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Correlates Of Positive Mental Health Among Migrants In Canada

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Abstract

Introduction: Positive mental health is of increasing interest as a public health measure, and is understudied among migrants.

Objective: The purpose of this project was to examine positive mental health and associated factors among migrants in Canada.

Methods: We used the Canadian Community Health Survey (CCHS) 2011-2012 cycles. A total of 28,051 respondents identified as migrants, which accounted for 23.2% of the entire sample. Using multivariable regression models, positive mental health among migrants was compared to non-migrants, and the effects of sociodemographic, lifestyle, and health-related factors were examined.

Results: The present study found that time spent in Canada since migration affects positive mental health in migrants, as well as their own perception of mental health. Furthermore, several important factors that contribute to better positive mental health or self-perceived mental health were identified.

Conclusion: Strategies that promote positive mental health in migrants and education about factors that can contribute to better positive mental health should be encouraged.

Keywords

Canadian Community Health Survey, immigrant, migrant, mental health, migrant mental health, positive mental health, mental well-being, flourishing

Summary for Lay Audience

Traditionally, mental health has been viewed as the opposite of mental illness; however, the absence of mental illness does not mean that a person is mentally healthy and functioning well. Mental health is better defined as a combination of emotional, social, and psychological factors that are all required for a person to be mentally healthy. Rather than focusing on negative aspects of mental illness, there has been an increasing interest in research that studies mental health as a positive phenomenon. Research in migrant populations has largely focused on studying mental illness, and research on positive mental health is limited. The present study used data from the 2011-2012 cycles of the Canadian Community Health Survey to examine positive mental health in migrants.. Positive mental health was classified as flourishing or moderate-to-languishing. This study examined factors that may influence positive mental health in migrants such as sociodemographic, migration-specific, lifestyle, and health-related variables. Migrants were compared to non-migrants, and factors that were associated with positive mental health were identified. The present study found that long-term migrants were less likely to have flourishing mental health than non-migrants. Factors such as age, province of residence, income, physical activity, fruit and vegetable consumption, and perceived physical health were associated with flourishing mental health. As research on positive mental health in migrants is lacking, this study will contribute to the existing gap in literature to further our understanding of migrant-specific mental health.

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P.S. Mia, this one is for you.

Love,

mama.

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Chapter 1

1 Introduction

The Canadian government has projected that migrants will account for 30% of the Canadian population by 2036.[1] Migrants, especially recent ones, appear to be in better physical and mental health than the Canadian-born population. This phenomenon is known as the "healthy migrant effect"; however, this advantage dissipates over time due to challenges of post-migration integration and acculturation.[2] The timepoint for when this advantage in disappears in migrants remains unclear.[3] Because of this projected increase in the migrant population in Canada, it is imperative that migrant mental health be considered a national priority and to monitor and better understand the mental health status of migrants.[4]

Positive mental health is a construct that recognizes that overall health is not only the absence of disease, but rather a required component that, together with physical health, reflects a person's well-being. Traditionally, mental health research has focused on the negative aspects of mental health and on determinants of mental illness, rather than on determinants of positive mental health and absence of mental disorders.

The mental health continuum model[5] classifies people into one of six possible states according to the three levels of mental health (flourishing, languishing, moderate mental health) and the presence or absence of mental illness. A person with complete mental health is flourishing and free of mental illness. However, it is important to note that the presence of mental health does not imply the absence of mental illness and vice versa. Furthermore, mental health and mental illness are conceptualized as two separate but correlated axes.[5] This relationship was further characterized as dynamic, with improvements in mental health resulting in reduction in mental illness and declines in mental health resulting in increases in mental illness.[6]

Positive mental health, also known as mental well-being, is increasingly recognized as essential in the development of public health policies and programs. Positive mental health is associated with better functioning, physical health, and ability to contribute to society.[7]According to the World Health Organization, "mental health is a state of well-being in which an individual realizes his or her own abilities, can cope with normal stresses of life, can work productively and is able to make a contribution to his or her

community".[8]Furthermore, the Public Health Agency of Canada[7] defines positive mental health as "the capacity of each and all of us to feel, think, and act in ways that enhance our ability to enjoy life and deal with the challenges we face." Therefore, it is suggested that emotional, psychological, and social factors affect overall mental well-being.

There is a plethora of literature on the determinants of mental well-being in the general population. Factors such as education, employment, and social connections have been associated with mental well-being.[9] Aging has been suggested as a potential protective factor for positive mental health in people with chronic health conditions[10] whereas frailty is associated with reduced well-being and increased five-year mortality.[11] Engaging in healthy behaviours, such as exercise, are also associated with mental well-being.[12] Other behaviours such as smoking and fruit and vegetable consumption were also associated with low or high mental well-being.[13]

There is currently a lack of studies that comprehensively examine mental health of migrants in nationally representative databases using validated scales for positive mental health while accounting for multiple confounders. In the proposed study, mental well-being will be examined using cross-sectional data from the Canadian Community Health Survey (CCHS) 2011 and 2012 annual components. The 2011 and 2012 cycles of the CCHS were chosen for this analysis, as these are the only annual cycles which assessed positive mental health in the entire population, as well as all covariates of interest. In the 2011-2012 CCHS, positive mental health is measured using the Mental Health Continuum-Short Form (MHC-SF), and two outcomes of interest (positive mental health score and positive mental health classification) derived from this instrument will be examined. The MHC-SF incorporates measures of emotional, social, and psychological well-being to create a comprehensive positive metal health variable. The overall goal of this work was to increase our understanding of mental well-being of migrants, with the goal of informing mental health approaches based on the specific needs identified in this study. We also aimed to understand the effect of modifiable factors (such as nutrition and exercise) on the mental well-being of migrants, as this can have a cascade of positive health outcomes which can benefit the individual person, as well as the health care system. Lastly, this research contributes to the growing field of mental well-being research where the focus has shifted towards a reconceptualization of mental health in positive rather than negative terms, and provides

Canadian evidence on the dynamic relationship between the migratory experience and mental health and well-being.

1.1 Thesis Purpose and Objectives

The overall goal of this project was to examine positive mental health among migrant groups in Canada. The two primary objectives of this study were:

> (1) To compare positive mental health of migrants with the non-migrant population, adjusting for sociodemographic, lifestyle, and health-related confounding factors; and
>
> (2) To explore the sociodemographic, lifestyle, and health-related factors that are associated with positive mental health among migrants.

As a secondary objective, we also explored effect modification based on the presence of self-reported mood or anxiety disorder through the use of stratified analyses.

1.2 Thesis Structure

This thesis follows the monograph style guidelines of the University of Western Ontario's School of Graduate and Postdoctoral Studies. Chapter 2 provides a review of the literature on positive mental health in migrants. Chapter 3 provides details on the methods used to complete this study. Results are presented in Chapter 4, and Discussion on the findings follows in Chapter 5. Conclusion, study summary, and future directions are also detailed in Chapter 5.

1.3 Role of the Student

The student initially submitted a request to Statistics Canada for access to the confidential 2011-2012 CCHS dataset. Once access was granted, the student was responsible for conducting all analyses at the Research Data Centre (RDC) at the University of Western Ontario. Due to the COVID-19 pandemic of 2020, access to RDC was lost in March 2020,

and the student requested approval from her supervisory committee to redirect her analysis to the 2011-2012 CCHS public use microdata file (PUMF) to prevent delay of thesis progress. The advisory committee approved the use of the PUMF, and the student recreated all analyses performed at RDC on the PUMF dataset. The student consulted Dr. Piotr Wilk (member of the supervisory committee), as well as Dr. Neil Klar (biostatistician at the Department of Epidemiology and Biostatistics at the University of Western Ontario) about the statistical analysis of this dataset.

Chapter 2

2 Literature Review

2.1 Mental Illness, Mental Health, and Mental Well-Being

Mental illness refers to a broad range of medical conditions that involve alteration in emotion, cognition, or behaviour resulting in serious impairment of everyday functioning.[14] The severity of mental illness can range from very mild forms that only interfere with daily life in limited ways, whereas other mental illnesses may be moderate to severe, and substantially impair or limit major life activities.

Positive mental health is a construct that recognizes that overall health is not only the absence of disease, but rather a required component that, together with physical health, reflects a person's well-being. The World Health Organization (WHO) defines mental health as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community".[15] The WHO definition challenges the traditional paradigm that mental health is the opposite of mental illness.[7, 16] Similarly, the Public Health Agency of Canada defines positive mental health as "the capacity of each and all of us to feel, think, and act in ways that enhance our ability to enjoy life and deal with the challenges we face."[7] Although there is no comprehensive definition of mental health that fits all cross-cultural differences, there is general agreement that mental health goes beyond the absence of mental illness or mental disorders,[8] and that mental health implies fitness instead of lack of mental illness.[15] Mental health is a positive phenomenon that encompasses dimensions of emotional, social, and psychological well-being.[5] Emotional well-being is based on the presence or absence of negative affect (i.e. positive feelings about life).[5, 17] Social well-being is based on the following five dimensions: social coherence, self-actualization, integration, acceptance, and contribution. Lastly, psychological well-being is based on positive functioning in the following six dimensions: self-acceptance, positive relations with others, personal growth, purpose in life, environmental mastery, and autonomy.[5] Mental health is thus achieved when emotional, psychological, and social well-being co-exist. There is an intimate connection and interdependence between mental, physical, and social functioning,[16] and the definition of what is mentally healthy may differ depending on the geographical,

cultural, and historical context.[15] Cultural beliefs about health and illness, as well as societal norms and values, all influence our understanding of what constitutes positive functioning in a cross-cultural context.[16]

Mental well-being,defined as subjective evaluation and judgement of one's own life, can be conceptualized as positive emotions about one's own life (*hedonic* well-being), as well as positive psychological and social functioning in life (*eudaimonic* well-being).[5, 18] This definition of mental well-being was important in the paradigm shift in reframing mental health in positive instead of negative terms. Mental well-being is synonymous with positive mental health, a concept that dates to the 1950s when a better definition of mental health was needed.[19] In her efforts to provide this definition, Marie Jahoda[19] argued that mental health is more than simply the absence of mental illness, and that health is not implied in such conditions. Jahoda further framed mental health in various states of well-being that largely depend on feeling good mentally and emotionally, and this definition varies depending on the environment, cultural setting, and socioeconomic and political factors.[19] To detach from the intimate connection with mental illness, efforts were made to reconceptualize mental health in positive, rather than negative terms, and to promote mental health and mental well-being beyond just the prevention of mental illness.[8]

2.2 The Dual Model of Mental Health and Mental Illness

Although it is true that society at large has traditionally considered mental health to be the absence of psychopathologies, such as anxiety and depression, it is also true that mental health does not necessarily imply the presence of healthy and productive living.[5] Mental health and mental illness are therefore better viewed existing along two separate continua, and not as antonyms of a single continuum line. The dual model of mental health and mental illness (Figure 1) consists of two distinct dimensions with the presence or absence of mental health along one continuum, and presence or absence of mental illness along the other continuum.[17, 20] While Figure 1 does not specifically indicate moderate mental health, this state of mental health can be visualized betweel languishing and flourishing where individuals cannot be classified into either of those two states of the dual continuum model of mental health.

A longitudinal cohort study[6] of 1,723 adults (age 25-74) that examined the prevalence of mental health and mental illness in 1995 and 2005 determined that the relationship between mental health and mental illness was dynamic.[6] Improvements in mental health resulted in reduction in mental illness and declines in mental health resulted in increases of mental illness. This longitudinal cohort study also found that change in mental health from the initial cycle strongly predicted episodes of mental illness at follow-up in 2005.[6]

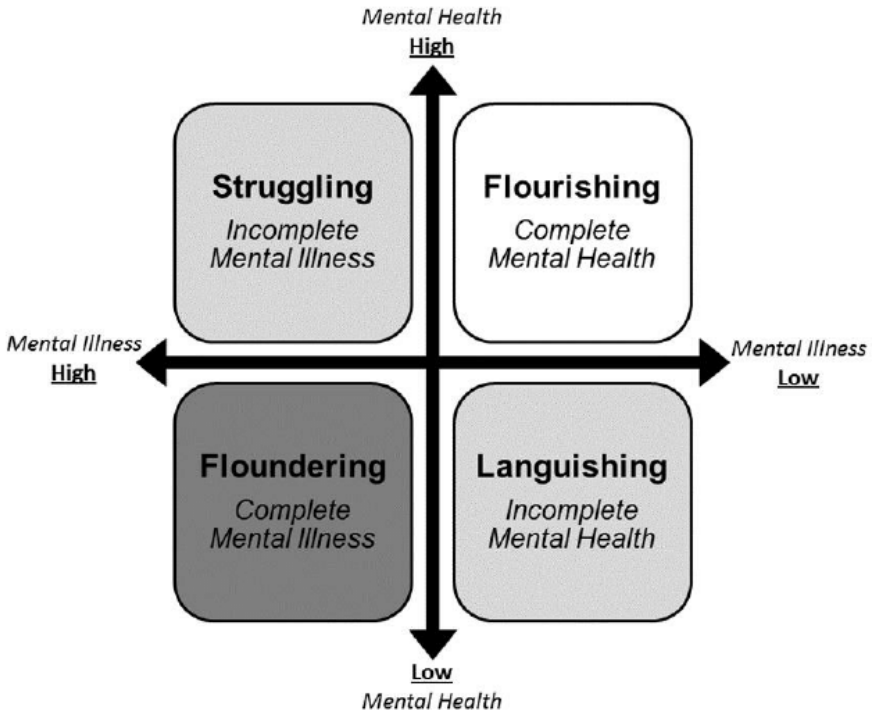

Figure 1**.** The dual factor continuum of mental health and mental illness, adapted from the theoretical work of Keyes and Lopez.[20]

According to a study of 3,302 healthy adults (age 25-74 years) that aimed to determine the prevalence of mental health categories, 17.2% adults were classified as flourishing, 12.1% were languishing, and 56.6% were moderately mentally healthy. This study also found that prevalence of languishing was equal to prevalence of major depression and that languishing was associated with substantial psychosocial impairment, at levels comparable to episodes of pure depression.[5] The level of mental health in individuals with mental illness distinguishes levels of functioning in those with mental illness.[17] The dual continuum of mental health and mental illness shows that flourishing can exist despite living

with a mental illness, and that languishing can exist without a mental illness. However, anything less than flourishing can lead to suboptimal functioning in terms of physical disease, utilization of healthcare, workplace productivity, and psychological functioning.[17] Languishing is associated with a greater risk of major depressive disorder, as well as poor emotional health, and impaired psychological and social functioning.[5] Unfortunately, mental health programs often ignore the absence of mental health when treating mental illness, and do not recognize the highly correlated and dynamic relationship between mental health and mental illness. Treatment of mental illness should promote increasing mental health despite presence of mental illness. Understanding of the nature and etiology of strengths and competencies in those with optimal mental health may serve to provide therapeutic insights to encourage development of the same strengths and competencies in those with mental illness.[5]

In 2016, the Public Health Agency of Canada initiated the Positive Mental Health Surveillance Indicator Framework (PMHSIF) to monitor positive mental health of Canadians.[21] The development of this network supports the increased recognition of positive mental health as a public health interest. As part of the PMHSIF, positive mental health was examined using the 2015 and 2017 CCHS surveys through indicators of self-rated mental health, happiness, life-satisfaction, and psychological and social well-being.[22] The findings from this study showed that the prevalence of positive mental health outcomes for adults in Canada ranged from 68.1% to 87.1%, depending on the indicator;[22] however, this study did not use a measure of overall positive mental health, such as the positive mental health continuum.[22]

In the context of the present study mental well-being, positive mental health, and flourishing are used synonymously.

2.3 Epidemiology of Positive Mental Health and Mental Illness in Migrant Populations

According to the 2020 World Migration Report, there were 272 million migrants globally in 2019 (representing 3.5% of the world's population), with migration becoming a top-tier political issue tightly connected to human rights, development, and geopolitics.[23] The research on migration health includes concerns related to human mobility, such as infectious

disease transmission, as well as physical health and well-being of migrants.[23]

In Canada, positive mental health in migrants was examined in the 2012 CCHS Mental Health (CCHS-MH) module.[24] The 2012 CCHS-MH was a one-time survey of mental health of 29,088 Canadians aged 15 years and older living in 10 provinces, and is not a regular annual component of the CCHS. In the analysis based on the full information 2012 CCHS-MH there was an association between migrant status and complete mental health in unadjusted analyses; however, this relationship was no longer significant after adjustment for demographic and health-related covariates. The findings from the 2012 CCHS-MH, where migrant country of origin was adjusted for, highlighted the importance of considering this variable, as this information may be required to elucidate the heterogeneity among the migrant groups.[24] The present study differs from the 2012 CCHS-MH Statistics Canada publication[24] in the use of a larger sample (annual components for 2011 and 2012 merged together), as well as in the choice of examined covariates. For example, the effect of lifestyle factors such as physical exercise, smoking, drinking, and fruit and vegetable consumption were not examined in the Statistics Canada report.

The overall literature on positive mental health among migrants is very limited, as majority of research focuses on studying mental illness and poor mental health outcomes, and not on assessing positive mental health.

Migration has been recognized as a critical factor contributing to mental illness in resettled individuals.[2] Mental illness outcomes in migrants are associated with structural determinants unique to the process of migration such as premigration exposures, stressful experiences during migration, and stresses associated with resettlement in the post-migration phase.[2] Although negative mental health outcomes are common in migrants and the process of migration is associated with specific stresses, most migrants handle the resettlement transition well.[2] For some migrants, particularly refugees, resiliency (despite times of significant adversity or trauma) prevents negative mental health outcomes through positive adaptation, and social and psychological competence.[2] Migration, for some, also results in upward mobility and improved quality of life which may in turn result in improved psychosocial outcomes that may negate the risk of development of ill-mental health outcomes due to acculturative stresses.[2] These positive migration changes in conjunction with resiliency could be partially responsible for initial mental health advantage and the

healthy migrant effect. The healthy migrant effect dissipates over time due to integration challenges associated with the initial stages of the post-migration period. This phenomenon parallels findings for common physical health problems in migrants, where the prevalence is lower than in the host country population in the initial post-migration period; however, this increases over time to be similar to the general population of the host country.[2] Despite some of these advantages in the post-migration period, negative post-migration experiences, such as unemployment and difficulties with integration still pose a risk for negative mental health outcomes.

2.3.1 Epidemiology of Positive Mental Health and Mental Illness in Migrant Populations: Overview of Systematic Reviews

Research on mental illness in migrants focuses on depression, anxiety, post-traumatic stress disorder, and schizophrenia and a brief overview of findings from systematic reviews on each mental health disorder in migrants is presented in this section.

Depression and Anxiety

A recent systematic review of depressive disorders in migrants calculated an aggregate prevalence of depression among 16,121 migrant participants across 20 different countries to be 15.6% (95% CI 11.5, 20.7%) with heterogeneity identified with education, employment status, and length of time spent in country of migration.[25] This systematic review found that newly arrived migrants are susceptible to developing mood dysfunction, due to economic and social challenges associated with migration. Furthermore, there was no significant difference in the prevalence of depression between migrants and native participants.[25]

A recent systematic review[26] of 17 studies focused on depression in refugees and asylum seekers (n=3,877) found that 31.5% were diagnosed with depression, and that duration of displacement had no significant impact on prevalence of depression. The same review[26] examined 11 studies of anxiety disorders (n=2,840) and found that 11.09% refugees and asylum seekers were diagnosed with an anxiety disorder. In contrast to depression, duration of displacement had an effect on the prevalence of anxiety and anxiety was higher in

refugees and asylum seekers who were displaced for less than 4 years, coming from the Middle East, living in refugee settlements, and in individuals with refugee status.[26] In Canada, the available evidence on the epidemiology of mood and anxiety disorders in migrants indicates estimates that are lower in migrant groups than in Canadian comparisons,[27] and presents a wide range of prevalence for mood and anxiety disorders in migrants (1.55 to 32.6%), with most studies estimating the prevalence from 1.5% to 8.2%.[32] One possible explanation for the lower estimates in migrant groups in Canada is positive migrant selection based on skills and education.[27] Furthermore, there may be cultural differences that influence whether migrants are diagnosed with mood or anxiety disorders in the host country, or whether they choose to self-report it, due to possible stigmatization.[27]

Post-Traumatic Stress Disorder

A recent systematic review that aimed to establish current overall prevalence of mental illness in refugees and asylum seekers found the prevalence of PTSD to be 31.46% across 22 studies (n=4,639).[26] The high prevalence of PTSD identified in this systematic review could reflect the fact that refugee populations from low- and middle-income countries were included in this review, or that the more recent refugee waves may have been exposed to higher numbers of risk factors contributing to a high prevalence of PTSD.[26]

Schizophrenia and Other Psychotic Illnesses

Migration has been recognized as a risk factor for schizophrenia,[28] however the relationship between migration and psychotic disorders is still unexplained. A meta-analysis of incidence studies that examined the association between migration and psychosis from 1997 to 2017 found a relative risk (RR) of 2.55 (95% CI 2.31, 2.82) in first generation migrants, and a RR of 1.78 (95% CI 1.66, 1.90) for second generation migrants.[29] Even though the magnitude of effect suggests a higher risk in first generation migrants, subsequent analyses revealed that there was insufficient evidence for the difference between these two generations of migrants.[29] This meta-analysis also did not find any evidence of greatly increased risk of psychotic disorders in migrants in Canada (RR = 1.21; 95% CI 0.85–1.74), possibly due to positive selection through Canadian immigration admission policies.[29] This meta-analysis[29] found that migrants with black skin who came from countries where the population was predominantly

Black had the highest relative risk of incident psychosis (RR=4.19, 95% CI 3.42–5.14), and suggested that belonging to a disadvantaged ethnic minority group is an important determinant of risk for the development of psychosis.[29]

A systematic review and meta-analysis[30] that examined the effect of age at migration on the risk of psychosis found that migration prior to age 18 posed a nearly double risk of developing a psychotic disorder, and that those who migrated early in life had a greater risk than those who migrated in early adulthood.[30] These findings suggest presence of a critical developmental period in childhood and adolescence during which the stresses of the migration process may exacerbate psychotic symptoms, and further imply that migration may be positively selected, as the risk period for psychotic illness onset is partially or fully avoided if migration occurs in early adulthood.[30]

2.4 Correlates of Positive Mental Health and Mental Well-being

Correlates of mental illness have extensively been studied, both in migrants and in the general population. However, the evidence base for determinants of positive mental health limited, especially for migrants. The following section therefore examines these variables in the context of positive mental health where available, and supplement with evidence from studies on mental illness where evidence is limited.

Sociodemographic Correlates

Sex

Gender and sex are critical correlates of mental illness and mental health.[7, 17, 24] It is known that certain mental illnesses such as depression, anxiety, and somatic complaints are more common in women, while personality disorders and substance use disorders are more common in men.[31] Previous research provides conflicting evidence regarding the role of sex in the context of positive mental health. Although a study of Dutch adults[17] found that women had more complete mental health than men, these findings were not replicated in the Canadian setting[24] where there was no difference in complete mental health between men and women. As for self-perceived mental health, women and men tend to equally perceive

their own mental health as very good or excellent.[32] The migratory experience of men and women can be vastly different, and women may be in vulnerable positions where they are exposed to a higher risk of violence, rape, and abuse compared to men in the migration process.[33] Therefore, it is important to study sex and gender differences in analyses of positive mental health of migrants.

Age

Data from the 2012 CCHS-MH indicates that older age is associated with complete mental health, even after controlling for sociodemographic and health-related variables.[24] In contrast, evidence from a study of Dutch adults suggests that age is not always associated with better positive mental health. [17] Even though mental illness is less common in older adults, there is no evidence that older adults experience complete mental health more readily than younger adults.[17] The association of mental well-being and age has a postulated U-shape, with mental well-being and happiness reaching highest levels early and late in life while reaching lowest levels in mid-life.[34]

Marital Status

Marital status is another key demographic factor that is associated with improved physical health, longer life expectancy, lower death rates, and higher psychological well-being.[35] Marital status is associated with better mental health in both men and women, and lower rates of depression, anxiety, suicide risk, and substance abuse.[36] This is true especially in societies that emphasize the importance of marriage.[36] Marital status influences psychological well-being, with married people having greater positive well-being than non-married people.[24, 37] Furthermore, expanding beyond the institution of marriage, any form of partnership is protective of mental health.[38]

Household Size

The literature on the effect of household size on positive mental health is limited. There is some evidence in children that greater household size is protective against development of internalizing and externalizing behavioural problems and is associated with better mental health.[39] In addition, there is evidence from a Canadian study of military service members that suggests better positive mental health in those living with others versus living alone.[40]

Furthermore, living alone has been associated with low positive mental health.[41] Taken together, the present study wanted to explore the effect of household size in the context of the study objectives.

Income

Globally, poverty has been associated with common mental health disorders.[42] Canadians with income in the lowest quintile are less likely to report complete mental health. Lower income is also linked to a greater level of psychological distress, partially due to a higher prevalence of socioeconomic and psychological stressors in individuals with lower income.[43] Decreased household income is associated with an increased risk of incident mood, anxiety, and substance use disorders.[44]

Education

Education represents another critical sociodemographic factor that influences mental health, with evidence for better mental health outcomes with higher educational attainment.[24, 45] Attempted, but not completed post-secondary education is associated with the lowest levels of positive mental health among adolescents in Canada, after adjustment for household income, single parent status, and household size.[46] Depressive symptoms are more common in individuals with low educational attainment.[47]

Knowledge of Official Languages

In migrants, limited knowledge of the official languages of the host country is associated with poor self-reported health, and is a barrier to accessing and utilizing health care.[48] Language proficiency is a vital facilitator of social integration, as well a facilitator for access and utilization of health and social services.[49] Lack of linguistic acculturation can be detrimental to migrant well-being.[50]

Visible Minority Status

There is some evidence for racial disparities in the prevalence of mental health disorders, but research on positive mental health in visible minorities is lacking. Racial inequalities in self-reported mental health have been identified in the CCHS,[51] where women born in China and White women born in Italy had a higher risk of fair to poor self-reported mental health,[51] and

migrant black women had lower mental health than migrant white women.[52] For mental illness, there is a higher prevalence of schizophrenia in African Americans compared to whites, however this could be explained by clinical overdiagnosis of schizophrenia and underdiagnosis of mood disorders in African Americans.[53] Stigma about mental illness is higher among visible ethnic minority groups than in majorities, which in turn influences physical and mental well-being of individuals belonging to these groups.[54]

Migration-Specific Correlates

Time Spent in Canada since Migration

Although the Healthy Migrant Effect has been recognized in the context of migrant physical and mental health, data from the 2012 CCHS-MH does not suggest a difference in positive mental health between recent and long-term migrants in Canada.[24] The high levels of stress in recent migrants are more evident in migrants who are less than satisfied with their settlement process.[55] As for depression, data from CCHS showed that long term migrants have similar rate of depression to the Canadian-born population.[56]

Lifestyle Correlates

Physical Activity

The effect of physical activity on positive aspects of mental health and well-being is less explored. A systematic review on the effect of physical activity on psychological well-being found a consistent positive relationship between physical activity and happiness.[57] Furthermore, physical exercise is associated with a lower mental health burden, measured as the number of days with low self-perceived mental health.[58] There is also evidence that physical activity has a positive effect on mental illness, and this has been demonstrated in patients with anxiety and depression.[59]

Alcohol and Tobacco Consumption

Low mental well-being is associated with excess alcohol consumption and smoking.[13] Poor mental well-being is also linked with harmful drinking, especially in individuals using drinking to cope.[60]

Fruit and Vegetable Consumption

Fruit and vegetable consumption is associated with higher mental well-being in both men and women,[13] whereas low fruit and vegetable consumption is a risk factor for poor mental health in adolescents.[61] The quality of nutritional intake is seen as a modifiable risk factor for mental illness and is at the forefront of the field of nutritional psychiatry.[62] Dietary constituents found in fruits and vegetables, such as vitamins and minerals may be beneficial for psychological well-being.[63] Healthy nutrition has a protective association with both mental illness and self-rated mental health among migrants, even after controlling for general health status, physical activity, and alcohol use,[64] suggesting the importance of addressing nutrition in the prevention of mental illness among migrants.

Health Correlates

Mood Disorders and Anxiety

Depression is associated with poor mental health, and people who have both depression and languishing mental health experience psychosocial impairment, such as emotional problems and limitations in activities of daily living.[5] The risk of experiencing a major depressive episode in adults who are languishing is six times greater than in adults who are flourishing.[5] Similar findings are true for anxiety, where the risk of anxiety is greater in those who have less than stable flourishing mental health.[65] A recent study using data from the CCHS found a lower prevalence of mood and anxiety disorders in migrants compared to the Canadian-born population.[66]

Self-Perceived Health

There is a fundamental link between physical and mental health.[67] Physical health is a positive attribute that can influence outcomes of both physical and mental illnesses.[15] Low self-perceived physical health has been associated with higher levels of psychological stress.[68] Furthermore, chronic pain is a critical factor in people with poor physical health conditions that prevents them from experiencing flourishing mental health.[24]

2.5 Existing Gaps in the Literature

Mental health conditions and mental illness in migrants have been well-recognized in the literature.[2, 4, 25-27, 30] Although negative aspects of mental health in migrants to Canada have been well studied under the framework of mental illness, there is a clear lack of information about what contributes to positive mental health in these individuals. Studies that have examined aspects of mental health of migrants that are not directly defined as mental illness have focused on measures of self-perceived mental health and did not use validated scales. Most importantly, positive mental health examined in the context of the dual mental health continuum has been understudied in migrant groups in Canada. There are no studies that have examined positive mental health in migrants while simultaneously evaluating multiple confounders such as sociodemographic variables, migration-specific attributes, as well as lifestyle and health-related measures. Given that it is known that mental health and mental illness are distinct, but highly correlated axes, there is reason to believe that positive mental health may also be different in migrants and non-migrants, and that there may be heterogeneity within the migrant groups. The aim of the present study was to add to the limited literature on positive mental health in migrants and to contribute to the literature on migrant-sensitive mental health care in Canada.

Chapter 3

3 Methods

3.1 Source of Data

Data were obtained from the publicly available 2011-2012 Canadian Community Health Survey (CCHS) annual components.[69,70] The CCHS is a nationally representative cross-sectional health survey based on a multi-stage sample of Canadians, conducted annually by Statistics Canada. The aim of CCHS is to collect information on health status, determinants of health, and health care utilization and then disseminate this information to improve the health of Canadians through research and the implementation or modification of programs. The positive mental health module was initially introduced in the 2011 and 2012 annual components of the CCHS, as well as in the 2012 CCHS Mental Health (MH) survey, and the March 2019 CCHS MH Rapid Response (MHRR) questionnaire. No other annual components of the CCHS collected data on positive mental health variables. All survey waves that included data on positive mental health were carefully examined, and the 2011-2012 CCHS was selected as the final source of data for the current study because of the availability of all covariates of interest.[71] We opted not to include the 2012 CCHS-MH and the 2019 CCHS-MHRR waves, as they were lacking information on many covariates of interest.

The CCHS collects information from Canadians aged 12 and older across all provinces and territories. People living on reserves or Aboriginal settlements, full-time members of the Canadian Forces, the institutionalized population, children aged 12 to 17 living in foster care, and people living in certain health regions of Quebec are excluded from the survey. The CCHS is representative of approximately 98% of the Canadian population aged 12 and older.[69,70] Each province is divided into health regions and each territory represents a single health region. A sample of 130,000 respondents over the two survey years was determined sufficient to provide reliable estimates for each health region and province. The sample allocation strategy consisted of three steps to provide minimal disturbance to proportionality of the allocation by province. Step 1 required a minimum of 500 respondents per health region, with a maximum sampling fraction of 1/20 dwellings. A total of 60,350 units were allocated in Step 1. Step 2 required allocating the remainder of the available sample by using the population size of each province as a guide for allocation. Step

1 and Step 2 combined create the total sample size at the provincial level. For the 2011-2012 CCHS, the targeted sample size was 131,498 respondents. Lastly, in Step 3 the sample size for each province was determined among its health regions proportionally to the square root of the estimated population in each health region. The allocation strategy used for provinces was not applied to the three territories, as they were each dealt with separately based on budget constraints. Following the sampling allocation, the sample was then divided between the area frame and the list frame (telephone numbers and random digit dialing). The area frame provided 40.5% of sample households, whereas 58.5% were obtained via telephone numbers, and 1% via random digit dialing sample frame.[70]

The sampling frame originally designed for the Canadian Labour Force Survey (LFS) was used as the area frame for CCHS. The LFS sampling plan involves a multistage stratified cluster design where the dwelling is the final sampling unit. The first stage of this sampling plan involves formation of homogenous strata where stratum-based independent samples of clusters were drawn. The second stage of this sampling plan involves preparation of dwelling lists for each cluster allowing for selection of households or dwellings from these lists. Further details on the sampling strategy for all provinces and territories are available.[71]

Computer-assisted interviewing (CAI) was the primary mode of data collection in the 2011-2012 CCHS, and interviews were conducted in person using computer assisted personal interviewing (CAPI) or computer assisted telephone interviewing (CATI). Interviewers were trained with a focus to minimize non-response and increase participation in the survey. Once the interviewers would reach the selected dwellings, basic demographic information on all residents of the dwelling was requested from a knowledgeable household member. A single household member was subsequently selected for the in-depth health content interview. Control measures that monitored interviewer performance were implemented to ensure data quality and to optimize data collection.[70]

The raw data was processed by Statistics Canada to include steps such as editing, coding, creation of derived variables, weighting, and income imputation. Data editing was performed at the time of the interview by the computer-assisted interviewing (CAI) application. Data coding was facilitated by pre-coded answer categories where interviewers were trained to assign answers to appropriate categories. Derived variables were created to minimize risk of error and to facilitate data analysis (e.g. collapsing response categories,

combining several variables, etc.). A sampling weight was assigned to each respondent to obtain meaningful, nationally representative estimates. Lastly, starting in 2011, the income variable was imputed by Statistics Canada to address missing data.[69,70]

A combined dataset was released by Statistics Canada to include all respondents and questions that were in the survey for both 2011 and 2012 reference periods. New sample weights were calculated for the combined dataset by halving the annual weights, which ensures that the sum of final weights is the same as the average population size over the two-year period.[70]

3.1.1 Response Rates for CCHS 2011-2012

A total of 183,721 units were included in the sampling frame of the 2011-2012 CCHS. The overall household-level response rate for the 2011-2012 CCHS was 78.4% with 144,000 households accepting participation in the survey. A single individual was selected from each of the responding 144,000 households which resulted in responses for 125,645 people, and the individual-level response rate was 87.3%. This resulted in the combined national-level response rate of 68.4% for the CCHS 2011-2012.[70] The present study did not exclude proxy respondents, as proxy interviews are completed based on the inability of the respondent to answer due to a physical health condition or mental health condition, and excluding this group would bias the study estimates. The final number of respondents in the Public Use Microdata File (PUMF) was 124,929.

3.2 Study Variables

3.2.1 Study Outcomes

The main outcome variable in this study was mental well-being (measured as positive mental health). In addition to positive mental health, self-perceived mental health was also assessed as an outcome.

The positive mental health-variable was based on the Mental Health Continuum Short-Form (MHC-SF) developed by Dr. Corey Keyes.[72] This instrument consists of 14 items that measure the frequency of each of the three facets of emotional, psychological, and

social well-being experienced by the respondent during the past month. Responses are measured on a 7-point Likert scale with the following options: never, once or twice, about once a week, about 2 or 3 times a week, almost every day, and every day.[72] The MHC-SF for adolescents (12-18 years of age) differs from the adult version by a single question (item 5 – belonging to a community in the adult version) where the wording is adapted for adolescents to ask about belonging to a "group of friends, at school, or your neighbourhood".

Appendix A provides details on the MHC-SF instruments used in 2011-2012 CCHS.

We used the Positive Mental Health Classification, which was based on responses to the 14 MHC-SF questions (PMH_01 to PMH_14). The positive mental health classification categorizes mental health into flourishing, languishing, and moderate based on respondents' answers to the MCH-SF. Respondents are classified as having flourishing mental health if they experience "high levels" (defined by the frequency of "every day" or "almost every day" during the past month) of at least 6 out of 11 measures of positive functioning and "high levels" of at least 1 out of 3 measures of emotional well-being. Respondents are classified as having languishing mental health if they experience "low levels" (defined by the frequency of "never" or "once or twice" during the past month) on at 6 out of 11 measures of positive functioning and at least 1 out of 3 measures of emotional well-being. Respondents who were not classified as either flourishing or languishing were classified as having moderate mental health.[72]

For the purposes of this study, this variable was further dichotomized into two groups: flourishing versus moderate to languishing. This dichotomization was needed to conform with Stata-permitted commands on multiply imputed data. Stata statistical software is unable to check for the proportional odds assumption (Brant test) using multiply imputed data. Therefore, logistic regression was chosen as the preferred method of analysis, instead of ordinal regression.

3.2.2 Validity of Measures

Construct validity of the MHC-SF has been confirmed in a study that used the 2011-2012 CCHS sample to describe measurement properties of the MHC-SF instrument in the Canadian context, and to examine its factor structure by correlating measures to validated

scales of mental health, life satisfaction, and sense of belonging to the community.[73] This was done through confirmatory factor analysis of 2012 CCHS-MH data, which were cross-validated with the 2011-2012 CCHS data. Individual dimensions of the MHC-SF (emotional, psychological, and social well-being) were correlated with positive or negative concepts, such as satisfaction with life, or level of psychological distress. This prior study[73] provided support for the construct validity of the emotional and psychological scales of the MHC-SF, but failed to find support for the social well-being scale. Positive mental health is reliably assessed by the MCH-SF and is a distinct indicator of mental well-being, despite its close relationship to mental illness.[74] Furthermore, the discriminant validity of the MHC-SF and its ability to differentiate between mental health and mental illness has also been confirmed.[74] Positive mental health was chosen as the primary outcome instead of self-rated mental health, which lacks the complexity in defining the three dimensions of mental health (emotional, social, and psychological).

Self-Perceived Mental Health

The second outcome variable in the present study was Self-Perceived Mental Health. This variable indicates the respondent's self-perceived mental health status and is rated as: "*poor", "fair", "good", "very good",* and *"excellent"*. For the purposes of this study, this variable was dichotomized as "*poor/fair/good*" and "*very good/excellent*" (reference category) for use in logistic regression models.

3.2.3 Exposure variable

Migrant status was determined by asking respondents if they were born in Canada, and respondents were coded as migrants if they responded '*No*'. Additional questions were asked to determine country of birth and year of arrival in Canada; however, this information was not available in the PUMF. The migrant status variable was dichotomized as migrants and non-migrants.

Respondents who indicated that they were not born in Canada were asked about the length of time in Canada since their migration. Information on length of time in Canada (measured in years) was recorded only in migrant-respondents and was dichotomized into

two groups: 0 to 9 years since migration and 10+ years since migration. In the PUMF, length of time in Canada was only available as a dichotomous variable split into these two groups.

Our exposure variable was created by combining migrant status with length of time in Canada. Respondents were separated into three groups, where 0 denoted "*non-migrants"* (reference category), 1 denoted "*recent migrants"*, and 2 denoted "*long-term migrants"*.

3.2.4 Covariates and Stratification Variables

Correlates of positive mental health are presented in three categories: sociodemographic, lifestyle-related, and health-related. Information on stratification variables is also detailed. Reference categories for all covariates were selected by choosing the category with the highest number of respondents.

Sociodemographic Variables

Province of Residence of Respondent

Geographical residence of respondents was grouped in the following way: Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario (reference category), Manitoba, Saskatchewan, Alberta, British Columbia, and Yukon/Northwest/Nunavut Territories.

Age

The age of each respondent was calculated by subtracting date of birth from participant's date of interview (measured in years) and was categorized in the following way: 12 to 24 years, 25 to 44 years, 45 to 64 years (reference category), and 65 years and older. Age was only available as a categorical variable in the PUMF.

Sex

Information on binary sex was obtained by asking the responded if they were "*male*" or "*female*" (reference category).

Marital Status

Marital status of respondents was determined by the question: "What is your marital status?" and was categorized into the following groups: "*married"/ "common law"* (reference category) *"widowed/separated/divorced", "single",* or *"never married".* Partnership rather than legal status was selected for grouping of this variable.

Visible Minority Status

Visible minority status of respondents was determined by asking them the question "What is your cultural or racial background?" and was dichotomized into as "*white"* (reference category) and "*visible minority"* in the PUMF, and no further information on the visible minority status was available.

First Official Language Spoken

First official language spoken was categorized into four groups: "*English"* (reference category), "*French*", "*English & French*", and "*Neither".* The PUMF contains two different language-related variables: knowledge of official languages, and language spoken at home. The latter variable was chosen as it implies active use of the official languages.

Income

Income was derived by calculating an adjusted ratio of each household's total income to the low-income cut-off for their household and community size. The distribution of these ratios was then categorized into deciles consisting of approximately equal percentages of respondents, with decile 1 being the lowest 10% of adjusted income ratios and decile 10 being the highest 10% of adjusted income ratios. This variable was further collapsed into quintiles to denote lowest quintile (reference category), low middle, middle, low upper, and upper income quintile. Income was not assessed in the three territories. The income variable in the PUMF was already imputed by Statistics Canada, and imputations were not performed during this procedure for the regions where the information was not collected.

Education

The highest level of education acquired by any household member was categorized into four groups: "*less than secondary school graduate", "secondary school graduate", "some post-secondary education", and "post-secondary certificate"* (reference category).

Household Size

The number of people living within a household was categorized into 5 groups: "*1 person*", "*2 persons*" (reference category), "*3 persons*", "*4 persons*", "*5 or + persons*". This variable was available only in the categorical format in the 2011-2012 CCHS PUMF.

Lifestyle-Related Variables

Physical Activity Index

Physical activity index was based on average daily energy expenditure (EE) (kilocalories expended per kilogram of body weight per day) during leisure time activities over the past three months, and was categorized as "*active*", "*moderately active*", or "*inactive"* (reference category). This derived variable is based on several individual variables that assess frequency and duration of physical activities such as walking, gardening, swimming, bicycling, running, soccer, weight training, and other sports and forms of physical movement expressed as kcal/kg/day.

Total Daily Consumption of Fruits and Vegetables

Nutritional intake of fruits and vegetables, defined as total daily consumption (measured as frequency, not amount consumed) was categorized into the following groups: "*less than 5 times/servings per day*", "*5 to10 times/servings per da*y", and "*more than 10 times/servings per day*", with the first category (*less than 5 time/servings per day*) used as the reference category in multivariate models. This variable was not based on Canada's Food Guide serving sizes, and did not assess the composition of nutritional intake, only total daily frequency of consumption.

Type of Smoker

Smoking behaviour was assessed by asking respondents questions about the nature and temporality of their smoking. Possible answers included: "*daily smoker*", "*occasional smoker (former daily smoker)*", "*always an occasional smoker*", "*former daily smoker*", "*former occasional smoker*", and "*never smoked*". This variable was further grouped into: "*never smoked"* (reference category), "*former smoker"*, and "*current smoker"*. This derived variable is based on three individual variables that assess lifetime tobacco consumption with the following questions: "*Have you smoked a total of 100 or more cigarettes (about 4 packs)?"*, "*Have you ever smoked a whole cigarette?",* and *"At the present time, do you smoke cigarettes daily, occasionally or not at all?; On the days that you smoke, how many cigarettes do you usually smoke?".*

Type of Drinker

Frequency of alcohol use was assessed by asking respondents questions about the nature and temporality of their alcohol consumption. This variable categorized frequency of drinking alcohol into the following groups: "*regular drinker*", "*occasional drinker*", and "*did not drink in the last 12 months*" (reference category). This derived variable is based on two individual variables that assess the frequency of alcohol consumption in the last 12 months with the following questions: "*During the past 12 months, that is, from [date one year ago] to yesterday, have you had a drink of beer, wine, liquor or any other alcoholic beverage?*" and "*During the past 12 months, how often did you drink alcoholic beverages?*".

Health-Related Variables

Physical Health

Self-rated physical health of respondents was assessed with the question: "*In general, would you say your physical health is..*?", with possible answers of "*poor"*, "*fair"*, "*good"*, "*very good"* (reference category), and "*excellent*."

Self-Reported Mood Disorders

Presence of mood disorders was assessed by asking respondents the following question: *"Do you have a mood disorder such as depression, bipolar disorder, mania, or dysthymia?"* This variable was dichotomized as "*yes*" and "*no*" (reference).

Self-Reported Anxiety Disorders

Presence of anxiety was assessed by asking respondents the following question: "*Do you have an anxiety disorder such as a phobia, obsessive-compulsive disorder, or a panic disorder?"* This variable was dichotomized as "*yes*" and "*no*" (reference).

A final variable was created to denote respondents with mood or anxiety disorders, and those without (reference). This variable was used in the exploratory analysis addressing the secondary study objective, and was not included in multivariable models, as it is conceptually very related to the domain of mental health.

3.3 Missing Data

Missing data analysis was conducted for all respondents in the 2011-2012 CCHS. There are three possible mechanisms of missingness: 1) Missing completely at random (MCAR) which assumes that the missingness of data is not dependent on values of observed or unobserved variables; 2) Missing at random (MAR) which assumes that the probability that a given subset of variables is missing depends only on values of observed variables; and 3) Missing not at random (MNAR) assumes that the probability of missingness depends on the unobserved variable.[75] Data that are missing due to MCAR and MAR mechanisms can be addressed using statistical methods such as multiple imputation.

The first step in addressing missingness was to explore the proportion of missing data and to determine the pattern of missingness. Information on variables used in the analysis was examined to clarify whether questions used to generate these variables were asked uniformly in the study frame (provinces & territories). Table 3.1 shows the proportion of missing data for all study variables.

Table 3.1 Proportion of missing data for each variable

Variable	Percent missing
Province	0 %
Age	0 %
Sex	0 %
Household size	0.05 %
Self-Perceived health	0.19%
Mood disorders	0.19 %
Anxiety	0.21 %
Marital status	0.27 %
Type of smoker	0.72 %
Time spent in Canada (migrants)	1.70%
Type of drinker	1.74 %
Physical activity Index	2.28 %
Income	2.55 %
First official language spoken	2.68 %
Migrant status	2.99 %
Visible minority status	3.44 %
Education	3.80 %
Fruit and vegetable consumption	7.65 %

Then, an indicator variable was created to denote respondents with missing data (missingness=1) and those with complete data (complete=0). Logistic regression was performed with the indicator variable used as the outcome, and demographic variables as the independent predictors.

The next step in addressing missing data was to create binary indicator variables for all variables of interest and regress them on other variables of interest to assess whether being observed/missing depended on other variables observed. The results of these logistic regressions are not presented here, however, these analyses indicated that there were significant associations between missingness of certain variables and the presence of other variables in the database. These findings were confirmed by performing Little's MCAR test, which is used to examine whether the mechanism of missingness was MCAR.[76] A non-significant Little's MCAR test indicates that the data are MCAR, and a significant test suggests that the data is not MCAR.[76] Results of this test revealed a violation ($p<0.0001$) which suggested that missingness was not completely at random.

Once the mechanism of missingness was determined to be MAR, variables and their roles in the imputation procedure were selected. The following variables were imputed:,

household size, marital status, education, first official language spoken, fruit and vegetable consumption, physical activity index, type of smoker, type of drinker, perceived health, mood disorders, and anxiety disorders. Migrant status and length of time in Canada since migration were not imputed as they were used in migrant-specific analyses (Objective 2) to avoid variation between imputed cycles, which is sometimes an artifact of the imputation procedure. The following variables were used to inform the imputation model, as full information was available for them for all respondents: province, sex, and age. Outcomes of interest were not imputed. Based on the final imputation model, 15,514 observations were marked as incomplete.

Multiple imputation by chained equations (MICE) was chosen as the principled method to handle missing data due to its flexibility in being able to handle variables of different types. In this study, logistic regression was used for binary variables and ordinal regression was used for ordinal scale variables. Ten imputation cycles were performed to create 10 new data sets where missing data was replaced with values predicted by the MICE imputation model, which was deemed sufficient to produce accurate estimates.[77] A pooled dataset with adjusted coefficients and standard errors was created using Rubin's rules[77] to incorporate both the within and between imputation variability. Once the imputed set was created, the analyses were limited to STATA- permitted *mi estimation* commands.

3.4 Weighting

The master sample weight was assigned to each respondent in CCHS by Statistics Canada, however, sample weights for the combined 2011-2012 annual components were standardized by performing the following steps: 1) The mean sample weight for the combined 2011-2012 CCHS was calculated; 2) the weight for each respondent was divided by the mean of the sample weight for the combined 2011-2012 CCHS; and 3) the standardized weight for each participant was used as the weighting variable for all further analyses.[70] The weighting procedure allowed for the preservation of the initial sample size of 124, 929 respondents for the analysis of the full sample.

3.5 Statistical Analysis

All analyses were carried out using STATA version 16. Descriptive statistics (means and standard deviations [SD]) were obtained for all continuous variables, and proportions were obtained for all categorical variables.

All multivariable analyses were performed on the combined multiply imputed (MI) dataset that combined 10 imputation cycles, and due to STATA programming restrictions concerning MI estimates, ordinal variables were collapsed into dichotomous ones to allow for analytic procedures on the MI set. Logistic regression models were used for the binary positive mental health classification and self-rated mental health outcomes. In the sensitivity analysis, linear regression models were used for the continuous variable positive mental health score.

The first objective was to compare positive and self-perceived mental health of recent and long-term migrants, relative to the non-migrant population, while adjusting for sociodemographic, lifestyle, and health-related covariates. This was done by looking at the change in the parameter estimates through the unadjusted and fully adjusted models for the two study outcomes.

The second objective was to explore the factors associated with positive and self-perceived mental health among migrants, and this was addressed by looking at the unadjusted and fully adjusted models for the migrant sub-sample.

Lastly, an exploratory analysis was conducted to explore whether mood or anxiety disorders acted as an effect modifier. This was done by conducting stratified analyses based on the presence of self-reported mood or anxiety disorder.

Sensitivity Analyses

To assess the robustness of our findings to the categorization of the positive mental health variable, we conducted a sensitivity analysis using the continuous Positive Mental Health score, where 0-70 denotes the total score obtained on the 14 item MHC-SF, and higher scores indicate better positive mental health.[72] In this sensitivity analysis, linear regression was

used when modelling the effects of independent variables on the continuous positive mental health score. Full results of the sensitivity analyses are presented in Appendix B.

Chapter 4

4 Results

4.1 Description of Population Estimates

The total number of respondents in the 2011-2012 CCHS survey was 124,929. Descriptive statistics for the study sample were obtained from the original, unimputed data and weighted by standardized weight. Multiple imputation was used to handle missing data, and based on the final imputation model, 15,514 observations (12.4% of the total sample) were marked as incomplete and imputed for 10 datasets. Proportions of missing data for specific study variables, as well as the imputation procedure, were detailed in section 3.4, and the imputed data were used for all multivariable analyses.

4.1.1 Population Estimates: Overall

The total number of respondents in the CCHS 2011-2012 annual components was 124,929. The highest number of respondents was recorded in Ontario [n=48,776], which accounted for 39.0% of the study sample, whereas the lowest number of respondents was recorded in the three territories [n=352], which accounted for 0.3% of the study sample. Females comprised 49.4% [n=63,267] of the sample, and the largest proportion of respondents were in the 45-64 years of age category [33.0%; n=41,235]. Analysis of marital status showed that 47.0% [n=58,584] were married, whereas 30.2% [n=37,653] identified as single or never married. Two person households were the most common household size [24.0%; n=42,505]. The majority of respondents had post-secondary certification [56.8%; n=68,238]. Migrant status was reported by 23.2% of respondents [n=28,051], and 22.2% of respondents identified as a visible minority [n=26,817]. Most respondents spoke English as their first language 75.3%, [n=91,573], whereas 1.2% [n=1,497] had no knowledge of English or French. Further details on the overall sample characteristics are presented in Table 4.1

Table 4.1 Descriptive statistics of study covariates, CCHS 2011-2012

Variable	Weighted Count (n)	Frequency (%)
Province of Residence		
Ontario	48,776	39.0%
Quebec	29,079	23.3%
British Columbia	16,768	13.4%
Alberta	13,486	10.8%
Manitoba	4,268	3.4%
Saskatchewan	3,587	2.9%
Nova Scotia	3,445	2.8%
New Brunswick	2,742	2.2%
Newfoundland & Labrador	1,893	1.5%
Prince Edward Island	532	0.4%
Yukon/NWT/Nunavut	352	0.3%
Age (years)		
12-24 years	23,911	19.1%
25-44 years	39,423	31.6%
45-64 years	41,235	33.0%
65 years and older	20,361	16.3%
Sex		
Male	61,662	49.4%
Female	63,267	50.6%
Marital Status		
Single/Never married	37,653	30.2%
Married	58,584	47.0%
Common-law	13,197	10.6%
Widowed/Separated/Divorced	15,161	12.3%
Migrant Status		
Non-Migrant	93,144	76.9%
Migrant	28,051	23.3%
Country of Birth		
Canada	92,234	76.0%
Other	29,138	24.0%
Minority Status		
White	93,816	77.8%
Visible minority	26,817	22.2%
First Official Language Spoken		
English	91,573	75.3%
French	26,348	21.7%
English & French	2,167	1.8%
Not English or French	1,497	1.2%

Table 4.1 Descriptive statistics of study covariates, CCHS 2011-2012 (continued)

Variable	Weighted Count (n)	Frequency (%)
Education		
Less than secondary school	24,200	20.1%
Secondary school graduate	20,085	16.7%
Some post-secondary education	7,766	6.4%
Post-secondary certification	68,238	56.8%
Household Income		
Lowest quintile	24,355	20.0%
Low-middle quintile	24,652	20.3%
Middle quintile	24,534	20.2%
High-middle quintile	23,905	19.6%
Highest quintile	24,296	19.9%
Household size (number of persons)		
1 person	17,751	14.2%
2 persons	42,505	24.0%
3 persons	23,145	18.5%
4 persons	25,143	20.1%
5 or more persons	16,324	13.1%
Physical Activity Index		
Inactive	56,369	46.2%
Moderately active	30, 861	25.3%
Active	24,853	28.6%
Smoking		
Never smoked	53,183	43.6%
Former Smoker	46,320	38.0%
Current Smoker	22,537	18.5%
Drinking		
No drink last 12 months	29,054	23.7%
Regular drinker	74,067	60.3%
Occasional Drinker	19,632	16.0%
Fruit and Vegetable Consumption		
<5 times per day	68,643	59.5%
5-10 times per day	42,331	36.7%
>10 times per day	4,394	3.8%
Self-Perceived Health		
Poor	3,312	2.7%
Fair	10,670	8.6%
Good	36,030	28.9%
Very Good	48,678	39.0%
Excellent	26,001	20.9%

4.1.2 Population Estimates: Migrants

When asked about migrant status, 23.3% [n=28,051] of respondents identified as migrants. At the time of the survey (2011-2012), most migrants [n=72.1%; n=19,993] had resided in Canada for 10 or more years since their landing date (long-term migrants), whereas the remaining 29.1% were recent-migrants [n=7,749].

Recent Migrants

Analysis of sociodemographic variables showed that most recent migrants resided in Ontario [43.9%; n=3,404], followed by Quebec [19.1%; n=1,483], British Columbia [17.9%; n=5,026], and Alberta [13.2%; n=1,023]. All other provinces and three territories accounted for geographical residence of 6.7% of migrants [n=524]. Females accounted for 49.2% [n=3,811] of all recent migrants, whereas males accounted for 50.8% [n=3, 938]. Most recent migrants were in the 25-44 year age category [n=59.8%%; n=4,631]. Most recent migrants were married or in common-law relatioships [62.6%; n=4,838]. Four person households accounted for 24.6% of recent migrants [n=1,904]. The majority of recent migrants had post-secondary certification [68.8%; n=5,241], and 77.9% [n=6,025] had knowledge of English. As for income, 40.9% [n=3,166] recent migrants had income in the lowest quintile. Most recent migrants belonged to a visible minority group [80.0%; n=6,155]. More than half of recent migrants were physically inactive [57.3%n=4,368], however 69.2% [n=5,205] have never smoked, and 42.8% [n=3,312] reported no consumption of alcoholic drinks in the last 12 months. The majority of the recent migrant sample reported consuming fruit and vegetables less than 5 times per day [61.4%; n=4,535], and 37.1% [n=2,871] perceived their physical health as ‘very good’.

Long-Term Migrants

Analysis of sociodemographic variables showed that most long-term migrants resided in Ontario [55.8%; n=11,164], followed by British Columbia [18.3%; n=3,362], Quebec [12.2%; n=2,440], and Alberta [9.4%; n=1880]. All other provinces and three territories accounted for geographical residence of 4.2% of migrants [n=849]. Females accounted for 53.0% [n=10, 116] of all long-term migrants, whereas males accounted for 47.0% [n=8, 977]. Most long-term migrants were in the 45-64 year age category [41.2%; n=8,228]. Most long-term migrants were married or in common-law relatioships [67.5%; n=13,468]. Two person

households accounted for 32.8% of long-term migrants [n=6,545]. The majority of long-term migrants had post-secondary certification [63.4%; n=12,485], and 85.3% [n=17,047] had knowledge of English. As for income, 25.5% [n=5,093] long-term migrants had income in the lowest quintile. Most long-term migrants belonged to a visible minority group [54.3%; n=10,774]. More than half of long-term migrants were physically inactive [52.7%; n=10,225], and 53.9% [n=10,561] have never smoked, and 50.0% [n=9,971] were regular drinkers of of alcohol. The majority of the long-term migrant sample reported consuming fruit and vegetables less than 5 times per day [59.5%; n=11,071], and 34.5% [n=6,880] perceived their physical health as 'very good'. All descriptive statistics for migrants and non-migrants are presented in Table 4.2

Table 4.2 Descriptive statistics for migrants (recent and long-term) and non-migrants, CCHS 2011-2012

Variable	RECENT MIGRANTS		LONG-TERM MIGRANTS		NON-MIGRANTS	
	Weighted count	% recent migrants	Weighted count	% long-term migrants	Weighted count	% non-migrants
SOCIODEMOGRAPHIC VARIABLES						
Province of Residence						
Nfld. & Labrador	15	0.2%	26	0.1%	1815	1.9%
Prince Edward Island	8	0.1%	23	0.1%	496	0.5%
Nova Scotia	49	0.6%	119	0.6%	3,219	3.5%
New Brunswick	27	0.3%	92	0.5%	2,543	2.7%
Quebec	1,483	19.1%	2,440	12.2%	24,103	25.9%
Ontario (reference)	3,404	43.9%	11,164	55.8%	32,303	34.7%
Manitoba	238	3.1%	428	2.1%	3,513	3.8%
Saskatchewan	175	2.3%	136	0.7%	3,228	3.5%
Alberta	1,023	13.2%	1,880	9.4%	10,406	11.2%
British Columbia	1,316	17.0%	3,662	18.3%	11,206	12.0%
Yukon/NWT/Nunavut	12	0.1%	25	0.1%	312	0.3%
Sex						
Female (reference)	3, 811	49.2%	10, 116	53.0%	47,257	50.7%
Male	3, 938	50.8%	8, 977	47.0%	45,887	49.3%
Age						
12-24 years	1,909	24.6%	1,392	7.0%	20,104	21.6%
25-44 years	4,631	59.8%	5,313	26.6%	28,327	30.4%
45-64 years (reference)	1,035	13.4%	8,228	41.2%	30,482	32.7%
65 years and older	174	2.2%	5,061	25.3%	14,231	15.3%

Table 4.2 Descriptive statistics for migrants (recent and long-term) and non-migrants, CCHS 2011-2012 (continued)

Variable	RECENT MIGRANTS		LONG-TERM MIGRANTS		NON-MIGRANTS	
	Weighted count	% recent migrants	Weighted count	% long-term migrants	Weighted count	% non-migrants
Marital Status						
Single/Never Married	2,611	33.8%	3,365	16.9%	53,484	55.2%
Married/Common-law	4,838	62.6%	13,468	67.5%	31,683	32.7%
Widowed/Separated/Divorced	280	3.6%	3,108	15.6%	11,775	12.1%
Household Size						
1 person	682	8.8%	2,684	13.4%	13,770	14.8%
2 persons (reference)	1,759	22.7%	6,545	32.8%	32,997	35.4%
3 persons	1,752	22.6%	3,615	18.1%	17,030	18.3%
4 persons	1,904	24.6%	4,020	20.1%	18,320	19.7%
5 or more persons	1,641	21.2%	3,113	15.6%	10,995	11.8%
Education						
Less than secondary school	1,013	13.3%	3,227	16.4%	19,765	21.5%
Secondary school graduate	914	12.0%	3,124	15.9%	15,924	17.3%
Some post-secondary education	447	5.9%	869	4.4%	6,320	6.9%
Post-secondary certification	5,241	68.8%	12,485	63.4%	49,996	54.3%
First Official Language Spoken						
English (reference)	6,025	77.9%	17,047	85.3%	67,618	72.8%
French	959	12.4%	1,517	7.6%	23,875	25.7%
English & French	281	3.6%	503	2.5%	1,365	1.5%
Neither	471	6.1%	911	4.6%	61	0.1%
Income						
Lowest quintile (reference)	3,166	40.9%	5,093	25.5%	14,450	15.9%
Low-middle quintile	2,036	26.3%	4,909	24.6%	16,572	18.3%
Middle quintile	1,175	15.2%	3,751	18.8%	19,218	21.2%
High-middle quintile	856	11.1%	3,361	16.8%	19,553	21.6%
Highest quintile	500	6.5%	2,850	14.3%	20,892	23.0%
Visible Minority Status						
White (reference)	1,543	20.0%	9,086	45.7%	82,955	89.9%
Visible minority	6,155	80.0%	10,774	54.3%	9,302	10.1%

Table 4.2 Descriptive statistics for migrants (recent and long-term) and non-migrants, CCHS 2011-2012 (continued)

Variable	RECENT MIGRANTS		LONG-TERM MIGRANTS		NON-MIGRANTS	
	Weighted count	% recent migrants	Weighted count	% long-term migrants	Weighted count	% non-migrants
LIFESTYLE VARIABLES						
Physical Activity						
Inactive (reference)	4,368	57.3%	10,225	52.7%	39,859	43.7%
Moderate activity	1,644	21.6%	4,729	24.4%	23,583	25.9%
Active	1,612	21.1%	4,442	22.9%	27,784	30.5%
Smoking						
Never smoked (reference)	5,205	69.2%	10,561	53.9%	35,633	39.0%
Former Smoker	1,590	21.1%	6,679	34.1%	36,810	40.3%
Current Smoker	729	9.7%	2,341	12.0%	18,959	20.7%
Drinking						
No drink in the last 12 months	3,312	42.8%	6,651	33.4%	18,265	19.7%
Occasional Drinker	1,458	18.8%	3,308	16.6%	59,944	64.6%
Regular Drinker	2,974	38.4%	9,971	50.0%	14,521	15.7%
Fruit and Vegetable Consumption						
<5 times per day (reference)	4,535	61.4%	11,071	59.5%	51,429	59.4%
5-10 times per day	2,606	35.3%	6,988	37.6%	31,687	36.6%
>10 times per day	251	3.4%	539	2.9%	3,496	4.0%
HEALTH VARIABLES						
Self-Perceived Health						
Poor	27	0.4%	727	3.6%	2,400	2.6%
Fair	398	5.1%	2,122	10.7%	7,790	8.4%
Good	2,257	29.1%	6,434	32.3%	26,024	28.0%
Very Good	2,871	37.1%	6,880	34.5%	37,604	40.4%
Excellent	2,194	28.3%	3,752	18.8%	19,210	20.6%

4.2 Objective 1

The first study objective was to compare positive and self-perceived mental health of recent and long-term migrants, relative to the non-migrant population, adjusting for sociodemographic, lifestyle, and health-related covariates. This was done by treating migrant status as an independent exposure variable and adjusting for confounding factors. The initial set of analyses examined the effects of all study covariates on the positive mental health of migrants, relative to non-migrants.

4.2.1 Positive Mental Health Classification

Table 4.3 presents the proportions of positive mental health categories among migrants (recent and long-term) and non-migrants. Although results of the full classification are presented, all multivariable models used a dichotomous positive mental health categorical variable where *flourishing* was compared to *moderate-to-languishing* mental health (combined into a single group).

Table 4.3 Positive Mental Health Classification: category distributions for migrants and non-migrants

Positive Mental Health Categorization	**Weighted count [column %]**		
	Recent Migrants	**Long-Term Migrants**	**Non-Migrants**
Languishing	37 [0.5%]	236 [1.3%]	1,344 [1.5%]
Moderate	1,626 [21.9%]	4,221 [22.6%]	18,561 [20.9%]
Flourishing	5,773 [77.6%]	14,182 [76.1%]	68,983 [77.6%]

Results from the unadjusted analysis and subsequent models are shown in Table 4.5. In the unadjusted model, there was no difference between recent migrant and non-migrants in the odds of flourishing mental health (OR=1.00; 95% CI 0.88, 1.15). However, long-term migrants compared to non-migrants may have a lower odds of flourishing mental health, although the confidence interval includes the possibility of a null effect (OR=0.92; 95% CI 0.85, 1.00).

The next set of models controlled for individual blocks of variables, and the estimates obtained from the model that controlled for sociodemographic variables were similar to the crude estimates for recent migrants (OR=1.11; 95% CI 0.95, 1.30) as well as for long-term migrants (OR=0.91; 95% CI 0.83, 1.00), relative to non-migrants. When lifestyle variables were controlled for, the same trends seen in the crude estimates were observed for recent (OR=1.01; 95% CI 0.88, 1.16) and long-term migrants (OR=0.92; 95% CI 0.85, 1.00).

After adjustment for health-related variables, there was no difference in the odds of flourishing mental health in recent (OR=0.91; 95% CI 0.79, 1.04) and long-term migrants (OR=0.97; 95% CI 0.89, 1.06), compared to non-migrants.

In the fully adjusted model, the odds of flourishing mental health were not different between recent migrants and non-migrants (OR=0.98; 95% CI 0.84, 1.15), but they were lower in long-term migrants compared to non-migrants (OR=0.87; 95% CI 0.78, 0.96).

Table 4.4 Positive Mental Health Classification: unadjusted, partially adjusted, and fully adjusted models

Outcome #1: Positive Mental Health Classification (binary)	
	OR (95% CI)
Unadjusted	
Recent Migrants	1.00 (0.88, 1.15)
Long-term Migrants	0.92 (0.85, 1.00)
Partially Adjusted	
Sociodemographic variables[a]	
Recent Migrants	1.11 (0.95, 1.30)
Long-term Migrants	0.91 (0.83, 1.00)
Lifestyle-related variables[b]	
Recent Migrants	1.01 (0.88, 1.16)
Long-term Migrants	0.92 (0.85, 1.00)
Health-related variables[c]	
Recent Migrants	0.91 (0.79, 1.04)
Long-term Migrants	0.97 (0.89, 1.06)
Fully Adjusted*	
Recent Migrants	0.98 (0.84, 1.15)
Long-term Migrants	0.87 (0.79, 0.96)

a: Sociodemographic variables: province of residence, age, sex, marital status, education, household size, income, visible minority status, first official language spoken
b: Lifestyle-related variables: physical activity index, smoking, alcohol consumption, fruit and vegetable consumption
c: Health-related variables: self-perceived health
*adjusted for a, b, and c

4.2.2 Self-Perceived Mental Health

Table 4.5 presents the proportions of perceived mental health categories in migrants and non-migrants. Although results of the full classification are presented here, all multivariable

models used a dichotomous perceived mental health categorical variable where very good/excellent was compared to poor/fair/good perceived mental health (combined into a single group).

Table 4.5 Self-Perceived Mental Health: category distributions for migrants and non-migrants

Self-Perceived Mental Health	**Weighted Count [column %]**		
	Recent Migrants	**Long-Term Migrants**	**Non-Migrant**
Poor/Fair	264 [3.5%]	1,108 [5.7%]	5,318 [5.8%]
Good	1,586 [20.8%]	4,824 [24.9%]	19,656 [21.6%]
Very Good/Excellent	5,767 [75.7%]	13,434 [69.4%]	66,073 [72.6%]

Results from the unadjusted analysis and subsequent models are shown in Table 4.6. In the unadjusted model, the odds of very good or excellent self-perceived mental health were higher in recent migrants compared to non-migrants (OR=1.18; 95% CI 1.04, 1.34), and lower for long-term migrants compared to non-migrants (OR=0.86; 95% CI 0.79, 0.93).

The next set of models controlled for individual blocks of variables, and the estimate obtained from the model that controlled for sociodemographic factors showed that the odds of very good/excellent self-perceived mental health were greater in recent migrants than non-migrants (OR=1.54; CI 1.32, 1.79). In the same model, there was no difference between long-term migrants and non-migrants in the odds of very good or excellent self-perceived mental health (OR=1.06; 95% CI 0.97, 1.15). When lifestyle-related variables were controlled for, the odds of very good or excellent self-perceived mental health were were greater in recent migrants (OR=1.22; 95% CI 1.07, 1.39) and lower in long-term migrants (OR=0.87; 95% CI 0.80, 0.94). When only health-related variables were controlled for, there was no difference with self-perceived mental health according to time spent in Canada.

In the fully adjusted model, the odds of very good/excellent self-perceived mental health were higher for recent migrants (OR=1.31; 95% CI 1.12, 1.54). There was no

difference between long-term migrants and non-migrants in the fully adjusted model (OR=1.03; 95% CI 0.94, 1.13).

Table 4.6 Self-Perceived Mental Health: unadjusted, partially adjusted, and fully adjusted models

Outcome #2: Self-Perceived Mental Health	
	OR (95% CI)
Unadjusted	
Recent Migrants	1.18 (1.04, 1.34)
Long-term Migrants	0.86 (0.79, 0.93)
Partially Adjusted	
Sociodemographic variables[a]	
Recent Migrants	1.54 (1.32, 1.79)
Long-term Migrants	1.06 (0.97, 1.15)
Lifestyle-related variables[b]	
Recent Migrants	1.22 (1.07, 1.39)
Long-term Migrants	0.87 (0.80, 0.94)
Health-related variables[c]	
Recent Migrants	1.04 (0.91, 1.20)
Long-term Migrants	0.96 (0.89, 1.05)
Fully Adjusted*	
Sociodemographic + Lifestyle + Health	
Recent Migrants	1.31 (1.12, 1.54)
Long-term Migrants	1.03 (0.94, 1.13)

a: Sociodemographic variables: province of residence, age, sex, marital status, education, household size, income, visible minority status, first official language spoken
b: Lifestyle-related variables: physical activity index, smoking, alcohol consumption, fruit and vegetable consumption
c: Health-related variables: self-perceived health
*adjusted for a, b, and c

4.2.3 Stratification by Self-Reported Mood or Anxiety Disorders

An exploratory model examined the change in the fully adjusted models for the two study outcomes through stratification on presence or absence of self-reported mood or anxiety disorders.

As shown in Table 4.7, for the first outcome of positive mental health classification, the analysis showed a lower odds of flourishing mental health in long-term migrants without mood and/or anxiety disorders (OR=0.84; 95% CI 0.76, 0.93), however the point estimate for

the mood or anxiety strata are very similar, suggesting that perhaps the sample was too small to reach statistical significance.

Table 4.7 Stratification of Positive Mental Health Classification fully adjusted models by self-reported mood or anxiety disorder

Fully Adjusted Model		
Flourishing vs Moderate-to-Languishing	**Mood or Anxiety Disorder**	**No Mood or Anxiety Disorder**
Recent Migrants	0.90 (0.53, 1.54)	0.95 (0.80, 1.12)
Long-Term Migrants	0.89 (0.65, 1.21)	0.84 (0.76, 0.93)

As shown in Table 4.8 we found no evidence of effect modification for the outcome of self-perceived mental health, as the parameter estimates were similar regardless of whether respondents had a self-reported mood or anxiety disorder, and the direction of the findings is largely similar to our main analyses, albeit no longer statistically significant, likely due to the smaller sample size.

Table 4.8 Stratification of Self-Perceived Mental Health fully adjusted models by self-reported mood or anxiety disorder

Fully Adjusted Model		
Very Good/Excellent vs Poor/Fair/Good	**Mood or Anxiety Disorder**	**No Mood or Anxiety Disorder**
Recent Migrants	1.22 (0.71, 2.10)	1.20 (0.99, 1.42)
Long-Term Migrants	1.08 (0.80, 1.39)	0.97 (0.88, 1.07)

4.2.4 Objective 1: Sensitivity Analysis

For the first study objective, sensitivity analysis using the continuous score for positive mental health did not replicate the results detailed in section 4.2.2, and instead found that recent migrant status was associated with better positive mental health. This sensitivity analysis also did not show a lower positive mental health score among long-term migrants, as in the main analysis, and instead found no difference between long-term migrants relative to non-migrants.

4.3 Objective 2

The second study objective was to explore the sociodemographic, lifestyle, and health-variables that are associated with positive mental health and self-perceived mental health among migrants. This was done by restricting the sample to migrants and examining the fully adjusted models for the two study outcomes. Only the fully adjusted models are discussed in this section, while all results are available in Table 4.9. Results of the sensitivity analysis for the continuous positive mental health score are presented in Appendix B.

4.3.1 Positive Mental Health Classification

The results of the unadjusted and fully adjusted model are presented in Table 4.9. Migrants in Newfoundland & Labrador relative to those in Ontario had lower odds of flourishing mental health (OR=0.34; 95% CI 0.13, 0.90). The same trend was observed for migrants in British Columbia, compared to those in Ontario, who had lower odds of flourishing mental health (OR=0.77; 95% CI 0.64, 0.93). The odds of flourishing mental health were lower in migrants in the 12-24 years of age category, compared to 45-64 years (OR=0.71; 95% CI 0.52, 0.99), and in those in the 25-44 years of age category compared to 45-64 years (OR=0.76; 95% CI 0.62, 0.93). Conversely, the older migrants (65 years and older) had higher odds of flourishing mental health, relative to those in the 45-64 years age group (OR=1.31; 95% CI 1.08, 1.60). Migrants with some post-secondary education compared to those with post-secondary certification had a higher odds of flourishing mental health (OR=1.30, 95% CI 1.03, 1.63). Migrants with income in the highest quintile had higher odds of flourishing mental health (OR=1.31; 95% CI 1.02, 1.69). High physical activity in migrants, compared those who were inactive, was associated with a higher odds of flourishing mental health (OR=1.49; 95% CI 1.24, 1.79). Migrants who consumed fruits and vegetables 5-10 times per day, compared to those who consumed < 5 per day, had a higher odds of flourishing mental health (OR=1.36; 95% CI 1.16, 1.59), as did those who consumed fruits and vegetables>10 times per day (OR=1.76; 95% CI 1.06, 2.93). Migrant respondents who perceived their physical health as less than excellent (compared to very good) all had reduced odds of flourishing mental health. However, migrants who perceived their physical health as excellent compared to very good had higher odds of flourishing mental health (OR=1.69; 95% CI 1.36, 2.09).

Table 4.9 Positive Mental Health Classification (Flourishing vs Moderate-to-Languishing) in migrants: unadjusted and fully adjusted models

Positive Mental Health Classification: *Flourishing vs Moderate-to-Languishing Mental Health*	**UNADJUSTED**	**FULLY ADJUSTED**
	OR (95% CI)	**OR (95% CI)**
SOCIODEMOGRAPHIC VARIABLES		
Province of Residence		
Ontario (reference)		
Newfoundland & Labrador	0.47 (0.20, 1.10)	0.35 (0.13, 0.90)
Prince Edward Island	1.56 (0.77, 3.15)	1.44 (0.67, 3.13)
Nova Scotia	0.75 (0.44, 1.29)	0.63 (0.36, 1.11)
New Brunswick	0.75 (0.41, 1.37)	0.76 (0.39, 1.47)
Quebec	1.02 (0.84, 1.24)	1.11 (0.83, 1.48)
Manitoba	1.04 (0.72, 1.50)	1.02 (0.69, 1.50)
Saskatchewan	1.26 (0.84, 1.89)	1.14 (0.73, 1.76)
Alberta	1.00 (0.79, 1.26)	0.94 (0.73, 1.22)
British Columbia	0.80 (0.67, 0.95)	0.77 (0.64, 0.93)
Yukon/NWT/Nunavut	1.55 (1.07, 2.26)	
Age (years)		
12-24 years	0.95 (0.76, 1.19)	0.71 (0.51, 0.99)
25-44 years	0.94 (0.80, 1.11)	0.76 (0.62, 0.93)
45-64 years (reference)		
65 years and older	1.06 (0.89, 1.26)	1.31 (1.08, 1.60)
Sex		
Female (reference)		
Male	0.99 (0.87, 1.13)	0.96 (0.82, 1.11)
Marital status		
Married/Common-Law (reference)		
Single/Never Married	0.76 (0.65, 0.89)	0.82 (0.65, 1.02)
Widow/Sep/Divorced	0.69 (0.58, 0.83)	0.81 (0.63, 1.05)
Household size		
1 person	0.74 (0.64, 0.86)	0.88 (0.71, 1.08)
2 persons (reference)		
3 persons	1.04 (0.86, 1.26)	1.12 (0.91, 1.37)
4 persons	1.14 (0.93, 1.39)	1.19 (0.94, 1.51)
5 or more persons	1.10 (0.89, 1.36)	1.17 (0.92, 1.50)

Table 4.9 Positive Mental Health Classification (Flourishing vs Moderate-to-Languishing) in migrants: unadjusted and fully adjusted models (continued)

Positive Mental Health Classification: *Flourishing vs Moderate-to-Languishing Mental Health*	**UNADJUSTED**	**FULLY ADJUSTED**
	OR (95% CI)	**OR (95% CI)**
Education		
Less than secondary school graduate	0.91 (0.76, 1.09)	1.04 (0.85, 1.26)
Secondary school graduate	0.84 (0.63, 1.13)	1.09 (0.77, 1.55)
Some post-secondary education	1.13 (0.95, 1.36)	1.30 (1.03, 1.63)
Post-secondary certification (reference)		
First official language spoken		
Neither	1.07 (0.73, 1.56)	1.10 (0.71, 1.70)
English (reference)		
French	1.00 (0.80, 1.25)	0.95 (0.68, 1.33)
English & French	1.20 (0.83, 1.74)	1.09 (0.71, 1.67)
Income (quintiles)		
Lowest quintile (reference)		
Low-middle quintile	1.08 (0.90, 1.29)	0.95 (0.78, 1.17)
Middle quintile	1.29 (1.06, 1.57)	1.15 (0.92, 1.44)
High-middle quintile	1.30 (1.06, 1.61)	1.18 (0.93, 1.50)
Highest quintile	1.47 (1.20, 1.81)	1.31 (1.02, 1.69)
Minority Status		
White (reference)		
Visible minority	0.99 (0.87, 1.13)	1.07 (0.91, 1.26)
Length of Time in Canada Since Migration		
0-9 years	1.09 (0.94, 1.27)	1.17 (0.97, 1.41)
10+ years (reference)		
LIFESTYLE VARIABLES		
Physical Activity Index		
Inactive (reference)		
Moderate activity	1.28 (1.09, 1.51)	1.18 (0.99, 1.41)
Active	1.74 (1.47, 2.06)	1.49 (1.24, 1.79)
Smoking		
Non-smoker (reference)		
Former Smoker	0.98 (0.85, 1.13)	1.02 (0.86, 1.20)
Current Smoker	0.79 (0.64, 0.98)	0.98 (0.78, 1.24)

Table 4.9 Positive Mental Health Classification (Flourishing vs Moderate-to-Languishing) in migrants: unadjusted and fully adjusted models (continued)

Positive Mental Health Classification: *Flourishing vs Moderate-to-Languishing Mental Health*	**UNADJUSTED**	**FULLY ADJUSTED**
	OR (95% CI)	**OR (95% CI)**
Drinking		
No Drink Last 12 months	1.05 (0.91, 1.22)	1.17 (0.98, 1.39)
Occasional Drinker	1.02 (0.86, 1.23)	1.15 (0.94, 1.40)
Regular Drinker (reference)		
Fruit and Vegetable consumption		
<5 times per day (reference)		
5-10 times per day	1.50 (1.30, 1.73)	1.36 (1.16, 1.59)
>10 times per day	1.89 (1.18, 2.98)	1.76 (1.06, 2.93)
HEALTH VARIABLES		
Self-Perceived Health		
Poor	0.26 (0.18, 0.32)	0.23 (0.16, 0.34)
Fair	0.57 (0.45, 0.73)	0.52 (0.40, 0.68)
Good	0.71 (0.61, 0.84)	0.70 (0.59, 0.83)
Very Good (reference)		
Excellent	1.71 (1.39, 2.10)	1.69 (1.36, 2.09)

4.3.2 Self-Perceived Mental Health

Table 4.10 presents the findings from the unadjusted and fully adjusted analyses with the self-perceived mental health binary outcome (Very good/Excellent vs Poor/Fair/Good) in the migrant sub-sample. Migrants who lived in Newfoundland and Labrador (OR=0.23; 95% CI 0.08, 0.65), New Brunswick (OR=0.44; 95% CI 0.24, 0.79), and British Columbia (OR=0.65; 95% CI 0.54, 0.78) reported lowed odds of perceiving their mental health as very good or excellent, relative to those living in Ontario. Migrants who were in the oldest category (65 years and older) had higher odds of perceiving their mental health as very good or excellent, relative to those in the 45-64 years age category (OR=1.44; 95% CI 1.19, 1.75). Migrants with less than secondary education, relative to those with post-secondary certification, had lower odds of reporting very good/excellent self-perceived mental health (OR=0.86; 95% CI 0.43, 0.92). Income in the high-middle, compared to lowest quintile, was associated with higher odds of reporting very good/excellent self-perceived mental health (OR=1.34; 95% CI

1.07, 1.67), as well as in migrants with income in the highest quintile compared to those in the lowest (OR=1.47; 95% CI 1.14, 1.90). Recent migrants to Canada (0-9 years since migration) compared to long-term migrants had a higher odds of perceiving their mental health as very good or excellent (OR=1.23; 95% CI 1.01, 1.50). Migrants who perceived their physical health as good (compared to very good) had a lower odds of very good or excellent self-perceived mental health (OR=0.23; 95% CI 0.20, 0.27). In contrast, migrants who perceived their physical health as excellent, compared to very good, had higher odds of very good or excellent self-perceived mental health (OR=1.67; 95% CI 1.31, 2.13).

Table 4.10 Self-Perceived Mental Health (Very good/Excellent vs Poor/Fair/Good) in migrants: unadjusted and fully adjusted models

Self-Perceived Mental Health: Very Good/Excellent vs Poor/Fair/Good	**UNADJUSTED**	**FULLY ADJUSTED**
	OR (95% CI)	**OR (95% CI)**
SOCIODEMOGRAPHIC VARIABLES		
Province of residence		
Ontario (reference)		
Newfoundland & Labrador	0.48 (0.21, 1.07)	0.23 (0.08, 0.65)
Prince Edward Island	1.15 (0.55, 2.38)	0.95 (0.38, 2.35)
Nova Scotia	1.20 (0.70, 2.07)	1.01 (0.57, 1.79)
New Brunswick	0.59 (0.36, 0.99)	0.44 (0.24, 0.79)
Quebec	0.91 (0.74, 1.11)	1.03 (0.77, 1.38)
Manitoba	0.87 (0.65, 1.18)	0.88 (0.63, 1.22)
Saskatchewan	1.18 (0.82, 1.70)	0.89 (0.58, 1.36)
Alberta	1.02 (0.81, 1.28)	0.98 (0.76, 1.27)
British Columbia	0.71 (0.60, 0.83)	0.65 (0.54, 0.78)
Yukon/NWT/Nunavut	1.09 (0.78, 1.52)	
Age (years)		
12-24 years	1.66 (1.33, 2.05)	1.22 (0.85, 1.74)
25-44 years	1.23 (1.05, 1.45)	0.84 (0.69, 1.02)
45-64 years (reference)		
65 years and older	0.94 (0.80, 1.10)	1.44 (1.19, 1.75)

Table 4.10 Self-Perceived Mental Health (Very good/Excellent vs Poor/Fair/Good) in migrants: unadjusted and fully adjusted models (continued)

Self-Perceived Mental Health: Very Good/Excellent vs Poor/Fair/Good	**UNADJUSTED**	**FULLY ADJUSTED**
	OR (95% CI)	**OR (95% CI)**
Sex		
Female (reference)		
Male	1.18 (1.04, 1.34)	1.00 (0.87, 1.16)
Marital Status		
Married/Common-Law (reference)		
Single/Never Married	1.16 (1.05, 1.36)	1.05 (0.84, 1.32)
Widow/Sep/Divorced	0.54 (0.45, 0.65)	0.78 (0.59, 1.05)
Household size (number of persons)		
1 person	0.70 (0.61, 0.80)	0.84 (0.66, 1.06)
2 persons (reference)		
3 persons	0.98 (0.81, 1.19)	0.97 (0.78, 1.19)
4 persons	0.96 (0.79, 1.16)	0.90 (0.72, 1.12)
5 or more persons	0.82 (0.67, 0.99)	0.86 (0.67, 1.10)
Education		
Less than secondary school graduate	0.79 (0.66, 0.94)	0.86 (0.43, 0.92)
Secondary School Graduate	0.87 (0.64, 1.18)	1.01 (0.58, 1.11)
Some post-secondary education	0.53 (0.45, 0.64)	0.66 (0.69, 1.69)
Post-secondary certification (reference)		
First official language spoken		
Neither	0.41 (0.29, 0.56)	0.63 (0.43, 0.92)
English (reference)		
French	0.82 (0.66, 1.02)	0.80 (0.58, 1.11)
English & French	1.33 (0.93, 1.90)	1.08 (0.69, 1.69)
Income (quintiles)		
Lowest quintile (reference)		
Low-middle quintile	1.21 (1.01, 1.44)	1.00 (0.82, 1.21)
Middle quintile	1.56 (1.30, 1.87)	1.21 (0.97, 1.51)
High-middle quintile	1.79 (1.47, 2.19)	1.34 (1.07, 1.67)
Highest quintile	2.20 (1.76, 2.75)	1.47 (1.14, 1.90)
Minority Status		
White (reference)		
Visible minority	0.88 (0.78, 1.00)	0.96 (0.81, 1.13)
MIGRATION-SPECIFIC VARIABLES		
Length of Time in Canada Since Migration		
0-9 years	1.38 (1.19, 1.59)	1.23 (1.01, 1.50)
10+ years (reference)		

Table 4.10 Self-Perceived Mental Health (Very good/Excellent vs Poor/Fair/Good) in migrants: unadjusted, and fully adjusted models (continued)

Self-Perceived Mental Health: Very Good/Excellent vs Poor/Fair/Good	**UNADJUSTED**	**FULLY ADJUSTED**
	OR (95% CI)	**OR (95% CI)**
LIFESTYLE VARIABLES		
Physical Activity Index		
Inactive (reference)		
Moderate activity	1.17 (0.99, 1.37)	0.88 (0.75, 1.05)
Active	1.77 (1.52, 2.06)	1.03 (0.87, 1.22)
Smoking		
Non-smoker (reference)		
Former Smoker	1.08 (0.94, 1.25)	1.11 (0.94, 1.31)
Current Smoker	0.82 (0.65, 1.02)	0.89 (0.71, 1.11)
Drinking		
No Drink Last 12 months	0.75 (0.65, 0.87)	1.05 (0.88, 1.27)
Occasional Drinker	0.86 (0.72, 1.02)	1.06 (0.87, 1.28)
Regular Drinker (reference)		
Fruit and Vegetable Consumption		
<5 times per day (reference)		
5-10 times per day	1.23 (1.08, 1.41)	1.11 (0.96, 1.28)
>10 times per day	1.27 (0.81, 2.00)	1.24 (0.76, 2.00)
HEALTH VARIABLES		
Self-Perceived Health		
Poor	0.11 (0.08, 1.15)	0.10 (0.07, 1.15)
Fair	0.12 (0.10, 1.16)	0.12 (0.10, 1.16)
Good	0.24 (0.20, 0.28)	0.23 (0.20, 0.27)
Very Good (reference)		
Excellent	1.72 (1.36, 2.18)	1.67 (1.30, 2.13)

4.3.3 Objective 2: Sensitivity Analysis

For the second study objective, sensitivity analysis using the positive mental health score variable confirmed trends detailed in section 4.3.1 for province of residence (Newfoundland & Labrador and British Columbia versus Ontario), as well as findings for age, high physical activity, fruit and vegetable consumption, and self-perceived health. The sensitivity analysis

did not show consistent findings for the effect of education and income. Furthermore, sensitivity analysis suggest some additional interesting findings, where migrants who resided in Quebec, relative to those in Ontario, had lower positive mental health, as well as lower positive mental health in single individuals (compared to married/common-law), those living alone compared to 2 person households, those engaging in smoking behaviour compared to not smoking, and in those with physical health status rated less than excellent versus very good. The sensitivity analysis also found better positive mental health in those living in households of 5 or more persons relative to 2 person households, with less than secondary education compared to post-secondary certification, and in visible minorities compared to those who identified as white. The sensitivity analysis also showed trends consistent with the healthy migrant effect, where recent migrants had better positive mental health compared to long-term migrants. The same trend was observed in migrants who reported not consuming alcohol relative to regular drinkers.

Chapter 5

5 Discussion

The main objective of this study was to examine positive mental health among migrants in Canada, relative to non-migrants, and subsequently in migrant-specific analyses. This study used data from the Canadian Community Health Survey, a nationally representative cross-sectional survey that collects population-level information. Unlike other studies that examined positive mental health using non-specific scales and proxy-measures, such as only self-rated mental health, the present study used a scale that was based on the dual continuum of mental health and an additional measure of self-rated mental health. Lastly, sociodemographic, lifestyle, and health-related covariates were examined, and an exploratory moderation analysis based on presence of self-reported mood or anxiety disorders was conducted.

5.1 Overview of Findings

5.1.1 Objective 1

The present study found that long-term migrants had a lower prevalence of flourishing mental health, and that recent migrants had a higher prevalence of high self-rated mental health. Although these findings for the two study outcomes may seem contradictory, they align with the available literature that suggests that the healthy migrant effect tends to dissipate over time.[2] Therefore, it is not surprising that in migrants who have resided in Canada for over 10 years the initial positive benefits of the migratory experience have diminished, and they are less likely to have flourishing mental health than Canadian-born respondents. For the second study outcome of self-perceived mental health, we observed an association in the opposite direction from what was seen with the first outcome, and found that recent migrants rated their own mental health more favourably compared to non-migrants. This finding supports the healthy migrant effect where migrants who have resided in Canada under 10 years are benefitting from the positive changes associated with the migratory experience, and this is reflected in their own perception of their mental health. Positive experience in the early post-migration period, such as better living conditions,

improved food and shelter security, and physical safety may explain the findings observed with the second study outcome.

The sensitivity analysis for the first study outcome revealed opposite results to what was initially observed, and also suggested the presence of the healthy migrant effect, where recent migrants had a higher prevalence of flourishing mental health. These inconsistent findings may be explained by the use of the different scales between the two outcomes, and the ability of the continuous score to detect more subtle differences in positive mental health. Although recent migrants had a similar prevalence of flourishing mental health as non-migrants, there was an indication of an overall positive association with better positive mental health relative to non-migrants. Additionally, because of the dichotomous nature of the time spent in Canada variable, very recent migrants (for example, <1 year) are treated the same as those who have been in Canada for 8 or 9 years. There is likely a lot of variation in the post-migration factors and challenges that migrants encounter that fluctuate with the time spent in Canada. Furthermore, the distribution of study covariates may also be different between these different durations of residence.

5.1.2 Objective 2

The results of the present study on the factors associated with positive mental health among migrants do not have a direct comparison in the literature, as no studies have examined positive mental health in migrants using the mental health continuum. The present study identified several common threads for the two study outcomes in the fully adjusted models, and the most salient findings are discussed. Findings from the sensitivity analyses are also discussed.

Migrants who resided in British Columbia and Newfoundland & Labrador were less likely to have flourishing mental health, and to rate their own mental health as more favourable, and this could partially be due to province-specific characteristics such as the relatively high cost of living in British Columbia[78] or due to myriad of factors associated with the lowest migrant retention rate of any Canadian provinces documented in Newfoundland.[79] Although highly important, these inter-provincial differences are beyond the scope of this thesis.

As for age, there was some evidence that flourishing mental health was not present in migrants under 45 years of age. Contrary to this, older migrants had flourishing mental health, as well as a favourable perception of their mental health status. These different findings may be explained by the distinct emotional, psychological, and social dimensions and expectations associated with life these stages, or by the different phases of the migratory experience of younger and older migrants. These factors were not specifically examined in the present study.

The present study has identified income as a factor that was consistently associated with flourishing mental health, and higher perception of own mental health in migrants. This finding follows a gradient where the magnitude of the association increases with an increase in income, and has been reported by many other studies which link higher income to better mental health outcomes.[48]

As for education, higher educational attainment in migrants was associated with flourishing mental health, as previously reported in the literature.[24] Conversely, lower educational attainment in migrants was associated with lower positive mental health score in the sensitivity analysis, and with unfavourable perception of own mental health, which has also been previously reported.[45] However, these findings should be interpreted with caution as the CCHS captures highest educational attainment for the overall household, and this may not be refelective of the respondents who provided answers about their positive and self-perceived mental health.

The findings of the present study suggest a clear association between high levels of physical activity and flourishing mental health, and this was confirmed by the sensitivity analysis using the continuous positive mental health score. Although there is no direct support in the literature for this finding, it is in line with studies that suggest beneficial effects of physical activity on happiness,[57] which is one of the dimensions of the MHC-SF instrument.

One interesting finding from the present study was the effect of fruit and vegetable consumption on the likelihood of having flourishing mental health in migrants, where an almost dose-dependent relationship was observed. This finding parallels previous research[13]

which has indicated the importance of nutrition as a behavioural correlate in mental well-being and mental health, and was confirmed by the sensitivity analysis

The healthy migrant effect was evident in the present study, as recent migrants rated their own mental health more favourably than non-migrants. Migrants who relocate to Canada undergo a health screen prior to migration and are generally in better physical and mental health than non-migrants in the host country.[2] The healthy migrant effect could be a residual effect of better physical and mental status in the post-migration period, along with many positive migratory changes such as increased shelter and food security, and physical safety.[3]

A very consistent and strong negative finding was observed for both study outcomes in migrants who rated their own physical health as less than good. Self-rated physical health status can be a good correlate of physician-rated health status,[80] however, health-related factors contributing to this rating of physical health were not explored in the present study Contrary to that, migrants who perceived their physical health as excellent were more likely to have flourishing mental health and to perceive their own mental health more favourably. Taken together, these findings, which are known in the literature, suggests that the psychological, emotional, and social burden associated with poor physical health are important determinants of positive mental health,[29] and support the interconnectedness of physical and mental health outcomes.[67]

5.2 Implications of Findings for Promotion of Migrant Positive Mental Health

The findings of this study provide information about factors that contribute to the positive mental health of migrants, adding to the vast body of literature that is mainly focused on factors contributing to mental illness. Identification of these factors can support the promotion of mental health in migrants through education about positive lifestyle habits and identification of modifiable factors, such as fruit/vegetable consumption and exercise. Because of the dynamic relationship between mental illness and mental health, strategies that are geared toward promotion of positive mental health in migrants may also result in a

beneficial effect for mental illness, although this was not assessed in the present study. Lastly, advice and education regarding the promotion of positive mental health, as opposed to mental illness, may be met with more acceptance and less stigmatization among migrants, as the focus is shifted away from the more sensitive aspects of mental illness. There should be efforts to ensure knowledge translation about positive mental health in migrants is communicated in multiple languages, and promotion of positive mental health in this group should receive as much attention as the prevention of mental illness.

5.3 Strengths

5.3.1 Sample Size

One of the main strengths of the present study was the use of a large sample with almost 125,000 respondents in the 2011-2012 cycles, which is representative of approximately 98% of the Canadian population aged 12 years and older (N=29,335,211).[70] Migrant mental health research is often limited by the lack of sizeable datasets, and the large sample size of the present study helps address this gap in research.[52] Another strength of this study is the application of a missing data procedure. Unlike complete case analysis, where the incomplete records are excluded, potentially introducing bias, the process of multiple imputation preserved statistical power by filling in missing values and not excluding respondents. Furthermore, the main study outcomes on positive mental health and self-perceived mental health were available as common content for both survey years and were asked of all respondents, allowing for comprehensive representation across all provinces. As observed from the literature review, studies on positive mental health have rarely been done on large population-based samples, which may limit the generalizability of the findings.

5.4 Limitations

One of the main limitations of the present study is the loss of information resulting from switching from the full CCHS database to the PUMF. This resulted in categorization of critical demographic variables (for example, age), and most importantly, resulted in the loss of information about country of origin for migrant respondents. The PUMF dichotomizes country of origin into Canada and not-Canada, whereas the complete file provides specific geographic origin which allows for more in-depth analyses of the heterogeneity of the migrant group. Although the present study used robust measures of positive mental health, detailed analyses of country of origin were not possible because of this dichotomization, which meant that differences between culturally diverse countries were not explored.

Another limitation of the present study is that there was no information about migrant class and nature of migration, and this study was not able to evaluate the heterogeneity of migrant classes and diversity of the migratory experiences. The 2011-2012 CCHS data used in this study was not linked to any external database that would provide additional

information about the nature of migration. As this information was not available, results may not be applicable to all groups of migrants because mental health largely depends on social and political constructs associated with countries of origin, as well as distinct personal experiences and migration journeys. Similarly, the present study was not able to distinguish first generation migrants from second generation migrants, as information about migrant generation status was not provided in the PUMF.

In addition, the present study was not able to evaluate the effect of urban versus rural place of residence on positive mental health and self-perceived mental health. There are known physical health disparities (measured as life-expectancy or chronic conditions) between urban and rural dwellers,[81] and exploring this factor would have been important and justified in the context of positive mental health. Lastly, CCHS 2011-2012 only captured information on biological sex and not gender, and this variable does not allow for adequate analysis according to gender.

As information on income was not collected in the three territories, multivariable models for the two study outcomes did not include information from those regions of Canada, suggesting that the findings of the present study are not representative of positive mental health of those residing in the three territories.

Although the present study examined positive mental health as flourishing versus moderate-to-languishing, individual aspects of the three factor model of positive mental health – which includes emotional, social, and psychological well-being – were not analyzed. There is also a possibility that migrants may differ on some of these three aspects of positive mental health but not all, and using an aggregate measure of positive mental health may overlook these subtle differences. Although this may seem as a limitation, one of the reasons for deciding against this approach is the lack of support for the social well-being factor in the MHC-SF in a study that used same sample of respondents, 2011-2012 CCHS.[43]

Furthermore, findings for the positive mental health outcome should be interpreted with caution for individuals in the 12-24 age category, as this outcome was evaluated with both the adolescent and the adult versions of the MHC-SF. There may also be a lot of variation in the level of maturity, comprehension, and education in this age group which

would impact their ability to respond to these questions, and this could not be explored in the present analyses.

As all measures in the CCHS are based on self-report, there is a possibility of recall bias, social desirability bias, and response bias. In particular, measures that assess consumption of tobacco, alcohol, and fruits and vegetables should be interpreted with caution as they may not indicate true levels of consumption. Intake of tobacco and alcohol may be underestimated as those may be perceived as negative behaviours, whereas consumption of fruits and vegetables, which tends to be seen as a positive behaviour, may be overestimated. Furthermore, as the fruit and vegetable consumption variable indicates only frequency, and not serving size or nutritional composition, this may not be an entirely reliable measure of nutrition. Lastly, limitations with measures of anxiety and mood disorders should also be acknowledged as these are entirely based on self-report and do not assess severity or whether these conditions have ever been diagnosed by a physician.

By design, the CCHS is a cross-sectional survey, and it is not possible to establish temporality in positive mental health outcomes among migrants. Despite examining the time spent in Canada after migration, the true duration of the three outcomes was not evaluated (i.e. participants were not asked about changes in positive mental health over time). The dichotomization of time spent in Canada after migration is another limitation, as there may be heterogeneity in the recent migrant group, where post-migration factors may differ for those who have recently arrived in Canada compared to those who have been in Canada for longer period. Due to the cross-sectional nature of the survey, it is possible that some of the observed associations are due to reverse causality, such as the potential effect positive mental health on physical activity or fruit and vegetable consumption.

As mentioned previously, the present study did not explore the effects of social connectedness, religiousness, or social provision in migrants. These important social determinants were initially investigated for inclusion in the present study; however, due to non-uniform data collection across provinces and territories, these variables were ultimately not included in the present analyses.

Although the present study may suggest that in general migrants in Canada are doing well from a positive mental health perspective, these findings should be interpreted in the

context of available data and study limitations. There is a lot of unexplored heterogeneity within the migrant group in terms of country of origin, migration class, migratory experiences, levels of trauma and resilience, social connectedness, and spirituality and religiousness. This unexplored variation may affect risk for poor mental health among migrants. Furthermore, the data used in the present study were collected in 2011 and 2012, and current research on migrant mental health highlights many ongoing barriers and challenges migrants in Canada experience almost a decade after these data were collected;[82] thus, replication of this work in more recent datasets would be warranted.

5.5 Future Directions

Building on findings and limitations of the present study, future studies should examine the effects of country of origin and migrant class (economic, family-based, or refugee) on the positive mental health of migrants, to disentangle the heterogeneity within the migrant group.[29] Positive mental health could also be included in datasets that are linked to national migration registries. A recent study that linked the 2011-2014 CCHS to the Longitudinal Immigration Database (IMDB) demonstrated the importance of studying mental health of migrants in databases that have detailed information about migrant admission categories, countries of origin, and duration since landing, while also having a Canadian-born reference group.[52] Accounting for these potentially relevant migration-specific factors could reveal differences in migrant positive mental health that could not be addressed in the present study.

As the positive mental health module was not evaluated in every cycle of the CCHS, importance should be placed on including this module in future cycles of the survey to accurately measure the positive mental health of both migrants and Canadian-born respondents. Having an accurate representation of the mental health of Canadians is arguably equally important as information on the prevalence of mental illness.

5.6 Conclusions

The present study examined the association between migrant status and positive and self-perceived mental health using a nationally representative population-based survey. The present study found that time spent in Canada since migration affects positive mental health

in migrants, as well as their own perception of mental health. Furthermore, several important factors that contribute to better positive mental health or self-perceived mental health were identified. Education about positive effects of healthy lifestyle choices in migrants, such as physical exercise and fruit and vegetable consumptions should be encouraged, as these contribute to better mental and physical health. It is suggested that future studies should examine measures of positive mental health in databases linked with national migration registries to better understand the heterogeneity of migrant admission groups, countries of origin, and migration experiences. The present study contributes to the growing body of knowledge in the reconceptualization of mental health as the positive phenomenon that is more than simply the absence of mental illness.

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Appendices

Appendix A: The Mental Health Continuum – Short Form (MHC-SF)

Adult MHC-SF (ages 18 or older)

Please answer the following questions are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month, how often did you feel …	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	ABOUT 2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
1. happy						
2. interested in life						
3. satisfied with life						
4. that you had something important to contribute to society						
5. that you belonged to a community (like a social group, or your neighborhood)						
SEE BELOW 6. that our society is a good place, or is becoming a better place, for all people						
7. that people are basically good						
8. that the way our society works makes sense to you						
9. that you liked most parts of your personality						
10. good at managing the responsibilities of your daily life						
11. that you had warm and trusting relationships with others						
12. that you had experiences that challenged you to grow and become a better person						
13. confident to think or express your own ideas and opinions						
14. that your life has a sense of direction or meaning to it						

Note: The original wording for item 6 was "that our society is becoming a better place for people like you." This item does not work in all cultural contexts. However, when validating the MHC-SF, test both versions of item 6 to see which one works best in your context

Adolescent MHC-SF (ages 12 to 18)

Please answer the following questions are about how you have been feeling during the past month. Place a check mark in the box that best represents how often you have experienced or felt the following:

During the past month, how often did you feel …	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
1. happy						
2. interested in life						
3. satisfied with life						
4. that you had something important to contribute to society						
5. that you belonged to a community (like a **social group, your school, or your neighborhood**)						
SEE BELOW 6. that our society is a good place, or is becoming a better place, for all people						
7. that people are basically good						
8. that the way our society works made sense to you						
9. that you liked most parts of your personality						
10. good at managing the responsibilities of your daily life						
11. that you had warm and trusting relationships with others						
12. that you had experiences that challenged you to grow and become a better person						
13. confident to think or express your own ideas and opinions						
14. that your life has a sense of direction or meaning to it						

Note: The original wording for item 6 was "that our society is becoming a better place for people like you." This item does not work in all cultural contexts. However, when validating the MHC-SF, test both versions of item 6 to see which one works best in your context.

The *Mental Health Continuum-Short Form* (MHC-SF) Scoring

Continuous Scoring: Sum, 0-70 range (use 10 point categories if desired).
Categorical Diagnosis: a diagnosis of flourishing is made if someone feels 1 of the 3 hedonic well-being symptoms (items 1-3) "every day" or "almost every day" and feels 6 of the 11 positive functioning symptoms (items 4-14) "every day" or "almost every day" in the past month. Languishing is the diagnosis when someone feels 1 of the 3 hedonic well-being symptoms (items 1-3) "never" or "once or twice" and feels 6 of the 11 positive functioning symptoms (items 4-8 are indicators of Social well-being and 9-14 are indicators of Psychological well-being) "never" or "once or twice" in the past month. Individuals who are neither "languishing" nor "flourishing" are then coded as "moderately mentally healthy."

Symptom Clusters and Dimensions:
Cluster 1; Items 1-3 = *Hedonic,* Emotional Well-Being

Cluster 2; Items 4-8 = *Eudaimonic,* Social Well-Being
Item 4 = Social Contribution
Item 5 = Social Integration
Item 6 = Social Actualization (i.e., Social Growth)
Item 7 = Social Acceptance
Item 8 = Social Coherence (i.e., Social Interest)

Cluster 3; Items 9-14 = *Eudaimonic,* Psychological Well-Being
Item 9 = Self Acceptance
Item 10 = Environmental Mastery
Item 11 = Positive Relations with Others
Item 12 = Personal Growth
Item 13 = Autonomy Item 14 = Purpose in Life

Appendix B: Sensitivity Analysis

To assess the robustness of our findings to the categorization of the positive mental health variable, we conducted a sensitivity analysis using the continuous Positive Mental Health score.

Note on Positive Mental Health Continuous Score

Normality of the continuous positive mental health score was explored. Formal tests of normality indicated a non-normal variable and various transformations (natural log, power, square root, inverse, etc.) of this outcome variable failed to produce normality. For continuous outcomes with 3000 observations or more, linear regression may be valid even if the assumption of normality is violated.[83] This deviation from the assumption of normality relies on the central limit theorem, which proposes that in large samples the distribution of sample means approaches normality.[83] This approach is useful in large public health databases, like the CCHS, where the samples are sufficiently large, therefore the use of linear regression is justified even when the outcome is not normally distributed.[84] Therefore, no transformations were conducted on the continuous positive mental health score variable.

Objective 1: Sensitivity Analysis

The mean positive mental health score for migrants was (mean ± SD) 55.43 ±10.06, compared to 54.97 ±10.42 for non-migrants.

Results from the unadjusted analysis and subsequent models are shown in Table 1. In the unadjusted model, recent migrant status was positively associated with positive mental health score (β=1.04; 95% CI 0.50, 1.58), however no difference was observed for long-term migrants.

Next, each group of covariates (sociodemographic, lifestyle, and health) were controlled for in separate models, and the change in the estimate was noted. When all sociodemographic variables were controlled for, the estimates for both recent and long-term migrants were similar to the crude estimates. The same trend was observed when all lifestyle related covariates were controlled for (i.e. estimated for both recent and long-term migrants paralleled the findings from the unadjusted models). In the third model, where all health-related variables were controlled for, recent migrant status was no longer associated with the

positive mental health score (β =0.42; 95% CI -0.11, 0.94), however, long-term migrant status became positively associated with positive mental health score (β =0.47; 95% CI -0.07, 0.87). In the final fully adjusted model recent migrant status remained positively associated with positive mental health score (β=0.63; 95% CI 0.03, 1.23), and there was no association between long-term migrant status and positive mental health score (β=-0.34; 95%CI -0.79, 0.10). Results from the unadjusted, partially adjusted, and fully adjusted models are shown in Table 1.

Table 1 Positive Mental Health Score: unadjusted, partially adjusted, and fully adjusted models

Positive Mental Health Score – Sensitivity Analysis	
	β (95% CI)
Unadjusted	
Recent Migrants	1.04 (0.50, 1.58)
Long-term Migrants	0.20 (-0.21, 0.60)
Partially adjusted	
Sociodemographic variables[a]	
Recent Migrants	1.63 (0.99, 2.27)
Long-term Migrants	0.01 (-0.45, 0.47)
Lifestyle-related variables[b]	
Recent Migrants	0.84 (0.31, 1.38)
Long-term Migrants	0.05 (-0.35, 0.46)
Health-related variables[c]	
Recent Migrants	0.42 (-0.11, 0.94)
Long-term Migrants	0.47 (0.07, 0.87)
Fully Adjusted*	
Recent Migrants	0.63 (0.03, 1.23)
Long-term Migrants	-0.34 (-0.79, 0.10)

a: Sociodemographic variables: province of residence, age, sex, marital status, education, household size, income, visible minority status, first official language spoken
b: Lifestyle-related variables: physical activity index, smoking, alcohol consumption, fruit and vegetable consumption
c: Health-related variables: perceived health
self-perceived health
*adjusted for a, b, and c

An exploratory model examined the change in the fully adjusted models for the positive mental health score outcome through stratification on presence or absence of self-reported mood or anxiety disorders. As shown in Table 2 there was no clear evidence of effect modification by the stratification variable of presence or absence of self-reported mood

or anxiety disorders. This analysis showed significantly lower positive mental health score in long-term migrants without mood and/or anxiety disorders. However, the point estimates for the mood or anxiety strata are very similar, suggesting that perhaps the sample was too small to reach statistical significance.

Table 2 Stratification of Positive Mental Health Score Adjusted Models by Self-Reported Mood or Anxiety Disorder

Fully Adjusted Model		
Positive Mental Health Score	**Mood or Anxiety Disorder**	**No Mood or Anxiety Disorder**
Recent Migrants	2.08 (-0.40, 4.56)	0.30 (-0.31, 0.91)
Long-Term Migrants	0.95 (-2.64, 0.73)	-0.52 (-0.96, -0.08)

Objective 2: Sensitivity Analysis

Positive Mental Health Score

In the fully adjusted model, migrant respondents from British Columbia (β=-1.56; 95% CI -2.55, -0.58) had significantly lower positive mental health score. Age in the 65 years and older category relative to 45-64 years of age group was was associated with better positive mental health score (β=1.04; 95% CI 0.13, 1.95), while age under 45 years relative to the 45-64 years of age group was associated with reduced positive mental health score. Positive mental health score was significantly lower in respondents who were single/never married relative to those who were married or in common-law relationships (β=-1.80; 95% CI -2.89, -0.71). Respondents who reported living alone had lower positive mental health score relative to those in households of 2 persons (β=-1.22; 95% CI -2.26, -0.19), whereas those who reported living in households of 5 or more persons had significantly better positive mental health score (β=1.89; 95% CI 0.94, 2.85). Migrants with less than secondary education, relative to those with post-secondary certification reported better positive mental health (β=1.06; 95% CI 0.09, 2.02). Being a visible minority was also associated with significantly better positive mental health (β=0.92; 95% CI 0.17, 1.66). Recent migrants to Canada (0-9 years since migration) had better positive mental health (β=1.11; 95% CI 0.34, 1.88). High physical activity relative to being inactive was associated with better positive mental health (β=1.77; 95% CI 1.07, 2.46). Current smoking versus no smoking in migrants was

associated with reduced positive mental health score (β=-1.34; 95% CI -2.36, -0.32). Lack of alcohol consumption was associated with significantly better positive mental health score (β=1.32; 95% CI 0.58, 2.06), whereas consumption of fruits and vegetables at 5-10 times per day was significantly associated with better positive mental health (β=1.88; 95% CI 1.24, 2.52), and this finding was paralleled in the >10 times per day category as well (β=2.89; 95% CI 1.49, 4.29). In migrants, self-perceived health that was rated less than excellent relative to very good was significantly associated with reduced positive mental health score, whereas the opposite was observed when migrants perceived their physical health as excellent (β=2.42; 95% CI 1.70, 3.13). Table 3 provides full details of the abovementioned analyses with the positive mental health score outcome in migrants.

Table 3 Positive Mental Health Score in migrants: unadjusted and fully adjusted models

Positive Mental Health Score	**UNADJUSTED**	**FULLY ADJUSTED**
	β estimate (95% CI)	**β estimate (95% CI)**
SOCIODEMOGRAPHIC VARIABLES		
Province of residence		
Ontario (reference)		
Newfoundland & Labrador	-3.28 (-7.76, 1.19)	-3.84 (-8.41, 0.74)
Prince Edward Island	1.26 (-1.21, 3.74)	1.82 (-0.83, 4.48)
Nova Scotia	-1.64 (-4.08, 0.81)	-2.31 (-4.86, 0.23)
New Brunswick	-0.02 (-2.32, 2.29)	0.22 (-2.41, 2.85)
Quebec	-0.10 (-1.06, 0.87)	-0.01 (-1.24, 1.21)
Manitoba	0.70 (-0.94, 2.33)	0.40 (-1.29, 2.09)
Saskatchewan	2.37 (0.52, 4.21)	1.42 (-0.37, 3.21)
Alberta	0.51 (-0.44, 1.46)	0.25 (-0.70, 1.20)
British Columbia	-1.62 (-2.40, -0.83)	-1.47 (-2.24, -0.69)
Yukon/NWT/Nunavut	2.14 (0.71, 3.58)	
Age (years)		
12-24 years	-0.58 (-1.48, 0.32)	-1.94 (-3.41, -0.47)
25-44 years	-0.52 (-1.32, 0.28)	-1.84 (-2.73, -0.96)
45-64 years (reference)		
65 years and older	0.23 (-0.61, 1.08)	1.52 (0.66, 2.38)
Sex		
Female (reference)		
Male	-0.04 (-0.66, 0.57)	0.19 (-0.45,0.84)
Marital Status		
Married/Common-Law (reference)		
Single/Never Married	-1.91 (-2.61, -1.20)	-1.80 (-2.89, -0.71)
Widow/Sep/Divorced	-1.72 (-2.73, -0.72)	-0.03 (-1.37, 1.30)

Table 3 Positive Mental Health Score in migrants: unadjusted and fully adjusted models (continued)

Positive Mental Health Score	**UNADJUSTED**	**FULLY ADJUSTED**
	β estimate (95% CI)	**β estimate (95% CI)**
Household size		
1 person	-2.11 (-2.86, 1.31)	-1.22 (-2.26, -0.19)
2 persons (reference)		
3 persons	-0.32 (-1.23, 0.61)	-0.04 (-0.94, 0.86)
4 persons	-0.01 (-0.90, 0.91)	0.10 (-0.87, 1.07)
5 or more persons	1.89 (1.03, 2.75)	1.89 (0.94, 2.85)
Education		
Secondary school graduate	-0.47 (-1.37, 0.42)	-0.01 (-0.89, 0.87)
Some post-secondary education	-1.27 (-2.85, 0.31)	0.15 (-1.53, 1.82)
Less than secondary school	0.(77 -0.04, 1.59)	1.06 (0.09, 2.02)
Post-Secondary Certificate		
First official language spoken		
Neither	-0.72 (-2.38, 0.94)	-1.10 (-2.76, 0.54)
English (reference)		
French	0.18 (-0.99, 1.35)	0.31 (-1.25, 1.87)
English & French	0.65 (-1.03, 2.33)	0.62 (-1.11, 2.36)
Income (quintiles)		
Lowest quintile (reference)		
Low-middle quintile	0.68 (-0.21, 1.57)	0.10 (-0.76, 0.97)
Middle quintile	0.48 (-0.41, 1.37)	0.28 (-0.66, 1.22)
High-middle quintile	0.23 (-0.81, 1.26)	0.03 (-1.01, 1.07)
Highest quintile	1.13 (0.23, 2.04)	0.71 (-0.33, 1.74)
Minority Status		
White (reference)		
Visible Minority	0.82 (0.19, 1.44)	0.92 (0.17, 1.66)
MIGRATION-SPECIFIC VARIABLES		
Length of Time in Canada Since Migration		
0-9 years	0.84 (0.20, 1.49)	1.11 (0.34, 1.88)
10+ years (reference)		

Table 3 Positive Mental Health Score in migrants: unadjusted and fully adjusted models (continued)

Positive Mental Health Score	**UNADJUSTED**	**FULLY ADJUSTED**
	β estimate (95% CI)	**β estimate (95% CI)**
LIFESTYLE VARIABLES		
Physical Activity Index		
Inactive (reference)		
Moderate activity	0.74 (-0.03, 1.51)	0.43 (-0.35, 1.21)
Active	2.55 (1.86, 3.25)	1.77 (1.07, 2.46)
Smoking		
Never smoked (reference)		
Former Smoker	-0.90 (-1.57, -0.23)	-0.39 (-1.13, 0.35)
Current Smoker	-2.74 (-3.78, -1.69)	-1.34 (-2.36, -0.32)
Drinking		
Regular drinker (reference)		
No drink last 12 months	1.39 (0.70, 2.07)	1.32 (0.58, 2.06)
Occasional Drinker	-0.11 (-0.97, 0.76)	0.15 (-0.71, 1.01)
Fruit and Vegetable Consumption		
<5 times per day (reference)		
5-10 times per day	2.54 (1.90, 3.19)	1.88 (1.24, 2.52)
>10 times per day	3.87 (2.40, 5.33)	2.89 (1.49, 4.29)
HEALTH VARIABLES		
Self-Perceived Health		
Poor	-12.56 (15.51, -9.61)	-13.16 (-16.14, -10.18)
Fair	-4.33 (5.80, -2.87)	-5.12 (-6.61, -3.63)
Good	-1.52 (2.26, -0.78)	-1.85 (-2.58, -1.12)
Very Good (reference)		
Excellent	2.71 (1.99, 3.44)	2.42 (1.70, 3.13)

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Curriculum Vitae

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