MANAGING THE IMPACT OF MENTAL HEALTH CONDITIONS ON THE CASCADE OF CARE AMONG WOMEN LIVING WITH HIV

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In loving memory of my grandfather. Your courage, love, and support will stay with me forever.

Table of Contents

ABSTRACT

Background: Mental health issues negatively impact engagement across the HIV care cascade. Women with HIV are more likely to experience worse overall mental health than men with HIV and are consequently at higher risk for poor HIV care outcomes. Given the synergistic interaction of HIV and mental illness, mental health interventions may have implications for HIV care. Specifically, the use of mental health services may improve the engagement of women across the HIV care cascade in addition to promoting mental well-being.

Objectives: The first manuscript aims to describe the movement of women with mental health symptoms or diagnoses across the HIV care cascade and determine the association between the use of mental health services and engagement in care cascade steps. The second manuscript describes the availability and use of mental health services and identifies characteristics associated with reporting shortages of these services that present a problem for their care.

Methods: Data from the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) were analyzed. CHIWOS followed 1422 women with HIV over three waves at 18-month intervals between 2013 and 2018. For the first manuscript, participants were included if they had clinically significant depressive symptoms or reported a mental health diagnosis at baseline. Four HIV care states were defined among this group at baseline, 18 months, and 36 months: (1) *unengaged in care* (no contact with an HIV provider in the last year), (2) *not on antiretroviral therapy (ART)* (engaged in care but did not report ART use), (3) *detectable* (reported ART use and a detectable viral load), and (4) *optimal* (reported ART use and an undetectable viral load). Sankey diagrams were constructed to depict the trajectory of women over the waves, and multinomial regression models were used to assess the relationship between mental health service use and care state at baseline. In the second manuscript, descriptive statistics were used to analyze women's reports of the availability and their use of mental health services at HIV clinics and alternate sites. Logistic regression models were employed to determine associations between baseline characteristics and reported problematic shortages of mental health services.

Results: 898 participants (63.2% of the cohort) had significant depressive symptoms or mental health diagnoses at baseline, of which 33% reported using mental health services. In our adjusted model, service use was significantly associated with engagement in the *optimal* state [adjusted odds ratio (aOR): 1.72, 95% confidence interval (CI): 1.07-2.77], but not with the *detectable* state (aOR: 1.67, 95% CI: 0.92-3.03). Among the entire cohort (n=1422), 38%, or 541 participants, reported that a shortage of services was a problem in their care. Only 28.5% (n=154) of this subset used mental health services in the last year, which most accessed at their HIV clinic. When characterizing the availability and use at HIV clinics, 22.1% (n=119) of those reporting a problematic shortage used services, 26.5% (n=143) indicated that services were available but did not access them, and 51.4% (n=277) either reported unavailable services, did not know if services were available, or were unengaged in HIV care. The characteristics associated with reported shortages were rural residence (aOR: 1.69, 95% CI: 1.03-2.77), higher educational level (aOR: 1.43, 95% CI: 1.02-2.02), and higher HIV stigma scores (aOR: 1.03, 95% CI: 1.02-1.03).

Conclusion: Our results demonstrate the important role that mental health services play in improving HIV clinical outcomes as well as the existing gaps in the service landscape. Accessible and quality mental health services may thus bolster engagement in both mental health and HIV care. As we strive towards the UNAIDS 95-95-95 targets, these findings can inform future service design to meet the mental health and HIV care needs of women.

RÉSUMÉ

Contexte: Les femmes vivant avec le VIH sont plus susceptibles aux troubles de santé mentale que les hommes vivant avec le VIH, ce qui augmente leur risque d'issues de santé négatives reliées au VIH. Compte tenu de l'interaction synergique entre le VIH et les troubles de santé mentale, les interventions en matière de santé mentale peuvent avoir des répercussions sur les soins liés au VIH. L'utilisation de services de santé mentale peut améliorer l'engagement des femmes dans la cascade de soins du VIH, en plus de promouvoir le bien-être mental.

Objectifs: Le premier manuscrit décrit le mouvement des femmes vivant avec le VIH présentant des symptômes ou des diagnostics de santé mentale et détermine l'association entre l'utilisation des services de santé mentale et l'engagement dans les étapes de la cascade de soins. Le second manuscrit décrit la disponibilité et l'utilisation des services de santé mentale et identifie les caractéristiques associées au fait de rapporter que les pénuries de ces services nuisent à leurs soins.

Méthodes: L'Étude sur la santé sexuelle et reproductive des femmes vivant avec le VIH au Canada a suivi 1422 femmes vivant avec le VIH pendant trois vagues, tous les 18 mois, entre 2013 et 2018. Pour le premier manuscrit, les participantes présentaient des symptômes dépressifs cliniquement significatifs ou elles avaient dit avoir reçu un diagnostic de santé mentale au début de l'étude. Quatre états de soins du VIH ont été définis dans ce groupe: (1) *non engagé dans les soins*, (2) *pas de thérapie antirétrovirale* (*TAR*), (3) *détectable*, et (4) *optimal*. Des diagrammes de Sankey décrivent la trajectoire des femmes au fil du temps, et des modèles de régression multinomiale ont été élaborés pour évaluer la relation entre l'utilisation des services de santé mentale et l'état de soins au départ. Dans le second manuscrit, des statistiques descriptives décrivent la disponibilité et l'utilisation des services de santé mentale dans les cliniques VIH et les sites alternatifs. Des régressions logistiques ont été utilisées pour déterminer les associations entre les caractéristiques de base et rapporter que les pénuries de services de santé mentale sont problématiques.

Résultats: 898 participantes (63,2%) présentaient des symptômes dépressifs ou avaient reçu un diagnostic de santé mentale au départ, et 33% d'entre elles ont déclarées avoir eu recours à des services de santé mentale. Ces services était significativement associée à un état de soins *optimal* par rapport à *pas de TAR* [rapport de cotes ajusté (RCA): 1,72, intervalle de confiance à 95 % (IC):

1,07-2,77], mais pas par rapport à l'état détectable (RCA: 1,67, 95% IC: 0,92-3,03). Dans la cohorte, 541 (38%) participantes ont déclarées que la pénurie de services était un problème dans leurs soins. Seulement 28,5% (n=154) de ce sous-groupe ont utilisé des services de santé mentale dans la dernière année, la majorité à leur clinique VIH. De plus, 22,1% (n=119) des personnes déclarant une pénurie problématique ont utilisé les services dans leur clinique VIH, 26,5% (n=143) ont indiqué que les services étaient disponibles mais n'y ont pas eu accès, et 51,4% (n=277) ont déclaré que les services n'étaient pas disponibles, ne savaient pas si les services étaient disponibles, ou n'étaient pas engagées dans les soins du VIH. La résidence dans un milieu rural (RCA: 1,69, 95% IC: 1,03-2,77), le niveau d'éducation (RCA: 1,43, 95% IC: 1,02-2,02), et un score de stigmatisation du VIH élevé (RCA: 1,03, 95% IC: 1,02-1,03) étaient associées aux pénuries problématiques rapportées.

Conclusions: Nos résultats démontrent le rôle important que jouent les services de santé mentale dans l'amélioration des issues cliniques du VIH, ainsi que les lacunes existantes dans les services offerts. Alors que nous nous visons les objectifs 95-95-95 de l'ONUSIDA, ces résultats peuvent guider l’amélioration des services de santé mentale et VIH dans le futur afin de répondre aux besoins des femmes.

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PREFACE AND CONTRIBUTION OF AUTHORS

This thesis is presented in the manuscript-based format. It includes two manuscripts which have been written based on the conventions generally employed in health sciences research. These completed manuscripts will be submitted for publication this year. In accordance with the manuscript-based thesis guidelines from McGill University, this thesis also includes the following major sections: an introduction, a comprehensive review of the literature, a scholarly discussion, and a conclusion. Other components include a title page, table of contents, abstracts in English and French, this preface, details of the contributions made by authors, a list of abbreviations, a list of tables and figures, a bridge between the manuscripts, a reference list, and appendices.

Seerat Chawla, as the MSc candidate and first author, was responsible for conceptualization of the research questions and objectives, data analysis, interpretation, presentations at scientific conferences, and writing and editing of all components included in this thesis.

Dr. Alexandra de Pokomandy, as a Principal Investigator of CHIWOS and MSc supervisor, was responsible for the co-conception and management of the CHIWOS cohort and provided guidance in all aspects of the thesis such as planning, interpretating results, and writing and editing.

Dr. Angela Kaida, as a Principal Investigator of CHIWOS and committee member, co-designed and oversaw the original cohort study as well as provided guidance with study design, data analysis, and thesis review.

Dr. Marie-Josée Brouillette, as a committee member with specific expertise in providing mental health care for people with HIV, contributed to study design, interpretation of findings, thesis review, and mentorship.

Bluma Kleiner provided feedback during the design and analysis stages and contributed towards reviewing and editing the manuscripts.

Danièle Dubuc, as a Peer Research Associate for CHIWOS, contributed towards recruitment and data collection for the original cohort study as well as interpretation of findings and manuscript review.

Lashanda Skerritt assisted with study design and reviewing the manuscripts.

Dr. Ann N Burchell, a member of the CHIWOS research team, contributed towards management of the cohort and supported with manuscript review.

Dr. Danielle Rouleau, a member of the CHIWOS research team, assisted with recruitment of participants and manuscript review.

Dr. Mona Loutfy, as a Principal Investigator of CHIWOS, was responsible for designing and managing the original cohort and assisted with planning, reviewing, and editing the manuscripts.

LIST OF FIGURES AND TABLES

CHAPTER 3: MANUSCRIPT 1

CHAPTER 4: MANUSCRIPT 2

LIST OF ABBREVIATIONS

AIDS: Acquired immunodeficiency syndrome

APA: American Psychological Association

ART: Antiretroviral therapy

ASSI: Abbreviated Social Support Instrument

CDC: Centers for Disease Control and Prevention

CES-D: Center for Epidemiologic Studies Depression Scale

CFPC: College of Family Physicians of Canada

CHIWOS: Canadian HIV Women’s Sexual and Reproductive Health Cohort Study

CIHR: Canadian Institutes of Health Research

Cis: Cisgender

DAG: Directed acyclic graph

DK/PNTA: Don’t know/prefer not to answer

DSM: Diagnostic and Statistical Manual of Mental Disorders

HAT-QoL: HIV/AIDS-Targeted Quality of Life Instrument

HIV: Human immunodeficiency virus

IFHP: Interim Federal Health Program

LBQQ2S: Lesbian, bisexual, queer, questioning, and two-spirit

NIH: National Institutes of Health Research

OECD: Organisation for Economic Co-operation and Development

PHAC: Public Health Agency of Canada

PRA: Peer research associate

PrEP: Pre-exposure prophylaxis

RAMQ: Régie de l’assurance maladie du Québec

RDU: Recreational drug use

SAVA: Substance abuse, violence, and AIDS

STI: Sexually transmitted illness

Trans: Transgender

WHO: World Health Organization

UNAIDS: Joint United Nations Programme on HIV/AIDS

U=U: Undetectable=Untransmissible

CHAPTER 1: INTRODUCTION

1.1 Gender and HIV

Women make up more than half of the people living with HIV globally and a quarter of the 62,790 people living with HIV in Canada, a statistic that is steadily growing with a rate of 2.5 new diagnoses per 100,000 women (1–3). The increase in cases among women has often been explained by multiple intersecting factors that put them at greater risk. To begin with, women have a higher biological susceptibility to HIV. Cisgender (cis) women are more than two times as likely to become infected if they are exposed to HIV compared with cis men (4). Additionally, emerging socio-ecological frameworks of health have indicated that social inequities continue to disadvantage women and exacerbate their risk for HIV acquisition and poor care outcomes following diagnosis (5). Similarly, certain groups of women are disproportionately affected due to their intersectional identities. For example, over half of new diagnoses in Canada are among women who recently immigrated from countries where HIV is endemic. Indigenous women and incarcerated women also have high rates of new diagnoses that exceed those of other women and men (5).

1.2 HIV care cascade

Gaining visibility in 2013 following an initiative in the United States to establish national measurement guidelines, the HIV care cascade is a prominent model that outlines the steps required for people living with HIV to maintain health (6,7). According to the Centers for Disease Control and Prevention (CDC), the model consists of the following five stages: 1) diagnosis of HIV infection, 2) linkage to HIV medical care, 3) receipt of HIV medical care (including antiretroviral therapy, ART), 4) retention in medical care, and 5) achievement and maintenance of viral suppression (7,8). Used as a tool on both the individual and public health levels, the primary goal of the HIV care cascade is the achievement of viral suppression, which is defined as having less than 200 copies of the virus per millilitre of blood (9). Attained through the consistent use of ART, viral suppression improves the individual’s health and well-being by keeping the immune system actively working to prevent illness. Simultaneously, viral suppression plays a significant role in the control of the epidemic by preventing an individual from transmitting the virus to sexual partners and through needle-sharing. The push to get people living with HIV to achieve viral suppression is best exemplified by the Undetectable=Untransmissible (U=U) initiative endorsed by the CDC, World Health Organization (WHO), National Institutes of Health Research (NIH), and Joint United Nations Programme on HIV/AIDS (UNAIDS) (10,11).

1.3 Treatment goals

At the 20th International AIDS Conference in 2014, UNAIDS launched the 90-90-90 targets (12). Focusing on the three most cited steps of the HIV care cascade, the following global targets were set: by 2020, 1) 90% of all people living with HIV will know their HIV status, 2) 90% of all people diagnosed with HIV will receive ART, and 3) 90% of all people receiving ART will be virally suppressed (13). By the end of 2020, it was found that 84% of people living with HIV globally knew their status, 87% of those diagnosed were on ART, and 90% of those on ART were virally suppressed (12).

In Canada, the Public Health Agency of Canada (PHAC) monitors progress towards these targets using provincial and national data. According to the agency's report at the end of 2020, Canada achieved two of the three UNAIDS targets with 90% of people living with HIV in Canada diagnosed, 87% of those diagnosed receiving ART, and 95% of those on ART achieving viral suppression. However, progress was not equal among all people living with HIV. Canadian women had lower percentages at each stage of the cascade compared with men, achieving 88% diagnosed, 85% on ART, and 90% virally suppressed (14). Thus, there is a need to focus on the engagement of women in HIV care to ensure that all people living with HIV in Canada are progressing towards the global goals.

Continuing the momentum, UNAIDS has published new targets for the next five years (12). The 95-95-95 campaign sets the following goals: by 2025, 95% of all people living with HIV will know their HIV status, 95% of diagnosed people will receive treatment, and finally, 95% of those on treatment will achieve viral suppression (15). This fast scale-up of HIV treatment is part of the movement to advance globally towards the 2030 goal of ending AIDS as a public health threat (16).

1.4 Impact of mental illness on the HIV care cascade

The HIV care cascade is often illustrated as a linear model that follows people living with HIV as they progress from diagnosis to viral suppression. However, it has been demonstrated that movement across the cascade is not as linear as originally posited. Rather, several factors can result in the movement of people with HIV backward and forward in the care cascade over time. One such factor is mental health, which may cause movement in either direction.

Poor mental health has specifically been shown to result in worse outcomes at every stage of the care cascade. To begin with, mental health conditions increase the risk of HIV acquisition four to tenfold by interfering with preventive efforts such as regular use of pre-exposure prophylaxis (PrEP) and routine HIV testing (17). In addition, mental illness has been associated with sexual behaviours that increase the risk of HIV acquisition. Among patients with severe mental illness, it was found that 46% had not used a condom in the past year and 33% reported a history of sexually transmitted illnesses (STIs), rates higher than those among the general population (18). These behaviours may be attributed to emotional distress that results in a lack of motivation and planning to engage in safer sex and the socio-environmental consequences of living with a mental health disorder such as poverty or housing insecurity that make the negotiation of safer sex difficult. Consequently, the prevalence of HIV is high in this population living with severe mental illness, with estimates between 4% and 23% (19). Following diagnosis, mental health problems continue to impact HIV care, namely by reducing retention and adherence. In multiple studies, depression, in particular, has been significantly associated with lower retention (20). In the next step of the cascade, depressive symptoms and diagnoses continue to be a barrier by contributing to non-adherence to ART (21).

These negative impacts of mental health conditions on the HIV care cascade present a significant obstacle in the management of HIV at both the individual and population levels. By reducing engagement in HIV testing, mental illness can delay diagnosis and connection to necessary care. In addition to impacting the individual's health, the delay in diagnosis becomes a public health concern, as most new infections are the result of transmission from individuals who are unaware of their status (17). After diagnosis, when engagement in care and the use of ART is compromised, people living with HIV experience a detectable viral load, which increases their risk of mortality as well as the risk of HIV transmission (22).

1.5 Mental health of women living with HIV

Mental health symptoms and conditions are more prevalent in people living with HIV than in the general population. According to the Health Resources and Services Administration in the United States, around half of all people with HIV screen positive for at least one mental health condition (20). However, the increased burden within this population is not shared equally. Women living with HIV are more likely to have mental health conditions compared with both men living with HIV and women in the general population (23). Through a global survey of women with HIV in 94 countries, Orza *et al.* found that 82% reported depressive symptoms (24). In comparison, only 19% of Canadians screened positive for depressive disorders in May 2021, which was likely heightened due to the effects of the COVID-19 pandemic (25). In the North American context, women with HIV also reported more severe anxiety symptoms than the general population (26). In the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS), the largest community-based study of women living with HIV in Canada, the prevalence of mental health conditions at the second follow-up wave was 57.4%, with depression and anxiety representing the most common disorders (27). Perhaps because of the pronounced impact of structural factors on their health, the rates of mental illness are even higher among more marginalized women living with HIV. For instance, while the prevalence of depression among the entire cohort was 32.3%, almost half of the transgender (trans) participants in CHIWOS had depressive symptoms (28). Similarly, Indigenous women with HIV enrolled in CHIWOS had the highest prevalence of substance use disorders (27).

1.6 Rationale and objectives

Most of the existing literature on the syndemic of mental health and HIV is focused on the impact of mental health symptoms or conditions on retention in HIV or adherence to ART (29–32). Many studies especially focus on the relationship between depression, the most prevalent mental health comorbidity in this population, and adherence to ART (21,33,34). With the negative impact of mental health challenges on the care cascade established, there is a pressing need to redirect our attention towards solutions to address the syndemic, with accessible and quality mental health services as the primary focus. Treatment for mental health symptoms or diagnoses has been shown to be associated with better retention in HIV care and adherence to ART (20,35–37). However, the limited evidence focuses on a specific stage and does not explore the impact of mental health care on engagement across the entire care cascade. Furthermore, despite the steady increase in HIV cases among women and the simultaneous greater burden of mental health concerns in this population, women with HIV are underrepresented in the research that informs mental health service design (23). In fact, women were only included in 19.17% of all the studies conducted globally on mental health conditions among people living with HIV (38). The dearth of knowledge on the mental health needs of women with HIV presents a challenge in adequately caring for this population. In addition to being a concern for individual well-being, the lack of evidence-informed mental health services for this group is also alarming for public health reasons, as women in Canada have lower engagement across the HIV care cascade (39).

The purpose of this manuscript-style thesis is to generate the knowledge necessary to manage the impact of mental health conditions on the engagement of women living with HIV across the care cascade. Using data from 1422 women with HIV enrolled in CHIWOS, the following objectives are addressed in the two manuscripts included in this thesis:

Objective 1: Measure the movement of women living with HIV who have mental health symptoms or diagnoses across the HIV care cascade, comparing those who use mental health service with those who do not use these services.

Objective 2: Among women living with HIV who have mental health symptoms or diagnoses, examine the association between the use of mental health services and HIV care state.

Objective 3: Describe the availability and use of mental health services among women living with HIV.

Objective 4: Identify sociodemographic, clinical, and psychosocial characteristics of women with HIV associated with reporting that shortages of mental health services presented a problem in their care.

CHAPTER 2: LITERATURE REVIEW

This literature review focuses on outlining the synergistic interactions between HIV and mental illness as well as the mental healthcare system in Canada. The chapter starts by describing the syndemic theory, from its roots in medical anthropology to its current use in HIV research. Next, the impact of mental health at different stages of the HIV care cascade is discussed. The chapter concludes by introducing the Canadian mental healthcare system with a specific focus on the services available for people living with HIV.

2.1 The syndemic of HIV and mental illness

Theory

With emerging research on the social and structural determinants of health, there is increasing recognition that the burden of disease in any given population is not discrete and cannot be neatly separated from the context in which it occurs (40). The syndemic theory was first formulated by medical anthropologist, Merrill Singer, as a necessary framework to understand disease concentrations and interactions within existing social and structural environments (41). A syndemic is defined as the interaction of two or more diseases where the presence of one exacerbates the other, resulting in a heightened burden of illness (40–42). While this interaction is often hypothesized to occur at the biological level, it can also take a social or psychological form. This shift to looking at concurrent epidemics syndemically allows researchers to adopt a necessary holistic lens and generate interventions, for either clinical practice or policy, that are effective in real-world contexts where the impact of a single condition cannot be isolated from all the others (43).

An important, but often underexamined, tenet of the syndemic theory is the role of upstream factors in sustaining the clustering of epidemics (42,44,45). These range from structural factors such as the legacy of colonialism to economic forces such as capitalist systems. This is best exemplified in the first syndemic described by Singer *et al.* The authors of this 1994 paper outlined how the interactions between substance use, violence, and AIDS, now referred to as the “SAVA” syndemic, negatively impacted the health and well-being of a population (41). The concentration of these three epidemics in inner-city Hartford, Connecticut and similar urban centers is the result of reinforcing social factors including poverty, unemployment, and family instability that are associated with behaviours such as substance use and domestic violence. Providers and policymakers must therefore focus on addressing all the intertwined conditions and the environment in which they occur to truly improve the well-being of residents (46).

Since Singer's landmark study, syndemic theory has been increasingly used in HIV research (42,44). In particular, syndemic thinking has often been applied to analyze the interactions between HIV and substance use with the added influence of upstream factors such as stigma, racism, and poverty that shape these conditions (46–51). Mimiaga *et al.* found that there was a positive dose-response relationship between the number of syndemic conditions such as substance use, violence, and mental illness and the risk of HIV infection (52). Therefore, framing the HIV epidemic as a syndemic may be necessary to understand and intervene on the interweaving socio-environmental and health factors influencing HIV prevention and care.

Despite its importance in understanding and addressing the HIV epidemic, gaps do exist in the current syndemic framework. While it does not necessarily mitigate it entirely, resilience may reduce the impact of a syndemic on an individual or community (53). However, resilience is not accounted for explicitly in the syndemic theory. Furthermore, while the influence of population-level factors is central to the definition of a syndemic, the role of individual risk factors such as interpersonal stressors is not addressed in the framework (47). Finally, the current field of syndemic research displays a bias towards studies situated in urban areas and the United States. In fact, in a 2019 review by Mendenhall and Singer, only four of the sixty articles on HIV syndemics included studies conducted in Canada (42).

HIV and mental illness

The complex relationship between HIV and mental illness has been demonstrated to meet the criteria for a syndemic. To begin with, there is a bidirectional impact of each chronic condition on the other. Mental health symptoms and conditions can increase one's engagement in behaviours that heighten the risk of acquiring HIV infection while impairing engagement in care which increases the risk of poor HIV care outcomes. In turn, the distress of an HIV diagnosis can worsen mental health, creating new mental health concerns or exacerbating existing conditions and symptoms (54). The epidemics of mental illness and HIV infection, particularly in the queer and trans communities, Indigenous populations, and communities of colour, are also shaped by intersecting social and structural factors. For instance, misogyny and transphobia normalize physical and sexual violence towards trans women, heightening their risk for HIV infection and mental health issues (55,56). Similarly, systemic racism continues to negatively impact the mental health of people of colour and their access to the necessary resources to prevent and treat HIV (50,57). In several studies, stigma has also been established as a factor that precedes and exacerbates mental health concerns and HIV (23,58–62). With the addition of each stigmatized condition, social marginalization only further increases, contributing to the maintenance of the syndemic in a community (63).

The characterization of mental illness and HIV as a syndemic highlights the importance of addressing both conditions simultaneously. Existing literature supports this approach by demonstrating the difficulties faced when attempting to treat HIV infection in isolation from mental health comorbidities (48). To create lasting solutions, these interventions must also focus on reducing social and structural inequities that sustain this syndemic.

2.2 Mental health and the HIV care cascade

The HIV care cascade is frequently employed in clinical and public health research to map outcomes for both individual patients and populations living with HIV. By illustrating the engagement at successive steps, this framework highlights gaps in services and informs the development of interventions (7). While several studies provide summaries of the entire care cascade, many have chosen to focus on what has often been viewed as the four most integral steps of the continuum: diagnosis, linkage to care, retention in care, and achievement and maintenance of viral suppression (64). Beyond simply documenting the number of individuals at each of these steps, researchers have now progressed towards identifying barriers to achieving optimal outcomes at these stages of care. From this work, mental health symptoms and diagnoses have emerged as a primary obstacle (65).

Mental health and diagnosis of HIV infection

The current guidelines from the CDC recommend that every patient between the ages of 13 and 64 is offered an HIV test at least once, ensuring that HIV screening becomes a routine practice in primary care (66). As the entry point into the HIV care continuum, regular HIV testing is crucial for the management of the epidemic at the individual and population levels. Testing enables earlier linkage to necessary HIV care, which improves the individual's well-being and decreases the risk of transmission (67). A recent study by Mangurian *et al*. reported that only 6.7% of individuals in a state public mental healthcare system received HIV testing in a year (68). Similarly, in a South African cohort of people living with HIV, those with severe depression had 2.2 times greater odds of late testing compared with those without depression (69). The lack of routine testing helps explain the estimation that less than 50% of psychiatric patients with HIV are aware of their serologic status (68). This is particularly concerning since this population has been identified as having a greater prevalence of HIV infection, stemming from the complex interplay of social marginalization, poverty, homelessness, higher risk sexual activities, and substance use (18,68). The latter two also increase the probability of transmission, especially when HIV goes undiagnosed (70).

Unfortunately, missed medical diagnoses such as HIV are not uncommon among people living with mental health disorders. Poor mental health negatively impacts social and cognitive function, resulting in impaired judgment, decreased impulse control, and challenges with interpersonal relationships (71). This is often accompanied by a decrease in energy (72). These negative consequences of mental illness can result in a lack of motivation and social support to engage in positive health actions such as regular HIV testing and instead, may lead to the adoption of maladaptive coping strategies like substance use (72). Furthermore, there is some evidence to suggest that this population does not receive adequate HIV testing services (18,68,73). Individuals living with mental illness have low rates of primary care use. They do, however, often frequent community mental health clinics (73). The mental healthcare teams at these sites prioritize psychosocial concerns and are often not equipped to provide medical screenings (68). The lack of HIV screening at these sites may be a missed opportunity for early entry into the HIV care continuum – a gap that could potentially be addressed through better connections between primary HIV care and community-based mental health services (74).

Mental health and linkage to HIV care

Following diagnosis, timely linkage to HIV care is crucial to ensure the well-being of patients. In an analysis of data from the National HIV Surveillance System in the United States, Hall *et al.* found that linkage within one month compared with three months improved HIV care outcomes, namely leading to earlier initiation of HIV treatment and achievement of viral suppression (67). Based on these and similar results, the CDC now defines successful linkage to care as a period of one month or less between diagnosis and initiation of treatment (7). When studying linkage in New York City, Bauman *et al.* identified mental health issues as a primary barrier to linkage among individuals newly diagnosed with HIV (70). These may be pre-existing mental health symptoms and conditions that interfere with engagement in medical care or issues that arise with the new diagnosis. A positive HIV test often causes significant emotional distress, with some patients denying or ignoring the result altogether (75). Without immediate counseling, they are unlikely to schedule and show up to a linkage appointment, presenting concerns for their health and transmission risk as the infection progresses without intervention.

Mental health and retention in HIV care

Based on the definition proposed by the CDC, an individual is considered retained in care if they complete two or more routine HIV care visits in a year (7). As with many other chronic illnesses, continued engagement in care is vital for the management of HIV and for ensuring an individual's health and well-being over time. A lack of retention in care is associated with a greater viral load, which not only increases the risk of mortality but presents an increased public health concern (22).

Sustaining engagement in care remains a challenge for people living with HIV with mental illness (43,76). With comorbid mental health symptoms or conditions contributing to apathy about health care, missed appointments are common among this population (72,77). Pooling effect estimates from thirty-five studies conducted in the United States, Rooks-Peck *et al.* reported a negative association between mental health symptoms and diagnoses and retention in HIV care. Specifically, depression was associated with lower retention in care (20). A similar relationship was found among participants in the Ontario HIV Treatment Network Cohort with those experiencing mental health and addiction issues more likely to drop out of care (78). Mental health service use has been previously reported to be associated with increased retention in HIV care, suggesting that mental health care may improve HIV care outcomes at the retention stage (20,35,79,80).

Mental health and the achievement and maintenance of viral suppression

An undetectable viral load has become synonymous with the successful management of HIV at both individual and public health levels. In addition to being associated with poorer outcomes at all previous steps of the care continuum, mental health concerns are also related to viral non-suppression. Haas *et al.* concluded that the risk of viral non-suppression was higher among patients with mental health conditions than those without mental health diagnoses in their cohort of 54,378 people living with HIV in South Africa (81). Similarly, those with untreated depression had the highest risk of viral non-suppression among those engaged in HIV care at an urban clinic in the United States (30). Adopting a gendered lens, Regan *et al.* reported that after six months on ART, women with depression had 1.94 times the risk of viral non-suppression compared with women without depression (82).

The mechanism by which mental health conditions negatively impact viral suppression has been proposed to be through reduced adherence to ART, which is noted as a primary determinant of viral suppression (6). Since the landmark study by Paterson *et al.*, the threshold for optimal adherence has generally been accepted as 95% of prescribed ART (83). Several studies have connected mental health conditions to less-than-optimal adherence, defined as less than this cut-off. In their systematic review, Springer *et al.* found that a significant association between depressive symptoms and disorders and ART non-adherence existed in most studies (21).

The established threshold for optimal adherence, however, is now being contested for several reasons (84,85). To begin with, given the biological differences, there may be different thresholds by sex which a universal 95% does not reflect (4). Furthermore, the original paper by Paterson *et al.* was based on unboosted protease inhibitors, a treatment approach that has been replaced with a combination of newer agents (86). Thus, there may no longer be a need for near-perfect adherence to achieve a suppressed viral load. In that case, mental health comorbidities may not reduce adherence to the point of concern, and further research is needed to determine the mechanism that causes the negative association of mental illness with viral non-suppression.

On the treatment end, there is some evidence that mental health interventions can positively impact viral suppression. Treatment was found to mitigate the negative association between depression and viral suppression in the Johns Hopkins HIV Clinical Cohort (30). Similarly, following the integration of mental health services at an HIV clinic at the University of Virginia, there were higher rates of viral suppression among patients who initiated mental health treatment (87).

2.3 Mental health of women living with HIV

Studies among the general population have often reported that women have greater rates of mental illness compared with men (88). This pattern holds when analyzing the epidemiology of mental health symptoms and conditions among people living with HIV. Women with HIV are more likely to have overall poor mental health than men with HIV (23). Specifically, the rates of common mental health concerns such as depressive disorders and trauma are higher among women living with HIV than among men with HIV (89,90).

While many theories have been proposed to explain the gender disparity, the impact of gender roles has received more attention in recent years. This explanation is largely supported by the narrowing of the discrepancy in rates of depression and substance use between women and men that parallels the increase in employment and bodily autonomy for women globally (88). There are also the differences that exist between men and women regarding the degree and form of emotional expression that is deemed socially acceptable (91). In the case of women living with HIV, these socio-environmental factors are compounded by the fact that women are often diagnosed and begin treatment at later stages of HIV than men, at which point the risk of neuropsychiatric comorbidities is higher (23).

Women living with HIV are also at a higher risk for experiencing poor mental health compared with women in the general population (23). Among women from 94 countries, Orza *et al*. found a 3.5-fold increase in the number of mental health issues after HIV diagnosis, which may be attributed to the added stress women experience over disclosure of their HIV status, changes in interpersonal relationships, and increased social isolation (24). Women living with HIV also have higher rates of intimate partner violence than seronegative women, which is linked to significant psychological distress. The rates of depressive disorders, the most prevalent mental health concern globally, are four times as high among women living with HIV than women in the general population (23). Given these stark disparities between seropositive and seronegative women, there is a need for targeted research and in turn, evidence-informed interventions that address the additional mental health challenges that an HIV diagnosis presents for women.

2.4 Mental health services in Canada

Current state

Among a national population of 37 million, approximately 5.3 million Canadians reported mental health service use in 2018 (92). The decision to seek out mental health care is shaped by a variety of factors including patient perception. Individuals are less likely to seek out support if they do not perceive a need, which is common in undiagnosed cases of mental illness. Female sex, younger age, and higher education have often been linked to the use of mental health services (93,94). Rather than solely due to a higher prevalence of mental health conditions in these groups, these patterns in service use can at least partly be attributed to the differences in perceived mental health needs and subsequent health behaviours. Greater education has been found to be protective against mental health issues (95). However, those with higher education are also more likely to recognize psychological distress and know where to seek out services than individuals with lower educational levels, as well as have employment-based health insurance that can cover mental health treatment outside of the public healthcare system (93,96). Likewise, compared with older individuals, younger patients have greater mental health literacy and thus, more confidence in and acceptance of mental health treatment (97). Younger individuals also often have privileged access to services through the integrated health care available at many schools (98,99). Conversely, the use of mental health services is lower among immigrants compared with those born in Canada (93). The process of immigration is frequently accompanied by significant psychological distress (100). However, the experience of mental illness and consequently, the motivation to seek out mental health care is shaped by sociocultural factors. For instance, some may face greater barriers in acknowledging the presence of psychological difficulties because of stigmatization in their country of origin and prefer support from community leaders or traditional healers rather than the formal healthcare system. Others may be hesitant to disclose mental health concerns to mental health service providers based on their perception of severity, different practices in their country of origin, or mistrust in the healthcare system (101).

In addition to differences in service use patterns, there is an increasing recognition that accessing care does not necessarily translate into having one's needs met (102). Of the 5.3 million Canadians using services, 22% (1.2 million) found that their mental health care needs were partially met and 21% (1.1 million) perceived that their needs were completely unmet (92). Women, younger Canadians, those without a high school diploma, and those with concurrent mental health and substance use disorders had greater unmet mental health care needs (93).

Mental illness presents a significant burden to the economy through healthcare costs, lost productivity, and reduced quality of life. When quantified, this amounts to an annual loss of $51 billion (103). Due to the growing financial significance of mental illness nationally, there is concern regarding the appropriate use of services. Some have suggested that costs may be increased by people accessing mental health services who do not meet the criteria for mental health disorders or experience significant psychiatric symptoms (93). However, through the World Mental Health Surveys conducted by the WHO, it was determined that approximately half of those who received mental health care globally met criteria for a Diagnostic and Statistical Manual of Mental Disorders IV (DSM-IV) disorder in the past year and 18% met the criteria for a lifetime diagnosis. The continued use of mental health support by those with a lifetime diagnosis may reflect a long-term preventative approach to reduce the risk of relapse. Even those patients who did not meet the criteria for a formal diagnosis were found to be experiencing recent stressors and behaviours that required mental health support (104). These global findings were validated in a Canadian sample by Urbanoski *et al.*, who reported that most mental health services were used by people with mental health disorders or symptoms that would benefit from care (93).

Gaps in the system

Adopted in 1984, the Canada Health Act established the current universal healthcare system referred to as Medicare. While the federal government sets national standards in Medicare, the provinces and territories operate as separate health systems for their residents with the autonomy to decide integral components such as the extent of coverage and provider remuneration (105). In Quebec, the Régie de l'assurance maladie du Québec (RAMQ) was created in 1969 and provides coverage for Quebec citizens (106). Forms of coverage outside of RAMQ include the Interim Federal Health Program (IFHP) for refugees and asylum seekers and private insurance (107).

Despite the recent reforms across provinces including Quebec, major gaps persist in the public healthcare system, particularly with the existing model of mental healthcare. The first obstacle in providing accessible mental health care arises from the structure of Medicare itself. With no user fees, Medicare is often thought to protect individuals from the financial consequences of illness. However, the scope of this protection is limited to hospital, diagnostic, and medical care, which excludes mental health services that are not provided by physicians and in medical settings (105). With the limited number of psychiatrists nationally, this presents a challenge for the one in five Canadians who experience mental illness each year (108). The options for this population then become limited to enduring long wait times or acquiring private health insurance to pay for mental health providers such as psychologists and social workers who are either in insufficient numbers or not covered by the public provincial health care insurance programs. Even with private insurance, the cost of mental health services is not entirely covered. In fact, most plans will only cover two to eight therapy sessions annually, which is unlikely to be sufficient to manage mental health conditions such as chronic depression (92). Among those that are not able to afford private insurance, untreated mental health conditions can often worsen to the point where they are forced to access high-cost care in the emergency department. The growing number of mental health crises has been cited as contributing to the overcrowding of emergency departments across the country with 10% of those who visit the emergency department for mental health or substance use issues becoming frequent visitors (105).

This gap stemming from the limited coverage under Medicare is often filled by primary care physicians. As the first point of contact in the healthcare system, family physicians manage most mental health issues. Up to 80% of Canadians report relying on their family physician for mental health support (109). This model of mental health care can reduce stigma since patients do not have to go to a separate location to discuss their mental health (110). Addressing mental health concerns in primary care settings can also reinforce the importance of both mental and physical health for overall well-being, serving as a hidden curriculum of sorts. However, in its current state, the reliance on primary care providers presents less than an ideal solution. To begin with, although the majority of Canadians access mental health support through their primary care provider, only 23% of family doctors indicate that they are prepared to manage mental health problems (111). In a study by Wener and Woodgate, primary care providers indicated that they need more time, knowledge, and experience to provide high-quality mental health care, which is also noted by many service users (112). For these patients, the reliance on primary care providers for mental health care may thus be due to circumstance rather than choice.

Ironically, another concern with the reliance on family physicians for mental health care is the lack of access to primary care in many communities. Compared with other Organisation for Economic Co-operation and Development (OECD) countries, the performance of primary care in Canada has been less than optimal over the years, especially when measuring the timely access to care or lack thereof (105). One of the most significant inequities in Canadian healthcare is based on geography. There continues to be a starkly uneven distribution of healthcare providers with persistent shortages in rural regions. The supply gap is best captured by the physician density measure, which is 2.6 doctors per 1000 residents in urban areas and only 1 doctor per 1000 residents in rural areas (105,113). Additional challenges include the growing health disparities between the Indigenous communities and non-Indigenous Canadians. Indigenous peoples have poorer health outcomes compared with other Canadians due to a combination of social determinants and lower access to primary care. Given that most Canadians access mental health support from their family physician, the lack of primary care is especially concerning for the mental health of residents of these Indigenous communities who remain disproportionately impacted by mental health symptoms and disorders (114).

Integration for the future

Integration has been proposed as a solution to address the lack of accessible mental health support. By integrating mental health services into primary care settings, family physicians would have access to the necessary resources to support patients with mental health needs. Integration can take a variety of forms such as a vertically integrated model where all services are provided in a single primary care site or a horizontally integrated model where links are established between primary care and nearby psychiatric sites (115,116). While provincial health systems have transitioned towards team-based primary care that encourages interprofessional collaboration, integration is not yet a reality in Canada (105,117,118). Furthermore, despite the growing recommendations for integrated primary care from the WHO, the American Psychological Association (APA), and the College of Family Physicians of Canada (CFPC), a central issue remains the paucity of data around the implementation of integrated care models in practice (119–121). The lack of implementation research prevents the effective incorporation of integrated care in healthcare delivery and policy.

Mental health services for people with HIV

Managing the syndemic of mental illness and HIV remains a challenge for health systems. The barriers to mental health care faced by the general population are compounded by the stigma, discrimination, higher rates of substance use and homelessness, and other heightened social determinants of health experienced by people living with HIV (71,122). In Canada, HIV is usually managed by either infectious disease specialists or primary care providers. While both specialist and primary care settings are team-based, the degree of connection of medical services with mental health care varies. In their comparison of the two, Kendall *et al.* found that primary care settings tended to offer more comprehensive services compared with specialist settings. For instance, 41.7% of the primary care settings had psychiatrists but only 20% of the specialist settings had psychiatrists as members of their healthcare team. Similarly, peer support workers were available in 16% of the primary care settings in the sample while they were found in none of the specialist clinics. This diversity of mental health support provided by the primary care setting was identified as particularly important to address the gaps in mental health care among this population (122).

Bourgeois *et al.* identified that primary care providers will probably see and manage more common mental health conditions in HIV patients (123). However, many do not have the capacity to manage the complexities of mental illness (124). Thus, it is necessary for models of care for people living with HIV to include trained, accessible mental health professionals such as psychologists to support HIV care providers. One way to accomplish this has been found to be through clinical consultations with mental health clinicians (physician or non-physician), which have been incorporated into several healthcare models. The three forms identified by Bourgeois *et al.* range in their degree of co-location, collaboration, and integration. Consultative models are the least integrated form where the mental health provider and primary HIV provider have an established relationship that facilitates referrals. However, there is limited or no regular communication between the two professionals. The next is integrated or co-located care where the mental health specialist is located within the HIV clinic, allowing for increased interaction between the professionals and easier access for the patient. The final model is a specific type of integrated care called collaborative care, which is defined by regular interaction between the HIV physician and mental health clinician. Unlike a traditional co-located model where both professionals operate in the same organizational framework, collaborative care does not have to be situated in a single clinic (123,125).

Integrated and collaborative care models can address many issues surrounding the engagement of people living with HIV in mental health care. To begin with, the co-location allows people with HIV to avoid the added stigma often associated with going to a separate psychiatric clinic. They can also potentially avoid having to disclose their HIV status to a new healthcare team (126). Furthermore, patients can be reassured of the stigma-free mental health care they will receive given that the personalized referral comes from a trusted HIV provider for care by a professional who is a part of their team (123). In integrated HIV clinics specifically, the likelihood of timely initiation of mental health treatment increases due to the presence of a mental health provider (127). Furthermore, the common charting method in many integrated and collaborative care sites makes it possible for both providers to note medication interactions and side effects and discuss the simultaneous management of two chronic conditions. In actively including mental health care in the HIV care model, other health care providers at these sites such as nurses are trained to conduct mental health screenings and, as a result, screenings are more routine and comprehensive, enabling prompt diagnosis and treatment (123).

While there is growing support for integrated and collaborative models, not all clinics have access to the resources required to provide such care. In particular, more needs to be done to address inequities in mental health resource distribution across the country to allow these care models to be a reality for all people living with HIV. One proposed solution has been linking community-based mental health services and primary HIV care (123,128,129). Many AIDS service organizations and similar community-based organizations already provide mental health and peer support programs. Breaking down the barriers between community-based resources and the formal healthcare system and increasing referrals to community-based services may improve access to and uptake of necessary mental health support among people living with HIV.

2.5 Research questions

Given the existing literature and aforementioned gaps, this thesis is guided by the following questions:

(1) Among women living with HIV with mental health symptoms or diagnoses, how does the engagement with HIV services of those who use mental health services compare with the engagement of those who do not use mental health services over time?

(2) What is the association between mental health service use and HIV care state?

(3) What is the availability and use of mental health services among women living with HIV in Canada?

(4) Which groups of women living with HIV are at risk for experiencing gaps in mental health care?

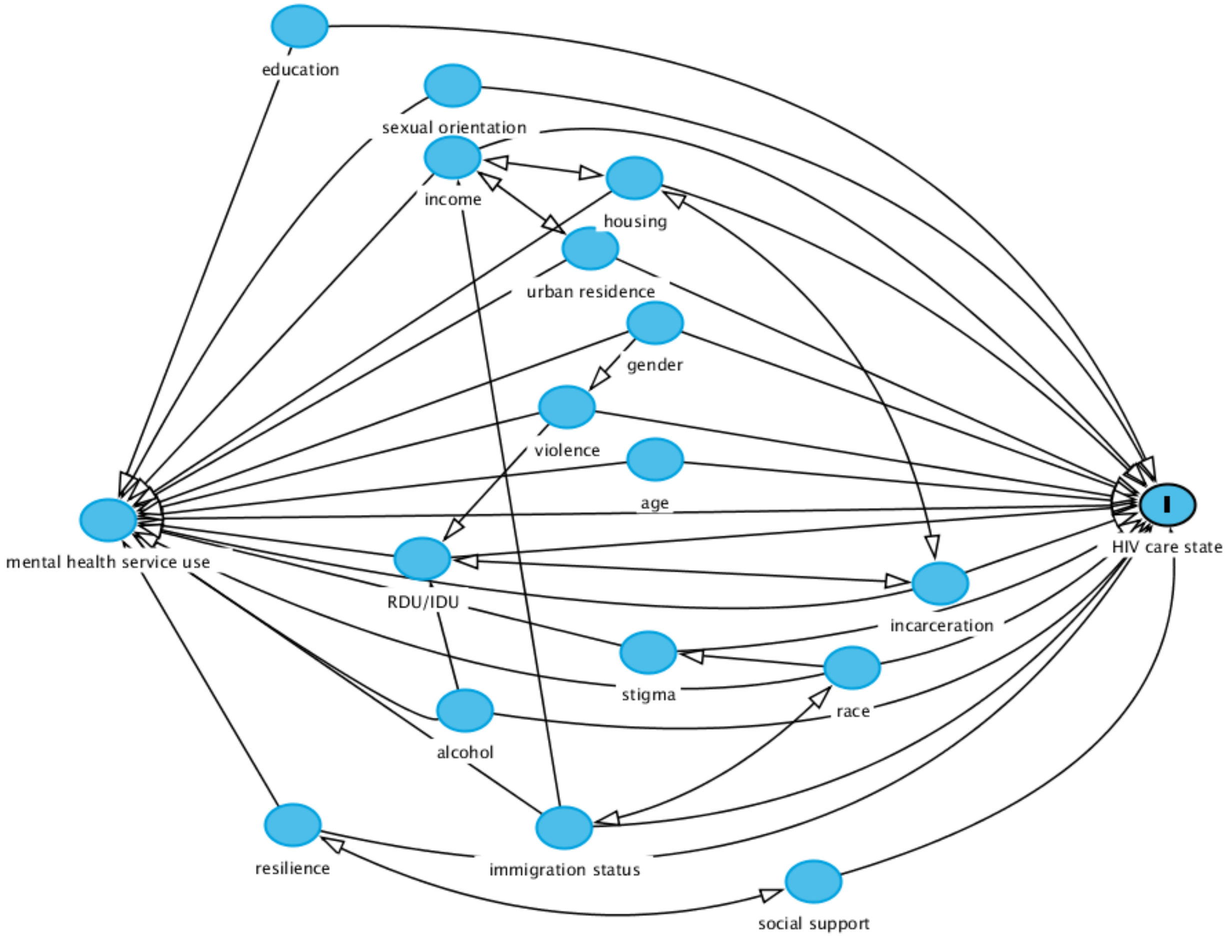
CHAPTER 3: MANUSCRIPT 1

3.1 Preface

The transitions of women with HIV across care states can be influenced by social, psychological, and environmental factors. The impact of mental health conditions has been a focus with the association between depressive symptoms and non-adherence especially well-established in the literature. Given the significant role mental health plays in HIV disease management, it is necessary to understand whether the existing mental health services are effective interventions for addressing the syndemic of HIV and mental illness.

The purpose of this manuscript was therefore to contribute to the limited evidence on the relationship between the use of mental health services and engagement in HIV care states. With the hypothesis that mental health service use would result in better states of care, Sankey diagrams were created to visually depict the movement of women across four defined care states (*unengaged in care, not on ART, detectable, optimal*) over the CHIWOS study's three waves based on their use of mental health services at baseline. Multinomial logistic regression models were also used to quantify the association between service use and care state at baseline. The covariates illustrated in the directed acyclic diagram (DAG) below were hypothesized based on existing literature and the expertise of the research team comprised of clinicians (specifically a family physician and a psychiatrist), researchers, and a peer research associate. These variables were taken into consideration when constructing the multivariate model. This evidence on the relationship between mental health service use and care outcomes may support ongoing efforts to integrate or coordinate mental health services with HIV care.

DAG 1: Association between the use of mental health services and engagement in HIV care state



3.2 Impact of Mental Health Service Use on the HIV Care Cascade Among Women

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ABSTRACT

Background: While the negative effects of mental health issues on HIV clinical outcomes have been well-documented, the impact of mental health treatment on the HIV care cascade is largely uncharacterized. The objective of this study was to describe the movement of women with mental health symptoms or diagnoses, who reported using mental health services, across the HIV care cascade and to assess the relationship between mental health service use and the engagement of these women in HIV care steps.

Methods: Longitudinal data were analyzed from participants enrolled in the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (2013-2018) who had clinically significant depressive symptoms or reported a mental health diagnosis at baseline. Among this subset, four states of HIV care were defined at baseline, 18 months, and 36 months: (1) *unengaged in care* (did not visit an HIV provider in the past year), (2) *not on antiretroviral therapy (ART)* (visited an HIV provider in the past year but did not report current ART use), (3) *detectable* (reported current ART use, but a detectable viral load), and (4) *optimal* (reported current ART use and an undetectable viral load). Sankey diagrams were used to illustrate the trajectory of women across the HIV care cascade over three years based on their self-reported use of mental health service at baseline. The association between mental health service use and care state at baseline was analyzed using multinomial logistic regression models.

Results: Of the 898 women in the cohort with significant depressive symptoms or mental health conditions at baseline, 3.8% (n=34) were *unengaged in care*, 10.9% (n=98) were *not on ART*, 12.4% (n=111) were *detectable*, and 72.9% (n=655) were *optimal*. Over the 36 months, 51.0% of women transitioned between states at least once. When stratified by service use, women who reported use of mental health services at baseline had better engagement across the care cascade and had fewer transitions between states over the three years, 37.2% of which were to better states of care. The use of mental health services at baseline was also significantly associated with greater odds of engagement in the *optimal* state compared with *not on ART* [adjusted odds ratio (aOR): 1.72, 95% confidence interval (CI): 1.07-2.77]. A similar but statistically insignificant association was found with the *detectable* care state (aOR: 1.67, 95% CI: 0.92-3.03).

Conclusion: Our findings demonstrate that mental health care has a positive impact on HIV care outcomes among women. Consequently, accessible mental health services may serve to improve both mental well-being and progression of these patients along the care cascade, thereby achieving individual and public health goals.

Key words: mental health care, service use, HIV care cascade, women living with HIV

INTRODUCTION

Since the advent of antiretroviral therapy (ART), viral suppression has become central in the management of HIV at both the individual and public health levels. Undetectable viral loads not only enable the immune system to work effectively but also prevent transmission of the virus (1). The process required to achieve viral suppression and maintain health is referred to as the HIV care cascade. The steps of the care cascade range from diagnosis of HIV infection to the achievement and maintenance of viral suppression (1). While the final step is often perceived as the primary goal, the steps in the middle of the cascade such as linkage and retention in care are also essential for optimal health outcomes and to reach viral suppression (2).

Mental health conditions have been demonstrated to interfere with every step along this care continuum. By presenting a barrier to engagement in HIV testing, delaying timely linkage to care and initiation of ART, and decreasing adherence to treatment, mental health conditions reduce the likelihood that people living with HIV will achieve viral suppression (3–9). This complex interplay of mental health conditions and HIV has recently been characterized as a syndemic, a synergistic epidemic of two or more diseases in which each aggravates the other (10,11). The consequences of this syndemic are especially concerning for women living with HIV, who experience worse mental health compared with both men living with HIV and women without HIV (12). In fact, women globally report experiencing a 3.5-fold increase in mental health issues following their HIV diagnosis (13). Potentially due in part to this increased burden of mental health concerns, women have worse outcomes at every stage of the HIV care cascade, resulting in the hypothesis that treating existing mental health problems may improve HIV care outcomes (14–18). While the positive effects of mental health care on women's mental health have been documented in the literature, the implications of mental health care for each step of the HIV cascade of care are not yet well understood. Most of the existing studies are limited to analyses of the relationship between mental health support and retention in HIV care (3,19–22). The objectives of this study were to measure the movement of women with mental health symptoms or diagnoses who reported on their use of mental health services at baseline across the HIV care cascade over 36 months and to determine the association between mental health service use and their current state in HIV care.

METHODS

Study design and participants

Longitudinal data from the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS) were analyzed. A prospective, multi-site study, CHIWOS included 1422 women living with HIV across British Columbia, Ontario, and Quebec, three provinces that collectively represent 82% of the women living with HIV in Canada. Participants had to be 16 years or older, diagnosed with HIV, and identify as women at baseline to be included in the cohort (23). Women with HIV trained as peer research associates (PRAs) conducted recruitment through word-of-mouth and social media as well as at HIV clinics, AIDS support organizations, and other community organizations. These peer-driven recruitment strategies resulted in better representation of women from historically underserved communities such as transgender (trans) and Indigenous women, sex workers, and those unengaged in care (24–26).

Women enrolled in the cohort were followed through three waves of structured questionnaires that were administered at 18-month intervals. The web-based questionnaires collected data on demographics, HIV disease, health care and support service utilization, psychosocial factors such as violence and resiliency, and physical, reproductive, and mental health (24). Participants could select "Prefer Not to Answer" for any question. Furthermore, due to the sensitivity of the topics, they could self-administer or decline to respond to the entire section on violence and abuse (23).

Participants were included in this study if, at baseline, they reported a mental health diagnosis, inclusive of mood, anxiety, addiction, sleep, personality, and other disorders, or had clinically significant depressive symptoms as determined by the 10-item Center for Epidemiologic Studies Depression Scale (CES-D 10). A self-report instrument, CES-D 10 is a shortened version of the 20-item CES-D scale that measures depressed affect, absence of positive affect, somatic activity, and interpersonal factors (27). Each item is scored on a scale of 0 to 3, for a total score ranging between 0 and 30. Higher scores represent worse depressive symptoms with scores equal to or greater than 10 representing clinically significant symptoms (28).

Written informed consent was obtained from all participants and they received a $50 honorarium to compensate for their time and costs. The study was approved by the Research Ethics Boards (REBs) of Simon Fraser University, University of British Columbia/Providence Health Centre, Women's College Hospital, McGill University Health Centre, and the study sites with independent REBs.

States of HIV care

At each wave, participants were asked if they had received any HIV medical care in the past year. The questionnaires also inquired about their current use of ART and the result of their most recent viral load. Using data from these questions, four states of HIV care were defined at baseline, 18 months, and 36 months (**Figure 1**). State 1, *unengaged in care*, was comprised of those who reported no contact with an HIV provider in the last year. Those who were engaged in care but did not indicate current ART use were included in state 2, *not on ART*. State 3, *detectable*, included participants who were using ART but reported their most recent viral load as detectable. Finally, those at state 4, *optimal*, reported current ART use and an undetectable result for their most recent viral load. Since some women may be continuing treatment despite not seeing their provider regularly, contact with an HIV provider in the last year was not a requirement for states 3 and 4.

Measures

In the baseline questionnaire, women were asked how often they had accessed "mental health services or counseling, such as a psychiatrist or psychologist" at an HIV clinic or alternate site in the last year. Since needs and thus the frequency of visits might differ, participants who reported accessing the services at least once were categorized as having used mental health services. Baseline demographic factors included in our analysis were province of residence, age, racial and/or ethnic background, gender identity, sexual orientation, educational level, personal gross yearly income, immigration status, and geographic area. A rural residence was defined as a town or area with a population less than 30,000 (29). Baseline psychosocial factors examined were alcohol use, history of recreational drug use (RDU), housing stability, history of incarceration, history of violence in adulthood, HIV stigma scores, resilience scores, and social support scores. Unstable housing was defined as residing in a transition, halfway or safe home, a self-contained room with or without amenities, couch surfing, or living in a car or outdoors. A history of violence was inclusive of experiences in adulthood of physical, verbal, sexual, and emotional abuse (30). Alcohol use in the cohort was quantified through the number of binge drinking episodes (≥4 drinks) in the last month. Non-binge, binge, and heavy were defined as 0, 1-8, and >8 episodes, respectively (31).

The 4-item Abbreviated Social Support Instrument (ASSI) was used to assess social support (32). With each item scored on a scale of 1 to 5, the total score ranges between 4 and 20 with higher scores representative of more positive social support (Cronbach's alpha=0.827) (33). The severity of HIV stigma was then measured using Wright's shortened 10-item version of Berger's HIV Stigma Scale (34). Based on recommendations from the CHIWOS community advisory board, the scale was expanded from four to five items with the addition of a "neither agree nor disagree" option to account for ambivalent responses (35). Ranging from 0 to 100, higher scores are representative of more stigma (Cronbach's alpha=0.83). Resilience was measured using the 10-item Resilience Scale. An abbreviated version of the Resilience Scale 25, the assessment tool captures personal competence and acceptance of self and life. Scores range from 10 to 70 and higher values are indicative of greater resilience (Cronbach's alpha=0.86) (36).

Statistical analysis

Characteristics of participants by HIV care state at baseline were examined through descriptive statistics. Frequencies and percentages were used to summarize categorical variables, and medians and interquartile ranges (IQR) were calculated for continuous variables. Missing values that totaled less than 5% of the sample were excluded. History of violence was the only variable that had more than 5% missing, but imputation was not conducted and missing was retained as a category because the values were likely missing not at random. Sankey diagrams with percentages were then created to illustrate the engagement of women who had significant depressive symptoms or mental health diagnoses at baseline in HIV care states over the waves. The diagrams were also stratified by baseline mental health service use to study the longitudinal impact of mental health care on engagement in the HIV care cascade. To protect participant privacy, mental health service users in the *unengaged in care* state at baseline (<5) were combined with the *not on ART* state in the Sankey diagram. Similarly, service users in the *not on ART state* (<5) were combined with the *unengaged in care* state at 36 months.

Since less than 5% of the sample ended up in the first state at baseline, we generated an adapted three-state cascade to use for our regression analysis where the *unengaged in care* and *not on ART* states were combined. Univariate and multivariate multinomial logistic regression models were then constructed to determine the association between mental health service use and engagement in the three care states at baseline with the combined *not on ART* state serving as the reference category. The expertise of clinicians and women with HIV as well as data-driven strategies were employed to select covariates for the multivariate model. Collinearity was checked with Pearson's correlation coefficient and Chi-square tests for continuous and categorical variables, respectively. Fisher's exact tests were also employed to determine differences among HIV care states by mental health service site (**Supplementary Figure 1**). All statistical analyses were performed using R (version 4.2.2) and RStudio (version 2022.07.2+576).

RESULTS

Baseline characteristics of participants

Of the 1422 participants in the cohort, 898 women had mental health symptoms or diagnoses at baseline. The median age of this subset was 43 years (IQR: 36-51). Geographically, 30.7% of the subset was in British Columbia, 46.3% in Ontario, and 22.9% in Quebec, and most (93.5%) were residents of urban areas. The majority were cisgender (cis) (95.1%) and had completed a high school diploma or higher (81.4%). Nevertheless, 73.6% had a personal gross yearly income below $20,000. The racial composition of the subset was 22.9% Indigenous, 24.9% African/Caribbean/Black, 43.9% white, and 8.2% other, demonstrating the success of our recruitment strategy in obtaining a racially diverse sample. While the occurrence of binge drinking in the past month was low in the sample, 54.7% did report a history of RDU. Notably, despite all participants having either significant depressive symptoms or mental health diagnoses, only 33% of the subset reported using mental health services at any location in the last year at baseline.

Engagement in HIV care states

Table 1 describes the sample stratified by engagement in the four HIV care states at baseline. 3.8% (n=34) were *unengaged in care*, 10.9% (n=98) were *not on ART*, 12.4% (n=111) were *detectable*, and 72.9% (n=655) were *optimal*. The median age of participants in the *optimal* state was the greatest at 45 years (IQR: 37-51). *Unengaged in care* had the largest percentage of Indigenous women among the four states (44.1%) as well as the largest percentage of women with a high school diploma or higher (88.2%). A greater percentage of women in the first two states, *unengaged in care* (38.2%) and *not on ART* (24.5%), were experiencing housing instability compared with those in the *detectable* (14.4%) and *optimal* (7.9%) states. Most women *unengaged in care* (58.8%) were also living with HIV for less than six years, while the majority of participants in the latter three states were living with the chronic condition for six or more years (*not on ART:* 61.2%, *detectable*: 72%, *optimal*: 79.2%). The median HIV stigma scores were higher among women in the *unengaged in care* (68, IQR: 60-80) and *not on ART* states (65, IQR: 54-75) compared with the medians of the two other states (*detectable*: 59, IQR: 45-75; *optimal*: 60, IQR: 45-73). The percentage of participants that had experienced violence in adulthood increased across the states (*unengaged in care*: 70.6%, *not on ART*: 76.5%, *detectable*: 82.9%, *optimal*: 82.6%). Finally, while the percentages of mental health service users at baseline were similar among the last three states (*not on ART:* 32.7%, *detectable*: 35.1%, *optimal*: 34.2%), the number of service users in the *unengaged in care* state was less than 5.

At 18 months, the percentage of participants who were *unengaged in care* increased from 3.8% at baseline to 16.8% (n=151) while the remaining three states, *not on ART*, *detectable*, and *optimal*, decreased to 7.2% (n=65), 6.5% (n=58), and 69.5% (n=624), respectively (**Figure 2A**). This pattern continued at the next wave (36 months) with the percentage of participants *unengaged in care* increasing further to 31.2% (n=280). The percentage of women *not on ART* decreased to 2.8% (n=25). Similarly, the *detectable* and *optimal* states decreased to 6.2% (n=56) and 59.8% (n=537). 612 state transitions occurred across the 36-month period with 51% of women (n=458) changing states at least once. The most frequent transition was from *optimal* to *unengaged in care* between both baseline and 18 months (93/317, 29.3%) and between 18 and 36 months (123/295, 41.7%).

When stratified by mental health service use at baseline, women who reported use of services had better engagement across the HIV care cascade compared with women who did not use these services (**Figure 2B-C**). Among service users, the proportion of the sample who were in the *optimal* state at baseline, 18 months, and 36 months was 75.7% (n=224), 71.6% (n=212), and 67.2% (n=199), respectively. In contrast, the proportion of women who did not use mental health services at baseline and were in the *optimal* state at baseline, 18 months, and 36 months was 71.6%

(n=431), 68.4% (n=412), and 56.1% (n=338), respectively. 45.9% of service users (n=136) changed states at least once. Of the 188 transitions over the 36 months among service users, 37.2% (n=70) were to better states of care. In contrast, 53.5% of non-service users (n=322) changed states at least once. Of the 424 transitions among this group over the 36 months, 34.4% (n=146) were to better states of care. Across the 36 months, the most frequent transition was from *optimal* to *unengaged in care* for both service users (56/188, 29.8%) and for non-service users (160/424, 37.7%).

Association of baseline characteristics with engagement in HIV care states

In the univariate multinomial logistic regression, the following positive associations between baseline characteristics and engagement in HIV care states were significant (**Table 2**): residence in British Columbia [engagement in *optimal*: odds ratio (OR): 2.54, 95% confidence interval (CI): 1.37-4.69], residence in Quebec (engagement in *optimal*: OR: 3.85, 95% CI: 1.68-8.79), 6-14 years living with HIV (engagement in *optimal:* OR: 4.12, 95% CI: 1.47-11.51), >14 years living with HIV (engagement in *optimal:* OR: 4.01, 95% CI: 1.24-13.00), and African/Caribbean/Black identity (engagement in *detectable*: OR: 5.34, 95% CI: 1.63-17.56; engagement in *optimal*: OR: 4.26, 95% CI: 1.73-10.52). Additionally, the following negative associations were significant in the univariate model: trans/other gender identity (engagement in *detectable*: OR: 0.17, 95% CI: 0.03-0.92), higher educational level (engagement in *detectable*: OR: 0.38, 95% CI: 0.17-0.81), and unstable housing (engagement in *detectable*: OR: 0.40, 95% CI: 0.17-0.90; engagement in *optimal*: OR: 0.31, 95% CI: 0.17-0.57). Age, gender identity, racial and/or ethnic background, immigration status, educational level, housing stability, history of incarceration, HIV stigma, and mental health service use were selected for inclusion in the multivariate model (**Table 3**). While residence in British Columbia and Quebec were significant in the univariate model, province of residence was excluded from the final multivariate model due to a strong correlation with housing stability ($p<0.001$). Similarly, income was removed due to a correlation with housing stability ($p<0.001$). Conversely, despite a correlation between racial and/or ethnic background and immigration status, both were retained based on previous literature and clinical expertise (37–40).

After adjusting for potential confounders, the use of mental health services at baseline was significantly associated with greater odds of engagement in the *optimal* state [adjusted odds ratio (aOR): 1.72, 95% CI: 1.07-2.77]; the association with engagement in the *detectable* state was not significant at the 5% level (aOR: 1.67, 95% CI: 0.92-3.03) (**Figure 3**). In the adjusted multinomial model, women also had greater odds of engagement in the *optimal* state if they were older (aOR: 1.04, 95% CI: 1.02-1.07) and identified as African/Caribbean/Black (aOR: 2.24, 95% CI: 1.13-4.44). Conversely, women who identified as Indigenous (aOR: 0.61, 95% CI: 0.37-0.99), trans/other gender identity (aOR: 0.45, 95% CI: 0.21-0.97), or were experiencing unstable housing (aOR: 0.29, 95% CI: 0.17-0.48) had lower odds of engagement in the *optimal* state. Women similarly had lower odds of being in the *detectable* state than the *not on ART* state if they had a high school diploma or higher (aOR: 0.34, 95% CI: 0.18-0.67) or were experiencing housing instability (aOR: 0.49, 95% CI: 0.24-0.98). There was no statistically significant difference between mental health service use at an HIV clinic and an alternate site and engagement in the HIV care states (p=0.47).

DISCUSSION

Among this subset of the CHIWOS cohort with clinically significant depressive symptoms or mental health diagnoses at baseline, there was dynamic movement across HIV care states over the 36-month study period with approximately half of the group transitioning between states at least once. The most common transition, accounting for 35.3% of transitions over the 36 months, was from *optimal* to *unengaged in care*. When we stratified by mental health service use at baseline, women who reported using mental health services in the past year had higher engagement in states further along the care cascade, compared with women who did not access these services. Service users also had fewer transitions between states than non-service users, which may reflect the benefits of mental health care in maintaining engagement in care, adherence to ART, and ultimately viral suppression. Compared with non-service users, a larger percentage of the transitions among service users were also to better states of care (34.4% vs 37.2%). It remains concerning, however, that even after stratification, the most frequent transition in both groups remained from the *optimal* state to the *unengaged in care* state.

Through the multivariate multinomial logistic regression, we found a significant positive association between the use of mental health services at baseline and engagement in the *optimal* state, supporting the descriptive and unadjusted results from the Sankey diagrams. While our study analyzes the broader care cascade, this finding is consistent with existing literature that analyzed mental health service use in relation to a specific stage of the care continuum. In a recent meta-analysis, Rooks-Peck *et al.* reported that in contrast to mental health conditions, mental health service use was associated with greater odds of being retained in care (3). The use of mental health services was also found to be associated with an increased probability of initiating ART (41). In fact, Turner *et al.* determined that patients who were accessing mental health care were over 50% more likely to report ART use (42). Even in the next steps of the cascade, mental health service use was suggested to have a positive impact by increasing the probability of adherence to ART and reducing the risk of discontinuing treatment (10,43).

Previous studies have also hypothesized a potential dose-response relationship between mental health care and benefits for HIV care outcomes (10,43,44). Saag *et al.* reported that retention in HIV care increased with the number of mental health services used (44). Additionally, Himelhoch *et al.* found that mental health service use could mitigate the negative impact of mental illness on ART adherence, as those with consistent and frequent mental health care visits were no more likely to discontinue ART as those without a mental health disorder (43). In this study, we chose not to analyze the number of visits because of the potential range of mental health needs. The frequency of mental health visits will differ based on the individual, diagnosis, and symptoms, and may also change based on the therapeutic intervention. Future mixed methods studies that collect detailed accounts of needs and experiences as well as outcomes may assist in better understanding this complex relationship between the frequency of mental health treatment and HIV clinical outcomes.

Many explanations have been posited for the relationship between mental health service use and HIV care. To begin with, by improving mental well-being, mental health interventions can facilitate a patient's engagement in HIV care (3,21,43–45). Women living with HIV, in particular, have indicated that mental health support is an integral part of their care rather than a supplementary service (46,47). Fulfilling this need for holistic care through coordinated services increases the likelihood of retaining these women in HIV care (48). In our study, we did not find any statistically significant association between the type of site where mental health services were accessed and engagement in the HIV care states. However, the small sample sizes restricted our analysis to a Fisher's exact test and a more thorough investigation is warranted especially since in previous studies, the co-location of mental health and HIV providers at clinics has been proven to increase interprofessional communication that allows for better coordination of care (49). Furthermore, patients find integrated care easier to navigate since appointments are at the same location and linked with their primary care, thereby bolstering patient engagement in both mental health and HIV care (44,50,51). The familiar environment of an integrated HIV clinic can also serve to reduce the stigma that surrounds both mental illness and HIV (52).

In the multivariate model, greater age and African/Caribbean/Black identity were similarly associated with higher odds of engagement in the *optimal* state. This relationship between age and *optimal* engagement corroborates earlier literature where older patients living with HIV were found to be more adherent to ART, resulting in better care outcomes (53,54). A previous paper with the CHIWOS cohort by Kerkerian *et al.* also reported that younger age was associated with attrition at viral suppression, which can be attributed to a combination of higher rates of stigma and substance use as well as a lack of youth-specific interventions (37,55). Older women, conversely, have likely had more time to cope with their HIV diagnosis and the stigma that accompanies (56). Similarly, older women who were diagnosed earlier in their lives with mental health conditions have more experience managing their symptoms, reducing the negative impact on their HIV treatment (57).

Existing research from the United States indicates worse care outcomes among the African/Caribbean/Black community living with HIV, which contrasts with the positive association we found between African/Caribbean/Black identity and engagement in the *optimal* state (58–60). Direct comparisons between the two, however, are likely not meaningful given the historical and socio-environmental differences between the experiences of the American and Canadian African/Caribbean/Black communities. Our work does align with previous results from the CHIWOS cohort. Specifically, Kerkerian *et al.* reported that African/Caribbean/Black women were approximately twice as likely to be virally suppressed as white women (37). Additional studies with Canadian women living with HIV would aid in further validating and explaining this association.

Conversely, Indigenous identity was associated with lower odds of engagement in the *optimal state.* This finding reflects the well-documented gaps that Indigenous women face in access to quality HIV care (61,62). While trans/other gender identity was similarly associated with lower odds of engagement in the *optimal* state, a result consistent with existing literature, this relationship should be interpreted with caution given the small sample size (<5%) (63,64). There was also a significant negative relationship between a higher educational level and unstable housing and engagement in the *detectable* state. Unstable housing remains a barrier to engagement in HIV care. When experiencing housing instability, people living with HIV can have more difficulty accessing ART, maintaining their insurance coverage, and adhering to their daily regimen (65–67). Additional support for women in transitioning to safe, stable housing can increase their retention in care, ART initiation, and likelihood of achieving viral suppression (37,68). Educational level is often employed as a proxy of socioeconomic status, which has profound implications for care outcomes (69–71). However, educational level may not be an appropriate proxy for the CHIWOS cohort because a large proportion of participants were recent immigrants to Canada. Due to discrepancies between educational systems, many with higher education may not have received the appropriate credential validation to enable them to pursue higher paying jobs or were met with relatively low job availability, which can partly explain the majority of our sample having incomes <$20,000 despite earning a high school diploma or higher (72).

There were several limitations to our study. First, since CHIWOS was an observational cohort study, it was not possible to identify causality between mental health service use and HIV care outcomes. Next, all data collected in the questionnaires was self-reported by participants. Even though PRAs were conducting the interviews and participants could skip any question, the stigma surrounding mental illness and HIV may have resulted in the presence of social desirability bias. Furthermore, the cohort was comprised of women from only three provinces. While most women living with HIV in Canada reside in these regions, national surveys have found a higher burden of mental illness in other provinces (73). Thus, additional research within those other provinces may be necessary. In the baseline CHIWOS questionnaire, participants were asked about their lifetime prevalence of mental health diagnoses, which was then used as part of the inclusion criteria for our study sample. Since the self-reported diagnoses may not be current, many women in our sample may not have required mental health services in the past year. Thus, the use of mental health services among women with present mental health diagnoses may be higher. On the other hand, the use of mental health services in the CHIWOS study population may be higher than in the entire Canadian population of women with HIV since CHIWOS' non-random, purposive sampling approach may have caused an overrepresentation of women engaged in care. Given the potential for both over- and underestimation, the utilization rates should be interpreted with caution. Finally, we were unable to determine the quality of mental health services, or the length of use of these services by participants. The services may not have been sufficient or effective at meeting their needs, or women may have just begun to receive treatments at baseline, in which case the benefits would not be felt yet (74). Moreover, different mental health interventions such as psychotropic medication and cognitive behavioural therapy may have varying impacts on engagement in the HIV care cascade. Future studies are therefore necessary to investigate gaps, if any, in existing services, and to understand the impact of different mental health interventions.

CONCLUSION

Our study demonstrates a positive association between the use of mental health services and the engagement of women in optimal HIV care. Our findings thus provide strong and necessary evidence to support offering mental health care to this population. When effectively implemented, accessible and quality mental health care may have the potential to optimize both mental health and HIV care for women living with HIV.

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CONFLICTS OF INTEREST

None.

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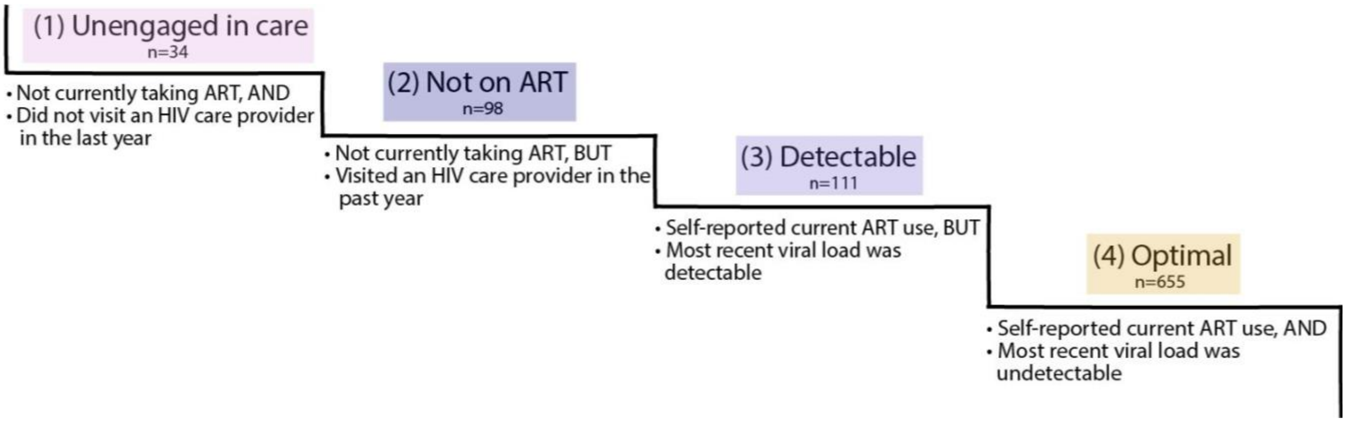
Figure 1: Determination of HIV care state



ART: antiretroviral therapy

Table 1: Baseline characteristics of women with mental health symptoms or diagnoses by HIV care state (n=898)

Variable	***Unengaged in care**** **(n=34)**	***Not on ART**** **(n=98)**	***Detectable**** **(n=111)**	***Optimal**** **(n=655)**	**Total (n=898)**
Province					
British Columbia	5 (14.7%)	29 (29.6%)	33 (29.7%)	209 (31.9%)	276 (30.7%)
Ontario	26 (76.5%)	62 (63.3%)	61 (55.0%)	267 (40.8%)	416 (46.3%)
Quebec	<5	7 (7.1%)	17 (15.3%)	179 (27.3%)	206 (22.9%)
Gender					
Cis	28 (82.4%)	90 (91.8%)	107 (96.4%)	629 (96.0%)	854 (95.1%)
Trans/Other	6 (17.6%)	8 (8.2%)	<5	26 (4.0%)	44 (4.9%)
Age	37 (30-42)	40 (34-46)	42 (36-51)	45 (37-51)	43 (36-51)
Sexual orientation					
Heterosexual/DK/PNTA	24 (70.6%)	71 (72.4%)	90 (81.1%)	571 (87.2%)	756 (84.2%)
LBQQ2S	10 (29.4%)	27 (27.6%)	21 (18.9%)	84 (12.8%)	142 (15.8%)
Racial and/or ethnic background					
Indigenous	15 (44.1%)	33 (33.7%)	36 (32.4%)	122 (18.6%)	206 (22.9%)
African/Caribbean/Black	7 (20.6%)	13 (13.3%)	17 (15.3%)	187 (28.5%)	224 (24.9%)
White	9 (26.5%)	44 (44.9%)	47 (42.3%)	294 (44.9%)	394 (43.9%)
Other	<5	8 (8.2%)	11 (9.9%)	52 (7.9%)	74 (8.2%)
Education					
High school or higher	30 (88.2%)	84 (85.7%)	73 (65.8%)	544 (83.1%)	731 (81.4%)
Lower than high school/DK/PNTA	<5	14 (14.3%)	38 (34.2%)	111 (16.9%)	167 (18.6%)
Immigration status					
Citizen	27 (79.4%)	90 (91.8%)	98 (88.3%)	529 (80.8%)	744 (82.9%)
Landed immigrant/permanent resident	<5	<5	10 (9.0%)	79 (12.1%)	94 (10.5%)
Refugee/protected person	<5	<5	<5	32 (4.9%)	38 (4.2%)
Other	<5	<5	0 (0%)	15 (2.3%)	22 (2.4%)
Personal gross yearly income					
<\$20,000	22 (64.7%)	70 (71.4%)	94 (84.7%)	475 (72.5%)	661 (73.6%)
\$20,000 - \$39,999	8 (23.5%)	12 (12.2%)	12 (10.8%)	113 (17.3%)	145 (16.1%)
≥\$40,000	<5	12 (12.2%)	<5	55 (8.4%)	69 (7.7%)
DK/PNTA	<5	<5	<5	12 (1.8%)	23 (2.6%)
Urban residence	33 (97.1%)	94 (95.9%)	105 (94.6%)	608 (92.8%)	840 (93.5%)
Housing					
Stable	21 (61.8%)	74 (75.5%)	95 (85.6%)	603 (92.1%)	793 (88.3%)
Unstable	13 (38.2%)	24 (24.5%)	16 (14.4%)	52 (7.9%)	105 (11.7%)
Incarceration (ever)	20 (58.8%)	46 (46.9%)	69 (62.2%)	263 (40.2%)	398 (44.3%)
History of violence in adulthood					
Yes	24 (70.6%)	75 (76.5%)	92 (82.9%)	541 (82.6%)	732 (81.5%)
No/DK/PNTA	5 (14.7%)	18 (18.4%)	9 (8.1%)	63 (9.6%)	95 (10.6%)
Missing	5 (14.7%)	5 (5.1%)	10 (9.0%)	51 (7.8%)	71 (7.9%)
Years living with HIV					
<6	20 (58.8%)	34 (34.7%)	28 (25.2%)	117 (17.9%)	199 (22.2%)
6-14	7 (20.6%)	34 (34.7%)	34 (30.6%)	262 (40.0%)	337 (37.5%)
>14	<5	26 (26.5%)	46 (41.4%)	257 (39.2%)	331 (36.9%)
DK/PNTA	5 (14.7%)	<5	<5	19 (2.9%)	31 (3.5%)
Age at diagnosis	32 (27-36)	32 (25-37)	28 (23-35)	31 (25-38)	31 (25-38)
ART adherence					

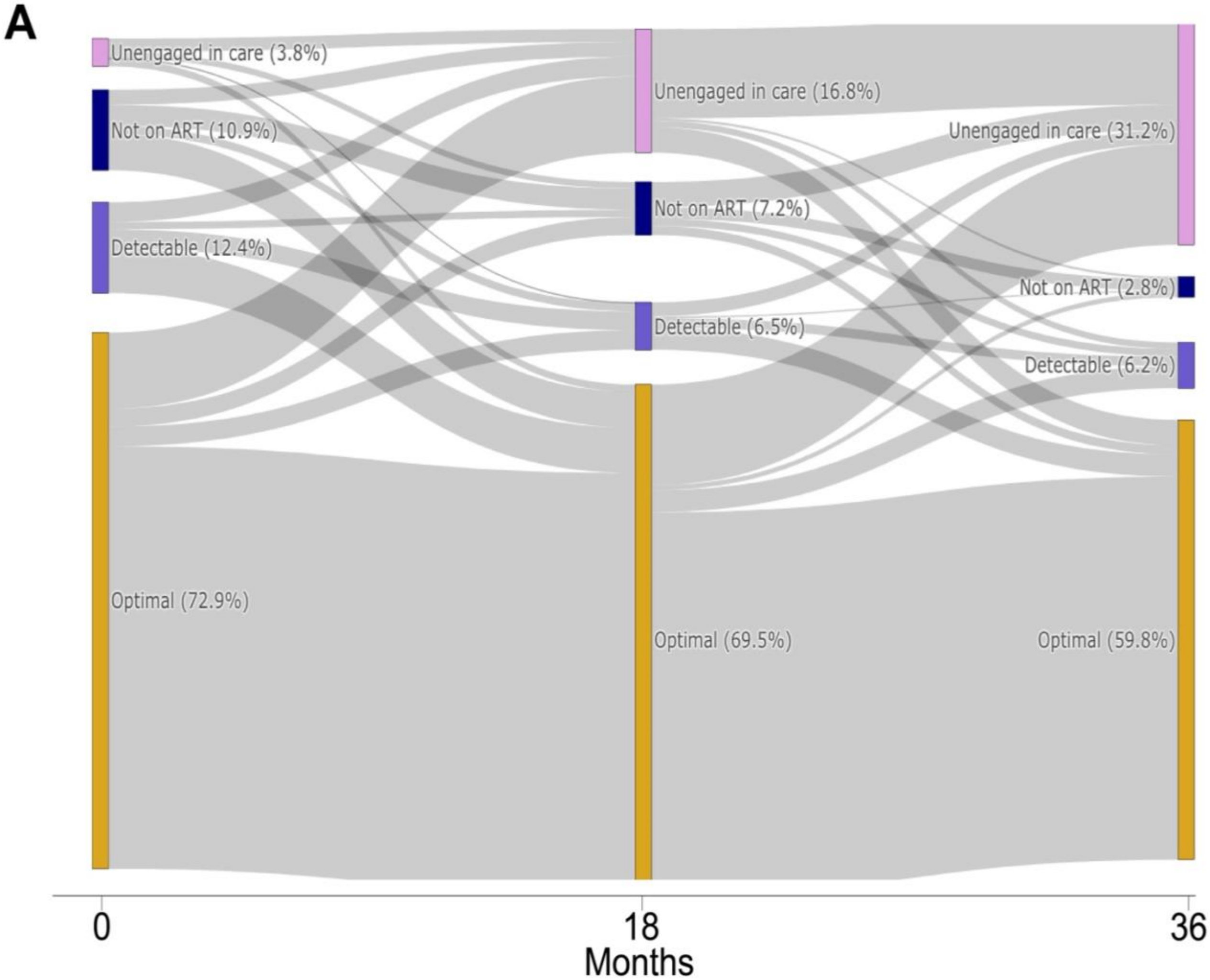
≥95% taken in last month	0 (0%)	0 (0%)	59 (53.2%)	484 (73.9%)	543 (60.5%)
<95% taken in last month	0 (0%)	0 (0%)	52 (46.8%)	171 (26.1%)	223 (24.8%)
Not on ART	34 (100%)	96 (98.0%)	0 (0%)	0 (0%)	130 (14.5%)
CD4 count					
<200 cells/mm^3	<5	<5	26 (23.4%)	26 (4.0%)	58 (6.5%)
200-500 cells/mm^3	<5	22 (22.4%)	31 (27.9%)	191 (29.2%)	248 (27.6%)
>500 cells/mm^3	<5	42 (42.9%)	23 (20.7%)	367 (56.0%)	434 (48.3%)
Never received/DK/PNTA	26 (76.5%)	30 (30.6%)	31 (27.9%)	70 (10.7%)	157 (17.5%)
Alcohol					
Binge	5 (14.7%)	17 (17.3%)	18 (16.2%)	108 (16.5%)	148 (16.5%)
Heavy	<5	5 (5.1%)	6 (5.4%)	12 (1.8%)	26 (2.9%)
Non-binge	23 (67.6%)	71 (72.4%)	81 (73.0%)	504 (76.9%)	679 (75.6%)
DK/PNTA	<5	5 (5.1%)	6 (5.4%)	31 (4.7%)	45 (5.0%)
Recreational drug use (ever)	15 (44.1%)	54 (55.1%)	77 (69.4%)	345 (52.7%)	491 (54.7%)
Resilience scores	58 (50-61)	60 (53-64)	60 (53-64)	62 (57-67)	61 (56-66)
ASSI social support scores	16 (9.8-17)	13 (9.5-16)	13 (10-17)	13 (10-16)	13 (10-16)
HIV stigma scores	68 (60-80)	65 (54-75)	59 (45-75)	60 (45-73)	60 (45-75)
Mental health service use**	<5	32 (32.7%)	39 (35.1%)	224 (34.2%)	296 (33.0%)

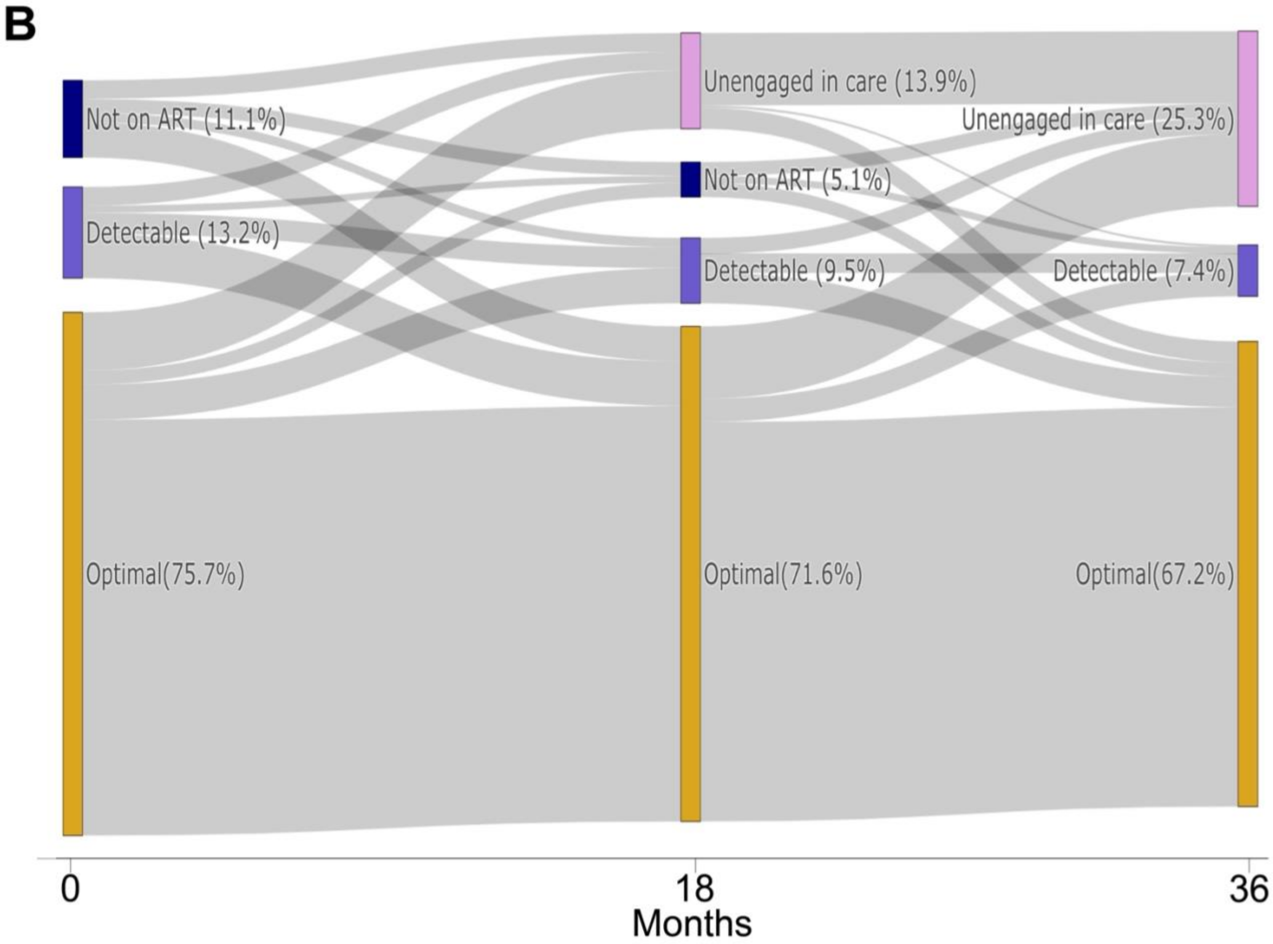
LBQQ2S: lesbian, bisexual, queer, questioning, and two-spirit; ART: antiretroviral therapy; DK/PNTA: Don't know/prefer not to answer; ASSI: abbreviated social support instrument

**Unengaged in care:* no contact with an HIV care provider in the last year; *not on ART*: engaged in care but not using ART; *detectable*: using ART, but detectable viral load; *optimal*: using ART, and undetectable viral load.

**Inclusive of participants who accessed mental health services at HIV clinic and/or other sites

Figure 2: Sankey diagram illustrating the engagement in the HIV care states of (**A**) participants with mental health symptoms or diagnoses at baseline (n=898), (**B**) participants with mental health symptoms or diagnoses who reported using mental health services in the past year at baseline (n=296),* and (**C**) participants with mental health symptoms or diagnoses who did not report using mental health services in the past year at baseline (n=602)




B
Not on ART (11.1%)
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Unengaged in care (13.9%)
Not on ART (5.1%)
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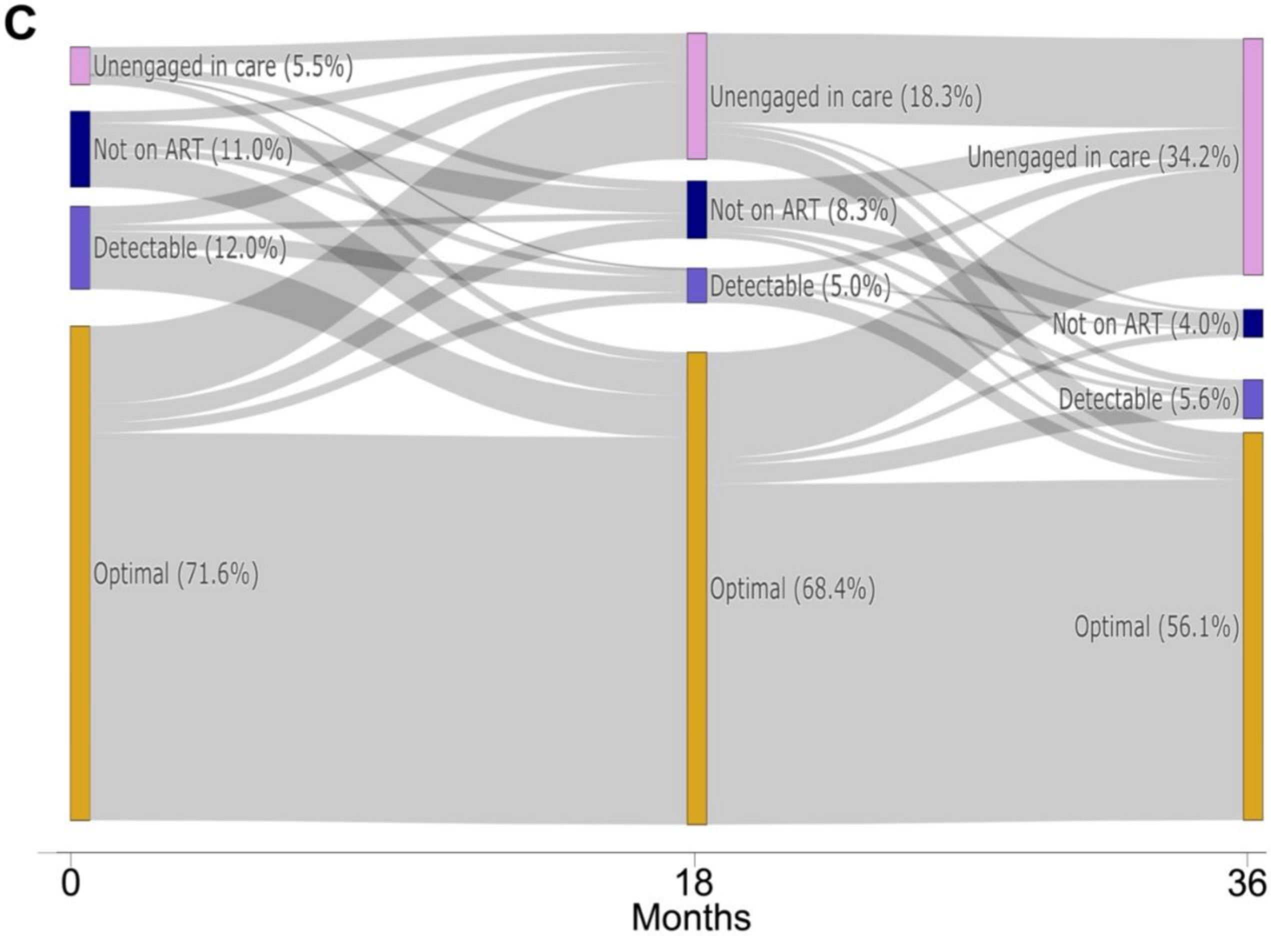


Unengaged in care: no contact with an HIV care provider in the last year; *not on ART*: engaged in care but not using ART; *detectable*: using ART, but detectable viral load; *optimal*: using ART, and undetectable viral load. ART: antiretroviral therapy

*To uphold participant confidentiality, the *unengaged in care* state (<5) was combined with *not on ART* in wave 1 of panel B. The *not on ART* state (<5) in wave 3 was similarly combined with *unengaged in care.*

Table 2: Univariate multinomial logistic regression of baseline characteristics of women with mental health symptoms or diagnoses associated with engagement in HIV care states, with *not on ART* serving as the reference (n=773)*

	HIV Care State			
	Detectable**		***Optimal*****	
Variable	**Odds ratio**	**95% CI**	**Odds ratio**	**95% CI**
Mental health service use***	1.58	0.80-3.12	1.47	0.85-2.55
Province				
British Columbia	0.79	0.36-1.73	**2.54**	**1.37-4.69**
Ontario	Ref	Ref	Ref	Ref
Quebec	1.35	0.47-3.87	**3.85**	**1.68-8.79**
Gender				
Cis	Ref	Ref	Ref	Ref
Trans/Other	**0.17**	**0.03-0.92**	0.51	0.19-1.34
Age	1.00	0.97-1.04	1.03	1.00-1.05
Sexual orientation				
Heterosexual/DK/PNTA	Ref	Ref	Ref	Ref
LBQQ2S	0.72	0.34-1.54	0.59	0.33-1.05
Racial and/or ethnic background				
Indigenous	1.18	0.55-2.52	0.69	0.38-1.25
African/Caribbean/Black	**5.34**	**1.63-17.56**	**4.26**	**1.73-10.52**
White	Ref	Ref	Ref	Ref
Other	2.54	0.86-7.50	1.57	0.68-3.63
Education				
High school or higher	**0.38**	**0.17-0.81**	0.87	0.44-1.71
Lower than high school/DK/PNTA	Ref	Ref	Ref	Ref
Immigration status				
Citizen/Permanent Resident	Ref	Ref	Ref	Ref
Other	0.32	0.05-2.12	0.92	0.28-3.05
Personal gross yearly income				
<$20,000/DK/PNTA	Ref	Ref	Ref	Ref
≥$20,000	**0.40**	**0.17-0.93**	0.64	0.36-1.13
Rural residence	1.60	0.40-6.37	1.71	0.57-5.11
Unstable Housing	**0.40**	**0.17-0.91**	**0.31**	**0.17-0.57**
Incarceration (ever)	1.44	0.63-3.30	0.69	0.37-1.27
History of violence in adulthood	1.48	0.53-4.13	1.59	0.77-3.28
Years living with HIV				
<6	Ref	Ref	Ref	Ref
6-14	1.18	0.55-2.54	**2.25**	**1.27-3.98**
>14	2.23	1.00-4.97	**2.83**	**1.50-5.33**
Alcohol				
Binge	1.06	0.44-2.53	1.57	0.79-3.10
Heavy	1.19	0.32-4.43	0.57	0.17-1.91
Non-binge	Ref	Ref	Ref	Ref
Recreational drug use (ever)	1.94	0.74-5.04	1.43	0.71-2.86
ASSI social support scores	1.01	0.94-1.08	1.02	0.96-1.08
Resilience scores	0.99	0.96-1.03	1.03	1.00-1.06
HIV stigma scores	0.98	0.97-1.00	0.99	0.98-1.00

LBQQ2S: lesbian, bisexual, queer, questioning, and two-spirit; ART: antiretroviral therapy; ASSI: abbreviated social support instrument; DK/PNTA: Don't know/prefer not to answer; CI: confidence interval
*n is lower due to missing values for covariates in regression model
***Not on ART*: not using ART; *Detectable*: using ART, but detectable viral load; *optimal*: using ART, and undetectable viral load.
***Inclusive of participants who accessed mental health services at HIV clinic and/or other sites

Table 3: Multivariate multinomial logistic regression of baseline characteristics of women with mental health symptoms or diagnoses associated with engagement in HIV care states, with *not on ART* serving as the reference (n=871)*

	HIV Care State			
	Detectable*		***Optimal****	
Variable	**Odds ratio**	**95% CI**	**Odds ratio**	**95% CI**
Mental health service use***	1.67	0.92-3.03	**1.72**	**1.07-2.77**
Gender				
Cis	Ref	Ref	Ref	Ref
Trans/Other	0.34	0.10-1.12	**0.45**	**0.21-0.97**
Age	1.02	0.99-1.05	**1.04**	**1.02-1.07**
Racial and/or ethnic background				
Indigenous	0.82	0.43-1.54	**0.61**	**0.37-0.99**
African/Caribbean/Black	1.89	0.74-4.82	**2.24**	**1.13-4.44**
White	Ref	Ref	Ref	Ref
Other	1.94	0.72-5.20	1.19	0.54-2.61
Education				
High school or higher	**0.34**	**0.18-0.67**	0.74	0.41-1.32
Lower than high school/DK/PNTA	Ref	Ref	Ref	Ref
Immigration status				
Citizen/Permanent Resident	Ref	Ref	Ref	Ref
Other	0.26	0.05-1.40	0.79	0.32-1.93
Unstable Housing	**0.49**	**0.24-0.98**	**0.29**	**0.17-0.48**
Incarceration (ever)	1.86	0.99-3.49	0.96	0.61-1.52
HIV stigma scores	0.99	0.97-1.00	0.98	0.97-1.00

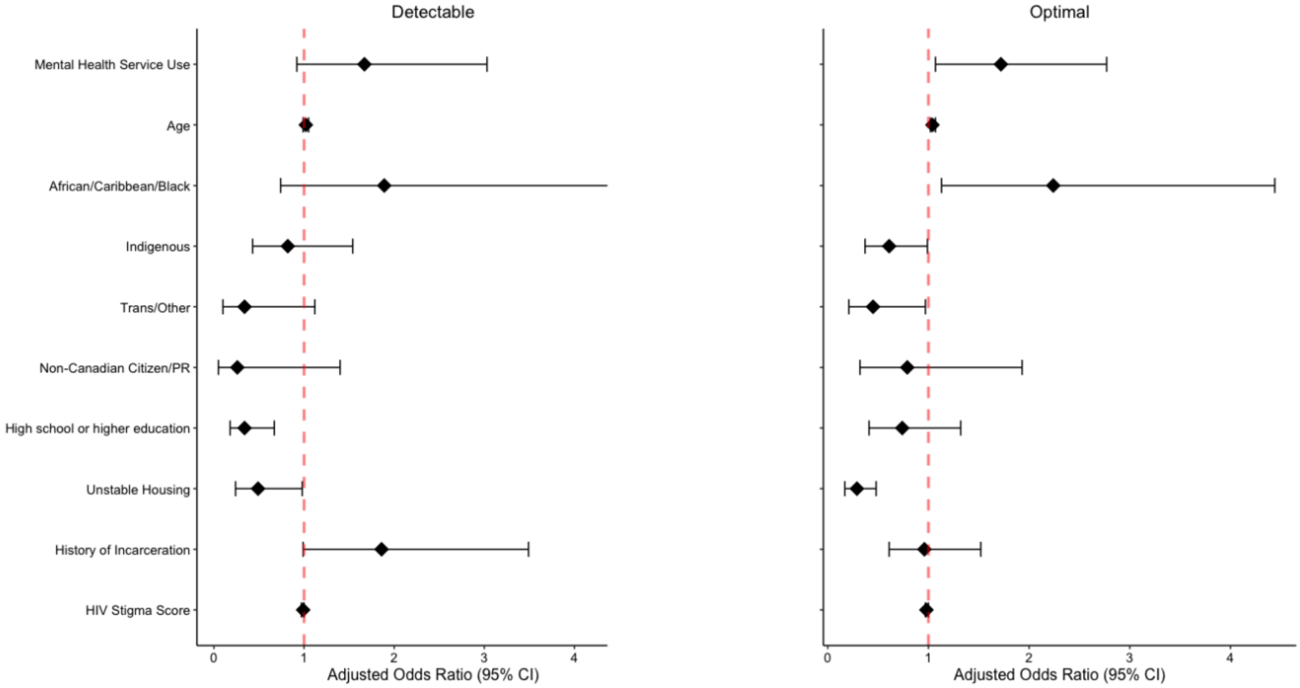
LBQQ2S: lesbian, bisexual, queer, questioning, and two-spirit; ART: antiretroviral therapy; DK/PNTA: Don't know/prefer not to answer; CI: confidence interval

*n is lower due to missing values for covariates in regression model

***Not on ART*: not using ART; *Detectable*: using ART, but detectable viral load; *optimal*: using ART, and undetectable viral load.

***Inclusive of participants who accessed mental health services at HIV clinic and/or other sites

Figure 3: Forest plot of adjusted odds ratios from multivariate multinomial regression of characteristics of women with mental health symptoms and diagnoses associated with engagement in *detectable* and *optimal*, compared with engagement in the reference state, *not on ART* (n=871)



Not on ART: not using ART; *detectable*: using ART, but detectable viral load; *optimal*: using ART, and undetectable viral load. ART: antiretroviral therapy

CHAPTER 4: MANUSCRIPT 2

4.1 Bridge & preface

Given the substantial obstacle that mental health conditions present to the management of HIV at the individual and population levels, there is a need for evidence-informed interventions to ensure both mental well-being and positive HIV care outcomes. The first manuscript demonstrated the significant relationship between mental health services and HIV care outcomes. Specifically, women who used mental health services had greater odds of engagement in optimal HIV care. These findings suggest that integrated mental health services may be a part of the solution to fully address the syndemic of mental illness and HIV among women.

Before translating these findings into healthcare design and delivery, we first need to understand the existing landscape of mental health services. Through the second manuscript, I thus sought to summarize the current availability and use of mental health services among women living with HIV as well as to characterize the location of accessed services. Capturing the utilization patterns of women will inform mental health service design moving forward, especially as we strive to promote equitable access. Furthermore, the second manuscript investigated the proportion of the cohort who reported that a lack of mental health services posed a problem in their care and characteristics associated with these problematic shortages. As detailed by Tanahashi *et al.*, availability of services does not necessarily translate into the provision of satisfactory care that meets the needs of patients (102). It is therefore necessary to understand the effectiveness of services from the user perspective and provide targeted support for those subsets of the population that face more difficulty accessing sufficient care. To identify such participants that have a higher likelihood of insufficient mental health support, I employed a logistic regression analysis that modeled factors associated with reported problematic shortages of mental health services. The selection of covariates for the multivariable model was informed by the DAG illustrated below. Like the first manuscript, covariate hypothesis was a collaborative, iterative process that was informed by existing literature and the expertise of a multidisciplinary team of clinicians, researchers, and community members.

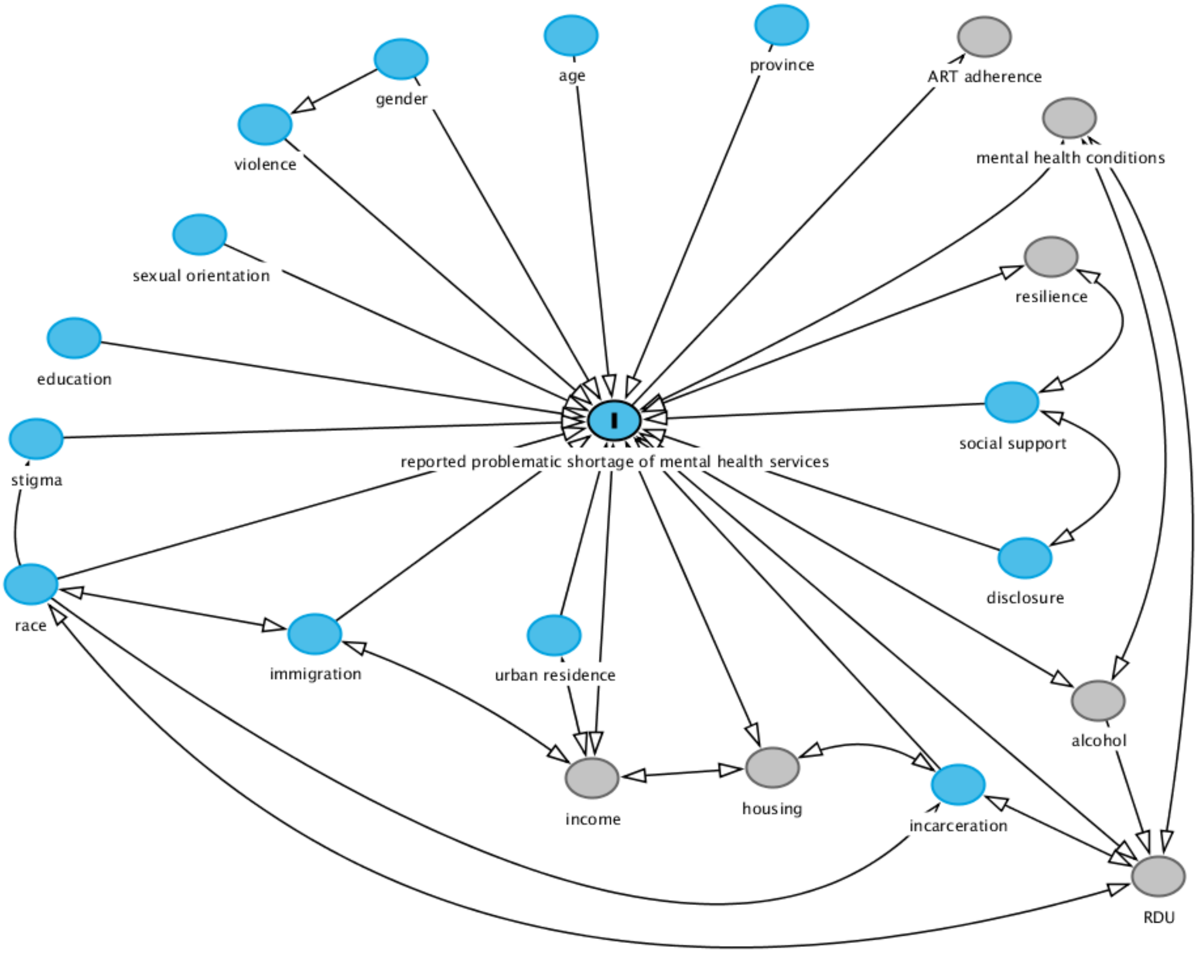
Our hypotheses were the following:

(1) Due to the increased accessibility provided by co-location, more women will use mental

health services at their HIV clinic compared with alternate sites.

(2) As a result of geographic disparities, stigma, and racism that persist in care delivery, residents of rural communities and more marginalized women with HIV such as racial and sexual minorities will be more likely to report that mental health service shortages presented a problem in their care.

DAG 2: Characteristics associated with reporting a problematic shortage of mental health services



4.2 Mental Health Service Use and Shortages among Women Living with HIV in Canada

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ABSTRACT

Background: The prevalence of mental health concerns among women living with HIV in Canada ranges between 29.5% and 57.4%, highlighting the need for accessible mental health care for this population. We aimed to (1) describe the availability and use of mental health services among women living with HIV and (2) identify characteristics associated with reporting that shortages of these services presented a problem in their care.

Methods: Baseline cross-sectional survey data from the Canadian HIV Women's Sexual and Reproductive Health Cohort Study were analyzed. Self-reported availability and use of mental health services were examined using descriptive statistics. Participants were asked to indicate the degree to which a lack of mental health providers and peer support groups was a problem in their care. Logistic regression models were constructed to determine associations between sociodemographic, clinical, and psychosocial characteristics and problematic service shortages.

Results: Of 1422 women with HIV, 26.7% (n=380) used mental health services in the last year, which the majority accessed through their HIV clinic. 38% (n=541) reported that the shortage of mental health support was a problem in their care. Among this subset, 22.1% (n=119) accessed services at their HIV clinic, 26.5% (n=143) reported available services but did not access them, and 51.4% (n=277) either indicated these services were unavailable, did not know if such services were available, or were unengaged in HIV care. Factors associated with reporting problematic shortages included rural residence [adjusted odds ratio (aOR): 1.69, 95% confidence interval (CI): 1.03-2.77], higher educational level (aOR: 1.43, 95% CI: 1.02-2.02), and higher HIV stigma scores (aOR: 1.03, 95% CI: 1.02-1.03). Conversely, African/Caribbean/Black identity (aOR: 0.37, 95% CI: 0.26-0.54), history of recreational drug use (aOR: 0.56, 95% CI: 0.39-0.81), and Quebec residence (aOR: 0.69, 95% CI: 0.50-0.96) were associated with lower odds of reporting service shortages.

Conclusion: Our findings highlight the HIV clinic as the primary location of mental health service use. However, existing services may not be sufficient to reach all participants or may need to be adapted to respond to specific needs as some participants reported service shortages as a problem despite accessing mental health care. Furthermore, the uptake of services was low among those reporting a shortage of mental health support, suggesting a lack of connection to services or patient knowledge about their availability. Characteristics associated with reporting problematic shortages also reflect geographic and socioeconomic disparities in access to mental health care that must be accounted for in future service design.

Keywords: mental health care, mental health needs, service use, women living with HIV

INTRODUCTION

Mental health concerns are the most common comorbidities among people living with HIV, with a prevalence between 28% and 62% globally (1). As overlapping epidemics, mental illness and HIV interact and exacerbate the health effects of one another (2). Mental health disorders and symptoms are associated with a higher risk for HIV acquisition and poor outcomes across the HIV care continuum (3–5). In turn, HIV infection and its treatments can contribute significant neuropsychiatric symptoms as well as the psychological burden of coping with a stigmatized chronic illness (6,7).

Women living with HIV are more likely to have poor mental health compared with women in the general population and men living with HIV (8–10). In the second wave of the Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS), the largest community-based Canadian cohort of women living with HIV, the prevalence of mental health concerns was 57.4% (11). Depression and anxiety were found to be the most common conditions, affecting 32.2% and 29.5% of women, respectively. While potentially undiagnosed, 47.1% of the cohort also experienced clinically significant posttraumatic stress symptoms (12). In other Canadian studies with women living with HIV, the levels of anxiety and severe depressive symptoms were similarly high, impacting 37% and 31% of women respectively (13,14). The greater risk for mental health conditions among women with HIV has been hypothesized to result in part from their vulnerable social positions (15). The increased social marginalization and intersectional forms of stigma faced by women following their HIV diagnosis can further exacerbate the burden of mental illness in this population (16).

Given the prevalence of mental health needs, the WHO and UNAIDS have recommended that psychosocial support be a priority in the care of women living with HIV (17,18). However, access to and use of mental health services remain low in this population. In a national urban cohort investigating service needs among people with HIV in the United States, women were found to have a higher prevalence of mental health needs compared with men (62.8% vs 56.2%) and a greater likelihood of reporting unmet mental health care needs (19). In a more recent study of women with HIV in New York City, an estimated 28% of participants with mental illnesses did not use mental health services (20). Unmet mental health needs are further heightened among more marginalized subsets of this population such as transgender (trans) women (21).

Access to mental health services is often limited due to a lack of linkage to care in health systems where HIV and mental health remain stigmatized (22,23). To improve the design and delivery of mental health care, we must understand the current landscape and service utilization patterns of women living with HIV, including gaps experienced by the service users. Most of the existing literature on mental health care among people living with HIV, however, originates from the United States, which may not apply to the Canadian context. Moreover, there is a lack of knowledge on the service utilization patterns of women specifically (8). The primary objective of this study was therefore to describe the availability of mental health services at HIV clinics and the use of these services at clinics and alternate sites by women with HIV in Canada. Despite universal health insurance in Canada, historically marginalized groups such as refugee, Black, and Indigenous communities continue to experience barriers to health care access (24–27). Our second objective was thus to identify participant characteristics associated with reporting shortages of mental health services as a problem in their care.

METHODS

Study design and participants

The CHIWOS study was a multi-site investigation that followed 1422 women living with HIV across British Columbia, Ontario, and Quebec from 2013 to 2018. All participants were 16 years of age or older, diagnosed with HIV, and identified as women (28). Aligning with CHIWOS' community-based participatory approach, recruitment and data collection were conducted by women with HIV trained as peer research associates (PRAs) (29,30).

Participants were followed longitudinally through three waves of structured web-based surveys collected at 18-month intervals. This study used the baseline survey data collected between August 2013 and May 2015 (29). Interviews were conducted in English or French in person, over the phone, or over Skype. Throughout the survey, participants could select "Prefer Not to Answer" for any question. Furthermore, due to the sensitivity of the information and the potential of retraumatization, participants had the option to self-administer or decline to respond to the section on violence and abuse (28). After completion of the survey, participants received a $50 honorarium to compensate for the time and expenses associated with their participation.

All study participants provided written informed consent before enrollment and ethics approval was obtained from the Research Ethics Boards of the University of British Columbia/Providence Health Centre, Simon Fraser University, Women's College Hospital, McGill University Health Centre, and participating clinics and AIDS service organizations.

Measures

Participants who did not report accessing HIV care in the past 12 months were classified as "unengaged in HIV care." The availability of mental health services at HIV clinics was assessed with the question, "*Are the following services available at your HIV clinic?: Onsite mental health services, such as a psychiatrist or psychologist*." Response categories included "Yes," "No," and "Don't know/prefer not to answer (DK/PNTA)." Use of mental health services at HIV clinics was determined through the following question: "*How often did you access this service, on average, over the past year from your HIV clinic?*" Mental health service use at alternate sites was elicited with the question, "*Which of the following services did you receive from this site in the past year?: Onsite mental health services or counseling (e.g. a psychiatrist or psychologist or counselor)*." Participants who reported receiving these services at alternate sites or accessing mental health support at least once at their HIV clinic were categorized as mental health service users.

To assess barriers to care, participants were asked to indicate to what extent certain circumstances made it difficult for them to receive the care, services, or opportunities they desired over the past year. Participants who answered "major problem" or "somewhat of a problem" to either "the shortage of psychologists, social workers, and mental health counselors who can help address mental health issues" or "the lack of psychological support groups for persons with HIV/AIDS" were categorized as reporting a problematic shortage of mental health services.

Sociodemographic, clinical, and psychosocial characteristics hypothesized to be associated with reporting problematic mental health service shortages were included in our analysis. Based on the definitions published by Statistics Canada, an urban residence was defined as living in locations with a population equal to or greater than 30,000 (31). Immigration status was determined through the question: "*What is your current legal status in Canada?*" Canadian citizen, landed immigrant/permanent resident, and refugee/protected person were retained as separate categories and all other responses were classified as other. Stable housing was defined as residing in an apartment, house, self-contained room in a house or apartment, or a group home (32). Alcohol use was categorized by the number of binge drinking episodes (≥4 drinks) in the last month. Non-binge, binge, and heavy were defined as 0, 1-8, and >8 binge drinking episodes, respectively (33).

Social support was measured using the 4-item Abbreviated Social Support Instrument (ASSI) (34). With each item scored on a scale of 1-5, the total score ranges between 4 and 20 with higher scores indicating more positive social support (Cronbach's alpha=0.847) (35). HIV disclosure was measured with the disclosure subscale of the HIV/AIDS-Targeted Quality of Life (HAT-QoL) scale (36). To allow responses to reflect general disclosure practices rather than restricting to specific time frames, the subscale was edited from a 5-point scale ranging from "none of the time" to "all of the time" to a 4-point scale ranging from "strongly disagree" to "strongly agree". Each item was scored from 0 to 20, for a composite score between 0 and 100 (Cronbach's alpha=0.826). Lower overall scores represent more disclosure worries. Wright's shortened 10-item version of Berger's HIV Stigma Scale was then used to determine the severity of stigma (37). Upon recommendation by the CHIWOS community advisory team, "neither agree nor disagree" was added to the scale to account for ambivalent responses (38). Scores ranged between 0 and 100 with higher values representative of more stigma (Cronbach's alpha=0.846). Finally, resilience was measured using a 10-item Resilience Scale, which is an abbreviated version of the Resilience Scale 25. Ranging from 10 to 70, higher scores are indicative of higher resilience (Cronbach's alpha=0.88) (39).

Statistical analysis

The availability and use of mental health services at participants' HIV clinics and other sites were analyzed using descriptive statistics. Bivariable analyses utilizing Wilcoxon's rank-sum, Chi-square, and Fisher's exact tests were performed to identify differences between participants based on reported mental health service shortage. We also constructed univariable and multivariable binary logistic regression models to identify characteristics associated with reporting problematic shortages of mental health services. Covariates for the final adjusted multivariable model were selected *a priori* based on the expertise of clinicians and women living with HIV as well as existing literature. Collinearity between covariates was then assessed using Pearson's correlation coefficient and Chi-square test for continuous and categorical variables, respectively. Missing values representing <5% of the cohort were excluded from the analysis. Only a history of violence had >5% missing. However, since the missing values were hypothesized to be missing not at random, imputation was not conducted, and they were retained as a separate category (40). All statistical analyses were performed using R (version 4.2.2) and RStudio (version 2022.07.2+576).

RESULTS

Participants

Among the 1422 participants in the cohort, the median age at baseline was 43 years [interquartile range (IQR): 35-50] (**Table 1**). Most participants identified as cisgender (cis) (95.6%) and heterosexual (87.3%). Most of the sample resided in urban centers (94%), and the median personal gross yearly income was below $20,000 despite 83.5% completing high school or higher. The racial composition was 41.1% white, 29.4% African/Caribbean/Black, 22.4% Indigenous, and 7.2% other. Regarding HIV disease activity and care, the median age at diagnosis was 31 years (IQR: 25-37) and most participants reported taking antiretroviral therapy (ART) (82.6%), maintaining ≥95% ART adherence in the past month (60.7%), and receiving a recent undetectable viral load (77.1%). 74.3% of participants reported experiencing violence in adulthood and 45.1% had a history of recreational drug use (RDU). The lifetime prevalence of mental health diagnoses at baseline was 40.3% and the most common mental health condition in the sample was a mood disorder (15.8%).

Availability and utilization of mental health services

38% (n=541) of the cohort reported that the shortage of mental health services was a problem in their care. There was no difference between the type of mental health support participants wished to obtain as a shortage of mental health providers and a lack of psychological support groups were found to pose similar barriers to overall care (**Supplementary Figure 1**). The availability and use of mental health services at HIV clinics are illustrated in **Figure 1**. Among the entire cohort, 20% (n=281) had mental health services available and accessed them, 28.5% (n=400) had services available but had not accessed them, and 51.5% (n=724) did not have these services available, did not know of their availability, or were unengaged in care. Among the subset that reported problematic shortages of mental health services, 22.1% (n=119) accessed services at HIV clinics, 26.5% (n=143) reported available services but did not access them, and the remaining 51.4% (n=277) indicated these services were unavailable, did not know if services were available, or did not visit HIV clinics. Of the 1422 women in the cohort, only 26.7% (n=380) had used mental health services at any location in the past year (**Figure 2**). The majority of these women (73.9%, n=281) had accessed those services at their HIV clinic. Among the 541 women who reported problematic shortages of mental health support, 28.5% (n=154) had used mental health services at any location in the past year, which 77.3% (n=119) accessed at their HIV clinic.

When stratifying the cohort by the reported shortage of mental health support (**Table 2**), there was a significant difference regarding availability. Specifically, compared with those not reporting a shortage, a greater percentage of those reporting a problematic shortage of mental health support did not have services available at their HIV clinic (17.5% vs 22.6%) or were unengaged in care (4.0% vs 7.4%). There was no significant difference, however, between the two groups regarding the use of services.

Characteristics associated with reporting a problematic shortage of mental health services

Modeling reported problematic shortages of mental health services, the following variables were significant in the univariable logistic regression (**Table 3**): African/Caribbean/Black identity [odds ratio (OR): 0.42, 95% confidence interval (CI): 0.26-0.67, p<0.001], rural residence (OR: 1.84, 95% CI: 1.09-3.11, p=0.023), unstable housing (OR: 1.57, 95% CI: 1.01-2.44, p=0.043), binge drinking in the past month (OR: 0.57, 95% CI: 0.38-0.85, p=0.005), history of RDU (OR: 0.53, 95% CI: 0.35-0.81, p=0.003), and higher HIV stigma scores (OR: 1.02, 95% CI: 1.02-1.03, p<0.001).

The final multivariable model included province of residence, gender, age, sexual orientation, racial and/or ethnic background, education, personal gross yearly income, geographic area, history of incarceration, adherence, history of RDU, ASSI social support scores, HAT-QoL disclosure scores, and HIV stigma scores (**Table 4**). Although significantly associated with a reported problematic shortage in the univariable analysis, housing stability and alcohol use were not included in the model because of a significant correlation with income (p<0.001) and RDU (p<0.001), respectively. Identifying as African/Caribbean/Black was negatively associated with reporting a problematic shortage of mental health services, with an adjusted odds ratio (aOR) of 0.37 (95% CI: 0.26-0.54, p<0.001). A history of RDU was similarly associated with lower odds of reporting a problematic mental health service shortage (aOR: 0.56, 95% CI: 0.39-0.81, p=0.002). Residence in Quebec was associated with lower odds of reporting a problematic shortage of mental health support with an aOR of 0.69 (95% CI: 0.50-0.96, p=0.030). In contrast, residing in a rural area was positively associated with self-reported problematic mental health service shortages with an aOR of 1.69 (95% CI: 1.03-2.77, p=0.038). An educational level beyond a high school diploma and higher stigma scores were also associated with greater odds of reporting that mental health service shortages presented a problem in their care (aOR: 1.43, 95% CI: 1.02-2.02, p=0.040; aOR: 1.03, 95% CI: 1.02-1.03, p<0.001).

DISCUSSION

We found that approximately half of the cohort reported that mental health services were available at their HIV clinics. The HIV clinic also emerged as the primary location of service use among the 26.7% of women who accessed mental health care in the last year. Furthermore, the majority of women did not report that a shortage of mental health support presented a problem in their care. However, among the 38% that did report problematic shortages of mental health support, there was low uptake of available mental health services. In regression analyses, rural residence, higher educational level, and higher HIV stigma scores were associated with greater odds of reporting a problematic shortage of mental health support, while African/Caribbean/Black identity, history of RDU, and Quebec residence were associated with lower odds.

Previous studies have reported on unmet mental health needs among people living with HIV. The prevalence of unmet mental health needs in these studies ranges from 12.3% to 40.8% (23,26,41–

44). Mental health need is often defined by an existing diagnosis or clinically significant psychiatric symptoms. However, not all mental health concerns are formally diagnosed or captured by symptom assessment tools. Due to the difficulty of ascertaining mental health care needs, we chose to focus on problematic shortages of mental health services instead, which was defined as reporting that a lack of mental health providers or peer support groups made it difficult to receive the care desired. Among the 38% of participants who indicated problematic shortages, there were similar proportions of those identifying a lack of mental health care providers and a lack of peer support as a problem. Given the positive impact of social support networks on the health of women with HIV, peer support groups could be an additional pathway for supporting women, especially in communities where there continues to be a shortage of mental health providers (20).

Approximately half of the cohort had mental health services available at their HIV clinic. However, participants who did not require mental health services were unlikely to be aware of their availability. Therefore, we analyzed availability and use among women who specifically reported that the shortage of mental health services presented a problem in their care. Notably, only 22.1% of those reporting that a lack of services was a problem for them had accessed mental health support at their HIV clinic in the last year despite 48.6% having such services available. Meanwhile, 22.6% of this subset did not have services available at their HIV clinic. Stigma, a lack of cultural safety, and long wait times have been identified in previous studies as factors that may influence the use of mental health services (45–47). Further qualitative studies with this population are needed to elucidate the reasons behind the lack of uptake of available services despite current needs. Since some participants continued to report a problematic shortage of support despite accessing mental health care, these studies can also investigate the potential gaps in existing services. Additionally, 21.3% of those who reported a shortage responded “DK/PNTA” to questions on the availability of mental health support, demonstrating a lack of knowledge about services at their HIV clinic. This corroborates previous studies, where a lack of patient knowledge regarding service availability was identified as a primary barrier to mental health treatment among people living with HIV (48).

Most women with HIV who accessed mental health services did so at their HIV clinic, which was in coherence with the previously reported preference among people living with HIV for integrated care (20–22,49). Many women indicate a desire to be seen and treated as whole individuals rather than compartmentalizing their HIV, mental, sexual, reproductive, and social concerns (50–52). For these patients, addressing their mental health is thus as important as managing their HIV diagnosis. Integrating mental health services into HIV care responds to this need for comprehensive care (21,53,54). Demonstrated to improve patient satisfaction and quality of life, the integrated care setting allows for the management of mental health symptoms in a more accessible, person-centered environment that reduces the stigma that is often associated with seeking out mental health support (49,55,56). The familiar environment and connection between services in integrated clinics can facilitate the initiation of mental health treatment, especially for women who are unable to travel to referred mental health providers or are hesitant to because of previous encounters of HIV stigma in medical settings (21). Integration can also involve community-based organizations such as AIDS service organizations. Coordinating care between HIV clinics and these sites can bridge the gap between the health care system and trusted community-based resources, improving the overall engagement of women with HIV in care (57,58).

For our second objective, we employed regression analyses to identify subsets of this population that are more likely to face challenges accessing sufficient mental health support. A higher educational level was found to be associated with reporting problematic mental health service shortages. A similar analysis by Taylor *et al.*, however, reported that people living with HIV without a college degree were more likely to have unmet mental health care needs (43). While greater education is correlated with better mental health, college-educated individuals are more likely to seek out mental health care and in turn, may be more likely to discover gaps in the system (59). Consistent with documented geographic inequities in health care access and quality, residing in a rural area was also associated with reporting mental health service shortages in both regression models (60). Individuals living in rural regions face several barriers to accessing mental health services, including a shortage of providers and long travel distances. Residents of smaller communities may also experience more mental health and HIV stigma, hindering engagement in care (61). Recent developments in telehealth during the COVID-19 pandemic, however, may have positively impacted access in rural communities (62,63). Since data collection for the CHIWOS cohort preceded the pandemic, future research on the availability and use of mental health services in a post-COVID landscape is necessary. Finally, higher HIV stigma scores were positively associated with reporting a problematic shortage of mental health services. Experiences of stigma can prevent women with HIV from accessing mental health care while exacerbating mental health needs (64).

In contrast, a history of RDU was associated with lower odds of reporting problematic shortages of mental health support. Substance use can function as a coping strategy and may reduce an individual's perceived need for psychosocial support in the short term, allowing these patients to go unseen for mental health symptoms (65). In these cases, screening for maladaptive coping behaviours may prove beneficial. The lower likelihood of reported shortages may also be explained by the engagement of people with a history of RDU in integrated mental health and substance use treatment programs.

There was also a negative association between residence in Quebec and reporting that mental health service shortages were a problem in their care. In a national study on the burden of mental illness, Quebec had the lowest prevalence of any mental health disorder which may in part explain the protective nature found in our analysis (66). Furthermore, many of the participants in the cohort from Quebec were recruited from hospital-based clinical sites, which often offer integrated mental health services from social workers, psychologists, and psychiatrists. The mental health support concentrated at these sites may drive the negative association found in our analysis. Similarly, African/Caribbean/Black identity was associated with lower odds of reporting problematic service shortages. This finding is in contrast with earlier work from the United States that found that African/Caribbean/Black people living with HIV had higher rates of unmet mental health needs compared with other populations (26,43). There are several historical and socio-environmental differences between the experiences of the African/Caribbean/Black community in the United States and Canada that we believe prevent a meaningful comparison. There were no studies on the mental health care needs of women with HIV in Canada that we could draw comparisons to instead.

The limitations of this study must be taken into consideration when interpreting our findings. First, while efforts were made to recruit from underserved communities, CHIWOS used a non-random, purposive sampling strategy that may have resulted in an overrepresentation of women engaged in care. Therefore, the true level of mental health service shortages that pose a problem for the care of women living with HIV may be higher. Furthermore, CHIWOS only includes women from British Columbia, Ontario, and Quebec. While these provinces capture the majority of women living with HIV in Canada, the service patterns may not reflect those residing in other provinces (28). Given the stigma surrounding mental health and HIV, the self-report data may have also been influenced by social desirability. This bias was, however, mitigated to some extent by PRAs conducting the interviews and allowing participants to skip any question. Finally, we were unable to identify the causes behind shortages reported by those accessing mental health care. Future qualitative studies are therefore necessary to understand the strengths and shortcomings of current services. Since service shortages were based on the perceptions of participants, these studies may also elucidate the contextual sociocultural and individual factors that shape expectations for mental health support.

To our knowledge, this study is the first to analyze the availability and use of mental health services among Canadian women living with HIV. Using data from the largest community-based cohort of women with HIV in Canada, our study's strength stems from its multi-site design that captures health care utilization across several provinces. Additionally, the use of services at both HIV clinics and alternate centers was analyzed, providing a more comprehensive overview of the types of sites where women living with HIV accessed mental health care.

CONCLUSION

Our findings provide an overview of existing mental health services and their uptake among women living with HIV in Canada, highlighting the HIV clinic as the primary location of mental health service use. Given the moderate degree of service availability at HIV clinics, the low uptake among women reporting problematic shortages of mental health support necessitates further investigation. Additionally, our findings suggest that existing services may not be sufficient, as participants continued to report a shortage of mental health support despite accessing mental health care in the past year. It is necessary to evaluate existing services to ensure that women living with HIV, especially those at higher risk of experiencing a shortage of services that poses a problem in their care, receive adequate mental health support.

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CONFLICTS OF INTEREST

None.

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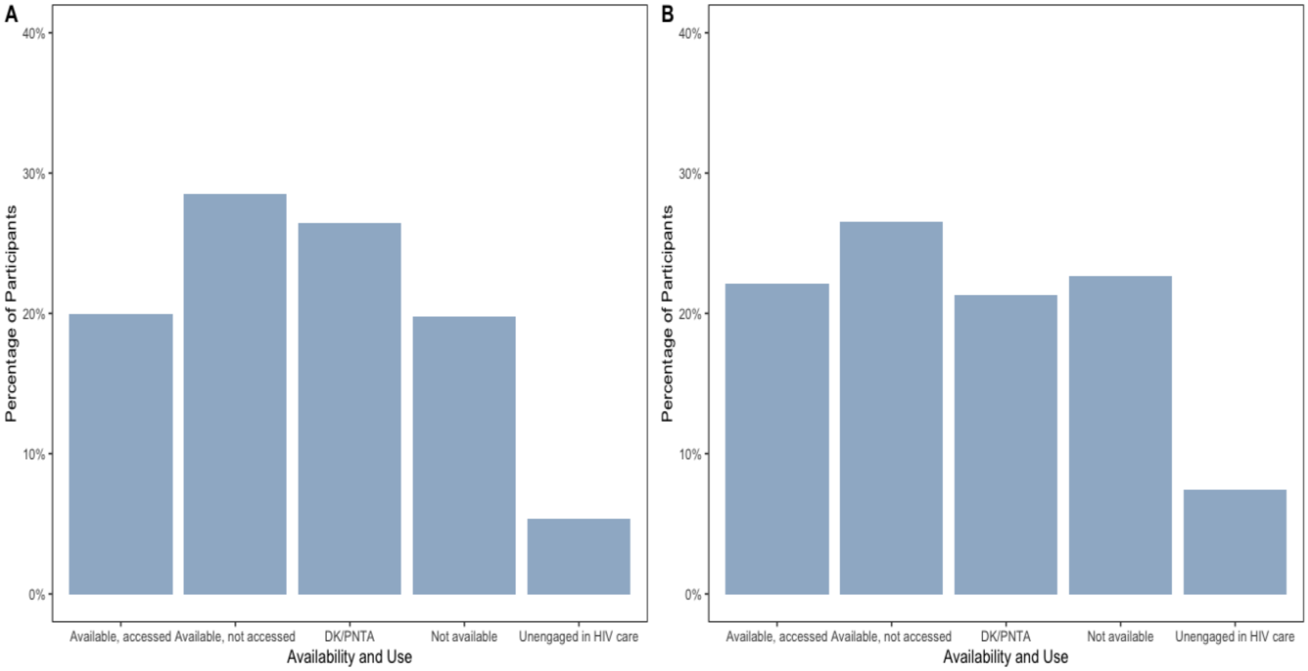
Table 1: Baseline characteristics of participants (n=1422)

Variable	N (%) / Median (IQR)
Province	
British Columbia	356 (25.0%)
Ontario	717 (50.4%)
Quebec	349 (24.5%)
Gender	
Cis	1395 (95.6%)
Trans/Other	63 (4.4%)
Age	43 (35-50)
Sexual orientation	
Heterosexual/DK/PNTA	1242 (87.3%)
LBQQ2S	180 (12.7%)
Racial and/or ethnic background	
Indigenous	318 (22.4%)
African/Caribbean/Black	418 (29.4%)
White	584 (41.1%)
Other	102 (7.2%)
Education	
High school or higher	1188 (83.5%)
Lower than high school/DK/PNTA	234 (16.5%)
Immigration status	
Citizen	1153 (81.1%)
Landed immigrant/permanent resident	167 (11.7%)
Refugee/protected person	63 (4.4%)
Other	39 (2.7%)
Personal gross yearly income	
<$20,000	998 (70.2%)
$20,000 - $39,999	244 (17.2%)
≥$40,000	145 (10.2%)
DK/PNTA	35 (2.5%)
Geographic area	
Urban	1337 (94.0%)
Rural	85 (6.0%)
Housing	
Stable	1270 (89.3%)
Unstable	152 (10.7%)
Incarceration (ever)	523 (36.8%)
History of violence in adulthood	
Yes	1057 (74.3%)
No/DK/PNTA	261 (18.4%)
Missing	104 (7.3%)
Years living with HIV	
<6	345 (24.3%)
6-14	552 (38.8%)
>14	477 (33.5%)
DK/PNTA	48 (3.4%)
Age at HIV diagnosis	31 (25-37)
Currently taking ART	1175 (82.6%)
Viral load	
Detectable	204 (14.3%)
Undetectable	1097 (77.1%)

Never received/DK/PNTA	121 (8.5%)
CD4 count	
<200 cells/mm^3	76 (5.3%)
200-500 cells/mm^3	387 (27.2%)
>500 cells/mm^3	698 (49.1%)
Never received/DK/PNTA	259 (18.2%)
Alcohol	
Binge	212 (14.9%)
Heavy	30 (2.1%)
Non-binge	1107 (77.8%)
DK/PNTA	73 (5.1%)
Recreational drug use (ever)	642 (45.1%)
ASSI social support scores	15 (11-18)
HAT-QoL disclosure scores	40 (25-60)
Resilience scores	64 (59-69)
HIV stigma scores	58 (43-73)
Diagnosed mental health conditions	
Mood disorders	224 (15.8%)
Anxiety disorders	109 (7.7%)
Addiction disorders	69 (4.9%)
Sleep disorders	123 (8.6%)
Other/DK/PNTA	48 (3.4%)
None	849 (59.7%)
Availability of mental health services at HIV clinic	
Yes	683 (48.0%)
No	276 (19.4%)
Not engaged in care	75 (5.3%)
DK/PNTA	371 (26.1%)
Accessed mental health services*	380 (26.7%)
Reported a problematic shortage of mental health services	541 (38.0%)

IQR: interquartile range; LBQQ2S: lesbian, bisexual, queer, questioning, and two-spirit;
ART: antiretroviral therapy; ASSI: abbreviated social support instrument; HAT-QoL: HIV/AIDS-targeted quality of life scale; DK/PNTA: Don't know/prefer not to answer
*Inclusive of participants who accessed mental health services at HIV clinic and/or other sites

Figure 1: Availability and use of mental health services at HIV clinic among (**A**) entire cohort (n=1405)* and (**B**) those who reported a problematic shortage of mental health services (n=539)*



DK/PNTA: Don’t know/prefer not to answer
*n is lower due to missing responses

Table 2: Baseline characteristics by reported shortage of mental health services (n=1422)

Variable	No shortage (n=881)	Shortage (n=541)	
	N (col %)/ Median (IQR)	N (col %)/ Median (IQR)	p-value
Province			**<0.001****
British Columbia	206 (23.4%)	150 (27.7%)	
Ontario	409 (46.4%)	308 (56.9%)	
Quebec	266 (30.2%)	83 (15.3%)	
Gender			0.421
Cis	845 (95.9%)	514 (95.0%)	
Trans/Other	36 (4.1%)	27 (5.0%)	
Age	44 (36-51)	41 (34-49)	**<0.001****
Sexual orientation			**0.004****
Heterosexual/DK/PNTA	787 (89.3%)	455 (84.1%)	
LBQQ2S	94 (10.7%)	86 (15.9%)	
Racial and/or ethnic background			**<0.001****
Indigenous	163 (18.5%)	155 (28.7%)	
African/Caribbean/Black	314 (35.6%)	104 (19.2%)	
White	344 (39.0%)	240 (44.4%)	
Other	60 (6.8%)	42 (7.8%)	
Education			**0.039****
High school or higher	722 (82.0%)	466 (86.1%)	
Lower than high school/DK/PNTA	159 (18.0%)	75 (13.9%)	
Immigration status			**<0.001****
Citizen	676 (76.7%)	477 (88.2%)	
Landed immigrant/permanent resident	123 (14.0%)	44 (8.1%)	
Refugee/protected person	48 (5.4%)	15 (2.8%)	
Other	34 (3.9%)	5 (0.9%)	
Personal gross yearly income			0.049
<\$20,000	598 (67.9%)	400 (73.9%)	
\$20,000 - \$39,999	166 (18.8%)	78 (14.4%)	
≥\$40,000	91 (10.3%)	54 (10.0%)	
DK/PNTA	26 (3.0%)	9 (1.7%)	
Geographic area			**0.004****
Rural	40 (4.5%)	45 (8.3%)	
Urban	841 (95.5%)	496 (91.7%)	
Housing			**<0.001****
Stable	807 (91.6%)	463 (85.6%)	
Unstable	74 (8.4%)	78 (14.4%)	
Incarceration (ever)	313 (35.5%)	210 (38.8%)	0.408
History of violence in adulthood			0.887
Yes	653 (74.1%)	404 (74.7%)	
No/DK/PNTA	160 (18.2%)	101 (18.7%)	
Missing	68 (7.7%)	36 (6.7%)	
Years living with HIV			0.067
<6	196 (22.2%)	149 (27.5%)	
6-14	352 (40.0%)	200 (37.0%)	
>14	298 (33.8%)	179 (33.1%)	
DK/PNTA	35 (4.0%)	13 (2.4%)	
Age at diagnosis	31 (25-38)	30 (24-36)	**0.018****
Currently taking ART	764 (86.7%)	411 (76.0%)	**<0.001****
Viral load			0.025

Detectable	111 (12.6%)	93 (17.2%)	
Undetectable	700 (79.5%)	397 (73.4%)	
Never received/DK/PNTA	70 (7.9%)	51 (9.4%)	
CD4 count			0.895
<200 cells/mm^3	50 (5.7%)	26 (4.8%)	
200-500 cells/mm^3	237 (26.9%)	150 (27.7%)	
>500 cells/mm^3	434 (49.3%)	264 (48.8%)	
Never received/DK/PNTA	159 (18.0%)	100 (18.5%)	
Alcohol			**0.003****
Binge	150 (17.0%)	62 (11.5%)	
Heavy	20 (2.3%)	10 (1.8%)	
Non-binge	676 (76.7%)	431 (79.7%)	
DK/PNTA	35 (4.0%)	38 (7.0%)	
Recreational drug use (ever)	404 (45.9%)	238 (44.0%)	0.208
ASSI social support scores	15 (11-18)	16 (11-18)	0.707
HAT-QoL disclosure scores	40 (25-60)	40 (25-60)	0.384
Resilience scores	65 (59-69)	63 (58-69)	0.345
HIV stigma scores	53 (40-65)	65 (50-78)	**<0.001****
Diagnosed mental health conditions			**0.011****
Mood disorders	123 (14.0%)	101 (18.7%)	
Anxiety disorders	62 (7.0%)	47 (8.7%)	
Addiction disorders	43 (4.9%)	26 (4.8%)	
Sleep disorders	68 (7.7%)	55 (10.2%)	
Other/DK/PNTA	26 (3.0%)	22 (4.1%)	
None	559 (63.5%)	290 (53.6%)	
Availability of mental health services at HIV clinic			**<0.001****
Yes	421 (47.8%)	262 (48.4%)	
No	154 (17.5%)	122 (22.6%)	
Not engaged in care	35 (4.0%)	40 (7.4%)	
DK/PNTA	256 (29.1%)	115 (21.3%)	
Accessed mental health services*	226 (25.7%)	154 (28.5%)	0.245

IQR: interquartile range; LBQQ2S: lesbian, bisexual, queer, questioning, and two-spirit; ART: antiretroviral therapy; ASSI: abbreviated social support instrument; HAT-QoL: HIV/AIDS-targeted quality of life scale; DK/PNTA: Don't know/prefer not to answer

*Inclusive of participants who accessed mental health services at HIV clinic and/or other sites

**Statistical significance at $p<0.05$

Figure 2: Location of accessed mental health services among (**A**) entire cohort (n = 380) and (**B**) those who reported a problematic shortage of mental health services (n=154)

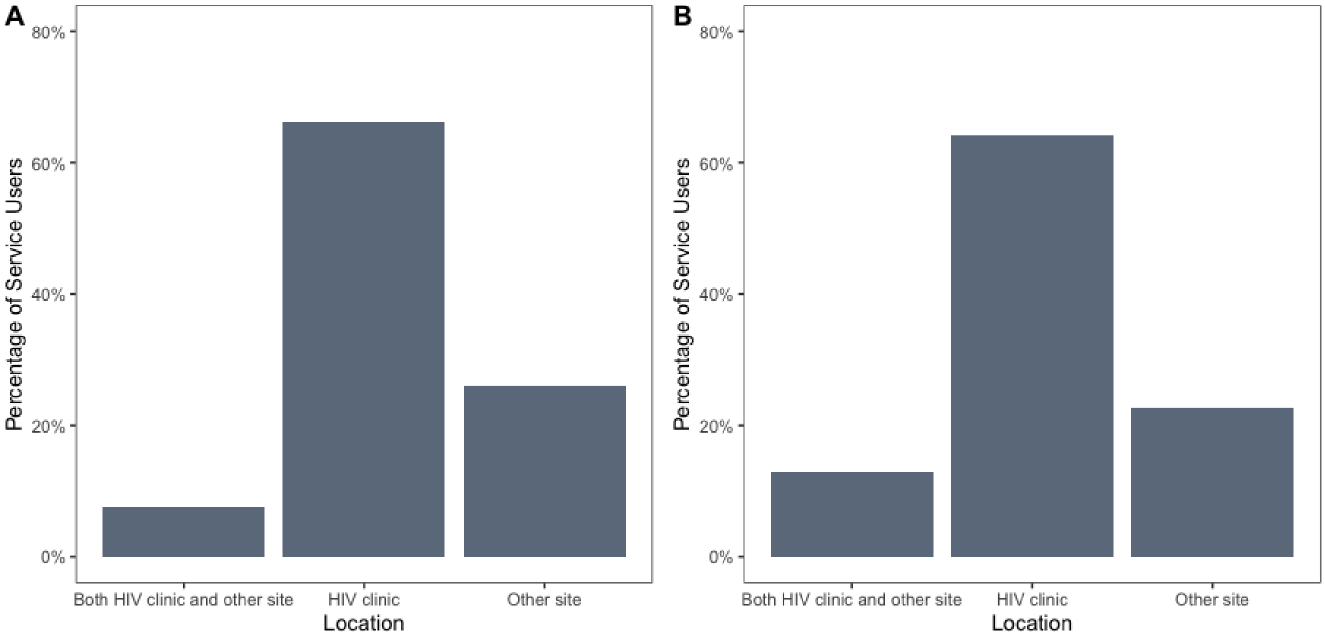


Table 3: Univariable binary logistic regression of baseline characteristics associated with reporting that a shortage of mental health services was a problem in their care (n=1180)*

Variable	Odds ratio	95% CI	p-value
Province			
British Columbia	0.92	0.63-1.33	0.644
Ontario	Ref		
Quebec	0.72	0.50-1.04	0.082
Gender			
Cis	Ref		
Trans/Other	0.75	0.38-1.48	0.405
Age	0.98	0.94-1.02	0.290
Sexual orientation			
Heterosexual/DK/PNTA	Ref		
LBQQ2S	1.19	0.79-1.79	0.416
Racial and/or ethnic background			
Indigenous	1.02	0.71-1.46	0.922
African/Caribbean/Black	**0.42**	**0.26-0.67**	**<0.001****
White	Ref		
Other	0.85	0.52-1.40	0.529
Education			
High school or higher	1.28	0.87-1.88	0.210
Lower than high school/DK/PNTA	Ref		
Personal gross yearly income			
<\$20,000/DK/PNTA	Ref		
≥\$20,000	0.74	0.54-1.01	0.058
Geographic area			
Rural	**1.84**	**1.09-3.11**	**0.023****
Urban	Ref		
Unstable Housing	**1.57**	**1.01-2.44**	**0.043****
Incarceration (ever)	1.11	0.77-1.62	0.570
History of violence in adulthood	1.31	0.89-1.91	0.169
Years living with HIV			
<14	Ref		
>14	1.09	0.66-1.80	0.739
Age at diagnosis	1.00	0.96-1.03	0.908
Not currently taking ART	1.43	0.91-2.25	0.122
<95% taken in last month	0.90	0.64-1.28	0.562
Viral load			
Other***	Ref		
Undetectable	1.07	0.71-1.60	0.747
CD4 count			
>200 cells/mm^3	1.38	0.96-1.98	0.078
Other	Ref		
Alcohol			
Binge	**0.57**	**0.38-0.85**	**0.005****
Heavy	0.66	0.26-1.66	0.373
Non-binge	Ref		
DK/PNTA	1.80	0.90-3.59	0.097
Recreational drug use (ever)	**0.53**	**0.35-0.81**	**0.003****
ASSI social support scores	0.98	0.94-1.01	0.164
HAT-QoL disclosure scores	1.00	1.00-1.01	0.346

Resilience scores	1.01	0.99-1.03	0.454
HIV stigma scores	**1.02**	**1.02-1.03**	**<0.001****
Diagnosed mental health conditions			
Mood disorders	1.45	0.99-2.10	0.054
Anxiety disorders	1.24	0.76-2.03	0.395
Addiction disorders	0.98	0.52-1.85	0.942
Sleep disorders	1.36	0.85-2.20	0.204
Other/DK/PNTA	1.71	0.81-3.58	0.158
None	Ref		
Availability of mental health services at HIV clinic			
Yes	Ref		
No	1.17	0.83-1.64	0.378
Not engaged in care	1.22	0.61-2.46	0.571
DK/PNTA	0.96	0.69-1.32	0.785

LBQQ2S: lesbian, bisexual, queer, questioning, and two-spirit; ART: antiretroviral therapy; ASSI: abbreviated social support instrument; HAT-QoL: HIV/AIDS-targeted quality of life scale; DK/PNTA: Don't know/prefer not to answer; CI: confidence interval

*n is lower due to missing values for covariates in regression model

**Statistical significance at $p<0.05$

***Other includes participants who answered detectable, never received, and DK/PNTA.

Table 4: Multivariable binary logistic regression of baseline characteristics associated with reporting that a shortage of mental health services was a problem in their care (n=1321)*

Variable	Odds ratio	95% CI	p-value
Province			
British Columbia	1.08	0.78-1.50	0.636
Ontario	Ref		
Quebec	**0.69**	**0.50-0.96**	**0.030****
Gender			
Cis	Ref		
Trans/Other	0.85	0.46-1.58	0.617
Age	0.99	0.98-1.00	0.059
Sexual orientation			
Heterosexual/DK/PNTA	Ref		
LBQQ2S	1.26	0.87-1.83	0.222
Racial and/or ethnic background			
Indigenous	1.07	0.77-1.48	0.694
African/Caribbean/Black	**0.37**	**0.26-0.54**	**<0.001****
White	Ref		
Other	0.80	0.50-1.28	0.357
Education			
High school or higher	**1.43**	**1.02-2.02**	**0.040****
Lower than high school/DK/PNTA	Ref		
Personal gross yearly income			
<$20,000/DK/PNTA	Ref		
≥$20,000	0.76	0.57-1.01	0.057
Geographic area			
Rural	**1.69**	**1.03-2.77**	**0.038****
Urban	Ref		
Incarceration (ever)	0.97	0.69-1.35	0.837
Adherence			
<95% taken in last month	0.86	0.63-1.17	0.330
Not on ART	1.31	0.92-1.84	0.130
Recreational drug use (ever)	**0.56**	**0.39-0.81**	**0.002****
ASSI social support scores	0.98	0.96-1.01	0.300
HAT-QoL disclosure scores	1.01	1.00-1.01	0.095
HIV stigma scores	**1.03**	**1.02-1.03**	**<0.001****

LBQQ2S: lesbian, bisexual, queer, questioning, and two-spirit; ART: antiretroviral therapy; ASSI: abbreviated social support instrument; HAT-QoL: HIV/AIDS-targeted quality of life scale; DK/PNTA: Don't know/prefer not to answer; CI: confidence interval

*n is lower due to missing values for covariates in regression model

**Statistical significance at $p<0.05$

CHAPTER 5: DISCUSSION AND CONCLUSION

5.1 General Discussion

As detailed discussions of each study's results can be found in Chapters 3 and 4, this section summarizes the general findings in relation to the purpose and hypotheses of this thesis and situates the findings within the broader field of study. It will also evaluate the models employed and other alternatives and proposes directions for future research in HIV and primary care for all women. Finally, this chapter concludes by discussing the implications of these findings for mental health and HIV care for women living with HIV.

Summary of research findings

The potential interventions for mental health symptoms and diagnoses include a range of evidence-based mental health treatment options such as psychopharmacological treatment and cognitive behavioural therapy. While such services are effective at improving mental well-being, the impact of mental health services when employed in a syndemic context has not yet been well studied. To contribute to this growing area of research, the purpose of this thesis was to understand how mental health services could be employed to manage the impact of mental health conditions on the HIV care cascade among women living with HIV in Canada, which was achieved through the two manuscripts presented in Chapters 3 and 4.

Chapter 3 investigated the impact of mental health service use on the engagement of women with mental health conditions in HIV care. I began by mapping the engagement of women with mental health symptoms or diagnoses in different states of HIV care over 36 months. Through multinomial logistic regression analyses, mental health service use was determined to have a positive impact by increasing the odds of engagement in optimal HIV care (i.e., current ART use and an undetectable viral load), supporting our initial hypothesis. After confirming the need for mental health services in HIV care, I explored the current availability and use of these services among this population and identified women who were facing problematic shortages of mental health services in Chapter 4. Services were found to be moderately available and tended to be accessed through HIV clinics compared with alternate sites, providing more evidence that co-location or integration on some level facilitates access to mental healthcare. Despite moderate availability, a significant number of participants who reported problematic shortages of mental health care did not access existing services.

Aligning with our earlier hypotheses, women residing in rural regions were more likely to experience problematic shortages probably due to the geographic disparities that persist in the Canadian healthcare system. However, racial and sexual minorities were not more likely to report similar shortages. In fact, African/Caribbean/Black identity was associated with lower odds of reporting service shortages. Due to a lack of Canadian studies exploring mental health service need among women with HIV, there are no existing studies to draw comparisons with. However, there are several proposed explanations for this unexpected association. First, the African/Caribbean/Black women in CHIWOS may have been receiving HIV care in community-centered or women-centered care environments, where services sufficiently met their needs. Since the shortages were self-reported by participants, this finding may also be explained by the different sociocultural norms around mental health needs and service expectations (130). For particularly immigrants in the African/Caribbean/Black community, stigma experienced in their country of origin may prevent them from perceiving mental health support as a necessary service and expressing needs for such services (131,132). The stigma measured in our study was restricted to an HIV-specific scale and thus, does not capture this intersectional form. Higher HIV stigma scores were, however, found to be associated with greater odds of reporting problematic shortages. Rather than stemming solely from a lack of services in general, this association suggests that there may also be a shortage of specifically stigma-free service settings accessible to these women.

Comparison with national engagement in the HIV care cascade

According to data published by the PHAC at the end of 2020, women had worse engagement across the HIV care cascade compared with men and did not meet all the 90-90-90 UNAIDS targets (14). In comparison, the sample of women with mental health symptoms or diagnoses in Chapter 3 did not meet any of these global targets. Since participants had to be diagnosed with HIV to be included in the CHIWOS cohort, only the last two goals of the 90-90-90 campaign (i.e., 90% of those diagnosed will be on treatment and 90% of those on treatment will be virally suppressed) were applicable. Of the 898 participants with significant depressive symptoms or mental health diagnoses, only 85.3% reported current ART use at baseline (n=766). Of these 766 women using

ART, 85.5% reported a virally suppressed test result (n=655). Despite not meeting the targets, the CHIWOS sample did perform comparably with women nationally, who achieved 85% on treatment and 90% of those on treatment virally suppressed.

Several studies illustrate the negative impact of mental health issues on HIV care outcomes (17,18,20,21,77,133). Furthermore, the prevalence of mental health conditions and symptoms is high among women living with HIV (23). Therefore, lower performance of women in the national data and the CHIWOS sample compared with men and the general Canadian population living with HIV may be due in part to the untreated mental health issues. Testing this hypothesis with the CHIWOS sample, I found that 88.9% of women using mental health services at baseline were on ART (263/296), of which 85.2% reported an undetectable viral load (224/263). In contrast, 83.6% of those not using mental health services at baseline were on ART (503/602), of which 85.7% reported achieving viral suppression (431/503). Thus, in our sample at least, service users performed better on some of the targets compared with non-users, providing support for the role that mental health plays in the care cascade outcomes and the benefits of mental health care services beyond mental health.

Alternate statistical models to examine the HIV care cascade

The HIV care cascade generally assumes a forward progression from diagnosis to the achievement and maintenance of viral suppression. However, several studies have demonstrated that people living with HIV may transition backwards and forwards in the care cascade and even skip some steps altogether (134,135). These transitions among women living with HIV can be influenced by mental illness and mental health treatment. To understand the influence of depressive symptoms and mental health service use on transitions among women, a multistate Markov model analysis was initially planned for the first manuscript in Chapter 3 (**Appendix D**). Multistate Markov models permit movement in either direction, capturing the engagement of women and the effect of a variable on transitions over time (136). However, with a total of nine possible transitions between the four states, the number of participants in each became too small to successfully run the analysis. A larger sample would be more appropriate for this model, allowing us to understand if and how mental health plays a role in the risk of transitioning between states. I thus pivoted from the planned multistate model to a descriptive analysis and a multinomial regression.

Another model-specific decision that often needs to be made when setting up the HIV care cascade in a study is choosing between a dependent and independent framework. A dependent methodology was employed to first set up the cascade (**Appendix E**). With this approach, successful completion of earlier states is required to move on to the next state (137). For instance, if an individual did not see an HIV care provider in the last year but continued using ART with ideal adherence because their prescription was renewed by phone or fax, they would still be categorized as *unengaged in care* in the cascade. While this aligns with the traditional framework outlined by the CDC, this approach does not accurately capture the clinical reality. I thus shifted to an independent approach in Chapter 3, where state 3 (*detectable*) and 4 (*optimal*) did not require participants to report seeing an HIV care provider in the past year. Following recoding, the percentage of women in the *unengaged in care* state decreased from 5.0% to 3.8% while the percentage of women in the *detectable* and *optimal* states increased from 11.7% to 12.4% and from 72.4% to 72.9%, respectively. Thus, 1.2% of the sample were previously classified as *unengaged in care* despite using ART, which is the primary route to obtaining optimal HIV care outcomes.

In the initial analysis with the dependent cascade, the most common transition was from *optimal* to *unengaged in care* among the entire sample and both groups when stratified by mental health service use. I hypothesized that this may be a result of the requirement to visit an HIV care provider to be optimally engaged in the dependent framework definitions. However, even after redefining the states, the most common transition remained from state 4 to state 1. The stark transition from being engaged in optimal care (current ART use and an undetectable viral load) to becoming entirely unengaged in care (no ART use and no contact with an HIV provider in the past 12 months) is concerning. A lower percentage of mental health service users at baseline did transition to lower care states over the three years compared with non-users, which suggests that the use of mental health services may prevent some of these backward transitions. Nevertheless, the most common transition among service users was also from *optimal* to *unengaged in care* in our independent care cascade.

Limitations

In addition to the limitations previously acknowledged in the manuscripts, it is important to recognize that mental health service use was only assessed at baseline in the CHIWOS questionnaires. Therefore, I was only able to stratify according to the use of mental health services at baseline in Chapter 3, which does not necessarily correlate with the use of mental health services over the following 36 months. Nevertheless, our analysis of their baseline use demonstrates their linkage to mental health services, or lack thereof, at a point in their care trajectory.

The question regarding mental health services also limits the clinician to a psychiatrist or psychologist and does not recognize mental health care that is often provided by the HIV clinician. In addition to providing referrals, when necessary, the HIV provider can deliver primary mental health care for many common mental health concerns. Consequently, some women with milder mental health concerns may not have reported using mental health services but may have received mental health support from their HIV doctor during their regular care appointments. In turn, those who were referred to mental health services by their HIV provider were likely to have more chronic, severe, or complex mental health concerns. This reversed causality may have biased results towards the null and the observed benefits of mental health services could be underestimated in our study.

Future research

Our findings suggest that the use of mental health services can support women in their concurrent HIV care. However, the descriptive results from our first study showed that even despite mental health service use, the most common transition remains from optimal care to complete disengagement from HIV care. Upcoming studies should focus on understanding these drastic transitions and the role that mental health services play. While it was not possible with the CHIWOS cohort, multistate Markov models may assist in this process of analyzing these backward transitions over time in a sufficiently large sample.

Furthermore, the aggregation of all mental health services into one variable in the CHIWOS dataset may have resulted in less nuance when estimating relationships. Further analyses should investigate the impact of different types of mental health services on HIV clinical outcomes among women, especially non-pharmacological interventions that are less represented in the literature. These studies can also elucidate the acceptability or accessibility of different services for women living with HIV, to further examine reasons for the low uptake of available services among women who reported experiencing problematic mental health shortages.

As we enter a post-COVID-19 landscape, the role of mental telehealth for women living with HIV should also be explored. The virtual platforms rapidly developed during the pandemic were found to help mental health services reach a broader audience, reducing geographic disparities (138). Given the geographic inequities highlighted in our results, these online tools may provide an avenue to improve access to necessary services for women with HIV in rural areas. Furthermore, with the virtual platform, individuals no longer have to come into mental health clinics for visits, which is particularly impactful for those residing in smaller communities where there is more stigma around mental illness (139).

These results may also have broader implications for the management of chronic diseases in primary care. Since chronic illnesses other than HIV are also associated with an increased prevalence of mental health challenges, the benefits of mental health service use may also apply to women living with other chronic diseases (140). Similar cascades for other chronic illnesses such as diabetes exist, and the use of mental health services may improve the trajectory of women in these care continuums as observed in the HIV care states (141,142). Additional research is, however, necessary to test this hypothesis. Understanding the role of mental health services in chronic disease management among women at large will provide crucial insight for primary care delivery.

5.2 Conclusion

Mental health conditions have been cited as the most significant barriers to achieving the UNAIDS 95-95-95 targets (76,143,144). To end the epidemic, mental health conditions must be effectively addressed, particularly among vulnerable populations such as women living with HIV who remain disproportionately impacted by mental illness (23). Both manuscripts presented in this thesis contribute significant evidence to demonstrate the importance of mental health care, an essential intervention to address the syndemic of mental health and HIV among women. Through the first analysis of women with mental health symptoms or diagnoses, a positive association between the use of mental health services and engagement in optimal HIV care was elucidated. The second manuscript provided an overview of the availability and use of mental health services by Canadian women living with HIV, highlighting the HIV clinic as the central location of mental health service uptake and the low uptake among those requiring services.

Implications

Demonstrating the importance of mental health services for women with mental health conditions is crucial for health care design and delivery moving forward. By illustrating the significant role that mental health care plays in improving HIV care outcomes, the first study included in this thesis provides key information to advocate for accessible mental health care for women living with HIV. These results support efforts to increase mental health screenings and linkages to mental health services in order to optimize both mental health and HIV care outcomes. Furthermore, these findings extend beyond HIV care and suggest the potential benefits of integrating mental health services into chronic disease management for women at large.

To begin improving linkage to mental health services, however, we need to also understand the current service landscape. The second study provides a survey of the availability and use of mental health services among women living with HIV in Canada. This information allows us to identify gaps that can then be addressed at the community, clinic, and policy levels. For instance, the low uptake of services found in this study can be, in part, addressed at the clinic level by increasing patient knowledge about available services. Additionally, by identifying characteristics linked to a higher likelihood of experiencing insufficient mental health support, these results can also aid in developing targeted solutions to ensure satisfactory access and coverage for all women living with HIV in Canada.

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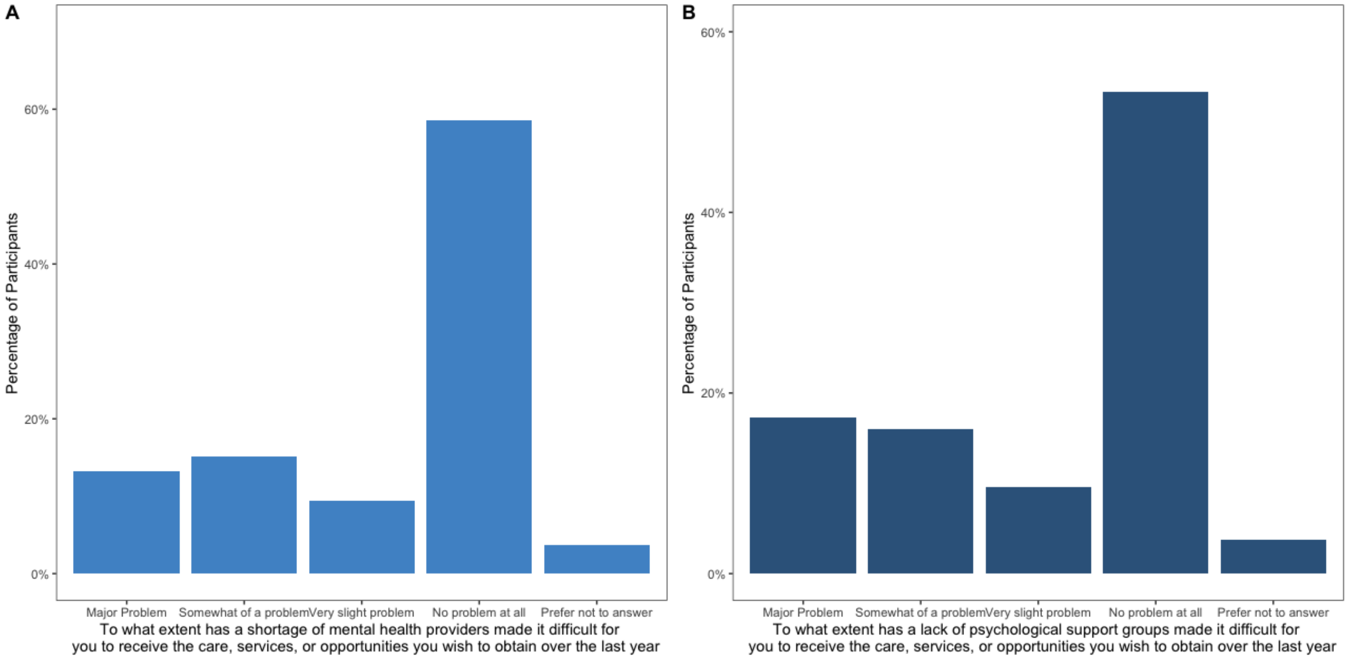
APPENDIX A: SUPPLEMENTAL FIGURES FROM MANUSCRIPT 1

Supplementary Figure 1: HIV care state by location of mental health service use (n=296)

HIV care state	**Location of mental health service use**			
	Both HIV clinic and alternate site (n=28)	**Alternate site (n=80)**	**HIV clinic (n=188)**	**p-value from Fisher's exact test**
Not on ART	3 (10.7%)	7 (8.8%)	23 (12.2%)	0.47
Detectable	2 (7.1%)	15 (8.8%)	22 (11.7%)	
Optimal	23 (82.1%)	58 (72.5%)	143 (76.1%)	

APPENDIX B: SUPPLEMENTAL FIGURES FROM MANUSCRIPT 2

Supplementary Figure 1: Impact of **(A)** a shortage of mental health providers and **(B)** a lack of psychological support groups on overall care (n=1422)



APPENDIX C: VARIABLE DEFINITIONS & IMPUTATION

If a category for a variable contained less than 10 participants, it was combined with another to uphold participant confidentiality and retain power. The following combinations were decided upon:

1. **Education:** Due to social desirability bias, participants with lower educational levels may have been more hesitant to answer. Thus, the "DK/PNTA" category with ≤10 participants was combined with "Lower than high school."
2. **Gender identity:** The eligibility criteria of CHIWOS allowed for several gender identities to be included in the cohort. If an identity was not cis/trans, it was classified as "Other." Due to a small group size, those in the "Other" group were combined with trans participants to maintain a dichotomy in the analysis.
3. **Sexual orientation:** Since the "DK/PNTA" group may include participants who have not explored their sexuality or are not aware of the differences, this category with ≤10 participants was combined with the "Heterosexual" group, which was the majority of the cohort.
4. **Immigration status:** Participants with historically marginalized statuses such as undocumented individuals may have selected DK/PNTA. Therefore, the "DK/PNTA" participants were recoded as "Other."
5. **CD4 count:** The "Never received" and "DK/PNTA" categories were combined since it is likely that those who do not know their CD4 count have never received one. Furthermore, in the logistic regression models, CD4 count was dichotomized to ">200 cells/mm^3" and "Other" (inclusive of all other values) because of the clinical significance of that cut-off value.
6. **Mental health conditions:** Given the small group sizes for "Personality disorders," "Other," and "DK/PNTA," the three groups were combined into "Other/DK/PNTA."
7. **Violence:** While it is possible that participants selected DK/PNTA because of social desirability bias, "DK/PNTA" was combined with "No" to avoid misclassification.

For the CES-D scale, a large percentage of responses were missing, resulting in >10% of the cohort being excluded from the analysis. To prevent losing a significant number of participants, missing values for scale components were replaced with the sample mean. For the elements of other scales, missing values or DK/PNTA responses were not imputed and thus, those participants did not have a score for those respective scales. However, this represented less than 5% of the cohort for all the scales.

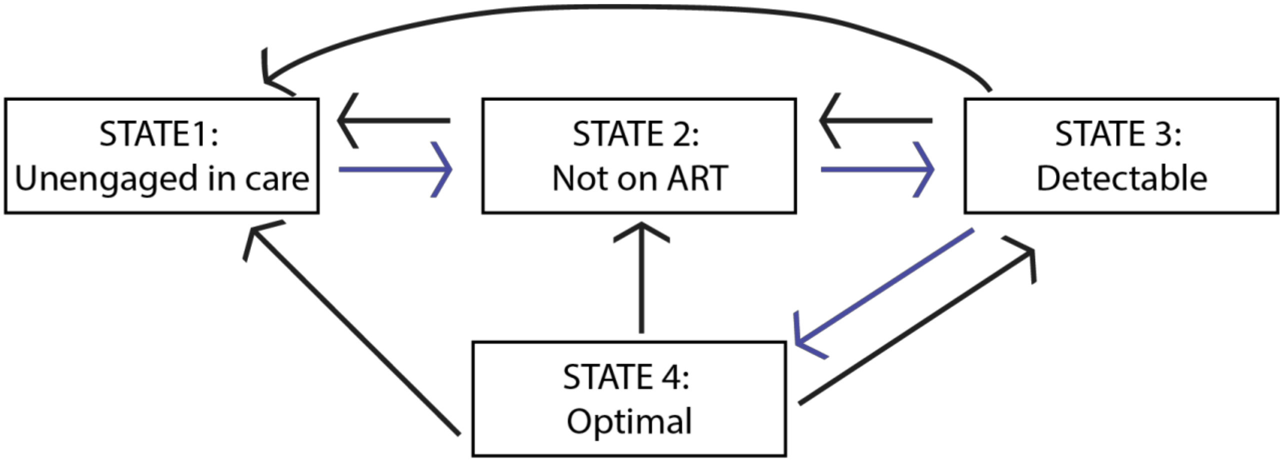
Missing values that represented <5% of the cohort were also removed from the regression models. While violence at baseline had >5% missing in both manuscripts, the missing values were hypothesized to be missing not at random. Since the missing values probably depended on other unmeasured factors, imputation was not conducted.

For the first manuscript, the following decisions were made when defining the care states:

1. **Unengaged in care:** Answering no or DK/PNTA to accessing HIV medical care in the last year was defined as being unengaged in care. Participants with missing values for this question were also assumed to be unengaged in care.
2. **Not on ART:** Participants who answered yes to accessing HIV medical care in the last year and no or DK/PNTA to current ART use were included. Those who accessed HIV medical care but had a missing value for current ART were also included in this state.
3. **Detectable:** Participants who indicated current ART use, and responded detectable, DK/PNTA, or never received to the question about their most recent viral load were included in this state. Women who were currently using ART but had missing values for viral load were also placed in this group.
4. **Optimal:** Answering yes to current ART use and an undetectable result for the most recent viral load was defined as optimal.

APPENDIX D: MULTISTATE MARKOV MODELS

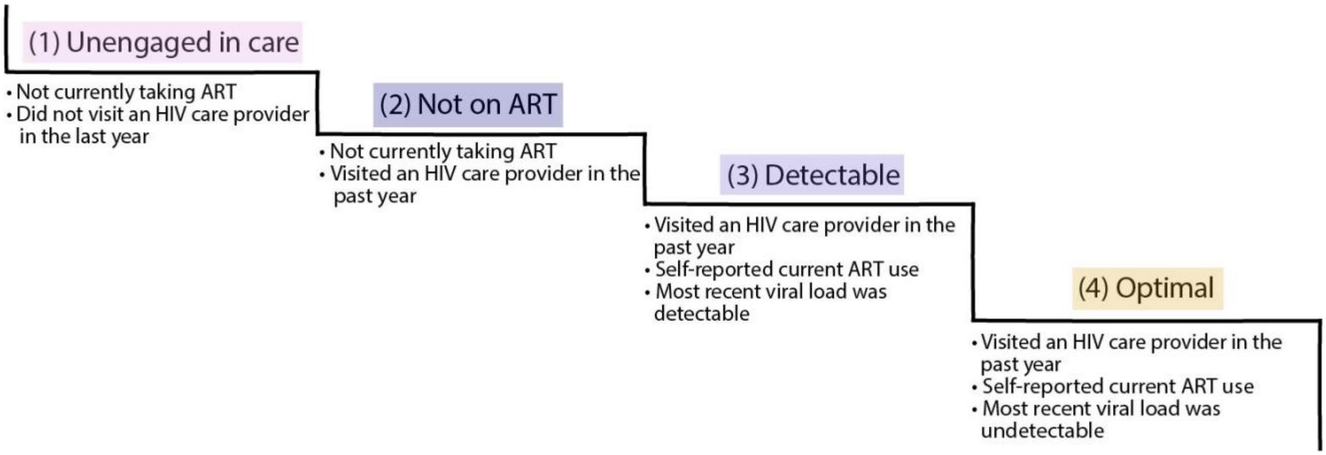
Figure 1: Transitions between states of care



Blue arrows represent transitions forward in the cascade and black arrows indicate possible backward movement. *Unengaged in care*: no contact with an HIV care provider in the last year; *not on ART*: engaged in care but not using ART; *detectable*: engaged in care, using ART, but detectable viral load; *optimal*: engaged in care, using ART, and undetectable viral load. ART: antiretroviral therapy.

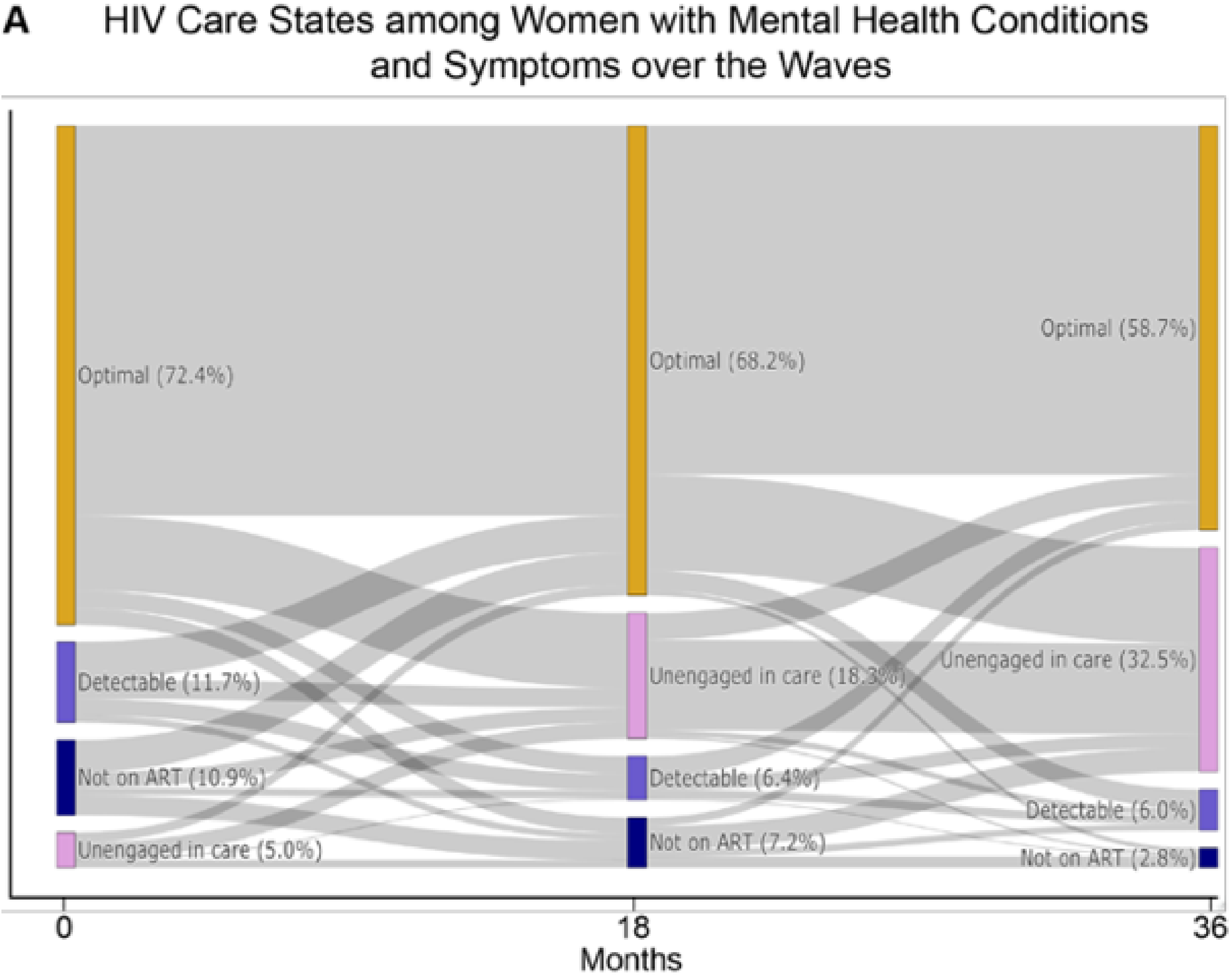
APPENDIX E: RESULTS FROM THE DEPENDENT CASCADE ANALYSIS

Figure 1: Determination of HIV care state

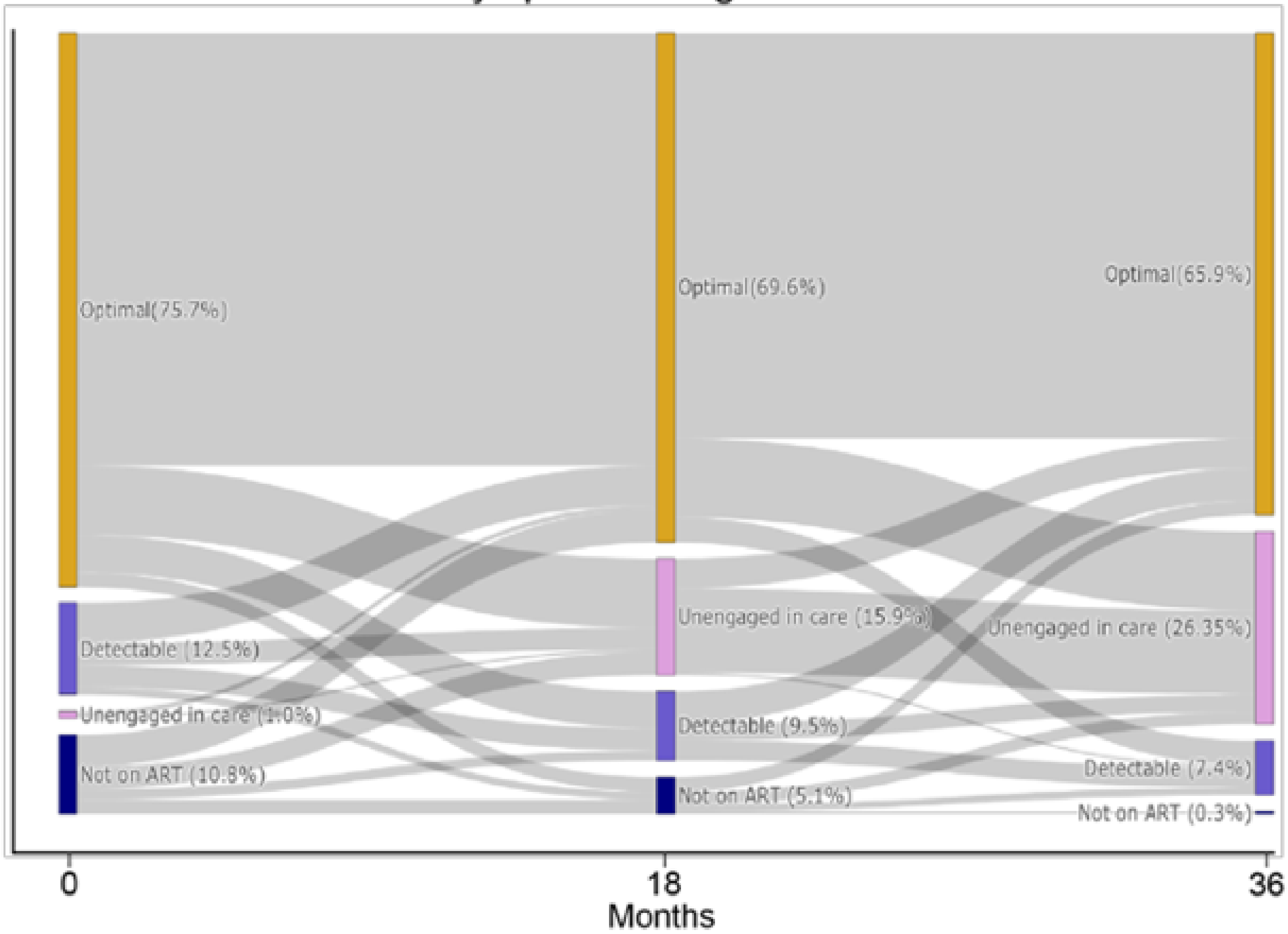


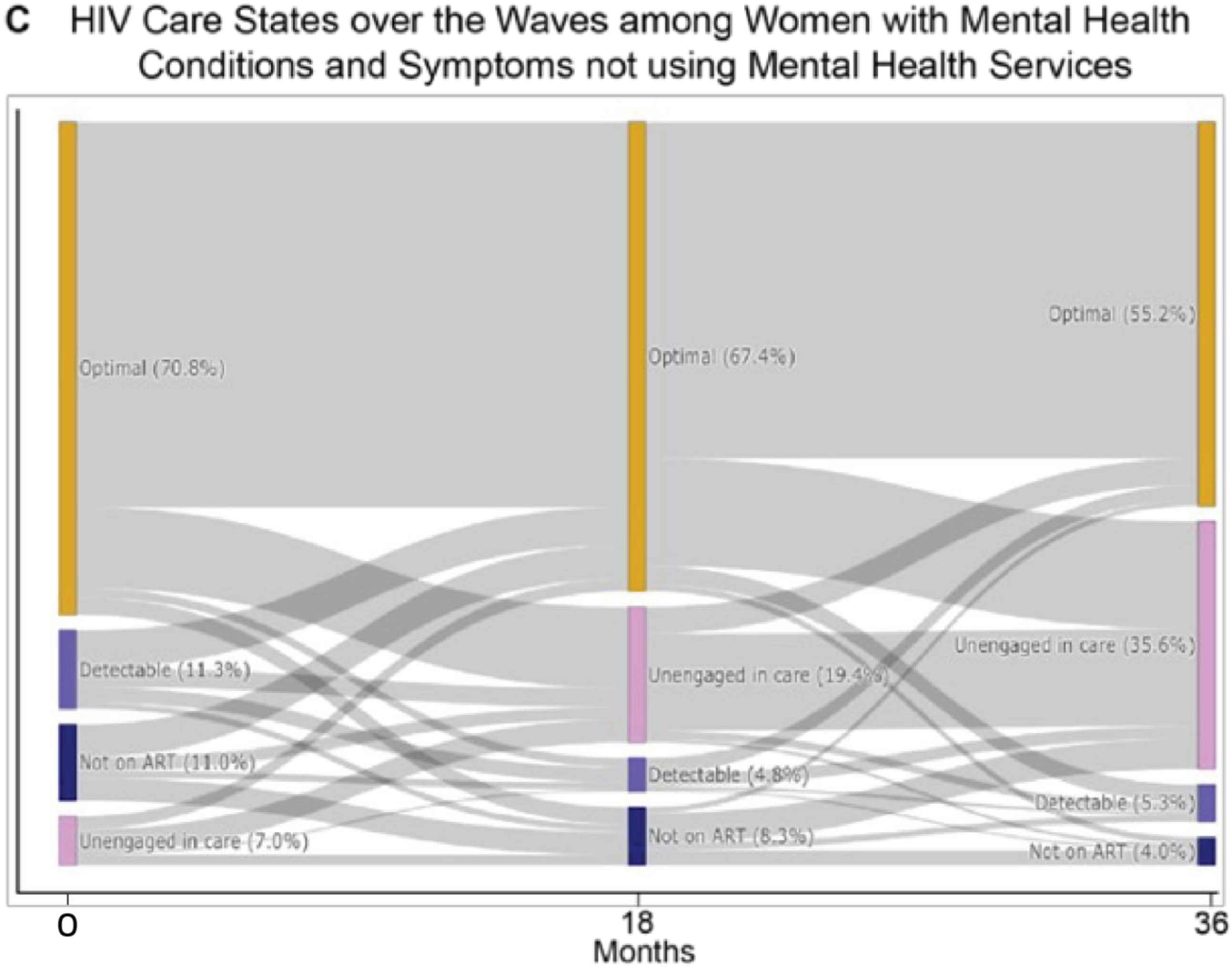
ART: antiretroviral therapy.

Figure 2: Sankey diagram illustrating the engagement in the HIV care states of (**A**) participants with mental health conditions and symptoms at baseline (n=898), (**B**) participants with mental health symptoms and diagnoses who reported using mental health services in the past year at baseline (n=296), and (**C**) participants with mental health diagnoses and symptoms who did not report using mental health services in the past year at baseline (n=602)



B HIV Care States over the Waves among Women with Mental Health Conditions and Symptoms using Mental Health Services

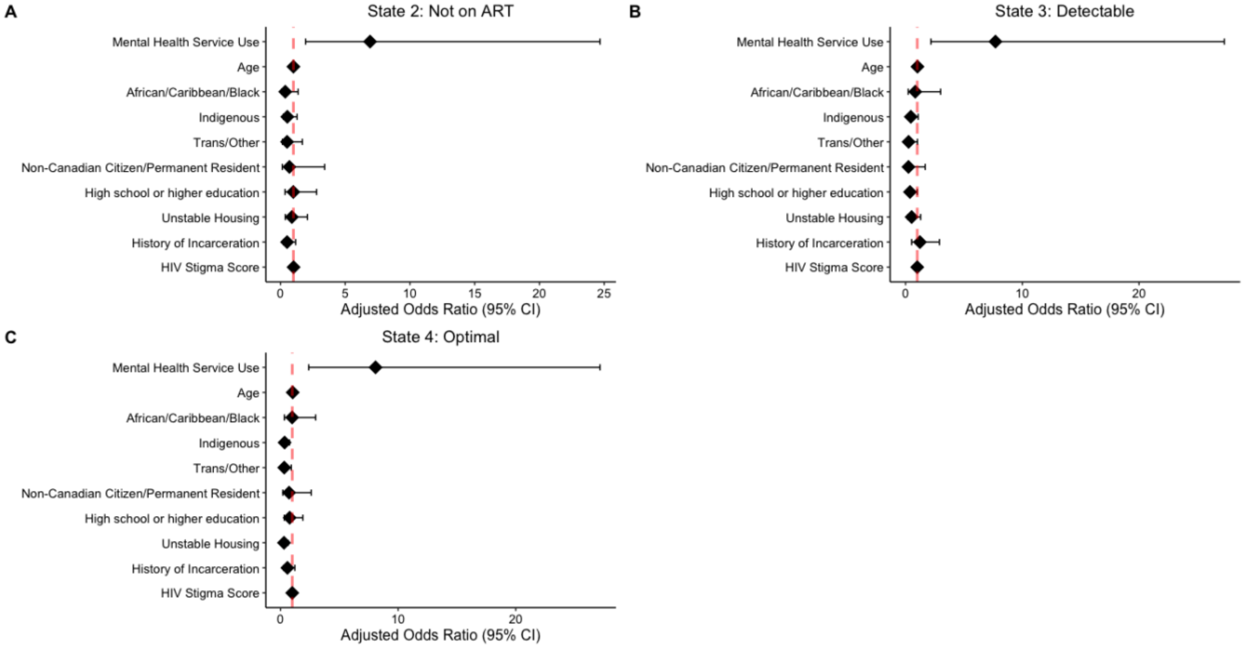




C HIV Care States over the Waves among Women with Mental Health Conditions and Symptoms not using Mental Health Services

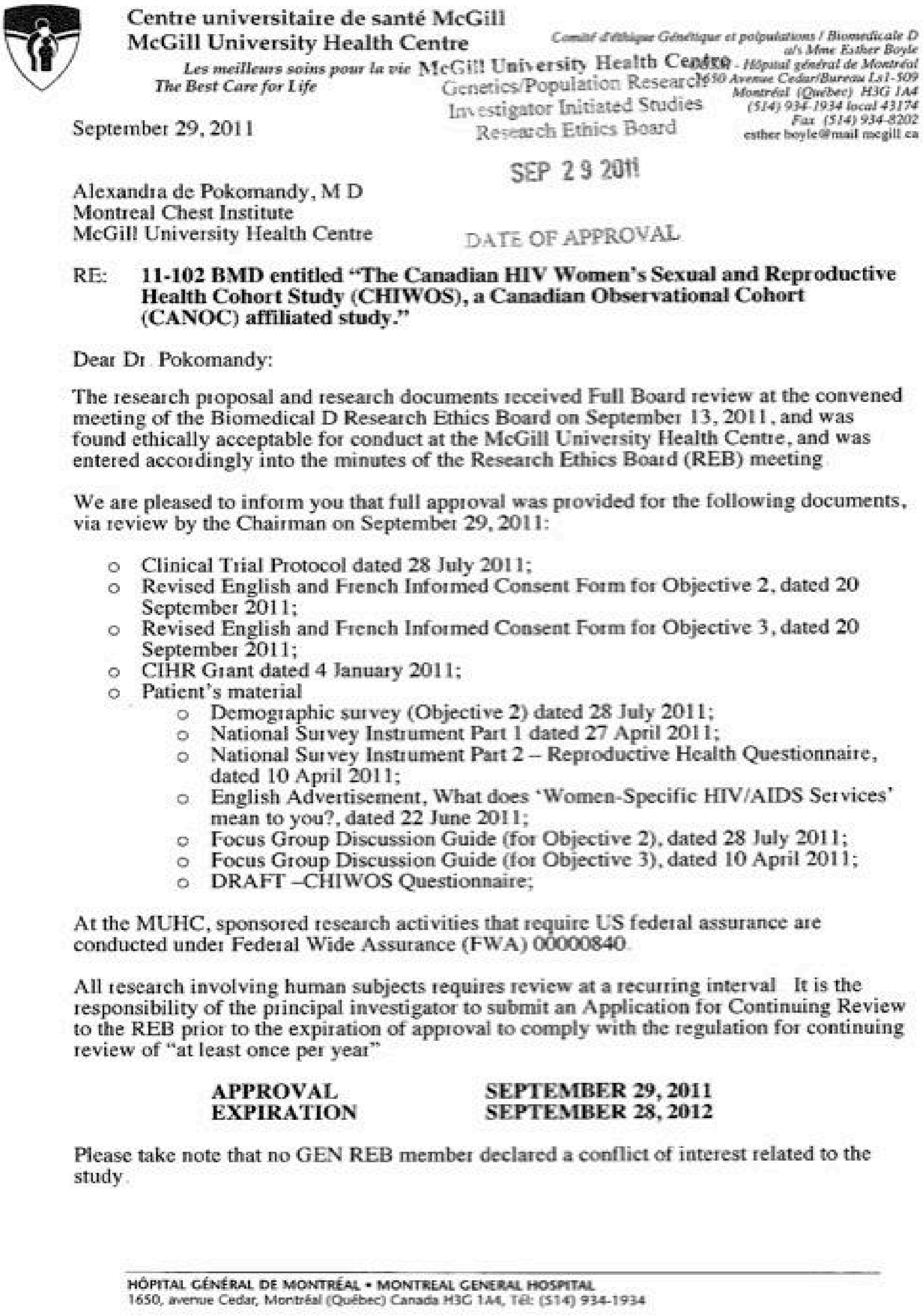
Unengaged in care: no contact with an HIV care provider in the last year; *not on ART*: engaged in care but not using ART; *detectable*: engaged in care, using ART, but detectable viral load; *optimal*: engaged in care, using ART, and undetectable viral load. ART: antiretroviral therapy.

Figure 3: Forest plot of adjusted odds ratios from multivariate multinomial regression of characteristics associated with engagement in (**A**) State 2: *Not on ART*, (**B**) State 3: *Detectable*, and (**C**) State 4: *Optimal* (n=871)



Unengaged in care: no contact with an HIV care provider in the last year; *not on ART*: engaged in care but not using ART; *detectable*: engaged in care, using ART, but detectable viral load; *optimal*: engaged in care, using ART, and undetectable viral load. ART: antiretroviral therapy.

APPENDIX F: ETHICS APPROVAL



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Comité d'éthique Génétique et polpulations / Biomedicale D
a/s Mme Esther Boyle
Hôpital général de Montréal
1650 Avenue Cedar/Bureau Ls1-509
Montréal (Québec) H3G 1A4
(514) 934-1934 local 43174
Fax (514) 934-8202
esther.boyle@mail.mcgill.ca

McGill University Health Centre
Genetics/Population Research
Investigator Initiated Studies
Research Ethics Board
SEP 29 2011
DATE OF APPROVAL

September 29, 2011

Alexandra de Pokomandy, M.D.
Montreal Chest Institute
McGill University Health Centre

RE: **11-102 BMD entitled "The Canadian HIV Women's Sexual and Reproductive Health Cohort Study (CHIWOS), a Canadian Observational Cohort (CANOC) affiliated study."**

Dear Dr. Pokomandy:

The research proposal and research documents received Full Board review at the convened meeting of the Biomedical D Research Ethics Board on September 13, 2011, and was found ethically acceptable for conduct at the McGill University Health Centre, and was entered accordingly into the minutes of the Research Ethics Board (REB) meeting.

We are pleased to inform you that full approval was provided for the following documents, via review by the Chairman on September 29, 2011:

- Clinical Trial Protocol dated 28 July 2011;
- Revised English and French Informed Consent Form for Objective 2, dated 20 September 2011;
- Revised English and French Informed Consent Form for Objective 3, dated 20 September 2011;
- CIHR Grant dated 4 January 2011;
- Patient's material
    - Demographic survey (Objective 2) dated 28 July 2011;
    - National Survey Instrument Part 1 dated 27 April 2011;
    - National Survey Instrument Part 2 – Reproductive Health Questionnaire, dated 10 April 2011;
    - English Advertisement, What does 'Women-Specific HIV/AIDS Services' mean to you?, dated 22 June 2011;
    - Focus Group Discussion Guide (for Objective 2), dated 28 July 2011;
    - Focus Group Discussion Guide (for Objective 3), dated 10 April 2011;
    - DRAFT –CHIWOS Questionnaire;

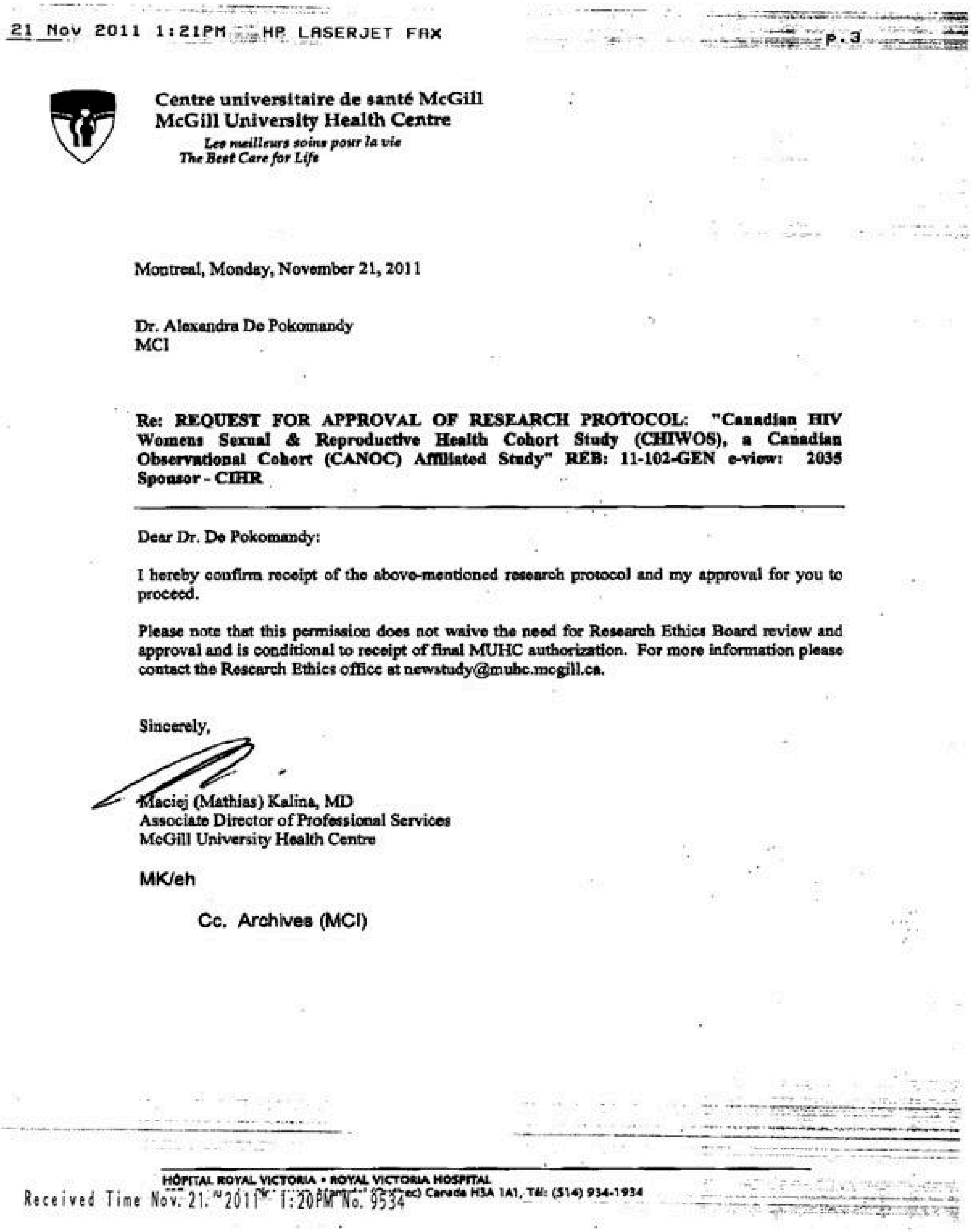
At the MUHC, sponsored research activities that require US federal assurance are conducted under Federal Wide Assurance (FWA) 00000840.

All research involving human subjects requires review at a recurring interval. It is the responsibility of the principal investigator to submit an Application for Continuing Review to the REB prior to the expiration of approval to comply with the regulation for continuing review of "at least once per year".

APPROVAL	**SEPTEMBER 29, 2011**
EXPIRATION	**SEPTEMBER 28, 2012**

Please take note that no GEN REB member declared a conflict of interest related to the study.

HÔPITAL GÉNÉRAL DE MONTRÉAL • MONTREAL GENERAL HOSPITAL
1650, avenue Cedar, Montréal (Québec) Canada H3G 1A4, Tél: (514) 934-1934



Centre universitaire de santé McGill
McGill University Health Centre
Les meilleurs soins pour la vie
The Best Care for Life

Montreal, Monday, November 21, 2011

Dr. Alexandra De Pokomandy
MCI

Re: REQUEST FOR APPROVAL OF RESEARCH PROTOCOL: "Canadian HIV Womens Sexual & Reproductive Health Cohort Study (CHIWOS), a Canadian Observational Cohort (CANOC) Affiliated Study" REB: 11-102-GEN e-view: 2035 Sponsor - CIHR

Dear Dr. De Pokomandy:

I hereby confirm receipt of the above-mentioned research protocol and my approval for you to proceed.

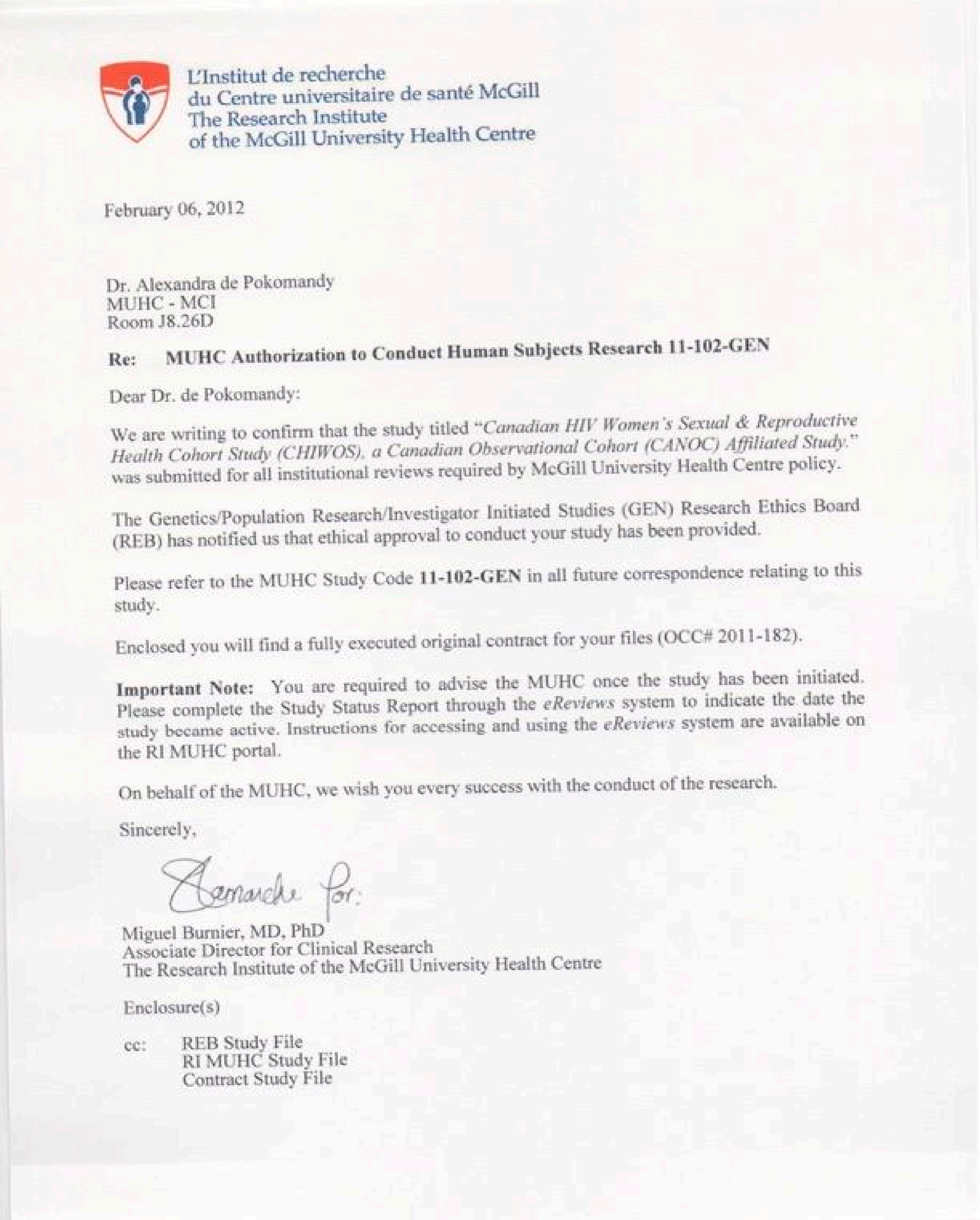
Please note that this permission does not waive the need for Research Ethics Board review and approval and is conditional to receipt of final MUHC authorization. For more information please contact the Research Ethics office at newstudy@muhc.mcgill.ca.

Sincerely,

Maciej (Mathias) Kalina, MD
Associate Director of Professional Services
McGill University Health Centre

MK/eh

Cc. Archives (MCI)



L'Institut de recherche
du Centre universitaire de santé McGill
The Research Institute
of the McGill University Health Centre

February 06, 2012

Dr. Alexandra de Pokomandy
MUHC - MCI
Room J8.26D

Re: MUHC Authorization to Conduct Human Subjects Research 11-102-GEN

Dear Dr. de Pokomandy:

We are writing to confirm that the study titled "*Canadian HIV Women's Sexual & Reproductive Health Cohort Study (CHIWOS), a Canadian Observational Cohort (CANOC) Affiliated Study.*" was submitted for all institutional reviews required by McGill University Health Centre policy.

The Genetics/Population Research/Investigator Initiated Studies (GEN) Research Ethics Board (REB) has notified us that ethical approval to conduct your study has been provided.

Please refer to the MUHC Study Code **11-102-GEN** in all future correspondence relating to this study.

Enclosed you will find a fully executed original contract for your files (OCC# 2011-182).

Important Note: You are required to advise the MUHC once the study has been initiated. Please complete the Study Status Report through the *eReviews* system to indicate the date the study became active. Instructions for accessing and using the *eReviews* system are available on the RI MUHC portal.

On behalf of the MUHC, we wish you every success with the conduct of the research.

Sincerely,

Lamarche for:

Miguel Burnier, MD, PhD
Associate Director for Clinical Research
The Research Institute of the McGill University Health Centre

Enclosure(s)

cc: REB Study File
RI MUHC Study File
Contract Study File