an Assertive Community Treatment (ACT) team (including physician care, case management and other health/social supports) clients are encouraged to define their own goals for treatment and psychiatric rehabilitation. There are no requirements for treatment or abstinence to maintain housing. [90] From a social-ecological perspective the HF approach to addressing homelessness is superior as it does not define the individual by their illness in the manner that the continuum of care model does, and it considers the needs of the individual in the context of their experience, their environment and the stage of recovery that they are at. [92] Additionally, the treatment philosophy that guides the ACT team is more holistic than that of traditional treatment approaches and the health and social needs of the individual are met through a more streamlined and less fragmented process that promotes consumer engagement. [93]

Housing First offers consumers access to independent scattered-site apartments as opposed to the congregate living arrangements that predominate in other models of housing interventions, and there are no onsite clinical supports for HF tenants. [86] Unlike “treatment first” approaches, the HF model is less restrictive for those who are unable or unwilling to comply with treatment and abstinence. [86] Based on a harm reduction philosophy of care, HF offers an opportunity for people with complex mental health problems and often substance use disorders to access housing as a means of promoting recovery and reducing the harms associated with living on the street. [90]

The HF approach is relatively new, however the evidence which does exist is promising. In evaluating the success of past housing interventions including “treatment

first" approaches like the continuum of care model, the primary outcome measure is long-term housing stability and psychiatric symptoms. In the New York Homeless Study chronically homeless participants were randomly assigned to either "Continuum of Care" (control) or "Housing First" (experimental) conditions and followed for 2 years. Those who were assigned to the HF condition spent significantly less time homeless than those who were in the continuum of care condition and spent a greater proportion of time in stable housing. [90] While there was no significant difference in psychiatric symptoms between the two groups, those in the HF condition felt like they had greater choice and autonomy as compared to their continuum of care counterparts. Furthermore, Tsemberis, et al. (2004) argue that these findings dispel a traditionally held assumption that individuals with mental illnesses are incapable of maintaining independent housing prior to psychiatric treatment, and as such there are no grounds for requiring treatment and abstinence from alcohol and substances prior to entering independent housing. [90]

1.4. Homelessness Research in Canada

1.4.1. Foundations of Homelessness Research in Canada

Homelessness research in Canada has taken several different forms, all in the effort to better understand the nature and extent of the problem, to assess the needs of those experiencing homelessness, and to design and evaluate interventions intended to improve health, social and quality of life outcomes. Much research has been focused on understanding homelessness among specific subgroups such as youth, Indigenous peoples, injection drug users, or individuals with specific health conditions including HIV/AIDS, hepatitis C or mental illness. The methods employed when studying homelessness are equally diverse. From rigorous experimental designs that use standardized empirically validated measures, to homeless counts that often rely on locally developed, unstandardized self-report measures, the quality and validity of research varies. Further differences in sampling strategies, sample sizes, and duration of follow-up play a role in determining the overall significance and reliability of research findings.

In a review of Canadian homelessness and health literature Frankish, et al. (2005) distilled areas of research focus into six main areas including: conceptual research; environmental scans; methods research; needs assessments; evaluation

research; and intervention research. [49] Through their review, Frankish et al. (2005) determined that the majority of research in Canada had been largely descriptive in nature, focused on defining the homelessness problem, by attempting to determine its prevalence, characterize who the homeless are and their pathways into homelessness, and on assessing the needs of those experiencing homelessness. [49] The areas of policy evaluation, outcome measurement and intervention were identified as areas lacking sufficient evidence. [49] The existing body of literature was deemed to be of moderate quality and capable of offering important insight into the homelessness situation, but that a shift towards development of more policy relevant, longitudinal outcome oriented, empirically defensible research would serve to advance public policy and encourage support for more effective interventions.

Much of the homelessness research conducted in Canada has been built upon methodologies used outside of Canada, particularly from European countries and the United States. While public policy as it relates to housing, social assistance and health care vary greatly between different countries, there is value in drawing upon findings developed internationally. The United States is known for conducting methodologically rigorous, large-scale quantitative analyses, and has had the capacity to carry out multi-year longitudinal analyses. [12,13] This is contrasted with the United Kingdom, where homelessness research has been primarily small scale, policy driven, cross-sectional studies dictated by short-term government priorities. [13] Where precedence has been given to quantitative research in the United States, qualitative research has been much more common in the United Kingdom and other European countries. These various trends are largely determined by available funding and governmental priorities, as such, expensive large-scale, longitudinal studies have been uncommon outside of the in the United States. [12] It has been suggested that moving forward, research programs that can integrate the use of both rigorous quantitative and qualitative methods will offer the most promise in advancing the field. [13]

1.4.2. Research Areas and Methodologies

The motivation to conduct research on homelessness as described by Anderson (2003) has been empirically driven rather than theoretically based and reactive to current trends and the need to define, measure and attempt to address the problem. [13] As described previously, homelessness research is challenging due to inconsistencies in

definitions, unstandardized data collection procedures and the inherent difficulties in studying a transient, marginalized population. Certain methodologies that have shown promise in helping to better understand homelessness and guide future research are outlined below.

Estimating Prevalence

As conventional national censuses do not reach those experiencing homelessness, alternative approaches are necessary to establish the prevalence of homelessness at any given time. Homeless counts carried out by municipal governments are common in Canada and are often relied upon to inform policy decisions related to homelessness. The validity and reliability of these counts are often criticized due to the fact that they rely largely on self-report measures, the interviewers performing the surveys are minimally trained, capture rates are variable, data collection periods are brief (approximately 24 hours), and the measures used to identify conditions such as mental illness are generally not psychometrically validated. [75,94] Studies that rely on the use of self-reported measures are at risk of introducing information bias as participants may be unable to accurately recall past events or may underreport certain behaviours due to perceptions of stigma or fear of persecution. [95,96]

While homeless counts are a consistently available source of data, their lack of methodological rigor limits their utility. As an alternative to standard homeless counts, service-based methods of sampling that survey individuals accessing service system resources such as shelters, drop-in centres, meal programs, and outdoor areas where people typically congregate, are believed to be capable of capturing between 90-95% of the population when thoroughly conducted over a 30-day period. [94] An important tension exists in enumerating the homeless between government and local service providers. It has been suggested that decision makers are likely to be skeptical of estimates produced by service providers who are advocating for resources for their clients. [94] Similarly service providers may expect counts conducted by government organizations to underestimate the true prevalence and as a result affect their programming budgets. [94] The transient and socially isolated nature of homelessness poses a considerable challenge in accurately estimating prevalence. Further, it is unknown whether those who are missed by homeless counts vary in meaningful ways from those who are captured.

As such it is possible that systematic error is inherent within these different counting strategies. [96]

Cross-Sectional Studies

Despite the criticism that homelessness research has often lacked a longitudinal focus, important knowledge has been generated from cross-sectional studies. Several studies have used cluster analysis to better understand the situation of those experiencing homelessness. Within homeless samples, individuals have been grouped into clusters based on various different sociodemographic characteristics, health status, level of functioning, social networks, and shelter use patterns in an effort to better understand the needs of subgroups of individuals. [78,97] Such analyses, along with other descriptive research, can help in developing targeted interventions that may better serve individuals with unique needs. Kuhn and Culhane (1998) conducted large-scale cluster analyses using administrative data from the shelter using populations in both New York City, NY and Philadelphia, PA to test the hypothesis that frequency of shelter use among people experiencing homelessness can be represented by three different categories of homelessness: transitional, episodic and chronic. [78] They found within a three-year period of observation, the greatest number of individuals (approximately 80%) using shelters in both cities consisted of those in the 'transitionally' homeless category who generally became temporarily homeless due to an acute personal crisis (i.e., recent unemployment, personal disaster, etc.), but who managed to have very few episodes of homeless during the observation period. Both the episodically and chronically homeless clusters made up approximately 10% of the observed individuals, with the episodic group experiencing the highest number of overall incidences of shelter use, but for shorter durations. [78] The chronically homeless group experienced fewer incidents of homelessness than the episodic group, but each incident was significantly longer in duration than either of the other two groups. [78] Overall, the number of shelter days utilized by the chronically homeless group grossly exceeded the relative use of individuals from either other group, consuming nearly half of all shelter days used over the observation period. [78] Additionally, demographic variables and indicators of health status were used to examine between group differences to understand the role that such variables might have in determining the likelihood of re-establishing housing stability, or continued shelter use.

Interventions that target specific subgroups within the homeless population may provide opportunities for more effective interventions. By understanding patterns of service use and the role that certain health and social indicators can play in determining housing trajectories we can move towards designing and implementing tailored interventions that better meet the needs of the different individuals we are attempting to serve. [78] An important issue of consideration is the provision of supportive housing, and the relative level of support necessary for people with different challenges. Existing research suggests that individuals experiencing more complex mental disorders such as psychotic disorders, should require a higher level of service need (both health and social services), compared to individuals with less complex mental disorders, however the opposite has been observed. [98] Research has shown that among homeless individuals there are specific individual characteristics that when categorized into predisposing, enabling and needs-based factors can predict service use. [99] By developing ways of predicting need among different subgroups, it becomes possible to develop targeted interventions that more efficiently meet the needs of different individuals. If we can predict service needs based on observable characteristics, it may also be possible to develop preventative interventions that anticipate needs before negative consequences develop.

Intervention Studies

Previous research has concluded that services available for people experiencing homelessness and mental illness are inadequate for meeting the needs of individuals facing these complex challenges. [50] In many cases researchers have called for reorientation of health and social services in a way that better meets the needs of individuals including shifting of institutional focus from a one-size-fits-all model of service delivery to a more client-centered approach. [6,50,78] Where housing is concerned, the debate over how to intervene among people experiencing homelessness is centered on the housing type, the presence of and level of supports available and transitional vs. permanent nature of the housing provided. A key difficulty in advocating for service reorientation is the need for sufficient empirical evidence to support such initiatives. As the cost of public health interventions is a significant issue and potential barrier to action, it is important to be able to empirically justify the implementation of an intervention that incorporates the perspectives of both cost-benefit and health equity.

The At Home/Chez Soi Study

From the need for a Canadian knowledge base upon which to advocate for supportive housing interventions, came the At Home/Chez Soi study. This study was conceived of in order to develop empirically valid, policy relevant evidence towards the goal or improving outcomes for people experiencing homelessness and mental illness. Conducted in five cities across Canada (Vancouver, BC; Winnipeg, MB; Toronto, ON; Montreal, QC; and Moncton, NB), the At Home/Chez Soi study was a longitudinal intervention study using a randomized control trial design, to determine the type of housing and supports that work best for people experiencing homelessness and mental illness. [2] With the goal of addressing the lack of basic housing and support needs for this population, the At Home/Chez Soi study built upon methods pioneered in the United States by testing the HF model of supportive housing in the Canadian context. [2] The At Home/Chez Soi study was the first to study HF in Canada and the largest complex housing and support intervention of its kind. Over the past decade, a significant body of knowledge has emerged from the At Home/Chez Soi study which has made important contributions to both our knowledge and understanding of the experience of homelessness and mental illness in Canada, and has had a direct impact on national housing policy.

1.5. Rationale for current study

The issue of homelessness in Canada is intriguing and troubling. Despite the complexity of challenges associated with homelessness – particularly the pervasive impact it has on all aspects of an individual's life – homelessness is unique in that it is possible to imagine concrete solutions. Unlike other endemic social problems, homelessness in developed countries is a relatively new phenomenon and it is possible to trace its evolution to understand how it came to be this way. In Canada, like in most wealthy developed countries, the prevalence of homelessness is increasing. [6,50] Those experiencing homelessness face daily challenges in meeting their most basic health, shelter and safety needs, and are at significantly higher risk of negative mental and physical health outcomes. A heterogeneous group, the needs of individuals experiencing homelessness vary greatly from acute incidents of short-term need to persistent and chronic need. [78] While strides have been made to develop national policy around homelessness, there has yet to be robust and coordinated efforts through all levels of

government to make sustainable and long-term investments in ending homelessness for people with mental illnesses, in ways that truly and sustainably address their complex needs.

As discussed previously, the burden of disease among those experiencing homelessness and mental illness is alarming and is indicative of failings within our public support structures. Previous research has identified gaps and disconnections within the service landscape, particularly those in the health service environment, which have been cited as contributing to persistently poor health outcomes within this population. These studies, however, often rely on self-reported service use and diagnostic information, or are only able to analyse variables related to one domain of service and therefore are unable to adequately situate their findings within the larger service landscape.

The analyses presented in the following chapters use a combination of self-report and administrative data to examine patterns of service use and unmet need among people experiencing mental illness and homelessness. By specifically studying the manner in which those with serious mental illness use medical services we hope to identify factors associated with positive health outcomes and identify opportunities for targeted intervention and support.

1.5.1. Study Aim and Objectives

The aim of this study is to examine patterns of health service use and unmet need among people experiencing homelessness and significant mental illness in BC. The study objectives are as follows:

1. **To examine patterns of medical service use among people experiencing both homelessness and mental illness in Vancouver, BC, and determine whether those with objectively high needs are accessing appropriately high levels of service compared to those with more moderate levels of need.** Chapter 2 provides results of a retrospective analysis applying the *Gelberg-Andersen Behavioural Model for Vulnerable Populations* to the baseline data from the Vancouver At Home (VAH) study. It was hypothesized that those with the highest level of need (i.e., diagnosis of schizophrenia)

would access greater levels of health services in order to meet their higher level of needs.

2. **To assess the role of continuity of care among people experiencing homelessness and mental illness, and the impact on rehospitalization.** Chapter 3 provides results of an analysis that used a combination of administrative data from the Inter-Ministry Research Initiative (IMRI) and baseline data from VAH study participants to examine the effect of continuity of care between inpatient and outpatient medical services, on rehospitalization.

3. **To study the effect of custody on medical service use and subsequent hospitalization among people diagnosed with schizophrenia.** This study used administrative data from the IMRI to examine the role of continuity of care between BC Provincial custody release and community-based medical service use among people with schizophrenia and the likelihood of subsequent hospitalization.

Chapter 2.

Examining the relationship between health-related need and the receipt of care by participants experiencing homelessness and mental illness

2.1. Abstract

Background: People experiencing homelessness and mental illness face multiple barriers to care. The goal of this study was to examine the association between health service use and indicators of need among individuals experiencing homelessness and mental illness in Vancouver, Canada. We hypothesized that those with more severe mental illness would access greater levels of primary and specialist health services than those with less severe mental illness.

Methods: Participants met criteria for homelessness and current mental disorder using standardized criteria (n=497). Interviews assessed current health status and involvement with a variety of health services including specialist, general practice, and emergency services. The 80th percentile was used to differentiate 'low health service use' and 'high health service use'. Using multivariate logistic regression analysis, we analyzed associations between predisposing, enabling and need-related factors with levels of primary and specialist health service use.

Results: Twenty-one percent of participants had high primary care use, and 12% had high use of specialist services. Factors significantly ($p \leq 0.05$) associated with high primary care use were: multiple physical illnesses [AOR 2.74 (1.12, 6.70]; poor general health [AOR 1.68 (1.01, 2.81)]; having a regular family physician [AOR 2.27 (1.27, 4.07)]; and negative social relationships [AOR 1.74 (1.01, 2.99)]. Conversely, having a more severe mental disorder (e.g., psychotic disorder) was significantly associated with lower odds of high service use [AOR 0.59 (0.35, 0.97)]. For specialist care, recent history of psychiatric hospitalization [AOR 2.53 (1.35, 4.75)] and major depressive episode [AOR 1.98 (1.11, 3.56)] were associated with high use, while having a blood borne infectious disease (i.e., HIV, HCV, HBV) was associated with lower odds of high service use.

Conclusions: Contrary to our hypotheses, we found that individuals with greater assessed need, including more severe mental disorders, and blood-borne infectious diseases had significantly lower odds of being high health service users than those with lower assessed needs. Our findings reveal an important gap between levels of need and service involvement for individuals who are both homeless and mentally ill and have implications for health service reform in relation to the unmet and complex needs of a marginalized sub-population. (Trial registration: ISRCTN57595077 and ISRCTN66721740)

2.2. Background

In Canada and throughout the developed world, homelessness is a significant social issue that demands the attention of our public institutions. A staggering proportion of those experiencing homelessness are also experiencing mental disorders, demanding high levels of health care service to meet the needs of these individuals. [81,100] Previous research has concluded that inadequate services are available for people experiencing homelessness and mental illness, often due to competing priorities, barriers to treatment access, and poor discharge planning and follow-up. [6,50] However, little is known about the association between varying complexities of need (e.g., type of mental disorder, multiple mental disorders, co-morbid conditions, substance use, criminal justice system involvement) and levels of health service use.

Individuals experiencing homelessness and mental illness are a heterogeneous population requiring varying levels of health and social supports. Discontinuity between services for people with complex needs (e.g., concurrent disorders), poor psychiatric follow-up, an absence of low-barrier treatment options, stigma, and discrimination each contribute to high levels of unmet need within this population. [46,101,102] Previous research has shown that homeless individuals underuse outpatient services and, as a result, rely heavily on emergency department visits and inpatient stays to address both physical and mental illnesses. [89,101,103] In response, researchers and service providers have called for the reorientation of health and social services to a more individualized and client-centered approach. [6,50,78,90] A challenge in advocating for such service reorientation is the lack of empirical research describing the distinct needs of subgroups within the homeless mentally ill population. [104] In order to orient services in a manner that best

addresses the needs of different individuals, it is important to identify the factors associated with different levels of health service use and unmet need.

A challenge to understanding discontinuities in health service use is identifying the unique and diverse needs of this population and matching individuals with differing levels of care. The *Gelberg-Andersen Behavioural Model for Vulnerable Populations* offers a framework to help identify factors associated with health service use with the aim of improving healthcare access and delivery. [105–107] Previous research using this model has shown that, among homeless individuals, there are specific characteristics that can help to predict and explain service involvement, and are categorized as *predisposing, enabling,* and *need-related* factors. Predisposing factors include individual characteristics, (e.g., age, gender ethnicity, education, history of homelessness), and are associated with commonly observed demographic trends in health seeking behaviour. Enabling factors are comprised of systemic and structural considerations such as having a regular family physician, social support, or access to health care, and exert an influence via the availability and accessibility of health care services. Finally, need-related factors consist of perceived and objective medical need and include mental and physical health status, severity and type of illness, and substance use. [99,105,106]

However, this model has not been applied to a sample of homeless individuals wherein all participants also have a mental disorder, with or without a concurrent substance use disorder. [105–107] Furthermore, previous applications of the Gelberg-Andersen model have primarily been in the context of the American healthcare system, where structural aspects of funding have an important bearing on access to healthcare.

Existing research suggests that individuals experiencing more complex mental disorders, such as psychotic disorders, require a higher level of service compared to individuals with less severe mental disorders. [107,108] It is therefore hypothesized that individuals with more complex needs, including those experiencing more severe mental disorders, multiple comorbidities and concurrent disorders will have a greater number of encounters with both primary and specialist health care than individuals with less complex needs.

By examining factors shown to be associated with different levels of service use, we can help to identify gaps in the current service landscape, and target services to

address areas of unmet need. Guided by the Gelberg-Andersen model, the purpose of this research is to examine the association between level of health service use with predisposing, enabling, and need-related factors among a sample of participants experiencing homelessness and mental illness in Vancouver, Canada. The empirically derived Gelberg-Andersen model will be used as a framework for this analysis with the goal of identifying potential discontinuities in care and opportunities for intervention.

2.3. Methods

2.3.1. Data Source and Sample

Data were drawn from baseline interviews for the full sample (n=497) of participants enrolled in the *Vancouver At Home* (VAH) study. Participants recruited to the VAH study met inclusion criteria for recent homelessness and current mental illness as assessed through the use of standardized assessment measures administered in person by trained interviewers. [4] Participants were recruited from over 40 different community and institutional agencies, representing roughly 13 different types of services.[4] Referral sources included homeless shelters, drop-in centres, homeless outreach teams, hospitals, community mental health teams, and criminal justice programs. Prospective participants were contacted directly by research team members or were referred to the VAH research team by agency staff. Final eligibility was confirmed with an in-person screening interview. Approximately 800 individuals were assessed for eligibility. Among those, roughly 300 were excluded due to: ineligibility (n~200); being eligible, but losing contact following screening (n=100); declining to participate (n=3); and not being able to complete the baseline interview (n=3). [4] All participants were at least 19 years of age and provided written, informed consent prior to participating in the study.

VAH is a longitudinal study, consisting of two randomized control trials (RCTs) investigating housing and supports for people experiencing homelessness and mental illness. [4] With the RCT design participants were randomly assigned to one of 5 different study arms each consisting of approximately 100 participants. Sample size calculations were performed prior to recruitment to ensure sufficient power to perform outcome analysis between groups. Sample sizes of 100 participants per arm were determined based on effect size estimates of 0.5 for major outcome variables, power of 0.80 (β =

0.20). [2,4] Analyses presented in the current study consider only baseline data from the full sample of VAH participants prior to randomization. The study is part of a Canadian multi-centre project which took place from October 2009 – March 2013. [2]

2.3.2. Predisposing, Enabling and Need Factors

Data concerning socio-demographic characteristics, health service use, housing histories, mental illness, substance use and quality of life were collected through a series of self-report questionnaires and categorized into the domains of predisposing, enabling or need-related factors. The selection of explanatory variables and categorization into the three different domains followed the procedures of previous investigators. [99,105] and the guidelines for implementing the Andersen-Newman and Gelberg-Andersen models. [107,108]

Predisposing Factors

Predisposing factors included sociodemographic characteristics as follows: gender (male/female), age [Youth (<25); 25-44; and > 44], education (incomplete high school; graduated high school), marital status (single/never married; married/partnered; separated/widowed/divorced), and whether they had a child 18 years or younger (yes/no). Self-reported ethnicity was categorized as: Caucasian, Aboriginal and Other. Housing status was assessed based on shelter use in the past 6 months (yes/no), lifetime duration of homelessness (1-3 years; >3 years); longest single period of homelessness (1 year; >1 year), and current housing status (absolutely homeless versus precariously housed) (See Goering et al., 2011). Criminal justice involvement was assessed in terms of having been in jail in the past 6 months (yes/no).

Enabling Factors

Personal and social resources were categorized as enabling factors including: having a regular family physician (yes/no); and having a place to go to seek health care (yes/no). Unmet need was assessed by asking participants if, in the past year, they felt they needed health care but did not receive it (yes/no). Social resources were assessed in terms of the type and quality of social relationships, including general feelings about family, types of daily activities, the amount of time spent with other people, and the people they interact with socially (Quality of Life Interview-20). [109]

Need Factors

Need related factors included variables concerning physical and mental health. Physical health was assessed through self-reported physical illness including: blood-borne infectious diseases (HIV, Hepatitis C and/or Hepatitis B); chronic illnesses (heart disease, cancer, COPD, etc.); history of head injury (yes/no); and having multiple physical illnesses (≥2). General health was evaluated on a five-point Likert scale ranging from excellent to poor. Responses were dichotomized as positive (excellent/very good/good) or negative (fair/poor) perceived health. Mental disorders, substance dependence and alcohol dependence were assessed using the MINI International Neuropsychiatric Interview. [110] Mental disorders were dichotomized into clusters of less severe form (major depressive episode, panic disorder, post-traumatic stress disorder) and severe form (mood disorder with psychotic features, psychotic disorder, and manic or hypomanic episode). Multiple mental disorders were assessed as meeting criteria for two or more (≥2) disorders.

2.3.3. Definition of High and Low Health Service Use

Service use was evaluated based on the frequency of past-month primary health care (family doctor, nurse, dentist, or pharmacist) or specialist health care (specialist physician, psychologist, psychiatrist, addiction worker or mental health worker) visits. The 80th percentile was used to define two groups whereby two or fewer visits (<3) for each type of service in the past month were categorized as 'low health service use' and three or more visits (≥3) were categorized 'high health service use'.

2.3.4. Statistical Analysis

Pearson's Chi-square tests were used to conduct pair-wise comparisons between predisposing, enabling and need-related baseline characteristics, among low and high service use groups for both primary and specialist health care providers. Bivariate and multivariate logistic regression analyses were used to estimate baseline associations between various predisposing, enabling and need-related factors and levels of primary and specialist health care. Variables were selected using the Gelberg-Andersen framework for the regression analysis. We used a significance level of $p \leq 0.10$ to select variables for inclusion in the multivariable logistic regression analyses.

Stepwise logistic regression (backwards elimination) was used to select variables for the final multivariable model. Odds ratios and 95% confidence intervals obtained through logistic regression were reported as effect sizes. All reported p-values were 2-sided. SPSS v21 software was used to conduct all statistical analyses. Institutional review and ethics approval was provided by Simon Fraser University's Office of Research Ethics, under the application entitled "Research Demonstration Project on Housing and Mental Health in Vancouver, BC", application number 2009s0231.

2.4. Results

2.4.1. Sample Characteristics

The median age of participants (n=497) was 41 years, and the majority were male (73%), born in Canada (87%), of European (57%) or Aboriginal (15%) decent, and met criteria for absolute homelessness (78%). The median duration of lifetime homelessness was 36 months, and the median age of first homelessness was 28 years. Most participants were single and never married (70%), unemployed (96%), and 41% had not completed high school. [4]

The most prevalent mental disorders in the sample were psychotic disorder (53%) and major depressive episode (40%), followed by post-traumatic stress disorder (PTSD) (26%), panic disorder (21%) and (hypo) manic episode (19%). Half (52%) of participants met criteria for two or more mental disorders. Substance dependence was observed among 58% of participants and alcohol dependence among 24%, with 28% of the sample reporting poly-drug use (two or more types) and 29% reporting daily illicit drug use [111] Physical illnesses, including infectious and chronic conditions, were highly prevalent, with most participants (81%) reporting having two or more physical illnesses including the presence of hepatitis C among 30% of participants. [4]

In the month prior to recruitment, 49% of participants reported being seen by a health service provider and 27% by a psychiatrist. Historically, 53% of participants had been hospitalized for a mental illness two or more times in the preceding five-years, and 12% had been hospitalized for more than 6 months in the same time period. In the preceding 6 months, the majority of participants (58%) had visited an emergency room and 40% had arrived at a hospital via ambulance.

2.4.2. Health Service Use – Past Month

In order to examine the nature of health service use among participants, visits were categorized as primary care or specialist care visits. For primary care, 393 (79%) participants were categorized as low use (<3 visits) and 103 (21%) as high use (≥3 visits). For specialist care, 437 (88%) were categorized as low use (<3 visits) and 60 (12%) as high use (≥3 visits).

Univariate associations between the outcome (levels of service use) and predictor variables are presented in Tables 1-3, sorted by primary and specialist health service use. Within the primary health service use category, none of the observed associations between predisposing factors and levels of service use were significant at the $p<0.05$ level; while the only predisposing variables significant at the $p\leq0.10$ level were ethnicity, marital status and having children under 18 years. Within the specialist health service use category, age at enrolment and being 'hospitalized two or more times for a mental illness in the past 5 years' were significantly associated with level of specialist health service use ($p<0.05$). These variables as well as education level and duration of longest single period of homelessness, were included in multivariable regression analyses.

Table 2-1 Univariate comparisons of predisposing characteristics, by primary and specialist health service use.

Variable	All N (%)	Primary Health Service Use			Specialist Health Service Use		
		Low Use (< 3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value	Low Use (< 3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value
Male gender	358 (73)	288 (74)	70 (69)	0.292	316 (73)	43 (72)	0.830
Age at enrolment visit Youth 25-44 years > 44 years	 36 (7) 280 (57) 180 (36)	 28 (7) 224 (57) 141 (36)	 8 (8) 56 (54) 31 (38)	0.889	 27 (6) 253 (58) 157 (36)	 9 (15) 28 (47) 23 (38)	**0.031**
Ethnicity Aboriginal Caucasian Other	 77 (15) 279 (56) 140 (28)	 61 (16) 212 (54) 120 (31)	 16 (16) 67 (65) 20 (19)	0.068	 71 (16) 245 (56) 121 (28)	 6 (10) 35 (58) 19 (32)	0.433
Education (≤ Grade 8)	76 (15)	62 (16)	14 (14)	0.840	65 (15)	11 (18)	0.093
Single marital status	342 (70)	278 (72)	64 (62)	0.067	301 (70)	42 (70)	0.939
Have children (under 18)	122 (25)	89 (23)	33 (32)	0.059	108 (25)	14 (25)	0.920
Hospitalized for mental illness (> 6 months) in past 5 years	57 (12)	49 (13)	8 (8)	0.164	49 (11)	8 (13)	0.666
Hospitalized for mental illness (> 2 times) in past 5 years	253 (53)	206 (54)	47 (47)	0.190	213 (50)	40 (71)	**0.003**
Worked continuously at least one year in the past	322 (65)	257 (66)	65 (63)	0.597	280 (65)	43 (72)	0.275

Variable	All N (%)	Primary Health Service Use			Specialist Health Service Use		
		Low Use (< 3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value	Low Use (< 3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value
Jail in last 6 months	68 (14)	53 (14)	15 (15)	0.777	06 (14)	8 (13)	0.933
Shelter in last 6 months	143 (29)	113 (29)	30 (29)	0.941	127 (29)	16 (27)	0.701
Duration of homelessness in lifetime **1-3 Years** **3 Years Plus**	 256 (52) 234 (48)	 208 (54) 179 (46)	 48 (47) 55 (53)	 0.197	 223 (52) 208 (48)	 34 (57) 26 (43)	 0.474
Duration of homelessness -longest single period **1 Year** **1 Year Plus**	 246 (50) 245 (50)	 190 (49) 198 (51)	 56 (54) 47 (46)	 0.330	 210 (49) 221 (51)	 36 (60) 24 (40)	 0.102
Age of first homelessness (< 25 years)	214 (44)	166 (43)	48 (47)	0.427	191 (44)	23 (38)	0.381
Housing Status (Absolutely Homeless)	388 (78)	313 (80)	75 (73)	0.135	342 (78)	23 (38)	0.780

Table 2 presents the results of chi-square tests for enabling factors. All variables pertaining to health care access were significantly associated with past month health service use in the primary care category ($p<0.05$) and were included in the regression model. In the specialist care category, only 'having a regular place to go for health care' was significant at the $p<0.05$ level. Measures related to quality of life were assessed for inclusion in the regression models. For primary care, both 'feelings about family in general' and 'feelings about the things done with other people' were significantly associated with levels of service use and thus included in the regression model ($p<0.05$). In the specialist care category, none of the variables were significantly associated with level of service use and only 'feeling about the amount of time spent with other people' was selected for inclusion in the regression model ($p\leq0.10$).

Table 2-2 Univariate comparisons of enabling characteristics, by primary and specialist health service use.

Variable	All N (%)	Primary Health Service Use			Specialist Health Service Use		
		Low Use (<3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value	Low Use (<3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value
Regular Family Physician	320 (65)	241 (61)	79 (78)	**0.002**	277 (64)	43 (72)	0.217
Regular place to go for health care	394 (81)	304 (79)	90 (88)	**0.031**	341 (80)	54 (90)	**0.053**
Needed health care but didn't receive it (past year)	209 (43)	155 (41)	54 (53)	**0.026**	189 (44)	20 (35)	**0.154**
Feelings about family in general	199 (43)	147 (41)	52 (54)	**0.013**	176 (43)	23 (40)	0.595
Feelings about things you do with other people	117 (25)	80 (21)	37 (37)	**0.001**	101 (24)	16 (27)	0.607
Feelings about amount of time spent with other people	151 (31)	116 (30)	35 (35)	0.341	138 (33)	13 (22)	0.119
Feelings about people seen socially	136 (28)	104 (27)	32 (32)	0.337	120 (28)	16 (27)	0.792

Several need-related factors were significantly associated with levels of service use (see Table 3). In the specialist health service use category, only major depressive episode and blood-borne infectious disease were significantly associated with level of service use at the $p<0.05$ level and no additional variables were included at the $p\leq0.10$ level.

Table 2-3 Univariate comparisons of need-related characteristics, by primary and specialist health service use.

Variable	All N (%)	Primary Health Service Use			Specialist Health Service Use		
		Low Use (<3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value	Low Use (<3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value
Major Depressive Episode	199 (40)	147 (37)	52 (51)	**0.016**	168 (38)	31 (52)	**0.050**
Manic or Hypomanic Episode	97 (20)	80 (20)	17 (17)	0.380	84 (19)	13 (22)	0.654
Post-Traumatic Stress Disorder (PTSD)	129 (26)	93 (24)	36 (35)	**0.021**	113 (26)	16 (27)	0.901
Panic Disorder	104 (21)	80 (20)	24 (23)	0.513	91 (21)	13 (22)	0.880
Mood Disorder with Psychotic Features	84 (17)	68 (17)	16 (16)	0.698	73 (17)	11 (18)	0.758
Psychotic Disorder	263 (53)	218 (56)	44 (43)	**0.021**	236 (54)	27 (45)	0.190
Suicidality (moderate/high)	168 (34)	128 (33)	40 (39)	0.232	144 (33)	24 (40)	0.234
Multiple mental disorders (≥2)	240 (48)	179 (46)	61 (59)	**0.013**	207 (47)	33 (55)	0.267
Less severe cluster of mental disorder	264 (53)	194 (49)	70 (68)	**0.001**	230 (53)	34 (57)	0.557
Severe cluster of mental disorder	363 (73)	299 (76)	63 (61)	**0.002**	318 (73)	45 (75)	0.715
Alcohol dependence	121 (24)	95 (24)	26 (25)	0.822	104 (24)	17 (28)	0.443

Variable	All N (%)	Primary Health Service Use			Specialist Health Service Use		
		Low Use (<3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value	Low Use (<3 visits) N (%)	High Use (≥ 3 visits) N (%)	P value
Substance dependence	288 (58)	217 (55)	71 (69)	**0.012**	257 (59)	31 (52)	0.293
Any physical illness	453 (91)	355 (90)	98 (95)	0.122	398 (91	55 (92)	0.880
Blood-borne Infectious diseases (HIV/HCV/HBV)	157 (32)	113 (29)	44 (43)	**0.009**	145 (34)	12 (20)	**0.042**
Multiple physical illness (≥2)	402 (81)	306 (78)	96 (93)	**0.000**	353 (81)	49 (82)	0.870
Head injury	270 (56)	211 (56)	58 (57)	0.830	234 (55)	36 (62)	0.322
General Health (fair/poor)	235 (48)	171 (44)	64 (62)	**0.001**	211 (48	24 (40)	0.222

Tables 4 and 5 present the results of univariate and multi-variable logistic regression analyses. Unadjusted odds ratios are included for all variables that met the threshold for inclusion in the logistic regression analysis ($p \leq 0.10$). For primary health service use (Table 4), having two or more physical illnesses, reporting poor general health, having a regular family physician, and feeling 'horrible' about the 'things that they do with others' were all significantly associated with high primary health service use. By contrast, participants with more severe mental disorders were significantly less likely to have high primary health service use than those without severe mental disorders. Ethnicity, having a regular location for seeking health services, self-assessed unmet health care need, current substance dependence, and blood-borne infectious diseases were not significantly associated with level of health service use in the final regression model.

Table 2-4 Associations between predictor variables and high primary health service use (≥ 3 visits).

Outcome Variable	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)[a]	P value
Predisposing Factors				
Ethnicity Aboriginals Caucasian Other	 1.57 (0.76, 3.25) 1.90 (1.10, 3.28)	 0.221 **0.022**		
Single marital status	1.53 (0.97, 2.41)	0.069		
Have children (under 18)	1.58 (0.98, 2.55)	0.061		
Enabling Factors				
Regular Family Physician	2.17 (1.31, 3.60)	**0.003**	2.27 (1.27, 4.07)	**0.006**
Regular place to go for health care	2.02 (1.06, 3.88)	**0.034**		
Needed health care but didn't receive it (past year)	1.64 (1.06, 2.55)	**0.027**		
Feelings about family in general	1.77 (1.13, 2.78)	**0.014**		
Feelings about things you do with other people	2.23 (1.39, 3.59)	**0.001**	1.74 (1.01, 2.99)	**0.047**
Need Factors				
Multiple mental disorders (≥2)	1.74 (1.12, 2.70)	**0.014**		
Less severe cluster of mental disorder	2.18 (1.38, 3.44)	**0.001**		
Severe cluster of mental disorder	0.50 (0.31, 0.78)	**0.003**	0.59 (0.35, 0.97)	**0.039**
Substance dependence	1.80 (1.13, 2.86)	**0.013**		
Blood-borne Infectious diseases (HIV/HCV/HBV)	1.82 (1.16, 2.84)	**0.009**		
Multiple physical illness (≥2)	3.90 (1.75, 8.71)	**0.001**	2.74 (1.12, 6.70)	**0.027**
General Health (fair/poor)	2.12 (1.36, 3.31)	**0.001**	1.68 (1.01, 2.81)	**0.047**

[a] Adjusted odds ratios and confidence intervals are only shown for variables that remained significant in the final logistic regression model after backwards elimination.

In the specialist care category (Table 5), having been hospitalized for a mental illness at least 2 or more times in the past 5 years and current major depressive episode were associated with high specialist service use, while having a blood-borne infectious disease was associated with lower odds of high specialist health service use. Age at enrolment was the only variable significant in univariate regression analyses at the p≤0.05 level that was not present in the final regression model.

Table 2-5 Unadjusted and adjusted odds ratios for associations between predictor variables and levels of service use for specialist health care visits (≥ 3 visits).

Outcome Variable	Unadjusted OR (95% CI)	P value	Adjusted OR (95% CI)[b]	P value
Predisposing Factors				
Age at enrolment visit Youth 25-44 years > 44 years	 0.33 (0.14, 0.78) 0.44 (0.18, 1.05)	 **0.011** 0.065		
Education (≤ Grade 8)	0.63 (0.37, 1.09)	0.097		
Hospitalized for mental illness (> 2 times) in past 5 years	2.48 (1.35, 4.56)	**0.004**	2.53 (1.35, 4.75)	**0.004**
Enabling Factors				
Regular place to go for health care	2.32 (0.97, 5.57)	0.059		
Needed health care but didn't receive it (past year)	0.66 (0.37, 1.17)	0.159		
Feelings about amount of time spent with other people	0.60 (0.31, 1.15)	0.122		
Need Factors				
Major Depressive Episode	1.71 (1.00, 2.94)	0.052	1.98 (1.11, 3.56)	**0.021**
Blood-borne Infectious diseases (HIV/HCV/HBV)	0.51 (0.26, 0.99)	**0.045**	0.48 (0.24, 0.97)	**0.042**

[b] Adjusted odds ratios and confidence intervals are only shown for variables that remained significant in the final logistic regression model

2.5. Discussion

Contrary to our hypothesis, the application of the Gelberg-Anderson model within our sample of homeless mentally ill individuals revealed that those with greater assessed need, including severe mental disorders and blood-borne infectious diseases, accessed health services at significantly lower levels than those with lower assessed needs. The burden of illness in our sample was extremely high. More than half of participants met criteria for psychotic disorder, and over eighty percent reported having multiple chronic physical illnesses. It was hypothesized that individuals with more severe mental disorders, multiple co-morbidities, and concurrent disorders, would have used health services at a higher frequency than those with less severe conditions. Further, based on findings from previous research using the Gelberg-Andersen model, it was

expected that need-related factors would be strongly associated with higher levels of service use. [107]

High health service use was defined as three or more visits in the past month, for both primary care and specialist visits. As such, 21% of participants accessed primary health services three or more times in the past month, while only 13% of participants accessed high levels of specialist health services. The vast majority of participants accessed primary or specialist services two or fewer times in the past month. This finding is consistent with other literature identifying that a small proportion of individuals tend to account for a disproportionately high amount of service use. [112,113] While the 80th percentile of the number of health services visits was chosen in order to define the outcome variable, it is important to note that even the median level of two visits in the past month is considerably greater than the number of health care visits per month that would be observed in the general population. [114]

The frequency of service use was considered independently in the categories of primary care and specialist health service use for the purpose of differentiating between primary health services accessed by the individual (i.e., family physician, nurse, dentist, etc.), versus specialized referral-based health service use (i.e., specialist physician, psychiatrist, psychologist, etc.). In both categories, as expected, a greater number of need-related factors were significantly associated with level of service use than the other Gelberg-Andersen domains. Variables shown to be significantly associated with higher levels of health service use in previous studies such as substance use and female gender were non-significant in our models. It is possible that non-significant results observed for certain predictor variables could be due to small sample sizes within these cells. All individuals included in these analyses were recruited on the basis of current homelessness status and therefore it was not possible to show a relationship between homelessness and level of service use. However, previous studies using the Gelberg-Andersen framework have shown homelessness to be significantly associated with high service use compared to housed individuals, and thus these findings are understood in the context of higher average service use. [107,115]

2.5.1. Primary Health Care Visits

In the primary health care visit category, none of the predisposing factors were found to be significantly associated with level of health service use. Having a regular family physician, and negative feelings about 'the things you do with other people' were enabling factors associated with significantly greater odds of high service use. It is intuitive that participants who have regular family physicians would have higher levels of service use than those who do not have a regular family physician, as this is suggestive of health seeking behaviour. Feeling "horrible" about one's social interactions may suggest a lack of positive social support and therefore an increased reliance on external sources, such as health services to meet needs.

Of the three need-related factors found to be significantly associated with level of service use, having multiple physical illnesses and reporting fair or poor general health were associated with higher levels of service use, supporting the hypothesis that people with poorer physical health ought to be accessing health services more frequently. Conversely, having a more severe mental disorder was associated with significantly lower likelihood of high health service use. This finding of lower health service use among those with more severe mental disorders (i.e., psychotic and bipolar disorder) is troubling and suggests possible gaps or barriers in the health system resulting in inadequate care for homeless individuals with more complex mental health challenges. The nature of such mental disorders can be such that individuals may not seek help when they need it due to stigma, mistrust in the medical system, negative past experiences, dissatisfaction with the prescription of medication without adequate psychological counseling and negative experiences with medication side-effects. This finding supports previous research that individuals experiencing homelessness and mental illness face barriers to service use. [21,23] and suggests that, in Vancouver, those with the most complex needs are particularly underserved.

2.5.2. Specialist Health Care Visits

The predisposing factor of hospitalization for a mental illness (>2 times) in the past 5 years was associated with higher levels of specialist health service use, suggesting that personal histories of specialized tertiary psychiatric care can help to explain increased levels of specialist care in the present. No enabling factors were

significantly associated with specialist health service use. The only other factors associated with specialist health service use were need-related factors. Major depressive episode was associated with higher levels of specialist service use, suggesting that individuals with depression are likely to be referred to and make use of specialist services, including being seen by a psychiatrist or other mental health professional. Having a psychotic disorder, or more severe mental disorder, was not significantly associated with either high or low levels of specialist health care use. Given the difficulty in treating individuals with severe mental disorders and the limited availability of specialists, it is possible that this finding of non-significance may be related to the fact that such individuals are more likely to be turned away from specialist services or inadequately followed. [116] Finally, having a blood-borne infectious disease (i.e., HIV, HCV, or HBV) was associated with significantly lower specialist health service use, which may suggest that individuals with these conditions are underserved by specialist health care providers, or that these conditions can be successfully managed by primary health care providers.

2.5.3. Strengths and Limitations

The Gelberg-Andersen framework guided the selection of variables to be included in analyses and provided a useful means of organization into the three domains of predisposing, enabling and need-related factors. The variables available through the VAH study were defined in ways consistent with previous studies using the Gelberg-Andersen framework, and were relatively complete in scope to populate the three domains. Analyzing health service use within this framework enabled comparison between previously established findings that also used this framework and highlighted differences between our sample and those studied elsewhere. Our results represent the first application of the Gelberg-Andersen framework to a homeless mentally ill cohort in Canada.

Limitations include the fact that the data used were based on self-reported past-month service use and thus were subject to recall bias whereby individuals may have had difficulty accurately recalling the exact frequency and nature of all health services contacts. As well, participants may over or underreport certain types of service use due to social desirability bias or perceptions of stigma. Individuals experiencing homelessness and mental illness tend to be a ‘hard to reach’ and heterogeneous

population and therefore it is difficult to generalize findings beyond our current sample. Further the cross-sectional design of this particular study does not allow us to make any direct causal inference about the association between level of need and service use. Efforts were made to ensure that as many established Gelberg-Andersen variables were included, however, certain variables might not have been included or may have been defined differently in comparison to previous studies. Additionally, inconsistencies between previous studies in the categorization of certain variables (i.e., substance use) within the three different Gelberg-Andersen domains, underscores the importance of judgment when placing particular variables into the three categories that comprise the model. While the overall sample size of the study allowed sufficient power to reduce the probability for a Type II error in the primary analysis, it is possible that the sample sizes for certain predictor variables (i.e., Aboriginal status) were not sufficiently large to establish a statistically significant finding.

2.5.4. Conclusion

The current study found that homeless individuals with more severe mental disorders and blood borne infectious diseases had significantly lower odds of using high levels of primary and specialist health services respectively, despite evidence of need. Our results raise important questions concerning the adequacy of services available to homeless individuals who experience severe mental disorders. Insufficient involvement in community care may contribute to the further worsening of health and the high use of hospital services in this population. Strategies to better connect individuals experiencing homelessness with indicated services in the context of public, private and mixed models of health care delivery need to be developed to be responsive to individuals complex and unique needs.

2.6. List of Abbreviations

AOR: Adjusted Odds Ratio

COPD: Chronic Obstructive Pulmonary Disease

HBV: Hepatitis: B

HCV: Hepatitis C

HIV: Human Immunodeficiency Virus

RCT: Randomized Control Trial

VAH: Vancouver At Home

2.7. Competing Interests

No competing interests.

2.8. Authors' Contributions

LC conducted field interviews, designed this study and led development of the manuscript.

MP supervised field research and contributed to the writing of the manuscript.

AM carried out the primary statistical analyses.

LM contributed to the statistical analyses and also contributed to the manuscript.

JS was principal investigator, contributed to the research design and the writing of the manuscript.

All authors read and approved the final manuscript.

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Chapter 3.

Continuity of care among people experiencing homelessness and mental illness: Does community follow-up, reduce rehospitalization?

3.1. Abstract

Objective: To examine whether timely outpatient follow-up after hospital discharge reduces the risk of subsequent rehospitalization among people experiencing homelessness and mental illness.

Data Sources: Comprehensive linked administrative data including hospital admissions, laboratory services, and community medical services.

Study Design: Participants were recruited to the Vancouver At Home study based on a priori criteria for homelessness and mental illness (n=497). Logistic regression analysis was used to assess the relationship between outpatient care within 7-days post-discharge and subsequent rehospitalization over a 1-year period.

Data Extraction: Data were extracted for a consenting sub-sample of participants (n=433) spanning 5-years prior to study enrolment.

Principal Findings: More than half of the eligible sample (53%; n=128) were rehospitalized within 1-year following an index hospital discharge. Neither outpatient medical services nor lab services within 7-days following discharge were associated with a significantly reduced likelihood of rehospitalization within 2-months [AOR=1.17 (CI=0.94, 1.46)], 6-months [AOR= 1.00 (CI=0.82, 1.23)] or 12-months [AOR=1.24 (CI=1.02, 1.52)].

Conclusions: In contrast to evidence from non-homeless samples, we found no association between timely outpatient follow-up and the likelihood of rehospitalization in our homeless, mentally ill cohort. Our findings indicate a need to address housing as an essential component of discharge planning alongside outpatient care.

3.2. Introduction

The high prevalence of co-morbid mental and physical illnesses among people experiencing homelessness results in high rates of hospitalization for this sub-population compared to the general public. [89,103,117] A critical period in health care delivery is the point at which patients, whether homeless or not, are discharged from inpatient hospital care, and released into the community. Patients leaving hospital are at heightened risk of medical complications, hospital readmission and death. [118,119] Continuity of care, including discharge planning and timely outpatient community follow-up, has been advocated as essential to improving health outcomes and preventing hospital readmission. [99,120–123] In a well-integrated health care system, discharge from hospital is followed by relevant outpatient health services. [124] This example of continuity of care is used as an indicator of system performance for both psychiatric and general health services. [1,120,121,125]

Many studies have reported that timely outpatient follow-up significantly improved outcomes on a variety of measures including reductions in hospital admissions, lower mortality, reduced symptom severity, improved community functioning, greater service satisfaction and improved quality of life. [119–121,123,125–127] Further, several studies have examined practices aiming to optimize discharge planning in support of positive patient outcomes, [128–130] leading to the recommendation that treatment guidelines should encourage that outpatient follow-up should occur within one week or one-month post-hospital discharge. [128]

Studies focusing on homeless samples have emphasized high rates of rehospitalization within this population, underscoring system fragmentation and barriers to accessing services as primary contributing factors. [126,131] A recent study identified homelessness as a risk factor for psychiatric readmission in a general psychiatric population. [127] An American study found that the experience of homelessness and having a mental illness interacted to produce even higher levels of emergency department use and hospital readmission compared to those experiencing homelessness alone, mental illness alone or neither. [132] More broadly, research findings have stimulated advocacy for increased emphasis and investments in continuity of care. Some studies have reported that despite timely follow-up post hospital discharge, readmission rates were not significantly improved among patients with psychiatric

disorders. [133–135] However, these findings were attributed by the authors to the quality of follow-up, whereby most patients were only engaged by telephone and not in person, and that the ability to engage in follow-up by phone may have more to do with the individual's level of functioning and therefore ability to be engaged by phone or to have access to a phone in the first place. [135] Further, these findings and similar ones form other studies have not specifically focused on individuals experiencing both homelessness and mental illness and therefore limits the ability to generalize such findings to this specific sub-population.

Compared to the general population, those who experience homelessness and mental illness have disproportionately high rates of hospital admissions, and longer lengths of stay. [136,137] Although the benefits of timely outpatient follow-up are well established in general samples, little research has addressed the effectiveness of this practice standard among patients who experience both homelessness and mental illness. The present study addresses this gap by investigating the relationship between timely in-person community medical care following hospital discharge and subsequent hospital readmission in a sample meeting criteria for both homelessness and mental illness. Based on findings from previous studies, we hypothesized that community follow-up within one week of hospital discharge would be associated with reduced risk of readmission.

3.3. Methods

3.3.1. Participants:

The *Vancouver At Home* (VAH) study recruited participants in two parallel longitudinal randomized controlled trials investigating housing and supports for people experiencing homelessness and mental illness in Vancouver, British Columbia (ISRCTN57595077 and ISRCTN66721740). [4] The VAH is part of a Canadian multi-centre research project. [2] All participants were at least 19 years of age and provided written, informed consent prior to participating in the study. Participants recruited to the VAH study met inclusion criteria for recent absolute homelessness and current mental illness as assessed through the use of standardized assessment measures administered in-person by trained interviewers. [4] Separate consent was requested for researchers to receive administrative data regarding health service encounters. The current study

examined administrative data collected during the pre-recruitment period (i.e., prior to randomization).

3.3.2. Data Sources

Historical health service encounter data including hospital discharge and community health service use details were provided by a public institution (note: all citizens of the province are required to enroll in the Provincial Medical Services Plan (MSP) which records all outpatient physician encounters and laboratory services in the province). Institutional review and ethics approval was provided by Simon Fraser University's Office of Research Ethics, under the application entitled "Research Demonstration Project on Housing and Mental Health in Vancouver, BC" (application number 2009s0231).

3.3.3. Variables

We defined index hospitalization as any acute hospital admission occurring in any hospital in BC during the study period (five-year period prior to randomization). Follow-up care was defined as any MSP services (examining medical appointments and laboratory services separately) received by the individual within a week after the last day of the index hospitalization.

3.3.4. Statistical Analysis

We presented categorical or nominal variables (such as gender and ethnicity) in terms of counts (n) and proportions (%) and continuous variables (such as age and number of services) in terms of mean with standard deviation (SD) or median with minimum (Min) & maximum (Max) as appropriate. We used independent sample t-tests to compare continuous variables and Pearson chi-square test to compare categorical variables between groups (such as re-hospitalization 'no' vs. 'yes').

Follow-up medical care was our primary independent variable (a continuous measure) and re-hospitalization (a binary variable, 'no' vs. 'yes') was the outcome variable. Consistent with previous research investigating post-discharge follow-up, and to facilitate direct comparison with other studies, we conducted logistic regression

analyses to examine the relationship between seven-day follow-up services and subsequent re-hospitalization within 2 months, or 6 months or 1 year. [105,123,127] Index hospital admissions that occurred within the year prior to their recruitment to the VAH were excluded because they were not associated with a full 12 months of follow-up. Further, acute hospital admissions that occurred within a week of the index hospital discharge were excluded due to the fact that such hospitalizations often represented a transfer between hospitals and therefore may not reflect a true readmission. [134]

We examined the effects of follow-up services on re-hospitalization in both univariate and multivariable models. For the multivariable regression models, we included variables that were found in previous studies to be potentially associated with re-hospitalization: age; gender; ethnicity; laboratory services; hospital admission and services prior to index admission; length of stay during index admission; and psychiatric reasons for index admission. [105,127] In the model building process, we included all the variables that were significant in bivariate models ($p \leq 0.05$). In addition, we forced other potential confounding variables and the primary independent variable (follow-up services) into the multivariable models regardless of significance in bivariate models. We also conducted sub-analyses to estimate the association between 4-weeks follow-up services and re-hospitalization using a similar set of confounding variables (results of this analysis reported in section 3.11 Supplemental Material). As measures of association (i.e., effect size), we reported both unadjusted and adjusted odds ratios (ORs) with 95% confidence intervals (CIs). All reported p-values were two-sided. IBM SPSS Statistics (version 22) was used to conduct these analyses.

3.4. Results

The sample of participants that provided consent to receive administrative data (n=433) did not differ meaningfully from the entire VAH sample (n=497). [4,138]

Table 1 presents the sociodemographic characteristics of individuals who had at least one hospital admission in the five-years prior to VAH recruitment n=318 (73%). Of those with at least one admission, the mean length of stay was 14 days, 40% (n=126) were admitted for greater than one week and 63% (n=201) of admissions were for psychiatric reasons.

Table 3-1 Socio-demographic characteristics of study participants.

Variable	Eligible sample[a] (n=318) n (%)/mean (SD)	Consented sample[b] (n=433) n (%)/mean (SD)	Full sample (n=497) n (%)/mean (SD)
Age at randomization (in years)	40.3 (11.3)	40.8 (11.0)	40.8 (11.0)
Age of first homelessness (in years)	29.8 (13.5)	30.1 (13.4)	30.3 (13.3)
Female gender	90 (28)	112 (26)	134 (27)
Ethnicity			
Aboriginal	57 (18)	70 (16)	77 (16)
White	166 (52)	235 (54)	280 (56)
Other	95 (30)	128 (30)	140 (28)
Incomplete High School	184 (58)	247 (57)	280 (57)
Single/Never Married	218 (69)	293 (68)	343 (70)
Need level (high)	198 (62)	255 (59)	297 (60)
Housing first interventions	192 (60)	257 (59)	297 (60)
Lifetime duration of homelessness (in months)	57.8 (67.0)	58.3 (64.8)	60.2 (70.3)
Longest episode of homelessness (in months)	29.8 (38.9)	30.4 (39.5)	30.9 (40.1)
Less severe cluster of mental disorders	152 (60)	235 (54)	264 (53)
Severe cluster of mental disorders	227 (71)	311 (72)	363 (73)
Suicidality (high)	56 (18)	79 (18)	87 (17)
Substance dependence	181 (57)	252 (58)	288 (58)
Daily substance use	86 (27)	131 (30)	143 (29)
Daily drug use	77 (24)	118 (27)	126 (25)
Index hospital admission			
Admission date (Min, Max)	Jun 12, 07 (Oct 22, 04; Feb 27, 11)		
Discharge date (Min, Max)	Jun 26, 07 (Nov 05, 04; May 09, 11)		
LOS (mean, SD)	14 (24.1)		
LOS: two to seven days (n, %)	128 (40)		
LOS: > 1 week (n, %)	126 (40)		
Psychiatric reason (n, %)	201 (63)		
Hospitalizations in past two years prior to index admission (mean, SD)	0.7 (2.1)		

[a] Included participants who had at least one acute hospital admission over a period of five years before randomization.
[b] Out of 497 participants, 433 provided consent to access to administrative data and were linkable to health records.

Table 2 presents the frequency of rehospitalization over the 1-year period following discharge from the index hospitalization. The frequencies of readmission are shown for different follow-up periods ranging from less than 1 week to several time points within 12 months. More than half (53%, n=128[1]) of the eligible sample had been readmitted to hospital within 12 months.

Table 3-2 Re-hospitalization over a period of 1 year among eligible study participants (N=318)

Acute hospital admission	< 1 week n (%)	1 month n (%)	2 months n (%)	3 months n (%)	6 months n (%)	12 months n (%)
Overall (any reason)	46 (15)	72 (23)	99 (31)	109 (34)	138 (43)	174 (55)
Psychiatric	34 (11)	53 (17)	70 (22)	75 (24)	96 (30)	123 (39)
Medical	12 (4)	19 (6)	29 (9)	34 (10)	42 (13)	51 (16)
Hospitalization (any reason) as outcome[c]						
Yes		26 (10)	53 (21)	63 (25)	92 (37)	128 (53)
No		236 (90)	204 (79)	188 (75)	157 (63)	115 (47)
Psychiatric admission as outcome						
Yes		19 (6)	36 (14)	41 (16)	62 (25)	89 (37)
No		243 (94)	221 (86)	210 (84)	187 (75)	154 (63)
Medical admission						
Yes		7 (3)	17 (7)	22 (9)	30 (12)	39 (16)
No		255 (97)	240 (93)	229 (91)	219 (88)	204 (84)

[c] Both numerator and denominator vary due to exclusion criteria. Participants with acute hospital admission within one week since their index discharge date were excluded from numerator ('yes' group). Due to the eligibility for follow-up, there were differences in the sample sizes available for inclusion at the different time points, as the index hospitalization for some participants occurred less than 1 year prior to recruitment in the study.

Table 3 presents univariate contrasts between those who were rehospitalized and not rehospitalized at different time periods, and their association with community medical services. Comparison between those who were readmitted to hospital within the year following their index hospitalization versus those who were not readmitted showed no differential effect of medical service involvement across all time points. No significant

[1] The eligible sample denominator varies here compared to the denominator used in Table 1 due to exclusion criteria. Patients who had hospital admissions within one week since their index discharge date were excluded from the 'yes' group as they likely represented transfers between hospitals and not true readmissions.

differences were observed for either outpatient physician or laboratory services or the combination of these services.

Table 3-3 Comparisons of outpatient services between participants who were re-hospitalized and who were not

	Any services Mean (SD)	P value	Outpatient Medical Services Mean (SD)	P value	Laboratory Services Mean (SD)	P value
Re-hospitalization in 2 months						
No	2.01 (3.12)	0.144	1.56 (1.45)	0.255	0.46 (2.52)	0.250
Yes	2.77 (4.17)		1.81 (1.39)		0.96 (3.88)	
Re-hospitalization in 6 months						
No	1.96 (2.59)	0.156	1.59 (1.48)	0.709	0.37 (1.95)	0.137
Yes	2.60 (4.47)		1.66 (1.37)		0.94 (4.02)	
Re-hospitalization in 12 months						
No	1.91 (2.77)	0.211	1.43 (1.27)	0.057	0.49 (2.27)	0.595
Yes	2.47 (3.96)		1.78 (1.58)		0.69 (3.43)	

Table 4 presents adjusted and unadjusted odds ratios, and 95% confidence intervals (CI) to estimate the association between outpatient medical and laboratory services and re-hospitalization. The model indicates that neither outpatient medical services nor lab services within one week following discharge were associated with reduced likelihoods of hospital readmissions within 2 months [AOR=1.17 (CI=0.94, 1.46)] and 6 months [AOR= 1.00 (CI=0.82, 1.23)]. A marginally significant finding at 12 months [AOR=1.24 (CI=1.02, 1.52)] indicates that participants were more likely to be rehospitalized if they received outpatient medical care within one week of discharge. Neither age, gender, psychiatric reason nor length of stay were associated with rehospitalization. Aboriginal ethnicity and prior hospital admission were both associated with significantly greater likelihood of rehospitalization (Aboriginal ethnicity at 2, 6 & 12 months, and prior hospital admission at 6 & 12 months).

Table 3-4 Logistic regression analysis to estimate the association between outpatient services and re-hospitalization

	Re-hospitalization in 2 months[d]		Re-hospitalization in 6 months[d]		Re-hospitalization in 12 months[d]	
	UOR (95% CI)	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**
Outpatient medical services in week following index hospitalization discharge (per service)	1.12 (0.92, 1.37)	1.17 (0.94, 1.46)	1.04 (0.87, 1.24)	1.00 (0.82, 1.23)	*1.19 (0.99, 1.43)*	***1.24 (1.02, 1.52)***
Laboratory services in week following index hospitalization discharge (per service)	1.05 (0.96, 1.15)	1.08 (0.97, 1.20)	1.07 (0.97, 1.17)	1.09 (0.98, 1.22)	1.02 (0.94, 1.12)	1.05 (0.95, 1.16)
Age at index hospitalization (per year)	1.00 (0.98, 1.03)	1.01 (0.98, 1.04)	1.01 (0.98, 1.03)	1.01 (0.99, 1.04)	1.00 (0.98, 1.03)	1.01 (0.98, 1.04)
Male	1.06 (0.53, 2.10)	1.16 (0.57, 2.38)	0.95 (0.54, 1.69)	1.00 (0.54, 1.84)	0.67 (0.37, 1.19)	0.71 (0.39, 1.31)
Ethnicity Aboriginals White Mixed/other	 **2.88 (1.15, 7.24)** *2.00 (0.89, 4.50)* Reference	 **4.19 (1.55, 11.33)** *2.20 (0.93, 5.18)* Reference	 *2.04 (0.96, 4.37)* *1.69 (0.90, 3.16)* Reference	 **2.90 (1.26, 6.68)** *1.84 (0.94, 3.60)* Reference	 *1.92 (0.91, 4.05)* 1.50 (0.83, 2.70) Reference)	 **2.63 (1.16, 5.94)** 1.51 (0.81 2.81) Reference
Psychiatric admission (no vs. yes)	1.23 (0.66, 2.30)	1.14 (0.57, 2.28)	1.43 (0.84, 2.44)	1.44 (0.79, 2.63)	1.42 (0.85, 2.38)	1.39 (0.78, 2.48)
Length of stay 1 day 2-7 days > 7 days	 Reference 1.00 (0.43, 2.32) 1.17 (0.51, 2.71)	 Reference 1.08 (0.44, 2.67) 1.32 (0.53, 3.72)	 Reference 0.84 (0.42, 1.68) 0.86 (0.43, 1.74)	 Reference 0.75 (0.35, 1.60) 0.77 (0.36, 1.68)	 Reference 1.15 (0.58, 2.29) 1.26 (0.63, 2.51)	 Reference 1.27 (0.60, 2.69) 1.27 (0.59, 2.73)
Prior services (past month) before index hospitalization (per service)	1.00 (0.96, 1.05)	0.98 (0.93, 1.03)	1.01 (0.98, 1.05)	0.99 (0.95, 1.04)	1.00 (0.97, 1.04)	0.98 (0.94, 1.02)
Prior hospital admission (past two years) before index hospitalization (per admission)	1.09 (0.95, 1.24)	1.10 (0.96, 1.25)	**1.45 (1.15, 1.82)**	**1.50 (1.18, 1.92)**	**1.33 (1.05, 1.68)**	**1.35 (1.04, 1.74)**

[d] Bold indicates p value ≤ 0.05 (significant) and italic indicates p value > 0.05 & ≤ 0.10 (significance trend)

A sensitivity analysis investigating the association between follow up four weeks (rather than one week) after discharge and rehospitalization is presented in section 3.11 Supplemental Material. Findings from this sensitivity analysis were comparable to those reported above.

3.5. Discussion

We found no protective association between community follow-up and the likelihood of rehospitalization in a sample recruited on the basis of both homelessness and mental illness. Our results diverge from those of previous studies with non-homeless samples, [120,121,123,125–127] and suggest that people experiencing homelessness and mental illness may require additional services to prevent readmission. Using comprehensive administrative data in a context of universal health benefits coverage, we found no significant protective effect of timely medical or laboratory services on the likelihood of rehospitalization within one year. To the contrary, at the 12-month time point timely outpatient medical service use was associated with significantly greater likelihood of rehospitalization. Nearly three-quarters (73%) of our sample had at least one hospital admission in the five-year observation period. Among those who were hospitalized, 53% were readmitted to hospital within one year of their index hospitalization regardless of their engagement with community medical services post discharge.

Clinical best practices and previous studies have emphasized the importance of timely outpatient follow-up post-hospital discharge, citing reduced morbidity and mortality as direct benefits. [99,120–123] Several studies have found that when patients are discharged and make connections with community health services within the first week post-discharge that outcomes improve in a wide variety of health domains, including psychiatric indicators. [128] Within our sample, however, these relationships were not replicated. Rather than questioning the importance of community follow-up, our results may indicate that timely post-discharge care is a necessary, but not sufficient means of reducing the risk of readmission among those who are homeless and mentally ill. Perhaps due to the interplay of factors such as poverty and social exclusion experienced by this particular sub-population, it is possible that attempting to generalize previous findings from other populations cannot adequately capture the reality of those experiencing both homelessness and mental illness. Given the absence of research

examining the impact of continuity of care for people who are both homeless and mentally ill, it is plausible, and perhaps probable, that adequate housing is a necessary condition to enable the benefits of community care to be realized.

Both hospital-based care and community-based outpatient follow-up practices are resource intensive. Previous studies have compared the cost of hospital admissions between homeless versus non-homeless patients and found that homeless patients incur substantial excess costs due to longer than expected lengths of stay for those admitted for medical and surgical reasons, and for high costs of psychiatric admissions unrelated to length of stay. [136] One American study, which examined hospital-based service use 30-days post hospital discharge found that rates of emergency department use and hospital readmission were higher among people experiencing both homelessness and mental illness as compared to other sub-populations. [132] Additionally, previous studies have found that among individuals with mental illnesses, while less likely to seek medical services overall, are more likely to seek medical care from urgent care settings (i.e. emergency departments) rather than via community based primary care. [132,139] Regardless of the performance of the healthcare system, the condition of homelessness likely contributes directly to the high rate of readmission observed in our study.

Previous studies have identified system fragmentation and limited access to community care as reasons for poor health outcomes among people experiencing homelessness and mental illness. [126,140] The high rates of community medical and laboratory service use within our sample suggest that the cohort accessed services beginning soon after hospital discharge, perhaps related to universal health coverage for patients in the province. Homelessness has been previously identified as a risk factor for psychiatric hospital readmission; [127] however, current discharge planning fails to sufficiently detail the housing needs of patients leaving hospital. Without directly addressing housing, health care investments may be insufficient to achieve recovery. Discharge planning and interventions that directly attend to health care needs as well as the conditions on which health is predicated (e.g., housing) have promise to reduce the burden on the health care system and create opportunities that promote recovery and prevent hospital readmission in both the short and long term. Regardless of whether the health care system publicly or privately funded, interventions that explicitly incorporate housing as an essential component of recovery, including Critical Time Intervention and

Housing First may offer better outcomes than continuity of health care services alone, particularly for people experiencing homelessness and mental illness. [126,141]

3.5.1. Strengths and Limitations

Limitations of this study include the fact that data were available only for those participants (87%) who consented for researchers to receive their administrative health records. Hospital admissions and community care encounters outside of the province were not included in these data. The retrospective nature of the study means we cannot be certain that each person met criteria for both homelessness and acute mental illness at each time point historically; however, as reported in previous studies, the average onset of homelessness was 10 years prior to recruitment in our sample. [4] The generalizability of our findings may be limited by the fact that the majority of our sample was white and male, and health service use occurred in the context of a publicly funded health care system. Further, those who were eligible and consented to participate in the study may differ on unmeasured variables from those who did not consent to participate or were excluded. Given the quantitative nature of the data used in this study, we were unable to assess the more qualitative aspects of the care received for both inpatient and outpatient care, and therefore we are not able to evaluate the quality of post-hospital discharge community-based care. As reported in previous studies, patient level characteristics including severity of illness and intensity of service provision are likely to have an impact on health service use, including readmission rates. [142,143] Given the nature of the data used in our analysis, we were unable to assess severity of illness within a particular diagnostic category or intensity of service provision beyond factors such as length of stay and frequency of service use. The logistic regression analysis chosen for this study, as well as the time points at which rehospitalization was assessed were chosen to be consistent with previous studies that have examined continuity of care in relation to hospital readmission, to allow for comparison between our findings and those of previous studies. However, analyses using other intervals of time may produce slightly different results.

Notwithstanding these limitations, the administrative data used in this study offered comprehensive medical records of both inpatient and community health care encounters during the 5 years prior to recruitment for the vast majority of participants. Further, criteria used to assess study eligibility in terms of both homelessness and

mental illness, were rigorously applied for all participants. Finally, universal provision of medical services in the province reduces the role that economic disincentives may play in the delivery of care to patients who live in poverty. This study is one of the first to assess continuity of care within a sample of participants experiencing both homelessness and mental illness.

3.6. Conclusion

Investments in continuity of care following hospital discharge are not likely to have optimal desired effects if people remain homeless. While continuity of care has been shown to be a valuable and effective mechanism for promoting recovery in the general population, for those without adequate and stable housing the same benefits may not be realized. The findings presented in this study indicate a compelling need to address housing as an integral component of hospital discharge planning. Collaborative solutions spanning health, housing and social welfare sectors are strongly indicated to prevent rehospitalization and to meet the needs of those experiencing homelessness and mental illness.

3.7. Statement of Ethics

Institutional review and ethics approval was provided by Simon Fraser University's Office of Research Ethics, under the application entitled "Research Demonstration Project on Housing and Mental Health in Vancouver, BC" (application number 2009s0231), and therefore all research was performed in accordance with the ethical standards articulated by the Declaration of Helsinki (1964) and its later amendments. All participants included in this study provided their free and informed consent to participate in the Vancouver At Home study and their consent for study researchers to access their administrative health records.

3.8. Funding

This research is supported by a grant to Simon Fraser University, made possible through a financial contribution from Health Canada to the Mental Health Commission of Canada. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

3.9. Acknowledgments

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3.10. Conflict of Interest

The authors state that they have no conflict of interest.

3.11. Supplemental Materials

Table 3.5 and Table 3.6, present comparisons of outpatient services use four-weeks following index hospital discharge with respect to subsequent hospital readmission. No significant differences between outpatient service use and hospital readmission over all time periods (2 months, 6 months and 12 months) within this four-week period were found. The results of this analysis are consistent with those presented in the primary analysis in the main article.

Table 3-5 Comparisons of outpatient services (over four weeks) between participants who were re-hospitalized and who were not.

	Any services Mean (SD)	P value[e]	Outpatient Medical Services Mean (SD)	P value	Laboratory Services Mean (SD)	P value
Re-hospitalization in 2 months						
No (n=204)	5.16 (8.01)	0.639	3.22 (3.26)	0.295	1.95 (6.28)	0.237
Yes (n=29)	4.45 (4.31)		3.90 (3.40)		0.55 (1.68)	
Re-hospitalization in 6 months						
No (n=157)	5.03 (6.35)	0.684	3.37 (3.41)	0.779	1.66 (4.47)	0.498
Yes (n=68)	5.49 (10.32)		3.24 (3.00)		2.25 (8.63)	
Re-hospitalization in 12 months						
No (n=115)	4.88 (6.30)	0.638	3.25 (3.41)	0.752	1.63 (4.08)	0.665
Yes (n=104)	5.38 (9.17)		3.39 (3.21)		1.98 (7.66)	

[e] p values were based on two-sample t-test with equal variances

Table 3-6 Logistic regression analysis to estimate the association between outpatient services (over four weeks) and re-hospitalization.

	Re-hospitalization in 2 months[f]		Re-hospitalization in 6 months[f]		Re-hospitalization in 12 months[f]	
	UOR (95% CI)	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**
Outpatient medical services in the following four-week after index hospitalization (per service)	1.06 (0.95, 1.18)	*1.14 (0.99, 1.30)*	0.99 (0.90, 1.08)	0.97 (0.87, 1.08)	1.01 (0.94, 1.10)	1.03 (0.94, 1.13*)*
Laboratory services in the following four-week after index hospitalization (per service)	0.91 (0.77, 1.07)	0.87 (0.72, 1.04)	1.02 (0.97, 1.06)	1.02 (0.96, 1.09)	1.01 (0.97, 1.06)	1.02 (0.96, 1.08)
Age at index hospitalization (per year)	1.00 (0.97, 1.04)	1.01 (0.97, 1.05)	1.00 (0.98, 1.03)	1.01 (0.99, 1.04)	1.00 (0.98, 1.03)	1.01 (0.98, 1.03)
Male	1.03 (0.43, 2.45)	1.12 (0.46, 2.77)	0.91 (0.49, 1.71)	0.93 (0.48, 1.79)	0.64 (0.35, 1.16)	0.67 (0.36, 1.25)
Ethnicity **Aboriginals** **White** **Mixed/other**	 2.31 (0.74, 7.16) 1.55 (0.57, 4.21) Reference	 *3.22 (0.96, 10.81)* 1.55 (0.56, 4.34) Reference	 1.64 (0.71, 3.77*)* 1.43 (0.73, 2.81) Reference	 *2.16 (0.87, 5.37)* 1.48 (0.72, 3.03*)* Reference	 1.61 (0.74, 3.53) 1.32 (0.72, 2.43) Reference)	 *2.11 (0.90, 4.94)* 1.33 (0.70 2.51) Reference
Psychiatric admission (no vs. yes)	1.12 (0.50, 2.50)	1.00 (0.41, 2.46)	1.40 (0.78, 2.53)	1.36 (0.69, 2.65)	1.38 (0.80, 2.38)	1.35 (0.73, 2.49)
Length of stay **1 day** **2-7 days** **> 7 days**	 Reference 0.68 (0.24, 1.92) 0.91 (0.33, 2.50)	 Reference 0.74 (0.25, 2.22) 1.12 (0.37, 3.38)	 Reference 0.70 (0.32, 1.50) 0.72 (0.34, 1.54)	 Reference 0.61 (0.27, 1.36) 0.61 (0.27, 1.40)	 Reference 1.04 (0.51, 2.12) 1.16 (0.57, 2.39)	 Reference 1.03 (0.48, 2.20) 1.06 (0.49, 2.30)

	Re-hospitalization in 2 months[f]		Re-hospitalization in 6 months[f]		Re-hospitalization in 12 months[f]	
	UOR (95% CI)	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**
Prior services in past month before index hospitalization (per service)	0.99 (0.93, 1.05)	0.98 (0.90, 1.06)	1.01 (0.97, 1.05)	1.00 (0.94, 1.05)	1.00 (0.96, 1.03)	0.98 (0.93, 1.03)
Prior hospital admission in past two years before index hospitalization (per admission)	1.07 (0.92, 1.24)	1.10 (0.94, 1.28)	**1.49 (1.17, 1.91)**	**1.52 (1.17, 1.97)**	**1.34 (1.04, 1.71)**	**1.34 (1.03, 1.73)**

[f] Bold indicates p value ≤ 0.05 (significant) and italic indicates p value > 0.05 & ≤ 0.10 (significance trend)

Table 3-7 Logistic regression analysis to estimate the association between psychiatric outpatient services and re-hospitalization (psychiatric reason).

	Re-hospitalization in 2 months[g]		**Re-hospitalization in 6 months[g]**		**Re-hospitalization in 12 months[g]**	
	UOR (95% CI)	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**
Outpatient psychiatric services in week following index hospitalization discharge (per service)	**1.51 (1.12, 2.02)**	**1.40 (1.00, 1.96)[h]**	**1.43 (1.13, 1.85)**	1.14 (0.84, 1.54)	**1.56 (1.20, 2.03)**	1.27 (0.95, 1.71)
Laboratory services in week following index hospitalization discharge (per service)	1.02 (0.92, 1.14)	1.06 (0.93, 1.21)	0.97 (0.87, 1.09)	1.02 (0.90, 1.16)	0.93 (0.82, 1.06)	0.98 (0.86, 1.11)
Age at index hospitalization (per year)	0.98 (0.95, 1.02)	0.99 (0.96, 1.03)	1.00 (0.97, 1.02)	1.01 (0.98, 1.04)	1.00 (0.98, 1.02)	1.01 (0.99, 1.04)
Male	1.13 (0.50, 2.56)	1.16 (0.49, 2.78)	1.12 (0.58, 2.15)	1.12 (0.54, 2.33)	0.82 (0.46, 1.46)	0.75 (0.39, 1.45)
Ethnicity **Aboriginals** **White** **Mixed/other**	 2.25 (0.79, 6.35) 1.59 (0.63, 3.97) Reference	 **4.05 (1.23, 13.33)** 1.89 (0.68, 5.26) Reference	 1.34 (0.57, 3.12) 1.39 (0.70, 2.77) Reference	 *2.39 (0.89, 6.46)* 1.41 (0.65, 3.07) Reference	 0.99 (0.46, 2.13) 1.09 (0.59, 1.99) Reference)	 1.58 (0.65, 3.86) 1.06 (0.54, 2.09) Reference
Psychiatric admission (no vs. yes)	**6.37 (2.18, 18.63)**	**4.58 (1.45, 14.47)**	**6.54 (2.95, 14.49)**	**6.13 (2.45, 15.37)**	**5.06 (2.71, 9.47)**	**4.28 (2.08, 8.88)**
Length of stay **1 day** **2-7 days** **> 7 days**	 Reference 0.87 (0.32, 2.33) 1.21 (0.46, 3.17)	 Reference 0.82 (0.27, 2.44) 1.03 (0.35, 3.00)	 Reference 0.82 (0.37, 1.79) 1.06 (0.48, 2.30)	 Reference 0.65 (0.26, 1.62) 0.71 (0.29, 1.75)	 Reference 1.03 (0.50, 2.11) 1.20 (0.59, 2.46)	 Reference 0.88 (0.39, 2.00) 0.77 (0.34, 1.77)

	Re-hospitalization in 2 months[g]		Re-hospitalization in 6 months[g]		Re-hospitalization in 12 months[g]	
	UOR (95% CI)	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**	**UOR (95% CI)**	**AOR (95% CI)**
Prior services (past month) before index hospitalization (per service)	0.97 (0.91, 1.04)	0.97 (0.91, 1.05)	0.96 (0.91, 1.01)	0.96 (0.90, 1.03)	**0.95 (0.91, 1.00)**	0.96 (0.91, 1.02)
Prior hospital admission (past two years) before index hospitalization (per admission)	1.10 (0.96, 1.26)	1.09 (0.95, 1.26)	**1.48 (1.18, 1.84)**	**1.52 (1.19, 1.95)**	**1.32 (1.07, 1.62)**	**1.30 (1.04, 1.62)**

[g] Bold indicates p value ≤ 0.05 (significant) and italic indicates p value > 0.05 & ≤ 0.10 (significance trend

[h] p value was 0.05

Chapter 4.

Schizophrenia and provincial corrections: Does timely community medical service use following custody release improve health outcomes?

4.1. Abstract

Introduction: People diagnosed with schizophrenia are overrepresented in corrections populations and face distinct challenges related to the transition from custody to community living, including maintaining continuity of healthcare. The purpose of this study was to examine whether timely community medical care following release from custody reduced the likelihood of hospitalization among people diagnosed with schizophrenia. We hypothesized that those who engaged with health services in the first week following custody-release would be at lower risk of hospitalization during the first-year post-release.

Methods: Non-identifying administrative health data for all individuals being released from British Columbia provincial corrections between 1997-2014 with a diagnosis of schizophrenia were analysed. Data were analyzed using time-to-event analysis with all individuals having 1 full year of follow-up time, post-index release. Community care (binary variable, yes vs. no) in the first week following index custody release was our primary independent variable and we evaluated its effect on future hospitalizations.

Findings: Nine and a half percent (n=4025) of people leaving BC provincial corrections between 1997-2014 had a diagnosis of schizophrenia. Our study included 3750 individuals with one-year hospitalization rate of 0.71 in the year following custody release. The sample had extensive histories of both community and hospital-based health service use. Overall, when the association between continuity of community health service use was examined (bi-weekly), we found that community service use was significantly associated with an increased likelihood of hospitalization over the full year following release from prison.

Conclusion: We found no protective association between contact with community health services in the first week post-custody release, and the likelihood of hospital admissions over 12 months. Contrary to our hypothesis, early outpatient service use as well as continuity of care were significantly associated with a greater likelihood of hospital admission. Our findings suggest that needs of this population cannot be addressed by the healthcare system alone. We suggest that deficits in the Social Determinants of Health for this population are responsible for the negative health outcomes experienced. Until they are addressed in a more coordinated fashion across multiple systems of support, we will continue to see people with schizophrenia disproportionately represented in our corrections, community health service and hospital settings.

4.2. Introduction

People diagnosed with schizophrenia are overrepresented in corrections populations [144,145] and face distinct challenges related to the transition from prison to community living. Navigating this transition is trying for most, but can be particularly difficult for those with serious mental illness (SMI). [146,147] Individuals with schizophrenia who have been in contact with the justice system represent a unique subpopulation with distinct and specialized needs [148] while also facing multiple barriers, significant stigma, [149,150] and personal challenges related to their mental illness. [151] The population of individuals who have committed offences with SMI have shown to have significantly higher rates of recidivism than those without severe mental illness, [148,152] as well those with SMI are significantly more likely to be hospitalized within 18 months of their release from incarceration. [152–154] Among general prison populations, engagement with primary health care services within one month following release from custody has been found to be positively associated with higher levels of overall health service engagement during the transition from custody to the community. [146,155,156] Similarly, findings from medical literature suggest that individuals across a broad spectrum of illnesses including psychiatric populations experience better overall health outcomes, and are less likely to experience adverse outcomes (including hospitalization) when continuity of care measures are put into place – including timely outpatient service use. [157–160] Little is known, however, about whether a relationship between greater continuity of care and

reduced hospitalization exists for people with schizophrenia following release from custody.

The weeks following release from custody have been identified as a particularly vulnerable time for people leaving custody including the risk of overdose and death. [161] Individuals leaving correctional settings have often lost connections with positive social networks, [162] are disconnected from community health services [163,164] and face significant challenges re-establishing themselves as members of society, including securing employment. [165] Recently incarcerated individuals are more likely to experience negative health consequences due to discontinuity with health services between the corrections system and the general health care system, [163] and are more likely to experience drug overdoses and death. [147,161,166] The month post release from prison has been identified as a critical time period in the transition from prison to community. [147,156,161,167] It is therefore important to understand the elements necessary to improve outcomes related to this transition, particularly among people known to be at high risk due to diagnosed mental illness.

The burden of illness among those involved in the justice system is staggering, involving a high prevalence of chronic illness, communicable diseases, mental disorders, and substance use compared to the general population. [144,151,155,168,169] Imprisoned individuals typically have histories of lower socioeconomic status, low educational attainment, low employment, low income and experiences of homelessness are common. [146,164,165,168] Deficits in the social determinants of health (SHD) often precede and are even more likely to persist after release from custody, leading to demands on publicly funded institutions including health care and social support. [147,170]

Individuals who have had experience with the justice system in general are at the highest risk of all-cause mortality immediately following release from custody [171] and this risk remains elevated compared to the non-offender population. [172] As a means of preventing mortality post-release, interventions have been designed to improve connections to community services for those leaving prison, often involving individualized case management. [173] Little research has investigated post-release interventions specifically targeting people diagnosed with schizophrenia, despite evidence that offenders with histories of psychiatric hospitalization have been found to be at significantly higher risk of mortality than other offenders. [174] Many studies rely on

data from self-reported measures, with small sample sizes and much of the available literature is based on analyses from offender samples outside of Canada where both the justice and health care systems may be difficult to draw comparisons from.

In the context of medical care, community follow up after hospital discharge is used as an important indicator of care quality for both general populations and those with SMI such as schizophrenia, and is strongly advocated for in order to reduce the likelihood of rehospitalization, morbidity and mortality. [1,120,123,125,131,133,157,159,175,176] Similarly, being released from custody may also be a critical opportunity for community-based intervention to prevent adverse outcomes including hospitalization. The purpose of the current study was to examine whether timely community medical care following release from custody reduced the likelihood of hospitalization among people diagnosed with schizophrenia. We hypothesized that those who engaged with health services in the first week following custody would be at lower risk of hospitalization during the first-year post-release.

4.3. Methods

4.3.1. Data Sources

This study was conducted using data from the British Columbia Inter-Ministry Initiative (IMRI), a database housed at SFU which links non-identifying administrative data from the provincial Ministries of Health (1990-2015) and Justice (1997-2015). Within the IMRI there are several different unique population-level databases including the Ministry of Health's: Medical Services Plan (MSP), PharmaNet, Vital Statistics, and Hospital Discharge Abstract Databases (DAD), and the Ministry of Justice's: Sentence Database, Custody Database, and Sociodemographic Database – all of which were accessed for these analyses. Additional details about the IMRI database, beyond what are relevant to this study, have been described elsewhere. [177]

The study sample was drawn from administrative records of all individuals who had been released from provincial custody (both remand and incarceration) between January 1, 2007 and March 31, 2014. We were interested in impact of exposure to provincial custody on health outcomes particularly hospitalization, therefore the releases considered in this study include both those who were serving a sentence as well as

those who were held on remand. Eligibility criteria included having been released from custody at least once, a linkable health record, a diagnosis of schizophrenia, and 1-year of follow-up time post index custody release. The 1-year follow up period began on the date of the most recent (index) release from provincial custody and ended at censoring (1 year post release). All individuals included in our sample were followed for 1 year, anyone who died with less than 1 year of follow-up time was excluded from the sample and all analyses. Community health service use data for both the pre- and post-custody periods were obtained from MSP records. Enrolment in MSP is mandatory for all Residents of British Columbia and includes services received during periods in the custody of provincial corrections. Hospitalization data were obtained from the DAD, which includes information related to each unique hospitalization including discharge diagnoses. Information regarding medication history were obtained from the PharmaNet database; and sociodemographic variables including age, sex, ethnicity, and educational status were obtained from Ministry of Justice's Sociodemographic database. As this study was retrospective and used exclusively deidentified administrative records, individual consent was not possible. This study was reviewed by the Research Ethics Board at SFU and approved without the need for a waiver of informed consent.

4.3.2. Measures

Community health service use was our main exposure variable and data were extracted from MSP records detailing dates, diagnostic codes (ICD-9), and costs associated with each service provided in a given visit. To examine the impact of timely community health service use following release from provincial corrections on subsequent hospitalization, we used MSP service contacts and hospitalizations for 1 year (post index release from custody). The period of time immediately following release from custody has been identified as a particularly vulnerable time for people as it relates to their health and safety. [161,162,178] Further, continuity of care for people with schizophrenia has been deemed essential to treatment success. [178] Community health service use was assessed during the first week post-release and at 2-week intervals for 1 year. Health service use was categorized as either non-substance related mental disorder (NSMD) related, substance use disorder (SUD) related, or as for a non-psychiatric reason. With best practice guidelines stating the importance of continuity of care for individuals with schizophrenia, we wanted to examine the extent to which timely

and ongoing community health service use would impact the likelihood of acute hospital admission. The main outcome of hospitalization was assessed using data from the DAD and classifies the reason for admittance by most responsible diagnosis for each patient's stay in the hospital. From these data we were able to assess the number of hospitalizations and categorize them as either NSMD related or any cause.

4.3.3. Analysis

Descriptive statistics (such as, counts and proportions for nominal variables, means and standard deviations (SD), or medians and interquartile ranges for continuous variables) were used to report the sample characteristics. Acute hospital admissions for any cause was the outcome (dependent variable). Follow-up time started (time 0) when participants were released from their current (index) custody exposure during the observation period (January 2007 to March 2014) and ended (time 1) when censoring occurred (1 year anniversary following release). All participants had one-year of follow up. Data were analyzed using time-to-event analysis because our emphasis was not only occurrence of the event, but also when the event occurred. Cox regression is one of the most commonly used time-to-event analysis techniques in health research. In the presence of censoring, it can examine the association between the outcome and single variables or a set of covariates using a semi-parametric approach. Participants with multiple acute hospitalizations were accounted for in the analysis. To address the recurrent nature of the outcome variable, Anderson-Gill (AG) counting process method, [179] an extension of the Cox model [180] was used. Moreover, time spent in hospital was excluded from the time-at-risk.

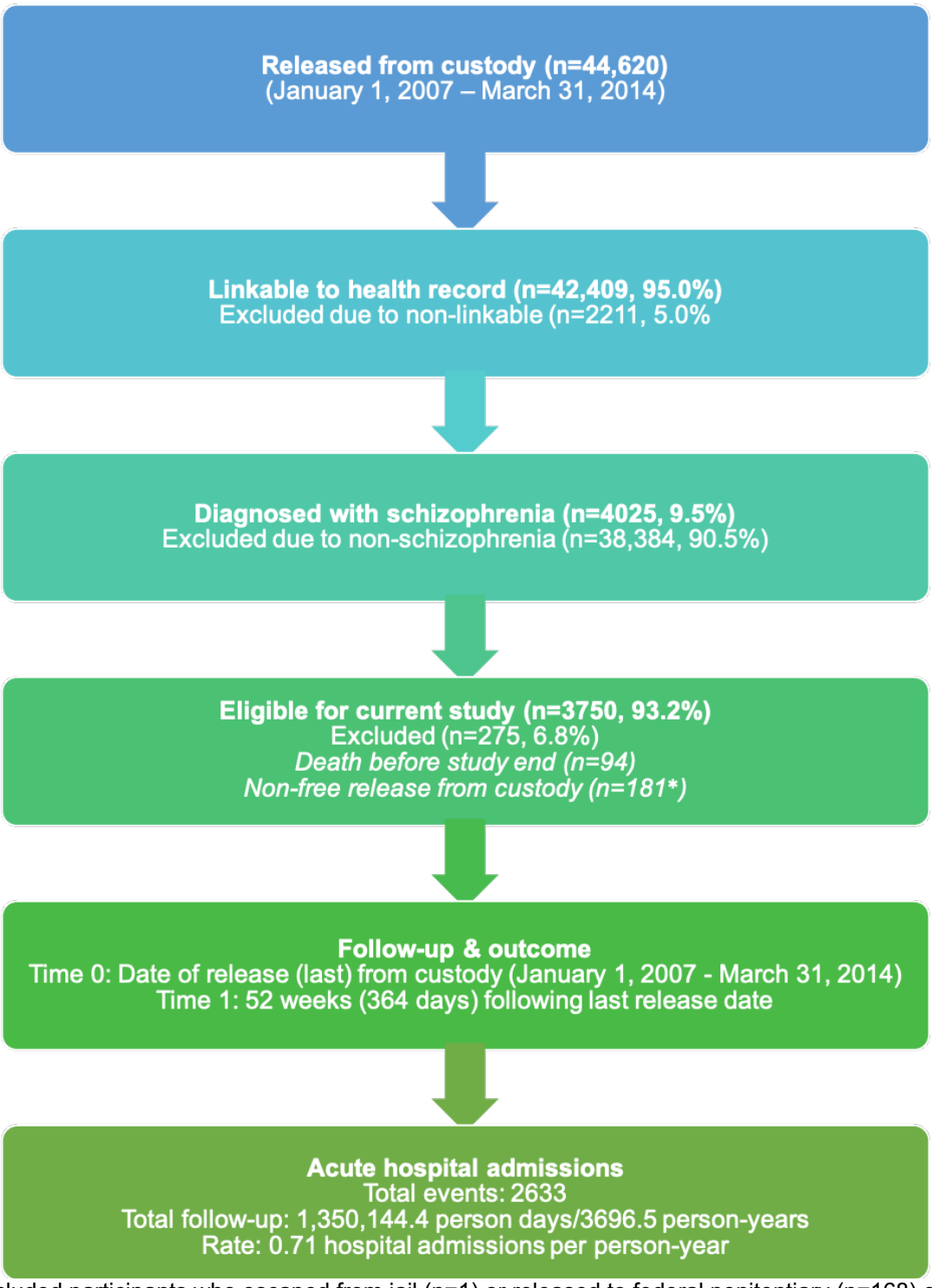
Community care (binary variable, yes vs. no) in the first week following index custody release was our primary independent variable. In order to ensure the temporal association between the independent variable and outcome, we excluded any hospital admission that occurred during 1st week of follow up. We evaluated the effect of community care in both bi-variate and multivariable settings. The multivariable cox model controlled for age groups, gender, ethnicity, education level, index offence type, prior MSP service utilization (NSMD related, SUD related & non-psychiatric reason), prior hospitalization (any cause & NSMD related) and prior use of anti-psychotic medication. Confounders were selected based on their associations with future hospitalizations based on prior publications. [155,167] As an effect size, we reported the

hazard ratio (HR) along with 95% confidence intervals (CI). We chose the conventional alpha level ($p \leq 0.05$) to report significance for the estimated parameters. Individuals with missing demographic information, including ethnicity and education level, were not excluded from the analysis but were included as separate categories titled 'unknown' ethnicity and 'unknown' education level.

In the Cox model, we used community care as a fixed covariate which was measured in the 1st week of follow up and evaluated its effect on future hospitalizations. As a sensitivity analysis, we also examined the time varying effect of community care on future hospitalizations. To address this issue, we used a panel data approach using a biweekly time cycle for 1-year follow up period. We measured both community care (yes vs. no) and hospitalizations (yes vs. no) in each bi-weekly cycle. We used a lag design to examine the effect of community care on hospitalizations (community care in the current interval and hospitalization in the following interval as outcome). Due to the binary nature of the outcome, we conducted the generalized estimating equations (GEE) logistic regression method to estimate the effect of community care on future hospitalizations. We used the same set of controlling covariates as in the multivariable Cox regression. In the GEE analysis, we reported an odds ratio with 95% CI as the effect size. SPSS 24 and Stata 13 was used to conduct these analyses.

4.4. Results

A total of 44,620 individuals were released from Provincial prison between January 1, 2007 and March 31, 2014. Among those released 9.5% (n=4025) had been diagnosed with schizophrenia. Excluding those who died before the end of the study (n=94) or had a non-free release from custody (n=181) resulted in a final sample of 3750 individuals (93.2%) who met our inclusion criteria for this study. For our primary outcome, hospitalization, there were a total of 2633 admissions (1,350,244.4 person days/3696.5 person-years), for a one-year hospitalization rate of 0.71 for our sample (see Figure 1 flow chart).



*Included participants who escaped from jail (n=1) or released to federal penitentiary (n=168) or intermittent custody (n=12).

Figure 4-1 Flow chart of individuals in judicial custody of British Columbia (BC) between 2007 and 2014 included in the study

Table 4-1 Socio-demographic, community care, service utilization and offence related characteristics of people with schizophrenia in BC Provincial custody, 2007 to 2014 (n=3,750)

Variable	Mean (SD)/ n (%)
Socio-demographic	
Age at enrollment[a] Mean (SD) Median (IQR)	 37.9 (10.8) 36.8 (29.4, 45.3)
Age groups, N (%) <25 yrs. 25-34 yrs. 35-44 yrs. 45 yrs. or older	 440 (11.7) 1,186 (31.6) 1,161 (31.0) 963 (25.7)
Men, N (%)	3,101 (82.7)
Ethnicity, N (%) White Indigenous Other Unknown	 2532 (67.5) 626 (16.7) 544 (14.5) 48 (1.3)
Education level, N (%) <Grade 10 Grade 10/11 Grade 12 Vocational /University Unknown	 605 (16.1) 1,215 (32.4) 1,125 (30.0) 554 (14.8) 251 (6.7)
Offence related characteristics	
Date of index release (last) from custody Mean Range (Min, Max)	 Jul 26, 2011 Jan 03, 07; Mar 31, 2014
Year of index release from custody, N (%) 2007 2008 2009 2010 2011 2012 2013 2014[b]	 293 (7.8) 355 (9.5) 377 (10.0) 376 (10.0) 469 (12.5) 532 (14.2) 883 (23.6) 465 (12.4)
Reasons of index release, N (%) Released to Bail Released to conditional sentence Mental Hospital Released at Court Sentence/Supervision End	 618 (16.5) 124 (3.3) 270 (7.2) 1213 (32.3) 1427 (38.1)

Variable	Mean (SD)/ n (%)
Others	98 (2.6)
Time served in custody at index release[c], in days	
Mean (SD)	49.5 (88.7)
Median (IQR)	17.0 (5.0, 56.0)
Index offense type, N (%)	
Violent	1,507 (40.2)
Non-violent	2,198 (58.6)
Unknown	45 (1.2)
Community follow up	
Community care (#) in the first week	
Mean (SD)	1.0 (2.0)
Median (IQR)	0.0 (0.0, 1.0)
Range (Min, Max)	0.0, 24.0
Community care in the first week, N (%)	
No	2,119 (58.4)
Yes	1,559 (41.6)
Prior Service utilizations, last five years	
MSP service (NSMD related)	
Mean (SD)	46.2 (63.8)
Median (IQR)	24.0 (7.0, 58.0)
MSP service (NSMD related), N (%)	
Very low (0-7)	943 (25.2)
Low (8-24)	965 (25.7)
High (25-58)	908 (24.2)
Very high (≥59)	934 (24.9)
MSP service (SUD related)	
Mean (SD)	23.0 (58.1)
Median (IQR)	2.0 (0.0, 13.0)
MSP service (SUD related), N (%)	
None	1,285 (34.3)
Low (1-3)	792 (21.1)
High (4-13)	766 (20.4)
Very high (≥14)	907 (24.2)
MSP service (non-psychiatric reason)	
Mean (SD)	119.6 (140.2)
Median (IQR)	75.0 (31.0, 154.0)
MSP service (non-psychiatric reason), N (%)	
Very low (0-30)	927 (24.7)
Low (31-75)	961 (25.6)
High (76-154)	929 (24.8)
Very high (≥155)	933 (24.9)
Prior hospitalizations (any cause), N (%)	
None	902 (24.0)

Variable	Mean (SD)/ n (%)
1-2 ≥ 3	1,271 (33.9) 1,577 (42.1)
Prior hospitalizations (NSMD related), N (%) None 1-2 ≥ 3	 1,835 (48.9) 1,096 (29.2) 819 (21.8)
Prior medication history, ever	
Anti-psychotic medication, N (%) Received and high MPR (≥0.80) Received and low MPR (<0.80) Didn't receive	 346 (9.2) 2,713 (72.8) 673 (18.0)
Methadone, N (%) Received and high MPR (≥0.80) Received and low MPR (<0.80) Didn't receive	 142 (3.8) 495 (13.2) 673 (83.0)

[a] Age at enrolment was based on last release date from custody (between January 01, 2007 to March 31, 2014).
[b] Year 2014 included only three months of data (January to March)
[c] This information was missing for 48 (1.3%) participants

Descriptive details about the sample are included in Table 1. The majority of offenders in our sample were men (82.7%, n=3101), with a median age of 36.8 years, 67.5% (n=2532) were identified as white, 16.7% (n=626) as indigenous and less than half (44.8%) were known to have completed high school. The median time served in custody for the release (index) considered in these analyses was 17 days (mean 49.5 days), with 40.2% (n=1507) for violent, and 58.6% (n=2198) for non-violent offenses. In terms of community follow-up, 41.6% were seen by community health care services within the week following their index release.

Historically, the individuals in this sample had extensive histories of community health care use. In the 5 years prior to the index release, the mean number of NSMD related visits was 46.2 visits, with a quarter (24.9% n=934) of individuals categorized as having 'very high' service use with 59 or more visits. The mean number of visits for SUD was 23.0 (median 2 visits), however only a quarter (24.2%, n=907) individuals had 14 or more such visits in the previous 5 years. For non-psychiatric visits, however, the mean number of visits was 119.6 with the highest quartile (24.9% n=933) having had 155 or more visits. The prevalence of hospitalizations in the preceding 5 years was also notable with 33.9% (n=1271) having been hospitalized 1-2 times in the past 5 years and 42.1% (n=1577) having been hospitalized 3 or more times. Most had histories of receiving

psychiatric medication (82%, n=3059), and 17% (n=637) had previously received methadone.

Table 4-2 Rate of hospitalization and estimates of hazard ratio for socio-demographic, community care, and offence related characteristics among people with schizophrenia in BC Provincial custody, 2007 to 2014 (n=3,750)

Variable	Rate, per person-year	Unadjusted HR (95% CI)	Adjusted HR (95% CI)
Socio-demographic			
Age groups			
<25 yrs.	0.75	Reference	Reference
25-34 yrs.	0.75	1.01 (0.79, 1.28)	1.00 (0.80, 1.25)
35-44 yrs.	0.66	0.89 (0.70, 1.13)	0.92 (0.74, 1.16)
45 yrs. or older	0.71	0.95 (0.74, 1.21)	1.04 (0.83, 1.31)
Men	0.66	**0.69 (0.59, 0.80)**	0.88 (0.76, 1.02)
Women	0.96	Reference	Reference
Ethnicity			
White	0.72	1.10 (0.88, 1.41)	1.01 (0.84, 1.21)
Indigenous	0.73	1.12 (0.92, 1.32)	1.04 (0.83, 1.31)
Other	0.66	Reference	Reference
Unknown	0.48	0.74 (0.46, 1.18)	0.64 (0.40, 1.03)
Education level			
<Grade 10	0.75	**1.32 (1.04, 1.68)**	**1.30 (1.02, 1.65)**
Grade 10/11	0.75	**1.32 (1.08, 1.63)**	**1.37 (1.12, 1.67)**
Grade 12	0.69	1.21 (0.98, 1.50)	**1.24 (1.01, 1.52)**
Vocational /University	0.57	Reference	Reference
Unknown	0.88	**1.56 (1.18, 2.08)**	**1.49 (1.12, 1.97)**
Offence related characteristics			
Index offense type			
Violent	0.71	0.99 (0.87, 1.13)	0.93 (0.82, 1.06)
Non-violent	0.72	Reference	Reference
Unknown	0.74	1.04 (0.44, 2.45)	1.29 (0.59, 2.85)
Community follow up			
Community care in the first week			
No	0.54	Reference	Reference
Yes	0.95	**1.77 (1.55, 2.01)**	**1.44 (1.26, 1.63)**
Prior Service utilizations, last five years			
MSP service (NSMD related)			
Very low (0-7)	0.36	Reference	Reference
Low (8-24)	0.52	**1.46 (1.17, 1.84)**	1.01 (0.80, 1.27)
High (25-58)	0.69	**1.92 (1.56, 2.37)**	1.01 (0.80, 1.26)

Variable	Rate, per person-year	Unadjusted HR (95% CI)	Adjusted HR (95% CI)
Very high (≥59)	1.30	**3.66 (3.01, 4.46)**	**1.31 (1.01, 1.69)**
MSP service (SUD related)			
None	0.48	Reference	Reference
Low (1-3)	0.56	1.18 (0.98, 1.42)	1.00 (0.83, 1.21)
High (4-13)	0.91	**1.91 (1.59, 2.29)**	**1.37 (1.13, 1.66)**
Very high (≥14)	1.01	**2.13 (1.78, 2.53)**	**1.37 (1.12, 1.67)**
MSP service (non-psychiatric reason)			
Very low (0-30)	0.46	Reference	Reference
Low (31-75)	0.61	**1.33 (1.08, 1.63)**	0.97 (0.79, 1.20)
High (76-154)	0.77	**1.67 (1.36, 2.04)**	0.97 (0.79, 1.19)
Very high (≥155)	1.02	**2.22 (1.82, 2.70)**	1.14 (0.92, 1.42)
Prior hospitalizations (any cause)			
None	0.23	Reference	Reference
1-2	0.47	**2.05 (1.62, 2.58)**	**1.80 (1.41, 2.32)**
≥ 3	1.19	**5.21 (4.20, 6.47)**	**3.04 (2.29, 4.04)**
Prior hospitalizations (NSMD related)			
None	0.43	Reference	Reference
1-2	0.71	**1.66 (1.44, 1.95)**	1.09 (0.89, 1.33)
≥ 3	1.36	**3.18 (2.71, 3.72)**	**1.41 (1.08, 1.84)**
Prior medication history, ever			
Anti-psychotic medication			
Received and high MPR (≥0.80)	0.82	Reference	Reference
Received and low MPR (<0.80)	0.76	0.93 (0.76, 1.13)	1.00 (0.82, 1.22)
Didn't receive	0.47	**0.58 (0.44, 0.75)**	1.02 (0.78, 1.33)

CI: Confidence Interval; HR: Hazard Ratio; MPR: Medication Possession Ratio; MSP: Medical Service Plan; NSMD: Non-substance related Mental Disorder; SUD: Substance Use Disorder; yrs.: Years

Table 2 includes rates of hospitalization and adjusted and unadjusted hazard ratios for a range of sociodemographic, community care and offense related characteristics following index release from prison. Community follow-up with outpatient health services in the first week following release from prison was associated with a significantly greater likelihood of hospitalization (AHR: 1.77 (1.26, 1.63)). Further, those with histories of high levels of health service utilization in the past 5 years were also more likely to be hospitalized post-release, including those with high NSMD (AHR: 1.31 (1.01, 1.69)), and SUD (AHR: high: 1.37 (1.13, 1.66); very high: 1.37 (1.12, 1.67)); as well as prior hospitalization for any cause (AHR: 1-2 admissions: 1.80 (1.41, 2.32); ≥ 3 admissions: 3.04 (2.29, 4.04)), and for those who had ≥ 3 NSMD related hospitalizations (AHR: ≥ 3 admissions 1.41 (1.08, 1.84)). Lower levels of education (grade 12 graduation or less) were also associated with greater likelihood of hospitalization.

Table 4-3 Continuity of community services and hospitalization during 1-year post-release (follow up) period among people released from custody with schizophrenia in BC, 2007 to 2014 (n=3,750)

Bi-weekly cycle	Bi-weekly community follow-up N (%)	Bi-weekly hospitalization N (%)
1	2006 (53.5)	320 (8.5)
2	1650 (44.0)	148 (3.9)
3	1640 (43.7)	127 (3.4)
4	1595 (42.5)	118 (3.1)
5	1520 (40.5)	101 (2.7)
6	1512 (40.3)	99 (2.6)
7	1518 (40.5)	88 (2.3)
8	1483 (39.5)	106 (2.8)
9	1495 (39.9)	91 (2.4)
10	1434 (38.2)	91 (2.4)
11	1467 (39.1)	103 (2.7)
12	1397 (37.3)	101 (2.7)
13	1438 (38.3)	95 (2.5)
14	1427 (38.1)	82 (2.2)
15	1425 (38.0)	91 (2.4)
16	1400 (37.3)	74 (2)
17	1407 (37.5)	81 (2.2)
18	1428 (38.1)	87 (2.3)
19	1434 (38.2)	97 (2.6)
20	1420 (37.9)	84 (2.2)
21	1399 (37.3)	81 (2.2)
22	1395 (37.2)	61 (1.6)
23	1381 (36.8)	75 (2)
24	1373 (36.6)	88 (2.3)
25	1355 (36.1)	87 (2.3)
26	1428 (38.1)	84 (2.2)

Table 3 includes bi-weekly frequencies of both community health service visits and hospital admissions over the first full year following prison release. Figure 2 shows a steady downward trend in community health care visits from the immediate post-release period through till the end of the first year. The highest number of individuals are both seen in the community (n=2006, 53.5%) and admitted to hospital (n=320, 8.5%) in the period immediately following custody release. The general trend for both community health service use and hospitalization is one of higher initial rates of health care use, which reaches a consistent plateau after the first few weeks following custody release.

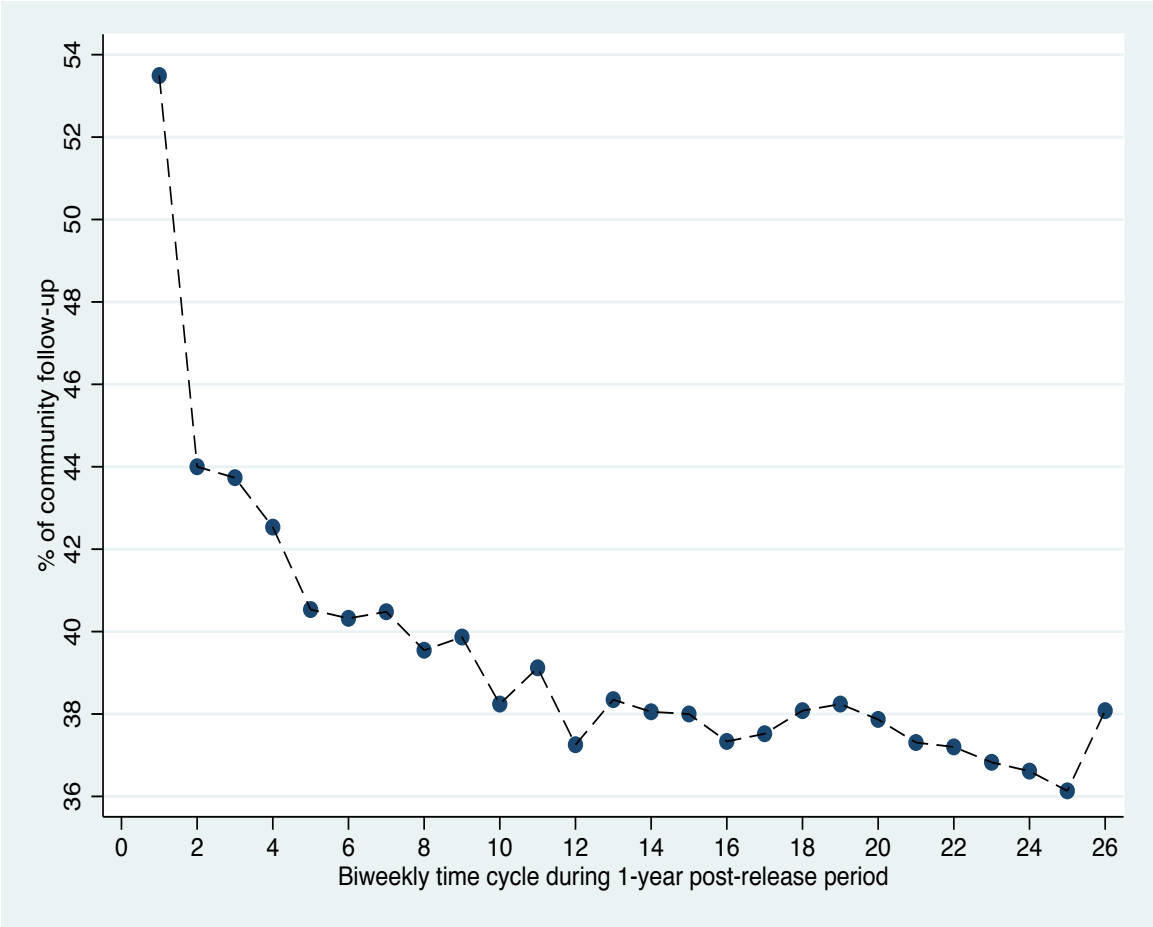


Figure 4-2 Biweekly community services (%) during 1-year post-release (follow up) period among people released from custody with schizophrenia in BC, 2007 to 2014 (n=3,750)

Table 4-4 GEE logistic to estimate the association between continuity of community service and re-hospitalization

	UOR (95% CI)	P value	AOR[d] (95% CI)	P value
Biweekly Community follow up (no vs. yes)	**2.01 (1.82, 2.23)**	**<0.001**	**1.72 (1.56, 1.91)**	**<0.001**

GEE: Generalized Estimating Equation; CI: Confidence Interval

[d] Adjusted for age groups, gender, ethnicity, education level, index offence type, prior MSP service utilization (NSMD related, SUD related & non-psychiatric reason), prior hospitalization (any cause & NSMD related) and prior use of anti-psychotic medication.

Overall, when the association between continuity of community health care service use was examined (bi-weekly), we found that community service use was significantly associated with an increased likelihood of hospitalization over the full year following release from prison.

4.5. Discussion

We found no protective association between contact with community health services in the first week post-custody release, and the likelihood of hospital admissions over 12 months. Contrary to our hypothesis, early outpatient service use as well as continuity of care were significantly associated with a greater likelihood of hospital admission. Other factors that were significantly associated with increased risk of hospitalization were high prior use of community-based services, histories of hospital admissions and lower levels of educational attainment. Our results indicate that this population is accessing services on an immediate and ongoing basis; however, without an expected deterrent effect on subsequent hospitalization. Prior use of both community-based services and histories of hospitalization are associated with later use of both modes of health service which is suggestive of the poor overall health of this population. The fact that those accessing health service are also more likely to end up hospitalized, also suggests that these individuals' needs are not being adequately met in the community health context.

An important distinction between hospital discharge and custody release, however, is the fact that the intention of hospital discharge is to release the individual at a point where their health is relatively stable and is done so with the expectation that their care can be managed in the community. The same is not true for those being released from custody, the majority of whom are being released at a time determined by the justice system, not at a point where their health is necessarily stable. For people with schizophrenia, this is likely a very important consideration to be assessed prior to release from custody. While some literature reports improved health of inmates while incarcerated, [181,182] for people with SMI this is typically not the case. Incarceration often limits an individual's ability to participate in treatment, including medication adherence and generally does not improve treatment compliance. [183] Therefore individuals with SMI are less likely to be leaving custody at a point where their health is necessarily stable.

In our sample, all heath related variables were significantly associated with an increased likelihood of hospitalization. Neither early, nor consistent use of community-based health services were protective against hospitalizations which occurred at an alarmingly high rate of 0.71 per person-year which was nearly 9 times (8.86) higher than the all-cause hospitalization rate for the Canadian general population. [184] Despite an

estimated population prevalence of schizophrenia of only 0.06%, [185–187] hospitalizations for 'schizophrenia and related schizotypical and delusional disorders' made up 1.8% of all hospital admissions in B.C. between 2018-2019. [184] In our sample, hospital admissions for those who had 3 or more hospitalizations prior to their index release from custody (42.1% of our sample), was associated with over three times greater likelihood of hospitalization for all causes in the follow-up period. For NSMD, however, prior hospitalization was only associated with a 1.41 times greater likelihood of hospitalization. Indicating that the burden of illness in our sample extends well beyond the schizophrenia diagnoses. We know from previous research that the prevalence of chronic illnesses, communicable diseases, other mental disorders, and substance use are also disproportionately high among people who have been under judicial supervision compared to the general population. [155,168,188] In addition, incarcerated individuals are more likely than others to have histories of poverty, low educational attainment, low employment, and experiences of homelessness. [168,189] These factors all present complex challenges for those reintegrating into society, managing health care needs and re-establishing social connections following time in custody.

The finding that lower levels of educational attainment were associated with a significant risk of hospitalization, may be explained in part by the relationship between employment and health. Previous research has found that for people with schizophrenia employment is protective against negative health and social outcomes. [190,191] It has also been found that individuals with schizophrenia face considerable barriers to employment. [192,193] It is possible that within our sample we are seeing this effect play out whereby lower levels of education, which typically are associated with fewer employment opportunities, [192] are resulting in lower levels of employment and thus poorer health outcomes.

For people with schizophrenia navigating these challenges can be especially complex and maintaining health can be very difficult. Stigma and discrimination are important considerations. People with lived experience of mental illnesses often report experiencing stigmatizing behaviours within both the judicial and healthcare systems. [150,194] Many report experiencing being spoken to by providers using stigmatizing language, dismissed, condescended to, and ignored when trying to seek care. [150] Research has shown that stigma related to mental illness exists both within the

healthcare system itself and among service providers, and that this is a major barrier to those seeking care, and a detriment to treatment outcomes. [150]

Our results indicate that the prevalence of schizophrenia within the broader BC Provincial custody population, was over 20 times greater than that of the general population. [185–187] This observation alone is important. People with schizophrenia are dramatically overrepresented in the provincial custody population suggesting structural biases that are disproportionately causing people with schizophrenia to come into contact with law enforcement. Previous research has identified explicit and implicit stigmatizing attitudes about mental illness among police as contributing to the overrepresentation of people with mental illnesses in corrections. [194] A lack of appropriate training to recognize and understand mental illness symptomatology and skills to appropriately intervene, has been cited as a critical failing of the justice system. As means of combating stigma and equipping law enforcement with the skills to be able to more effectively intervene in situations involving a person with mental illness, crisis intervention training has been found to be an effective means of minimizing the number of people with mental illnesses who are inappropriately routed through the justice system. [194]

Part of the explanation for our findings could be that community-based physicians are appropriately identifying cases that require a greater level of intervention than can be addressed by community-based health services, thus requiring hospital admission. One thing that seems to be clear, is that individuals who are released from provincial custody with a diagnosis of schizophrenia are at significant medical risk. Whether this risk is being identified by community physicians, or an acute medical emergency is leading the individual to seek hospital-based care on their own, seems to be indicating that there are significant unmet needs within this population.

While our study does not specifically examine social determinants of health (SDH) there is compelling international evidence that insufficient attention to the SDH contributes to incarceration among people with SMI. A recent study from Finland found that the prevalence of people with schizophrenia in prisons has dramatically increased in recent years and has cited underinvestment in community-based resources as the explanation. [145] Relatedly, involuntary hospital admissions have been steadily increasing internationally since institutional care has been replaced by community-based care. [195–

[197] While we are not yet aware, we suspect the same may be true in BC. We know that people with SMI are overrepresented in homeless populations both in BC and internationally. [81,198] We've seen from previous studies that people who are homeless have very frequent involvement in corrections, [199,200] and that in the absence of interventions to address housing and social wellbeing, that these individuals are likely to remain unhoused, [201–203] or in extremely poor-quality housing, [204] and at risk of exposure to the corrections system. [138]

4.5.1. Strengths & Limitations

This study makes a unique contribution to the body of literature by examining the intersections between custody, community health services, and hospitalization among people diagnosed with schizophrenia. The quality of the data used lends strength to these analyses by including the vast majority of those who had exposure to the BC provincial corrections system between 2007 and 2014 and who were clinically diagnosed with schizophrenia, allowing us to generalise our findings to the province of BC. Within the dataset we were able to disaggregate service encounters and hospitalizations by categories of NSMD, SUD, and non-psychiatric reasons so as not to group all service contacts together and give a better understanding of health seeking behaviours for this population. Given that this study focused solely on the BC corrections population, we are unable to generalise our findings to other Canadian provinces or jurisdictions outside of Canada where both judicial and healthcare systems may vary or be substantially different to that which exists in BC. Despite the strengths of the administrative data used, these data lack important contextual data such as housing status, employment status, or details about social context and support systems that have important bearing on people's health and wellbeing.

4.5.2. Conclusion

Our findings suggest that the needs of this population cannot be addressed by the healthcare system alone. The health sector deserves acknowledgment for the high volume of service being delivered; however, it is clear that frequent and ongoing community medical service use is not protective against hospitalization for those in our sample due to the severity and complexity of their needs. Our results suggest that deficits in the SDH for this population are responsible for the negative health outcomes

experienced. Until they are addressed in a more coordinated fashion across multiple systems of support, we will continue to see people with schizophrenia disproportionately represented in our corrections, community health service and hospital settings. We know from previous research, that individuals with schizophrenia are more likely to experience poverty, homelessness, unemployment, and other deficiencies in the SDH all of which contribute to a significant burden of illness. We also know that homelessness is a major risk factor for criminal justice system involvement, poor health and high use of both community and hospital-based services. [205–207] Additionally, previous research has shown that housing alone reduces offending. [138,167] Our results indicate that this burden of illness extends well beyond mental health needs and speculate that the true causes of the high use of healthcare services is due not only to illness, but due to poverty and social exclusion, which are preventing recovery, and sustaining the poor health experienced by this population.

The challenges that people with schizophrenia face, require inputs from a broader system of care which includes, but is not limited, to the health care system. People who are incarcerated face systemic marginalization which typically predates their contact with the criminal justice system and therefore a more upstream approach which addresses the broader social determinants of health is necessary to address the unmet needs of this population. Longstanding poverty is likely to play an important role in contributing to the overall burden of illness which is so acutely apparent in our sample. Having a diagnosis of schizophrenia is highly stigmatizing and people with schizophrenia face significant discrimination and social exclusion throughout society, including in healthcare, the justice system and other service settings. Until we are able to address the spectrum of needs of these individuals beyond healthcare provision, we are unlikely to change the negative trajectory of their experiences. As Canadians, we expect our primary health care services to be protective against significant illness which would render us hospitalized, but in the absence of a coordinated systems approach to care and social support, our community-based health services are destined to be overwhelmed by people in crisis with needs they cannot meet.

4.6. Supplemental Materials

The current study analyzed information obtained from several administrative databases maintained by the BC Ministry of Health and the BC Ministry of Justice. Table

1 & 2 present a snapshot of information available from the Ministry of Health and Ministry of Justice dataset that was used in the study. Table 3 presents variables used in the multivariable cox regression analyses.

Table 4-5 Summary of variables/information available from the Ministry of Health dataset

	Ministry of Health: Available Information	Timeline
Medical Service Plan (MSP) billing data	• Medical services delivered to patients covered by MSP • Date, diagnostic code (ICD-9) and cost associated for each service (including laboratory and diagnostic procedures) • Type of services	April 1990 to March 2015
Discharge Abstract Database (DAD)	• Activities including discharges, transfers and deaths for in-patient and day-surgery patients in BC Acute Care Hospitals • Time of admission & discharge • Length of stay in hospital • Diagnostic codes and types • Intervention/procedure codes • Hospital codes • Type of Disposition • Mode of entry	April 1990 to March 2015
PharmaCare and PharmaNet Data	• Prescription service dates • Drug codes/DIN, therapeutic codes • Costs associated with ingredients and professional services • Location of pharmacy • Type of PharmaCare plan • Type of drugs based on therapeutics class (such as, Opiate agonists, Antidepressants, Benzodiazepines, Tranquilizers), • Type of drugs based American Hospital Formulary classification (such as, Antidepressants, Antipsychotic agents, Opiate agonists) • Generic and brand name of drugs • Quantity (e.g., 60 pills), dosage (e.g., 50 mg) and days of supply (e.g., 5 days)	April 1990 to March 2015
Vital Statistics death file	• Dates and causes of death (diagnostic codes)	April 1990 to March 2015

Table 4-6 Summary of Variables/information available from the Ministry of Justice.

	Ministry of Justice: Available Information	Timeline
Sentence Database	• Offences: dates, types and charge counts • Sentences: dates, types and lengths of sentences • Court that delivered sentences	April 1997 to March 2015
Custody database	• Date of movement (such as, admission & release) between different facilities/jail/prison • Movement reasons • Number of days served in custody supervision • Name of facilities/jail/prison • Type of offence leading to custody	January 2007 to March 2015
Socio-demographic database	• Gender • Ethnicity status • Education level • Date of birth • Age	April 1997 to March 2015

Table 4-7 Description of variables included in the multivariable Cox regression.

Name of Variables	Time of measurement	Analytic type & levels	Time varying	Reference level
Community care	During the 1st week of follow-up period (following index release)	Binary (no and yes)	No	No
Age	At the time of index release	Categorical with five levels <25 years, 25 to 34 years, 35 to 44 years, 45 to 54 years & 55 years or older	No	<25 years
Gender	Self-reported, time of justice contact	Binary (men & women)	No	Women
Ethnicity	Self-reported, time of justice contact	Categorical with three levels White, Indigenous & Other Unknown included as separate level	No	Other
Education level	Self-reported, time of justice contact	Categorical with four levels <Grade 10, Grade 10/11, Grade 12 & Vocational /University Unknown included as separate level	No	Vocational /University
Index offence type	Offence leading to custody exposure	Categorical with two levels Violent & Non-violent Unknown included as separate level	No	Non-violent offence
MSP service (NSMD[a] related)	In the five-year period preceding the index release	Categorical with four levels[b] Very low (0-7), low (8-24), high (25-58) and very high (59 or higher)	No	Very low (0-7)
MSP services (SUD[c] related)	In the five-year period preceding the index release	Categorical with four levels None, Low (1-3), High (4-13) & Very high (≥14)	No	None
MSP services non-psychiatric reason)	In the five-year period preceding the index release	Categorical with four levels[d] Very low (0-30), low (31-75), high (76-154) and very high (155 or higher)	No	Very low (0-30)

Name of Variables	Time of measurement	Analytic type & levels	Time varying	Reference level
Prior hospitalizations (any cause)	In the five-year period preceding the index release	Categorical with three levels None, 1-2 & 3 or more	No	None
Prior hospitalizations (NSMD related)	In the five-year period preceding the index release	Categorical with three levels None, 1-2 & 3 or more	No	None
Prior anti-psychotic medication	In the period prior to index release	Categorical with three levels Received and high MPR (≥0.80), Received and low MPR (<0.80), Didn't receive	No	Received and high MPR (≥0.80)

MPR: Medication Procession Ratio; MSP: Medical Service Plan; NSMD: Non-Substance Mental Disorder; SUD: Substance Use Disorder.

[a] Non-Substance Mental disorders (NSMD) were identified using the ICD-9 three-digit code range from 290 to 319 (except 291, 292, 303, 304, and 305).

[b] 25th, 50th & 75th percentile was used to categorize into four quartiles.

[c] Substance use disorders (SUD) were identified using the ICD-9 three-digit codes of 291, 292, 303, 304, and 305.

[d] 25th, 50th & 75th percentile was used to categorize into four quartiles.

Chapter 5.

Conclusions and Implications

5.1. Summary & Findings

The content of this thesis includes a series of analyses examining patterns of health service use and unmet need by people experiencing homelessness and mental illness in British Columbia. The overall goal of this body of work was to assess the extent to which community health services were being used by these extremely marginalized populations as an indicator of whether their health needs were being met by existing community-based services and the impact on hospitalizations. Overall, the findings from all three studies suggest that the burden of illness among those experiencing homelessness and serious mental illness (SMI), in particular schizophrenia, is staggeringly high, and beyond the current capacity of the healthcare system alone. The conclusions drawn from all three studies highlight the desperate need for greater coordination between broader systems of care including health, justice and social assistance systems.

Chapter 2 presents the results of a cross-sectional study examining factors associated with different levels of health service use among the Vancouver At Home (VAH) sample (prior to study enrolment), all of whom were experiencing current homelessness and mental illness. These analyses showed that contrary to our hypothesis, individuals with more severe mental disorders and blood-borne infectious disease had significantly lower odds of using high levels of both primary care and specialist health services, despite evidence of need. For this study we used the Gelberg-Andersen Behavioural Model for Vulnerable Populations to help build the model for these analyses and ground our findings in an established and credible framework. [105–107] This model provides a framework for identifying factors associated with healthcare access and delivery in the domains of *predisposing* (individual), *enabling* (systemic/structural) and *need-related* (perceived/objective) factors. [99,105,106] These findings raise important questions about the adequacy of services available to those experiencing homelessness and severe mental disorders. Previous research has highlighted the high demand for services among this population; [81,100] high use of

emergency department and inpatient hospital use, and underuse of outpatient services. [89,101,103] With the high cost of hospital-based services these findings underscore the need for low-barrier, accessible, client centered approaches that better connect individuals to community services according to their needs.

The findings from the first set of analyses covered in Chapter 2 underscore the need to better understand where the disconnections with services may be occurring for our VAH sample. To explore this further in Chapter 3 we sought to examine the role of continuity of care among people experiencing both homelessness and mental illness. Previous research has highlighted the importance of continuity of care between inpatient and outpatient services. [99,120–123] Given the high self-reported hospital use among our VAH sample we sought to examine the relationship between timely community outpatient follow-up after hospital discharge and the risk of subsequent rehospitalization. For these analyses we used comprehensive administrative data from the Inter-Ministry Research Initiative (IMRI) database which included hospital admissions, laboratory services and community medical service records for the majority of the VAH sample (n=433). In order to examine the effect of continuity of care, we extracted data from the 5-years prior to VAH study enrolment to look at prior hospitalizations. At the point of hospital discharge we examined whether participants had outpatient visits within 7 days of their hospital discharge and subsequent rehospitalization over a 1-year period. We found that more than half (53%, n=128) of our eligible sample were rehospitalized within one year of their index hospitalization and that neither outpatient medical services, nor lab services were associated with a reduced likelihood of rehospitalization at any point over the next year.

Contrary to our hypothesis and previous research from non-homeless samples, [119–121,123,125–127] we found no protective effect of timely outpatient follow-up and a reduced likelihood of rehospitalization. What we found was that these individuals were accessing outpatient services in both a timely and frequent manner, however, it was not reducing their risk of hospitalization as had been shown to occur among the general population. These findings suggest that the problem is not discontinuity between inpatient and outpatient services, rather other factors that lie outside of the health care system. Given that the participants in our study were known to be homeless at the time of recruitment, we suggest that housing was likely a critical factor to be addressed.

Homelessness does not exist in a vacuum and many different social determinants of health (SDH) contribute to the experience of homelessness including poverty, metal illness, involvement in the criminal justice system, substance use, social exclusion, and stigma. Further, there is considerable heterogeneity among those experiencing homelessness, thus one-size-fits-all approaches to addressing homelessness are likely to be ineffective as not everyone who finds themselves in such circumstances needs the same level of supports. Factors that stood out in the analyses previously discussed and in findings reported in other VAH manuscripts were those of SMI and criminal justice system involvement.

Within the high-needs arm of the VAH study, diagnoses of schizophrenia were the most common mental disorder reported and the majority of these participants had also had contact with BC provincial corrections in their recent pasts. In the interest of better understanding the intersection between SMI, criminal justice system involvement and the use of medical services, in Chapter 4 we decided to investigate whether timely community medical service use following release from provincial custody had an effect on subsequent likelihood of hospitalization. For these analyses we shifted our focus away from the VAH sample alone and opted to study the larger BC provincial corrections population. Using the available linked data from the IMRI database, we extracted medical service use data for all individuals diagnosed with schizophrenia, who had been in BC Provincial custody from 2007-2014. To study whether timely community-based medical service use had an effect on future risk of hospitalization, we examined the rates of service use in the first week following release from custody (and at two-week intervals thereafter) to see if these visits would reduce the likelihood of hospitalization within one year.

Similar to the findings discussed in Chapter 3, we found that among people with schizophrenia leaving provincial custody, that timely community medical service use did not have the expected protective effect of reducing the likelihood of hospitalization. In fact, we found that the majority of our sample were accessing care in a timely fashion, and on an ongoing basis, but that they were more likely to be hospitalized within the year following their custody release. Histories of high levels of medical service use and prior histories of hospitalizations were also predictive of hospitalization post-custody release. Despite everyone in the sample having a schizophrenia diagnosis, the highest rates of both inpatient and outpatient medical services used were surprisingly for non-psychiatric

reasons. While we also examined several sociodemographic variables, the only significant finding was that lower levels of education (grade 12 graduation or less) were associated with greater likelihood of hospitalization.

The findings presented in Chapter 4 do not specifically address the SDH. However, until interpreting them within this context, any explanation as to why timely and frequent community medical care does not protect individuals in our sample, falls short of understanding the underlying reasons for this outcome and the astonishing burden of illness observed within this population. It is clear from our findings that the healthcare system is being accessed by and is responding to the acute medical needs of this population; however, their efforts are not having the predicted effect at improving health outcomes. As such we are compelled to look beyond the healthcare system and suggest that it is not medical care that is failing to protect these individuals, rather failings in other areas including housing, social assistance, and justice that are all contributing the disproportionate use of medical services and stunningly poor health within this population.

5.2. Implications for Policy & Practice

The policy and practical implications that emerged from each of the studies included in this thesis are addressed in the discussion sections of each respective chapter. This section aims to focus on implications that arise when considering the complete body of research presented in this thesis. All studies had the aim of investigating medical service use among extremely marginalised individuals experiencing SMI and homelessness. These analyses called attention to the overwhelming burden of illness – both physical and mental – experienced by this population and thus the demands on the healthcare system. Previous research has identified gaps and barriers in the service landscape as contributing to poor health outcomes for people experiencing homelessness and mental illness. While there are important disconnections to be addressed, and definite barriers that make it more difficult, or in some cases impossible, for people to access needed services, fixing these issues will not address the deeply entrenched social exclusion faced by this population.

Through previous research and the analyses discussed here, we can see that the healthcare system is absorbing a considerable proportion of the responsibility for

meeting the needs of this population; however, it is also clear that these efforts are not resulting in improved health outcomes. Our findings confirm, as has been previously identified, that this population is prone to getting stuck in a revolving door of service use between outpatient and inpatient medical service use without being able to exit from this cycle. [208] While studies of psychiatric populations (not accounting for homelessness) have shown consistent and timely outpatient care to be protective against rehospitalization, and have thus advocated for continuity of care measures, [123] we found no such benefit in our study of people experiencing both SMI and homelessness. This cyclical use of community-based and hospital-based care is costly to the public medical system and is not ameliorating the burden of illness within this population.

Given that other studies have shown that continuity of care improves health outcomes, reducing morbidity and mortality among both general and psychiatric samples, it would seem that our contrary findings are likely attributable to the absence of adequate housing with supports. Having looked at continuity of care in the context of both hospital discharge and release from custody we found similar results. Individuals leaving institutional settings were accessing community-based health services in a timely and ongoing manner, but these service connections where not having the protective effect observed among other populations. Further, those accessing services were more likely to end up hospitalized within the following year. Being released from an institutional setting without stable housing in which to recover, has consequences that cannot be addressed by the healthcare system alone. While the nature of release from a hospital setting is different from that of a custody setting, both represent critical transition points and opportunities for intervention.

The findings from these studies compel us to look beyond medical needs and acknowledge that the healthcare system alone cannot meet the needs of this population, despite the considerable volume of service that is being provided. Failings among important SDH and structural inequities are most responsible for the plight of people experiencing homelessness and SMI in BC. The circumstances of being discharged from a hospital stay to homelessness or having a custody exposure and shortly after which finding yourself hospitalized, is suggestive of larger systemic failings within our social structure. By virtue of poverty, discrimination and stigma, people experiencing homelessness and SMI are not able to participate fully in important cultural, economic and social aspects of society. [209] Further this population is more likely to be unemployed,

have poor social connections, experience chronic disease, and come into contact with the criminal justice system, all of which contribute to social exclusion and marginalization. [209] Interventions to address the unmet need in this population must consider these factors and recognize that coordination between service sectors is critical.

Through the VAH and the At Home/Chez Soi study as a whole, important knowledge has emerged in support of Housing First (HF) as an effective intervention for meeting many of the needs of people experiencing homelessness and mental illness in Canada. Findings from the VAH study among those in scattered-site housing included lower rates of emergency department use, [210] improved antipsychotic medication adherence, [211] reduced re-offending, [138] improved 'psychological integration', [212] improved subjective quality of life, [213] and improved residential stability [214] compared to 'treatment as usual' (TAU). The evidence that has emerged from VAH and other trials involving HF interventions that adhere to the fidelity of the HF principles have demonstrated the efficacy of recovery-oriented housing.

A critical missing piece appears to be a lack of available recovery-oriented housing. Recovery-oriented housing takes a client-centered approach to addressing the broad range of determinants that contribute to individuals experiencing homelessness and mental illness and the negative consequences thereof. Recovery-oriented approaches seek to employ evidence-based practices – like HF – to address housing and support needs, while empowering individuals to set their own goals for what recovery would look like for them. [215] A systematic review and narrative analysis published in 2011 articulated a conceptual framework for recovery in mental health which has applicability in both research and practice. Five recovery processes, distilled into the acronym 'CHIME' were identified as: connectedness; hope and optimism about the future; identity; meaning of life; and empowerment. [215] The CHIME recovery process situates recovery within a social-ecological approach to health and allows for the individual's life context and environmental factors to be integrated into their recovery goals. [215]

Adopting a recovery-oriented approach to both articulating policy and applying interventions for people experiencing homelessness and SMI allows adaptations to be made that fit the local context. Such an approach recognizes that one-size doesn't fit all,

and that different communities will need different types of services and supports depending on local resources and the needs of diverse residents. The inherent flexibility of taking a client-centred approach means that type and intensity of support can be decided on an individual basis. Recovery-oriented interventions, like HF, can be effectively implemented to address the broad range of needs among this population and within diverse communities. This approach allows for inputs from different sectors beyond the healthcare system, creating opportunities for coordination between different service sectors to collaboratively meet the needs of this population.

5.3. Future Research

The findings from this body of work show that there remains a need for greater understanding of the complex role of mental illness and substance use in the experience of homelessness. Recent research internationally and emerging research locally has highlighted the increasing overrepresentation of people diagnosed with schizophrenia within corrections populations, citing failures within community-based services as the cause, and prisons becoming de facto psychiatric institutions in the absence of adequate community services. [145] Given the association we found between exposure to custody and the strong likelihood of being hospitalized within the year following release (despite use of community health services) we need to better understand why our services, as they are currently operating, are unable to meet the needs of this population. Further understanding where these services are failing to meet the needs of people with SMI may help to better understand the increasing overrepresentation of this population within our corrections system.

Despite abundant evidence of the benefits of recovery-oriented approaches, such as the HF intervention that was employed in the Vancouver At Home study, there has been a lack of meaningful and widescale adoption of such interventions in Canada, and BC in particular. With longstanding, empirically valid evidence from the US, Canada, Europe and Australia, there is a strong body of literature available to support the implementation of such interventions at a provincial level for people experiencing homelessness and mental illnesses. [216–220] Because much of the Canadian evidence emerged through the At Home/Chez Soi project, most of it was only based on two-years of follow-up. A recent systematic review and meta-analysis by Baxter et al. (2019), analysed the health and well-being impacts of HF interventions on adults, and found that

overall, these interventions improve health and wellbeing, and reduce non-routine health service use. They did, however, cite the need for longer-term studies to better understand the impact on health and corresponding service use patterns that that may emerge over time for this population. [221] It could be argued that the lack of adoption of HF in the BC context is due to a knowledge-to-action gap. In addition to the need for longer-term data, perhaps knowledge translation efforts ought to be enhanced to ensure that recovery-oriented approaches to addressing the housing and support needs of people experiencing SMI and homelessness are adopted into provincial policy and service delivery.

As the analyses presented in chapters 3 and 4 explored continuity of care for people being discharged from hospital and released from custody prior to the introduction of a housing intervention, we were unable to study the impact of recovery-oriented housing on continuity of care. To extend these analyses and replicate them in the context of widescale implementation of recovery-oriented housing, we would be able to better understand the impact of continuity of care within the population of people experiencing homelessness and SMI in BC, and help identify pathways to improving health and wellbeing.

5.4. Strengths & Limitations

Taken together the studies included in this thesis have several strengths and limitations, similar to those that have been previously discussed in their respective chapters. Here the focus will be on strengths and limitations as they pertain to these analyses more generally. Data used from the VAH study were based on participant self-report of measures of demographic, service-use, health status, interviewer assessed mental health, current and historical housing status, and measures of quality of life and community functioning, and therefore are subject to recall bias and social desirability bias. We therefore cannot be certain of the accuracy of these data, however, in another published paper the validity of participant self-reported service use was tested against administrative data including health, social, and justice service use data and we found that there was a high degree of reliability between the administrative and self-report data in this study. [222] We were not able, however, to validate all self-report measures against administrative data. For the studies that used IMRI data, there is significant strength in these analyses due to the quality and comprehensiveness of the administrative data that

were used. They contain detailed information on individuals including clinical diagnoses of mental disorders, which have been shown to be reliable, [223] and with the exception of excluding emergency department data, they include a relatively complete accounting of contacts with the health and justice systems.

Within both the VAH and IMRI databases there is a need for greater gender diversity and representation of non-binary gender identities. For the VAH data there was an opportunity for participants to report non-binary identities, however, the response options were limited, and the sample contained too few individuals reporting non-binary identities to be analysed distinctly. Within the IMRI database, gender is only recorded in the binary (male/female) without accounting for other identities. Similarly, due to the nature of these datasets there is limited ability to address the needs of youth or older adults as youth are systematically excluded from provincial corrections before the age of 19 and the VAH study only recruited adults 19 years of age and older. Further the median age for the VAH sample was 41 and the sample of people diagnosed with schizophrenia from the corrections population was 36 years. As such both samples are made up of relatively young adults, therefore, we are likely unable to generalise to older adults as well as youth. Further, in terms of generalizability our findings specifically pertain to people experiencing homelessness and mental illness who were living in Vancouver, BC or those with diagnoses of schizophrenia from the BC provincial corrections system and therefore we may not be able to generalise our findings to other provinces or jurisdictions outside of BC due to differences in the way that both health and justice system services operate. With this in mind, analyses that came out of the larger At Home/Chez Soi project did attempt to compare outcomes between the 5 different and diverse sites across the county, in both urban and rural settings, and found there to be a high degree of similarities in patterns of service use and responses among participants across all sites. [203]

Finally, while our overall conclusion led to the recommendation for greater emphasis on recovery-oriented approaches to housing and service delivery for people experiencing homelessness and SMI, we were not always able to directly identify housing status within the administrative data. For the analyses included in chapters 3 and 4 that included looking at histories of both hospitalizations, community health service use, and contacts with provincial corrections, it was not possible to explicitly identify in the data whether or not people were experiencing homelessness during

different periods in their lives. Similarly, these data do not capture other contextual details such has employment status, social supports, and other measures of social and emotional wellbeing, which would be helpful to more fully understanding the experience of the individual. While we know from previous studies that the intersections of SMI, involvement in corrections, and frequent/intensive health service utilization are often associated with experiencing homelessness, we are unable to discern from the IMRI data alone whether the individual was experiencing homelessness at any given contact with these systems.

5.5. Conclusions

A grossly disproportionate number of public resources and service provider attention is drawn to address the needs of this population, and it is not working. While the province is going about addressing the realities of life post-COVID, it must be recognized that there will continue to be a subgroup of individuals throughout BC who need to be provided with intensive evidence-based care. Through the studies presented in this thesis and in others that have emerged in recent years – including those from the VAH study and At Home/Chez Soi study more broadly, a substantial and persuasive body of research compels the need for widescale implementation of fidelity-based HF programming for people experiencing homelessness and mental illness. The cost of intensive service provision like HF is high, but we know that maintaining the status quo is extremely costly and the outcomes are dire. [75,224–227] By providing evidenced-based care we can support more people more effectively. By reorienting service provision towards recovery-oriented housing, like HF, we can spend valuable resources in a more efficient and purposeful manner that has proven efficacy at not only addressing acute health needs but other important domains of wellbeing, in a sustainable and long-term manner.

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