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Social connectedness and self-perceived mental health in Canadian transitional aged youth

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Graduate Program in Epidemiology and Biostatistics

A thesis submitted in partial fulfillment of the requirements for the degree in Master of Science

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Abstract

Introduction: Transitional aged youth (TAY; ages 15-24) is a vulnerable age group that face several life changes which contribute to many forms of distress in their lives.

Objective: To assess the impact social connectedness has on self-perceived mental health in Canadian TAY.

Methods: The dataset provided by the Canadian Community Health Survey 2016 cycle was used. Listwise deletion was used to handle missing data. The final sample size for the study was 5,378 youth between the ages of 15-24. Linear and ordinal logistic regressions were conducted for the statistical analysis of the dataset.

Results: With every point decrease in social connectedness, Canadian TAY have 12% more odds to rate their self-perceived mental health as good or fair/poor in comparison to excellent/very good.

Conclusion: A better understanding of social connectedness and its association with mental health in TAY may allow for implementation of programs and policies that can address lack of social connectedness across the country.

Keywords

Youth mental health, social connectedness, self-perceived mental health, social provisions scale, Canadian community health survey

Summary for Lay Audience

Individuals in their youth, specifically between the ages of 15 and 24, are in a crucial period for developing poor mental health. Transitional aged youth (ages 15-24) are facing high volumes of stress associated with transitioning to adulthood, such as societal demands, shift from dependence to independence, and sculpting of personal identities associated with occupation, sexuality, and relationships. An individual's perception of their belongingness to their community and their value in society have implications to their self-esteem, anxiety, mood and emotional well-being. Social connectedness, which refers to the social connection we have with others and our interpersonal closeness to the social world that consists of family, friends, peers, strangers, community, and society, can impact one's mental health. There is insufficient research that has explored the association between social connectedness and mental health in youth. This study will use the data from the 2016 cycle of the Canadian Community Health survey to examine how social connectedness can impact the way youth perceive their mental health. We found that as social connectedness gets worse in transitional aged youth, they are more likely to perceive their mental health to be poor. Our findings also suggest that socio-demographic factors such as sex, sexual orientation, household income, and whether an individual lives in a rural or urban setting can impact their mental health. Additionally, having a mood and/or anxiety disorder, and not being physically healthy are other contributors to poor mental health. It can be concluded from the findings that promoting social connectedness with transitional aged youth can facilitate better mental health. Models of engagement of combining youth decision-making, caring community members, and opportunities to make community contributions ought to be implemented as such models are associated with long lasting positive effects of mental health. A focus on youth mental health is crucial because their health now predicts their prosperity in the future.

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Abbreviations

CCHS	Canadian Community Health Survey
CCTB	Canadian Child Tax Benefits
LFS	Labour Force Survey
LGBTQ+	Lesbian, Gay, Bisexual, Transgender, Queer
SPS	Social Provision Scale
TAY	Transitional Aged Youth
WHO	World Health Organization

Chapter 1

1 Introduction/Rationale

This chapter presents the rationale for this thesis. The purpose and objectives of the thesis will also be introduced in this chapter along with the thesis outline and the role of the student.

1.1 Thesis Rationale

The World Health Organization (WHO) defines mental health as a state of well-being in which an individual is a contributing member of society and can cope with the normal stresses of life (1). Mental health is more than the absence of mental illness – mental health is an individual’s cognitive, emotional, and behavioural state of well-being (2). In Canada, approximately one in five people will experience a mental health problem or illness in their lifetime (2). Within the Canadian population, it has been reported that 70% of mental health problems have their onset during childhood or adolescence (3). More specifically, transitional aged youth (TAY; ages 15-24) face several life changes which contribute to many forms of distress in their lives. This age group is more likely to face mental health challenges than any other age group (4).

There is considerable evidence that youth in Western countries are experiencing substantial levels of distress including feelings of being overwhelmed, hopeless, depressed and anxious (5). Furthermore, adolescence and young adulthood is a time period where there is an increased risk for the development of common psychiatric disorders, many of which are associated with social dysfunction (12,13). Issues with mental health contribute to the most prevalent and costly health challenges for youth (8). Furthermore, unresolved mental health challenges are associated with increased risk for self-harm, substance abuse, educational failure and loss in productivity (9). Literature suggests that during this time period, youth face a reduction in sources of resilience and mental wellness such as family structure, social support, self-esteem, self-efficacy, and

perceptions of safety and optimism making them more vulnerable to developing poor mental health (5).

Mental health is multi-dimensional and complex. It is shaped by the social environment as well as economic and physical environments (10). Research supports the importance of social relationships and sense of belonging on mental health, two components of the broader construct of “social connectedness” (11,12). Social connectedness has been defined in the literature as having positive relations with one’s social networks and community (13). More specifically, social connectedness has been described as the meaningful relationships that a person develops with others that allows one to give and receive information, emotional support, and material aid, and to create a sense of belonging and to value and foster growth (14). Mashek and colleagues (2006) explained how social connectedness encompasses an individual’s “interpersonal closeness” with the social world that consists of one’s family, friends, peers, strangers, community, and society (15).

Individuals who lack social connectedness are more likely to experience low sense of belonging and may be prone to chronic loneliness, lower self-esteem, greater social mistrust, and possibly adverse health outcomes (13). It is important to note that although a bidirectional relationship exists between social connectedness and mental health, research has shown that the relationship between social connectedness (as risk factor/exposure) and mental health (as an outcome) is significantly stronger than the reverse direction (16).

Previous studies on social support and sense of belonging have shown that the structure and quality of transitional aged youth’s (TAY) relationships can have strong impacts on health and development (17). Studies have evaluated the association between social connectedness and mental health; however, the majority of this research has been carried out within the adult population. There is limited research exploring the relationship of social connectedness on mental health in TAY. To our knowledge, there

has not been any research exploring the association between TAY mental health and social connectedness using national level survey data in Canada.

In this proposed study, the relationship between social connectedness and mental health among Canadian TAY will be examined using cross-sectional data from the 2016 annual Canadian Community Health Survey (CCHS), a national level survey. The 2016 survey includes the Social Provision Scale (SPS) assessing the five dimensions of social support, such as attachment, social integration, reassurance of worth, reliable alliance, and guidance (18). The 2016 CCHS dataset is being used as it is the only cycle to have made the SPS a mandatory module for provinces and territories to include in the annual survey. The 2016 CCHS represents the largest data source on this measure in Canada. The items in the SPS describe the presence and absence of a positive and meaningful type of support (19). In this study, a more comprehensive analysis will be done on social connectedness by using the social provision scale in an age group that presents with the highest prevalence of mental illness (4). The SPS is an adequate measure for social connectedness as it captures perceived social support and its impact on the individual's life (20). A better understanding of the relationship between social connectedness and mental health in TAY may help to inform and facilitate the design and implementation of programs and policies that can address the lack of social connectedness and/or poor mental health in Canadian TAY population.

1.2 Purpose and Objectives

The thesis is intended to examine the association of social connectedness on self-perceived mental health among TAY living in Canada, using a national population-based survey (CCHS). The specific objectives of this thesis are:

- 1) To examine the association between social connectedness (as the exposure variable) and self-perceived mental health (as the outcome variable) in the Canadian population, while controlling for socio-demographic factors, the presence of common mental disorders, and self-perceived physical health.
- 2) To examine how the association between the exposure and outcome variable differs between TAY living in Canada: a) with and without a mood and/or

anxiety disorder; b) TAY living in rural versus urban areas; and c) TAY who rate their physical health to be excellent/very good, good, or fair/poor.

- 3) To assess whether there are sex differences in the adjusted association between social connectedness and mental health among TAY living in Canada.

1.3 Structure of the Thesis and Role of the Student

The thesis follows the University of Western Ontario's School of Graduate and Postdoctoral Studies monograph format. The following chapter (Chapter 2) contains a review of the literature on the association between social connectedness and mental health. Chapter 3 outlines the methodology employed in this study. The following chapter (Chapter 4) presents the results. The discussion of results is reported in Chapter 5. Chapter 5 also includes the conclusion section, summary of the study, and recommendations for future research.

The student was responsible for submitting a request to Statistics Canada for the 2016 CCHS dataset. Once the candidate received access to the dataset, all analyses were conducted by the student through the secured network at the Research Data Centre located at Western University. The student consulted the biostatistician, Dr. Yun-Hee Choi, on the supervisory committee and Dr. GY Zou, a biostatistician at the Department of Epidemiology and Biostatistics for the statistical analysis plan.

Chapter 2

2 Literature Review

This chapter provides an overview of the current literature on TAY mental health, and the role and impact of social connectedness on mental health. Section 2.1 provides the leading definitions of mental health and outlines the mental health and mental illness continua. It also presents information on the epidemiology of mental health and illness in Canadian youth. Section 2.2 outlines the determinants of mental health in youth. Section 2.3 provides a detailed discussion of social connectedness and its relationship to mental health, specifically in youth. Section 2.4 describes the current gaps in the literature that need to be addressed.

2.1 Differentiating Mental Health, Mental Illness, and Mental Well-being

For many years, mental health was largely defined as the absence of mental illness. However, more recently, there has been a movement to focus beyond the presence or absence of pathological states of mental health (21). Mental health is currently defined as the “state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to their community” by the World Health Organization (WHO) (1). In order to fully understand mental health, mental illness and mental well-being need to be also understood. Mental illness is defined as the alternation in thinking, mood or behaviour, it is associated with significant distress and impaired functioning (3). Mental illness symptoms vary from mild to severe, depending on the type of mental illness, the individual, and their environment (3). Mental well-being is the combination of hedonic and eudemonic well-being. Hedonic is described to be feelings of happiness, satisfaction, and interest in life, which can be further described as emotional well-being (22). Eudemonic well-being is the optimal psychological functioning, positive relationships with others and personal growth (22). The focus of

this thesis will be mental health, which encompasses both mental illness and mental well-being.

According to the definition of mental health put forth by WHO, there are three components that the definition outlines: 1) well-being, 2) effective functioning of an individual, and 3) effective functioning for a community. Mental health is not only defined as the absence of a mental disorder, it also includes the state of well-being (10). Furthermore, it has been argued that a narrow focus on symptoms, pathology, or mental illness contributes to the negative connotations typically associated with mental health, which is why the holistic definition by the WHO is gaining increasing attention (10,23). For individuals to be considered mentally healthy, a combination of emotional, psychological, and social well-being needs to be maintained (23). Mentally healthy individuals are able to create a balance between life activities and efforts to achieve psychological resilience (10).

2.2 Overview of the Dual Model of Mental Health and Mental Illness

The Dual Model of Mental Health and Mental Illness (presented below in Figure 2.1) is being widely used to understand the complexity and multi-dimensional nature of mental health (23). A major difference between mental health and mental illness is that everyone has some level of mental health, similar to physical health, whereas one can be with or without a mental illness (3). Mental illness can be described as a wide range of psychological or behavioural symptoms that negatively impact one's ability to cope with daily life. According to the Canadian Mental Health Association, mental illness is one of Canada's leading public health problems (24). One in five Canadians will experience some form of mental illness during their lifetime. Furthermore, by the time Canadians reach 40 years of age, research suggests that 1 in 2 will have or have experienced a mental illness (25). Although mental illness is commonly experienced, there is still significant levels of stigma around it which affects the way people access mental health services and care. With more public awareness of mental illness, there has been an introduction of a paradigm shift to mental health. As outlined by Brugha (2015), there

has been a gradual movement in psychiatry, both nationally and internationally (WHO), to adopt the term mental health, with integration of well-being, prevention, and promotion (10).

On the Dual Model of Mental Health and Mental Illness continua presented by Westerhof and Keyes (2010), mental health is categorized into two groups: flourishing and languishing (23). Flourishing mental health can be defined as a state that combines a high level of subjective well-being with an optimal level of psychological and social functioning. In contrast, languishing can be defined as a state where there are low levels of subjective well-being with a combination of low levels of psychological and social well-being (23). On the other two sides of the axis, as seen in *Figure 2.1*, having a serious mental illness is on one end and not experiencing any symptoms of mental illness is on the other end of the continua. The model proposes that individuals who experience less mental illness do not necessarily experience better mental health (26). Additionally, those who have a mental illness can also have flourishing mental health, and those who have languishing mental health may be without a mental illness. A nationwide study examining Canadian positive mental health found that in 2012, 76.9% of individuals rated their mental health as flourishing, 21.6% as moderate and 1.5% as languishing (27). The model suggests that mental well-being is on the positive end of the axis, in contrast to pathological disease states which is on the opposite end of the axis. The entire continua is considered to be a representation of mental health (28).

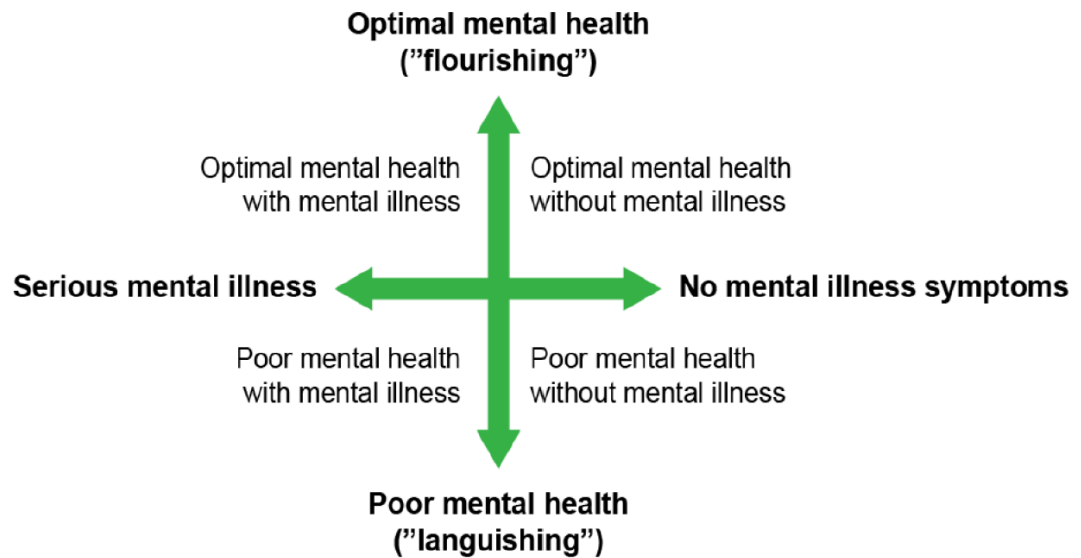


Figure 2.1: The Dual Model of Mental Health and Mental Illness

2.3 Mental Health in Youth

In Canada, 30% of the current population are youth (29). Of these individuals, it is estimated that 10% to 20% are affected by a mental illness or a disorder (30). Furthermore, 70% of mental health problems have their onset during childhood or adolescence (3). Individuals in their youth, specifically between the ages of 15-24, are in a crucial period for developing and also maintaining emotional and social habits that are important for positive mental health (5). Individuals in this age group are facing high volumes of stress associated with transitioning to adulthood such as societal demands, shifts from dependence to independence, and sculpting of personal identities associated with occupation, sexuality, and relationships (5,30). Aside from societal and structural changes individuals are facing during adolescence and early years of adulthood, there are also many physiological changes that occur during this time that affect behaviour and emotional functioning, thus inhibiting physical, intellectual and psychosocial maturity (31). The brain is in a critical period of maturation during this age period and is particularly susceptible to deleterious effects of stress and vulnerable to the development of mental health challenges (32).

According to the WHO 2004 Global Burden Disease study, mental health challenges are the most prevalent and most costly health challenge experienced by young people (8). Many youth living with mental health challenges have an increased risk of self-harm, substance abuse, educational and vocational failure, compromised social functioning and lost productivity (8). Furthermore, an individual's perception of their belongingness to their community and their value in society have implications to their self-esteem, anxiety, mood, emotional well-being, and/or addiction (33). The WHO outlines that supportive environments at school with the family and in the community are important for positive mental health (34). There are multiple factors that impact youth mental health, and the more risk factors individuals are exposed to, the greater the potential impact on their mental health.

A focus on youth mental health is crucial because their current health status predicts their health and prosperity in the future. Additionally, doing further research on individuals in this age group is important as long-term health-related behaviours begin and are established during adolescence and early adulthood (8). Youth who face persistent mental health challenges that do not get resolved or addressed, have increased risk of developing mental illnesses in adulthood (9). The risk of a greater burden of disease due to poor mental health amongst TAY and mental health challenges that carry on or develop further in adulthood, is what drives Canadian research on the mental health of transitional aged youth (30).

2.3.1 Risk Factors / Correlates for Poor Mental Health in Youth

Previous research has suggested there are many risk factors associated with mental health during adolescence and early adulthood. Some are associated with socio-demographic factors such as sex, rurality (living in a rural setting versus urban), immigrant status, and economic stability (26,35-42). Other common factors are self-perception of physical health, presence of a chronic physical condition, and presence of common mental disorders such as mood or anxiety disorders (4,10). Furthermore, health-related behavioural factors also pose as a risk to poor mental health (43). This section

outlines common risk factors and correlates that have emerged in literature to have an impact on mental health among youth.

Sex

Previous research suggests that due to biological differences, mental health varies between the sexes (35). Across many epidemiological studies, it has been concluded that females are more prone to poor mental health than males (5). Longitudinal studies support findings that suggest poor mental health is more prevalent in females versus males due to the differences in maturation and morphological differences (44). The impact of gender in mental health is compounded by its interrelationships with other social, structural determinants of mental health (such as education, income, employment, social roles and ranks). Societal pressures and responsibilities are different for women than they are for males, and generally these pressures and responsibilities are greater for women (35).

Rurality

Rural versus urban residence impacts how individuals perceive their mental health. Literature shows that mental health varies across the urban to rural continuum (36). A study conducted by Kitchen and colleagues (2012) using the 2007 and 2008 Canadian Community Health Survey examined how self-perceived mental health varies across the urban and rural continuum (45). The study concluded that individuals 15 and older living in rural or less populated areas were more likely to rate their mental health as excellent or very good rather than good, fair or poor, compared to those living in urban areas (39).

Immigrant Status

Previous literature shows that immigrant status is a protective factor for mental health (40). The immigrant population have significantly better mental health than those born in Canada, but their mental health status becomes similar to native-born Canadians approximately 10-years after immigration. This is known as the “healthy immigrant” effect (37). Immigrants tend to be healthier physically and have better mental health upon

immigration. The immigration screening process also contributes in the healthy immigrant effect, as the screening reduces the prevalence of poor mental health in the migrant population (37). A recent longitudinal study (Robert & Gilkinson, 2012) conducted using the Survey of Immigrants to Canada found that sex, immigration category, region or origin, income, and perceptions of the settlement process are all associated with mental health outcomes for recent immigrants (40). The study suggested that emotional well-being and life stresses increase four years after landing. Individuals who belong to a lower income quintile, those who are female, those who are from South and Central America, Asia and the Pacific Islands, and immigrants who have a negative perception of settling have worse mental health than other immigrants (40).

Literature also suggests that second-generation immigrants may represent a vulnerable population subgroup, and have poorer mental health in comparison with first-generation immigrants (46). Ruiz-Castell and colleagues (2017) suggest that the second-generation immigrants may be highly prone to poor mental health due to the emotional conflict that may arise between two cultures (46).

Education

Studies suggest that youth who have higher educational attainment tend to have better mental health (10). In a study examining the percentage of Canadians who rated their mental health as flourishing, moderate, or languishing found that those without a postsecondary education were less likely to report their mental health as flourishing in comparison to those with a postsecondary education (27). Additionally, there has been growing literature to support that those with higher education have higher mental health literacy, and thus, a better understanding of factors that contribute to poor mental health, symptoms of mental illness and overall better understanding of the importance of mental well-being (47).

Household Income

A large number of studies have repeatedly shown that individuals living in a low-income household report poorer mental health (42,48). These individuals are faced with greater challenges due to socio-economic disparities that contribute to greater stress and lower emotional well-being (42). Individuals from low-income neighbourhoods have greater need of mental health services, but are also less likely to use services due to low accessibility and availability (48).

Sexual Orientation

Sexual orientation is considered to be a risk factor for poor mental health. Although not widely explored, individuals who identify as being LGBTQ+ have poorer levels of self-reported mental health compared to individuals who identify as heterosexual (30). Individuals who identify as members of the LGBTQ+ community face greater societal pressures, prejudice and stigma (41). These challenges contribute to feeling isolated from their community and contributes to poor mental health (41).

Physical Health

Research shows that a correlation exists between physical and mental health, such that those who have poor physical health also tend to have poor mental health (49). Individuals who have chronic physical disabilities have a higher likelihood of developing mental health challenges or experiencing poor mental health compared to those living without chronic physical disabilities (10). Individuals who tend to have better physical health also have a better relationship with others, higher engagement with their community, and partake in healthier behaviour (i.e., less drinking, more physical activity, more sleep) (10,16). These factors are also contributors to better mental health, therefore; physical and mental health are highly interrelated in most populations (16).

Anxiety and/or Mood Disorders

Anxiety disorders – such as phobias, obsessive compulsive disorder, and panic disorder – as well as mood disorders – which include depression, bipolar disorder, and dysthymia – are the most prevalent mental disorders in Canadians, and more specifically,

Canadian youth (34). Statistics Canada states that approximately 12.6% of Canadians meet the criteria for a mood disorder during their lifetime, and 8.7% meet the criteria for an anxiety disorder (4). Studies show that 7% of Canadian youth have been diagnosed with an anxiety and/or mood disorder (2). These conditions can negatively affect social functioning, academic performance or functioning at work (50). Furthermore, presence of an anxiety and/or mood disorder is correlated with poorer mental health (11). Among individuals who have an anxiety and/or mood disorder, symptoms such as low energy, sleep problems, pain, and fatigue contribute to having poor mental health (42). Additionally, the stigma and discrimination that is associated with mental illnesses can result in social isolation, which can also contribute to poorer mental health (17). Mental health encompasses the presence of mental illness along with the state of well-being, therefore the presence of common mental disorders is an important indicator to be considered when evaluating mental health (28).

Health-Related Behavioural Risk Factors

Common health-related behavioural factors include diet, exercise, smoking, and alcohol consumption. Studies suggest that these health-related behavioural factors can impact mental health (43). Alcohol consumption is found to have a U-shaped association with mental health. Regular to moderate consumption of alcohol is linked to better mental health, compared with abstinence or heavy drinking (43). Furthermore, individuals who were heavy smokers had worse mental health than those who do not smoke (43). A healthy diet, measured as high fruit and vegetable intake in most studies, is associated with better mental health (51). Literature also supports that exercise can positively impact mental health (43). All exercise types are associated with better mental health, the largest association is seen between team sports, cycling, aerobic, gym activities, and mindfulness-based techniques (52). Exercise has been shown to relieve symptoms of fatigue, increase motivation, and reduce stress, all of which are linked to improving mental health (52).

2.4 Previous Studies on Social Connectedness and Mental Health across the Lifespan

In recent years, there has been an increase in the number of studies investigating the association between social connectedness and mental health across different age groups. Social connectedness can be described as the degree to which an individual perceives to have a sufficient number and diversity of relationships that fulfill these six domains of well-being: 1) allow them to give and receive information; 2) provide emotional support; 3) provide material aid; 4) create a sense of belonging; 5) give value; and lastly, 6) foster growth (13). Social connectedness refers to the social connections we have with others and our interpersonal closeness to the social world that consists of family, friends, peers, strangers, community, and society (15). Individuals who are socially isolated and have meaningless relationships with others are more likely to suffer from poor physical and mental health (49).

Sense of belonging and perceived social support are considered to be components of social connectedness (12). Sense of belonging or community belonging is described as the connection an individual feels to their community (53). Social support is the emotional and physical comfort that we receive from our loved ones. Furthermore, it is recognizing that you are a part of a community that values and cares for you (54). As explained by Lee and Robbins (2000), social connectedness is how one sees oneself in relation with the world, which is the differentiating component of social connectedness in comparison to sense of belonging and perceived social support (55). Sense of belonging and social support focus more on discrete and current relationships. However, the three concepts encompass sense of identity and sense of place in society (55)

Although social connectedness is receiving increasing attention, there is still limited literature available on the impact it has on mental health. Due to the limited amount of literature available, the literature review will also examine components of social connectedness such as social support and sense of belonging (12). Studies have examined the relationship in various settings. For example, a study conducted by Kitchen

and colleagues (2012) examined the association between sense of community and health in Canada (45). This study also investigated the role of geographical location as a risk factor for sense of belonging. The researchers used the 2007 and 2008 CCHS dataset for their study and measured sense of belonging from a one-item questionnaire on the survey. The study included Canadians aged 18 and older ($n=120,838$). The findings indicated that residents of urban health regions tended to have lower rates of community belonging, compared to residents of rural health regions. Sense of belonging improved progressively across the urban to rural continuum. Furthermore, the study concluded that 68% of respondents ($n=120,838$) who reported their sense of belonging to be strong, or somewhat strong also reported their mental health to be excellent or very good. Using a national-population based survey, Kitchen et al. (2012) were able to establish an association between lower sense of belonging and poorer self-perceived mental health (45).

A report released by Statistics Canada also highlights the association between community belonging and self-perceived health using the CCHS dataset from 2005. The report examined the variation in community belonging across age groups and region of residence (49). Similar to the Kitchen et al. (2012) study, the report stated that approximately 64% of Canadians reported a strong sense of belonging. This report found that respondents living in urban communities – such as Toronto, Ontario and Winnipeg, Manitoba – reported lower sense of belonging than rural communities (49). Additionally, the report found that youth aged 12 to 17 years had the highest proportion (77%) of individuals who rated their sense of belonging to be strong. However, among young adults (individuals aged 18 to 29) the prevalence of strong sense of belonging was only 55% (49). The report also suggests that self-perceived mental health in respondents declined with decreases in sense of belonging. There was an approximately 20% decrease in respondents who reported excellent/very good mental health to good or fair/poor mental health as sense of belonging decreased (49).

The studies described above were mostly conducted in Canada, with the exception of two studies based in the United States. These studies have established the

association between components of social connectedness, such as sense of belonging or community belonging, and mental health using CCHS data (39,45,49,53,54,56). Some studies did not evaluate mental health as a primary outcome in their study, but rather explored it as an additional variable. A study in New Zealand examined the bidirectional relationship between social connectedness and mental health (16). The study used a longitudinal national dataset that consisted of a three-item questionnaire to measure social connectedness and a six-item questionnaire to measure mental health. Both variables were modelled as a latent variable. Because the study design was longitudinal, it was conducted over the span of three years, thus temporality can be established in the relationship between the two variables. The findings in the study showed that social connectedness and mental health were positively and reciprocally associated, however, the evidence to suggest that social connectedness was associated with subsequent mental health was stronger (16).

2.4.1 Previous Studies on Social Connectedness and Mental Health in Youth

Adolescence and young adulthood are time periods where individuals are experiencing significant physical, emotional, and social transformations (57). As outlined earlier, due to these changes, youth are at a high risk of experiencing poorer mental health. Evidence from literature was gathered to analyze the impact of social connectedness, or components of social connectedness, on mental health. For this section of the literature review, the inclusion criteria for selecting the studies was broadened to international studies as the amount of literature examining the association between social connectedness and youth mental health in North America was limited.

A cross-sectional study conducted with students enrolled in early childhood programs, as well as primary and secondary schools in Australia measured the indicators relating to their social and emotional well-being (5). This is an important measure to consider as individuals who have poor social and emotional well-being may have poor mental health. Social and emotional well-being was measured through a survey

developed by the Australian Council for Educational Research. The findings indicated that the environment the student is surrounded by is a large contributor to their social and emotional well-being. The study defined the environment to be the community, home, or school as well as the relationships that are made. The study emphasized the importance of positive relationship and connectedness of the individual with their school, community and family (5).

In a quasi-experimental study carried out by McCay et al. (2011), homeless youth between the ages of 16 and 24 years living in Toronto were recruited and randomized into control and treatment groups (21). The treatment group received an intervention that consisted of six weekly sessions that were focused around building meaningful relationships that would work towards guiding, supporting, and nurturing youth. The study measured mental health by using a 90-item, five-point Likert self-report scale. Social connectedness was measured by a 20-item questionnaire, with a six-point Likert scale that assessed belongingness in the domain of social connectedness and social assurance. After the intervention, the treatment group demonstrated a significant improvement in social connectedness and a decrease in symptoms of poor mental health (21). The study supports the association between higher social connectedness and better self-reported mental health in youth.

A study conducted by Lee and Robbins (2000) evaluated the difference in social connectedness between male and female students studying at a large urban, southeastern university in the United States (55). The study recruited 198 females and 185 males ranging between the ages of 17 to 48 years old. The study used three different measurement tools to evaluate social connectedness in the participants: 1) the Social Connectedness Scale created by Lee and Robbins in 1995, 2) the Social Provision scale developed by Russell and Cutrona in 1984, and 3) the revised University of California, Los Angeles (UCLA) Loneliness Scale developed by Russell, Peplau, and Cutrona in 1980. The results showed that although both male and female students seek to have high social connectedness, they differed on what forms of relationship and connectedness most impacts their feelings of social connectedness. For female college students, physical

proximity and less social comparison contributed to their social connectedness. Whereas for male students, relationships that emphasized comparison and less intimacy or physical proximity contributed most to their social connectedness (55).

2.5 Gaps in Literature

The association between social connectedness and the components of social connectedness, such as sense of belonging and perceived social support, and mental health have been established in literature (15). Social connectedness is viewed as a protective factor for poor mental health (13). However, the majority of previous research has been focused on exploring this association in the adult population. There is limited literature on social connectedness and the impact it has on mental health in youth, especially in the Canadian context. Previous research that has been conducted on social connectedness and mental health in youth took place in other developed worlds such as the United States, United Kingdom, Australia, and New Zealand. The results of the previous research cannot be extended to the Canadian context as environmental and sociodemographic factors vary between the countries. The reports that have been released with findings on this association in the adult population use measurement tools that are considered to have low validity to assess the exposure variable. Social connectedness is multi-dimensional and requires a comprehensive questionnaire to measure the variable. Most of the studies that were conducted with the adult population used a single-item questionnaire measuring a component of social connectedness. Furthermore, studies in the past did not explore the role of possible effect modifiers, such as presence of mood and/or anxiety disorder, self-reported physical health, and rurality in the association. If the possible effect modifiers are not correctly accounted for in the statistical analyses, the findings could be misleading. In conclusion, the association between social connectedness and mental health in youth needs to be examined using a comprehensive and validated questionnaire, and a statistical model that accounts for variables that could alter the true association.

Chapter 3

3 Methods

This chapter outlines the methods used to complete this study. Section 3.1 details the design of the Canadian Community Health Survey (CCHS) 2016 and the study population. Additionally, Section 3.2 provides an explanation of the exposure variable, outcome variable, and covariates and how they were measured. Section 3.3 describes the statistical analysis plan. Section 3.4 describes statistical considerations such as sample weights, bootstrap weights, and missing data.

3.1 Data Source and Sample Design

The data source for this thesis was the CCHS, a cross-sectional national survey conducted by Statistics Canada. The CCHS takes place yearly and aims to collect information from the Canadian population on health status, health care utilization, and health determinants. The survey is provided in both French and English. The survey was first administrated in 2001. Up until 2005 the survey occurred every two years, then starting in 2007, the survey was administered annually. The purpose of the CCHS is to provide large data for health surveillance and population health research (58). The data gathered from the CCHS are used by federal and provincial departments of health and human resources, social service agencies, and other types of government affiliated agencies that use the data to identify the need for health services amongst the Canadian population (58).

The inclusion criteria for the survey included individuals who are 12 years and older living in Canada. People were excluded if they were: living on reserves and other Aboriginal settlements in the provinces; full-time members of the Canadian Armed Forces; living in an institution; children aged 12-17 living in foster care; and persons living in specific regions in Quebec. Due to the exclusions set for the survey, the CCHS is generalizable to 97% of the population (58).

The CCHS was used for the purpose of this thesis due to the large sample size, the community-wide nature of the sample, and the availability of a wide range of variables that are included in the survey. Each component of the CCHS questionnaire is developed in collaboration with experts in the area. Statistics Canada uses an extensive procedure for the data collection process to ensure high quality of the data. For administrative purposes, each province is divided into health regions (HR) and each territory is designated as a single HR. For the 2016 CCHS cycle, there were a total of 100 HRs in ten provinces and three HRs for each territory. The objective of the survey was to achieve a sample of approximately 130,000 respondents. Of the 130,000, 120,000 would be the adult population and 10,000 would be youth (59) .

The sample for the survey is selected through the use of area frame for the adult population (18 years and older) and list frame for the youth population (12 to 17 years old). The sampling plan for the area frame, used by the Canadian Labour Force Survey (LFS), is a two-stage stratified cluster design. This sampling design was used for all provinces except for Prince Edward Island, where a Simple Random Sample design was used (59). In the first stage of a two-stage stratified cluster design homogenous strata are formed and independent sample of clusters are extracted from each stratum. The second stage consists of the preparation of the dwelling lists for each cluster. Dwellings, or households are then selected from these lists. The area frame sample design differed for the three territories; the larger communities have their own stratum and the smaller communities are categorized into strata based on various characteristics. The list frame is created from the Canadian Child Tax Benefits (CCTB) files which contain records of all program beneficiaries with their names, addresses, and phone numbers. This list is then used to select the youth who will be interviewed over the phone (59).

There are three data validation steps performed, and an external validation step where the data are scrutinized, and any concerns or anomalies are addressed before the data are released. For the adult population, the survey is administered online or over the phone by trained interviewers, for the youth population the interview is administered only over the phone. The average length of the a CCHS interview is between 40 and 45

minutes. For interviews with youth between the ages of 12-15, interviewers obtained verbal permission from parents/guardians to be able to conduct the interview. The Person Most Knowledgeable (PMK) block was applied to the interviews with youth between the ages of 12-17. The PMK block was applied to collect household level information such as insurance coverage, food security, income and administration, from the most knowledgeable person in the household. Furthermore, the information that is collected through the survey is linked to the respondents' personal tax records (i.e. T1, T1FF or T4) along with the tax records of all household members. Other variables included are: 1) respondent's information such as social insurance number, full name, date of birth/age, sex; 2) information on other members of the household such as full name, age, sex, and relationship to the respondent; and 3) household information such as address, postal code, and telephone number (58).

In the current study, the relationship between social connectedness and mental health among Canadian transitional aged youth between the ages of 15 and 24 years was examined using cross-sectional data from the 2016 Annual Canadian Community Health Survey (CCHS). The 2016 CCHS dataset is being used, as it is the only wave of CCHS to have made the Social Provisions Scale (SPS) a mandatory module for provinces and territories to include in the annual survey, therefore 2016 CCHS has the largest sample on this scale (59). Refer to *Appendix B* for the SPS and the questions that measure each social provision. The items in the SPS describe the presence or absence of a positive and meaningful type of support. In this study, a more comprehensive analysis will be done on social connectedness by using the Social Provisions Scale in an age group that presents with the highest prevalence of mental illness. The SPS is an adequate measure for social connectedness as it captures an individual's perception of their interpersonal closeness to the social world (55)

The SPS is also widely used to measure perceived social support in the psychological literature (60–62). As explained earlier in the thesis, social support is feeling supported from our loved ones and recognizing that you are a valued member of the community (54). The SPS has been used to measure social support through

measuring different social relationships encompassed in the scale's five social provisions (60). There is also literature that uses SPS to measure social connectedness and has shown to be an accurate measure (55,63). The SPS is also shown to capture one's closeness to the social world by measuring combined experiences of proximal and distal relationships (55). For the purposes of this thesis SPS is used to measure social connectedness.

3.1.1 Study Sample

The study sample included TAY between the ages of 15 and 24 years from across Canada. After the age exclusion criteria was applied, (i.e. only individuals in the age range of 15 to 24) the sample size decreased from $n=55,690$ to $n=5,808$.

3.2 Variable Definitions

The following variables (outcome variable, exposure variable and covariates) were selected from the 2016 CCHS. A detailed description of the variables and how they are measured is provided below.

3.2.1 Outcome Measure

The questionnaire item for self-rated mental health was used to capture the outcome measure. The question asks: "In general, would you say your mental health is..." The options are: excellent, very good, good, fair, and poor. The question can indicate the proportion of the population who perceive their mental health to be excellent, very good, good, fair, and poor (35). The one-item questionnaire has been used in many studies to measure self-perceived mental health (64). Mawani and Gilmour (2010) tested the validity of the questionnaire by testing the prevalence of each mental morbidity and characteristics associated with each mental morbidity with scores of self-perceived mental health. The mental morbidities examined in the study were: depression, bipolar disorder, panic disorder, social phobias, dysthymia, psychosis, schizophrenia, obsessive compulsive disorder, and psychological distress. Each mental morbidity was measured as a self-reported disorder that had been diagnosed by a health professional. Two key

findings emerged from this study: 1) independent of socio-demographic factors, the association between fair/poor self-rated mental health and mental morbidities remains persistent, and 2) self-perceived mental health accurately represents current mental health status and predicts future mental health (35).

For the current study, the five categories of the responses were collapsed into three categories: 1) excellent/very good, 2) good, and 3) fair/poor. The categories were collapsed to ensure that there was sufficient cell count and to also remain consistent with how the variable has been grouped in past studies (4,10,27,35,39,64).

3.2.2 Exposure Measure

In our study, the exposure variable of social connectedness is being measured by the 10-item Social Provisions Scale (SPS). The 10-item SPS is based on the 24-item Social Provisions Scale developed by Cutrona and Russell (1987). The 24-item social provision scale originated from Weiss's theory on social provision, which can be defined as "different functions that may be obtained from relationships with others" (63). The SPS measures the social relationships in an individual's life and the essential elements of social support that are provided through social relationships. The 24-item scale consists of six components of social support: attachment, social integration, reassurance of worth, reliable alliance, guidance, and opportunity for nurturance (19). The objective of the SPS is to use the six dimensions of social support to measure an individual's perceived social connectedness (65). The SPS is considered to be an accurate measure for social connectedness due to the high reliability for the total scale which is presented by the Cronbach's alpha score: $\alpha=0.84 - 0.92$. The Cronbach's alpha score for the subscales is: $\alpha= 0.64 - 0.76$ (60). Cronbach's alpha is the coefficient of reliability which measures internal consistency. A reliability coefficient of 0.70 or higher for a scale is considered to be acceptable in most social science studies (66).

A shorter version of the SPS, a 10-item survey, was developed in English by Dr. Caron (20). The 10-item SPS includes five dimensions of social provisions: attachment

(emotional closeness), guidance (advice or information), social integration (sense of belonging to a group of friends), reliable alliance (assurance that others can be counted on in times of stress), and reassurance of worth (recognition of one's competence). Opportunity for nurturance was not included in the shorter version, as this dimension of social provisions measures more of the support offered than the support received (20). Refer to *Appendix B* for the questions used to measure each social provision and the full SPS. A study using the shortened survey on participants selected from the general population of the southwest region of Montreal (n=2433), suggested that the SPS 10-item scale is a reliable instrument for measuring social connectedness (67). The Cronbach's alpha score is $\alpha = 0.88$ for the overall score and ranges from $\alpha = 0.53-0.69$ for the subscales. Furthermore, the validity of the scale remains consistent between the longer and shorter scales. The 10-item SPS has strong concurrent validity with the original 24-item SPS, which is presented by the correlation coefficient: $r = 0.930$ (67). The administration time of the shorter scale is reduced by half, thus, increasing the response rate of the survey (20).

The questions on the survey are on a 4-point scale. On the CCHS scale, the responses are: 1 (strongly agree), 2 (agree), 3 (disagree) and 4 (strongly disagree). The measure produces a total score for the overall index of social connectedness and also scores for the distinct components. For the purposes of this study, the overall score of the SPS will be used. The score will be treated as a continuous variable. The values range from 10-40 (range established by Cutrona and Russell, the developers of the scale), where a higher score reflects a higher level of perceived social connectedness (59).

3.2.3 Covariates

The selection of the covariates has been theoretically derived. According to Miettinen and Cook (1981), it is important to determine *a priori* confounders based on previous research (68). For the purposes of this study, a "common cause" approach was used to select the covariates. Common cause approach is where pre-exposure covariates that are shown to be correlated with the exposure and outcome are adjusted in the

statistical model (69). It is important to note that although education status is shown to be a risk factor for poor mental health (explained in Chapter 2), it was not included as a covariate in this study. Education attainment in the 2016 CCHS is categorized into three levels: 1) less than secondary school graduation, 2) secondary school graduation, no post-secondary education, and 3) post-secondary certificate diploma or university degree. There are no significant differences in education attainment in individuals between the ages of 15 and 24, therefore, adding education status as a covariate in the model would not be meaningful.

Age

Age was measured through a single-item questionnaire: “What is [respondent’s name]’s age?” Age was reported in years as a continuous variable and was centred by subtracting off a value within the range of the data. Centering age allows for better interpretation of the data as the intercept is set to the average age rather than the age of zero.

Sex

Sex was measured through a single-item questionnaire: “Is [respondent name] male or female?” It was reported as a dichotomous variable: male or female.

Rurality

The geographic location of the respondents was determined based on the postal code linked to the respondent’s household information. It was categorized to rural areas (>1,000), small population centre (1,000 to 29,999 people), medium population centre (30,000 to 99,999 people), and large urban population centre (\leq 100,000 people).

Immigrant status

Immigrant status was measured through a one-item questionnaire: “Have you ever been a landed immigrant in Canada?” Immigrant status was used as a dichotomous variable: immigrant or non-immigrant. Exploring the number of years since immigration would

have provided more details on the participants' immigrant status, however, the variable was not used in the study due to high missingness (missingness greater than 10%).

Sexual Orientation

Respondent's sexual orientation was measured through a one-item questionnaire:

"Do you consider yourself to be...?" Sexual orientation of the respondent was reported as a categorical variable: heterosexual, homosexual, and bisexual.

Household income

The household income was measured by the respondents selecting what household income category they identify with (the categories ranged from less than \$50,000 to over \$150,000). Statistics Canada reported the national household income as the ratio between the total income of the respondent's household and the before-tax income cut-off corresponding to the number of persons in the household and the size of the community. The variable used for this thesis is the relative measure of the respondent's household income to the household incomes of all other respondents. Statistics Canada reported household income in a range between lowest to highest decile. To maintain high cell count, the deciles were collapsed to quintiles; lowest, low-middle, middle, high-middle, highest.

Physical health

This variable was measured through a one-item questionnaire: "In general, would you say your physical health is..?" The options were: excellent, very good, good, fair and poor. Physical health was established as a covariate in this study and was collapsed into three categories to maintain high cell count: 1) excellent/very good, 2) good, 3) fair/poor.

Anxiety and Mood Disorders

Anxiety and mood disorders were measured through one-item questionnaires for each variable. For the mood disorder variable, respondents were asked: "Do you have a mood disorder such as depression, bipolar disorder, mania or dysthymia?" To measure anxiety

disorder, respondents were asked: “Do you have an anxiety disorder such as phobia, obsessive-compulsive disorder or a panic disorder?” Mood disorder was reported as a dichotomous variable: 1) presence of a mood disorder, 2) absence of a mood disorder. Anxiety disorder was also reported as a dichotomous variable: 1) presence of an anxiety disorder, 2) absence of an anxiety disorder. Although mental health encompasses mental illness, it is an important covariate to consider when evaluating mental health (28). Furthermore, because of the high prevalence of anxiety and mood disorders amongst youth (outlined in Chapter 2), these two variables were included in the study to account for the impact common mental disorders have on the association between social connectedness and mental health.

3.3 Statistical Analysis

The data analyses were conducted using STATA version 13.0. Only weighted results were requested for release from the RDC. The level of significance used was $p < 0.05$.

3.3.1 Descriptive Statistics

Descriptive statistics were derived to understand the characteristics of the CCHS 2016 cohort and the participants who were included in the study. Frequency distributions were calculated for self-perceived mental health, rurality, sex, immigrant status, sexual orientation, household income, self-perceived physical health, and anxiety and/or mood disorders. The mean and standard deviation was calculated for the Social Provisions Scale and age. Additionally, descriptive statistics were also derived for participants who were excluded from the study due to missingness. The purpose of this was to understand the demographic characteristics of the population that selected “valid skip,” “don’t know,” “not stated” or “refused” for the questions that are measuring the variables of interest in the study.

3.3.2 Analyses for Objective 1

To determine the association between social connectedness (as the exposure variable) and self-perceived mental health (as the outcome variable) in the Canadian TAY population, while controlling for socio-demographic factors (immigrant status, sexual orientation, household income, rurality), presence of common mental disorders (mood and/or anxiety disorders), and self-perceived physical health.

To examine Objective 1, bivariate analyses were conducted with each selected confounder and the outcome variable. An additional bivariate analysis was conducted with the confounders and the exposure variable. These analyses were completed to better understand and to further explore the statistical relationship between the confounders, self-perceived mental health, and social connectedness. Although the confounders are theoretically driven, it is important to also understand the statistical relationship the confounders have with the outcome and exposure variable. The odds ratio (OR) and p-value of the bivariate analyses can help in understanding the effect size and its significance (68). To determine the association between each confounder and the outcome, an ordinal logistic regression was conducted for self-perceived mental health, a multilevel categorical response variable with ordered categories (70). For the bivariate analyses with the confounders and the exposure, linear regressions were conducted using the dependent variable, as the overall score for social connectedness is on a scale from 10-40. Social connectedness (continuous variable) and age (continuous variable) in the analysis were centred before any regressions were conducted. Centering age allows for better interpretation of the intercept in the model as it is set to the average age, rather than the age of zero. Centering social connectedness also allows for better interpretation of the intercept in the model as it is set to the average overall score for social connectedness rather than the score of zero. All the confounders, with the exception of immigrant status and rurality, had a $p < 0.2$. A conventional threshold of 0.2 was used when evaluating confounders as it is considered best practice in epidemiology-based studies (71). The two variables were still included in the final regression model, as there is strong theoretical evidence to suggest that immigrant status and rurality correlates with both the outcome and exposure (27,39,45).

Progressive adjusted multivariable regressions were conducted with clusters of confounders to determine the difference in magnitude of effect between each cluster. One of the three clusters were socio-demographic factors, which consisted of the following variables: age, sex, sexual orientation, household income, rurality, and immigrant status. The second cluster was common mental disorders, which consisted of variables for mood and anxiety disorders. The third cluster was for self-perceived physical health. Each cluster was added to the model one by one, and the difference in the OR between the models was examined to determine which cluster alters the OR the most.

To examine the association between the continuous predictor variable and the ordinal categorical outcome variable, a multivariable ordinal logistic regression was conducted. In STATA, a program called *olgoit* is used to conduct ordinal logistic regressions. To test whether the proportional odds assumptions for an ordinal logistic regression was met, a program in STATA called *omodel* was used for every confounder and the main predictor. In the output, if the test of proportionality was violated then an alternative test to the ordinal logistic regression was used. The alternative test is known as a generalized logistic regression, the STATA program used for the test is *gologit2*. A generalized logistic regression model is used for ordinal dependent variables when the proportional odds assumption is violated, it provides a different coefficient for every level of the ordinal outcome variable. The program *gologit2* allows users to indicate which variables in the equation did not violate the proportional odds assumption and derive the coefficients for the variables that violated the proportional odds assumption at each level of the ordinal outcome (72). For the purposes of this study, ordinal logistic regressions were conducted as the proportional odds assumption for the predictor was not violated. Furthermore, for interpretation purposes a reverse scale was used for the variable measuring social connectedness (SPS). Therefore, the interpretation of effect measure between social connectedness and self-perceived mental health is for a decrease of social connectedness rather than an increase.

3.3.3 Analyses for Objective 2

To examine how the association between the exposure and outcome variable differs between TAY living in Canada: a) with and without mood and/or anxiety disorder, b) TAY living in rural vs. urban, and c) TAY who rate their physical health to be excellent/very good, good or fair/poor.

To examine Objective 2, multivariable ordinal logistic regressions were conducted to test whether mood disorder, anxiety disorder, self-perceived physical health, and rurality present to have a significant interaction in the association between social connectedness and self-perceived mental health. To determine if the interaction is significant, a conventional threshold of 0.2 was used. Commonly, a lower p-value is set when selecting confounders, effect modifiers, and mediators (71). In the regression models, the interaction terms were tested with the exposure variable (social connectedness). When testing mood disorder and anxiety disorder as interaction terms with social connectedness, the confounding variables (socio-demographic factors, rurality, and self-perceived physical health) were controlled for in the two models. Another multivariable ordinal logistic regression model was used to test rurality as an interaction term with social connectedness, controlling for socio-demographic factors, self-perceived physical health, and anxiety and mood disorders. Self-perceived physical health was also tested as an interaction term with social connectedness in a multivariable model controlling for socio-demographic factors, rurality, and anxiety and mood disorders.

3.3.3.1 Interaction terms

The selection of the interaction terms was based on the variables that were thought to play the role of an effect modifier between the association of the exposure and the outcome, based on previous literature and biological plausibility. The interaction terms that were selected for this thesis were: 1) rurality, 2) anxiety and mood disorders, and 3) self-perceived physical health. These variables were selected as interaction terms with the exposure variable because studies show that these variables have significantly impacted the association between social connectedness and self-perceived mental health (2,4,50,10,11,16,17,36,39,42,49). Furthermore, the literature lacks information on the

role these important variables play in the association between social connectedness and self-perceived mental health in TAY.

3.3.4 Analyses for Objective 3

To assess whether there are sex-differences in the adjusted association between social connectedness and mental health in TAY living in Canada.

A three-way interaction was conducted with each of the three interaction terms listed in Objective 2, social connectedness, and biological sex to determine if there is an interaction between anxiety and mood disorders, self-perceived physical health, rurality, and sex (as the third interaction term). The output suggested that there was no significant interaction with the three interaction terms and sex, however, sex was still stratified in the final model. Sex-stratified analysis were provided as *a priori* hypothesis as there are well-established differences in self-perceived mental health between men and women (35,44,73).

3.4 Other Statistical Considerations

3.4.1 Sample Weights

Sample weights were applied to all statistical tests conducted in the study in order for the results in the study to be representative of the TAY population in Canada. As outlined earlier under Study Source and Sample Design, the CCHS uses two sampling frames for its sample selection. The sample weights are applied to the statistical tests to account for the sampling design used for the survey. CCHS derived a separate person-level weight for each of the two frames (area and CCTB frames), which was then combined into a single set of weights, and later became the final person-level weight. The CCHS assigned a person-level weight to every respondent of the survey, the weight corresponded to the number of persons in the entire population that are represented by the respondent. The survey weights are applied to each respondent included in the final sample.

3.4.2 Bootstrap Weight

Bootstrap weights with 1000 replications were provided by the CCHS and applied to the statistical analyses. The bootstrap weights were used to compute appropriate variance for the survey data. This method involves random resampling with replacement from the original sample.

3.4.3 Missing Data

The missing data could have been a result of respondents refusing or simply not answering specific questions. Respondents may not want to disclose certain information, might not have access to that information or the question is inapplicable. To account for missing data, listwise deletion was used. Cases that had missing values for the variables of interest were deleted. Listwise deletion was the most appropriate method to use for this dataset as the sample size is large and the missingness is low (74). The following variables were selected as correlates of mental health: age, rurality, sex, immigrant status, sexual orientation, household income, self-perceived physical health, anxiety and mood disorders. These variables all had missingness well below 10%. A conventional threshold of 10% was set to ensure that there was not a large sample size lost due to listwise deletion for the missing values. Refer to *Table 4.1* for the frequency and percentage of the missing values for the variables included in this study. The highest percentage of missingness is for sexual orientation, 5.5%. The percentage of missingness for all the other variables is below 2.8%. Refer to *Appendix A* for the participant flowchart which outlines the progressive decrease in sample size after listwise deletion was used to account for any missing values for the variables of interest.

Chapter 4

4 Results

This chapter presents the findings of this study. Section 4.1 provides descriptive statistics for the study sample and an assessment of the portion of TAY that rate their mental health as good or fair/poor in comparison to excellent/very good. This section presents the patterns seen in self-reported mental health and social connectedness by demographic characteristics. Section 4.2 examines the bivariate associations between self-perceived mental health and its correlates, and the bivariate associations between social connectedness and its correlates. Section 4.3 reports the findings from the multivariable analyses that were conducted.

4.1 Description of the Study Sample

4.1.1 Sample Characteristics

The CCHS 2016 cycle had a total of 55,690 participants who responded to the survey. From these individuals, 5,808 were in the age range of interest (i.e. 15 to 24 years). After listwise deletion of the cases that had missing data for the variables of interest, the final sample size decreased to 5,378. This reduction in number was due to: missing data for self-perceived mental health (n=160); missing data for social provision scale (n=106); missing data for self-perceived physical health (n=1); missing data for mood disorder (n=11); missing data for anxiety disorder (n=13); missing data for immigrant status (n=72); and finally missing data for sexual orientation (n=317). The remaining total sample size was n=5,378. *Appendix A* provides the participant flowchart which outlines the decrease in sample size after listwise deletion. *Table 4.1* represents the number and percentage of missing values for variables in the dataset that had missingness. The variable with the greatest missingness was the variable for identifying sexual orientation; missingness of 5.46%.

Descriptive statistics for the sample population is presented in *Table 4.2*. For the overall sample size of 5,378 participants included in the study, 2,741 (51.0%) of them

were males and 2,637 (49.0%) were females. The majority of the population (65.9% [n=3,545]), were living in a large urban centre, 7.6% (n=410) in a medium population centre, 10.6% (n=569) were from small population centres, and 15.9% (n=854) were from rural areas. The survey had representation from all of the ten provinces with the largest number of respondents coming from Ontario (39.6% [n=2,129]) and the smallest from Prince Edward Island (0.5% [n=26]). In regard to the respondents' household income, the sample is well distributed within the quintiles ranging from lowest to highest. However, there is an overrepresentation of the sample in the lowest-decile, likely due to the age range (15-24-year-old). The sample population consisted of 20.2% (n=1,085) of immigrants. The majority of the population that took part in the survey were individuals who identified as heterosexual. The percentage of those who identified to be homosexual or bisexual was a little over 5%. A large portion of TAY in Canada (68.5% [n=3,684]) rated their self-perceived mental health to be very good/excellent, versus good and or fair/poor. A high percentage of individuals (71.2% [n=3,827]) also self-reported their physical health to be very good/excellent versus good or fair/poor. Furthermore, the prevalence of a self-reported diagnosed mood disorder was 8.3% (n=444). The prevalence of self-reported diagnosed anxiety disorder was 10.9% (n=585). Additionally, the mean of social connectedness was 35.64 ± 0.06 . Given that the highest score that can be received on the social connectedness scale is 40 and the lowest is 10 (a feature established by the developers of the scale), the mean score of 35.64 ± 0.06 represents a high degree of social connectedness.

Table 4.1: Number of missing values for variables with missingness

Variable	Frequency N (%) for the Canadian population
Self-perceived mental health	160 (2.8%)
Immigrant Status	72 (1.2%)
Sexual Orientation	317 (5.5%)
Self-perceived physical health	<5 (0.1%)
Common mental disorders: Mood disorder	11 (0.2%)
Common mental disorders: Anxiety disorder	13 (0.2%)

Table 4.2: Descriptive statistics of participants included in the study

Variable	Mean \pm SD or Frequency N (%) for Canadians n= 5,378
Age	20 \pm 0.04
Sex	
Male	2,741 (51.0%)
Female	2,637 (49.0%)
Rurality	
Rural areas (<1,000)	854 (15.9%)
Small population centre (1,000-29,999)	569 (10.6%)
Medium population centre (30,000-99,999)	410 (7.6%)
Large urban population centre (\geq 100,000)	3,545 (65.9%)
Province of Resident	
Newfoundland and Labrador	73 (1.4%)
Prince Edward Island	26 (0.5%)
Nova Scotia	137 (2.6%)
New Brunswick	102 (1.9%)
Quebec	1,196 (22.2%)
Ontario	2,129 (39.6%)
Manitoba	207 (3.9%)
Saskatchewan	164 (3.1%)
Alberta	641 (11.9%)
British Columbia	701 (13.0%)
Household Income	
Lowest Decile	1,449 (27.0%)
Low-Middle Decile	1,037 (19.3%)
Middle Decile	928 (17.3%)
High-Middle Decile	1,004 (18.7%)
Highest Decile	959 (17.8%)
Immigrant Status	
Immigrant	1,085 (20.2%)
Non-immigrant	4,292 (79.8%)
Sexual Orientation	
Heterosexual	5,068 (94.2%)
Homosexual	108 (2.0%)
Bisexual	203 (3.8%)
Social Connectedness	35.64 \pm 0.06
Self-perceived mental health	
Very good/excellent	3,684 (68.5%)
Good	1,261 (23.5%)
Fair/poor	433 (8.1%)
Self-perceived physical health	
Very good/excellent	3,827 (71.2%)
Good	1,273 (23.7%)
Fair/poor	277 (5.2%)

<i>Common mental disorders:</i>	
Presence of mood disorder	
Yes	444 (8.3%)
No	4,934 (91.7%)
Presence of anxiety disorder	
Yes	585 (10.9%)
No	4,793 (89.1%)

4.1.2 Self-perceived mental health

Overall, the number of participants in Canada that rated their mental health to be very good/excellent was 68.5% (n=3,684), 23.4% (n=1,260) for good and the number of participants that rated their mental health to be fair/poor was 8.0% (n=432). Refer to *Table 4.3* for the findings. There appeared to be no specific changes between age and self-reported mental health within each category (excellent/very good, good, fair/poor). When comparing between male and females, a larger proportion of males (71.5% [n=1,960]) rated their mental health as excellent/very good versus females (65.4% [n=1,724]), and more females rated their mental health as good or fair/poor than males. The portion of respondents who rated their mental health to be very good/ excellent, good and fair/poor is similar amongst immigrants and non-immigrants. In regard to sexual orientation, participants in the sample that identified to be heterosexual rated their mental health to be the highest (70.1% [n=3,553]) compared to individuals that identified as homosexual and bisexual. Additionally, respondents who identified to be heterosexual had the lowest percentage reported for fair/ poor mental health (7.0% [n=354]). Amongst the three categories for sexual orientation, the highest percentage to have reported fair/ poor mental health identified to be bisexual versus homosexual and heterosexual. For household income, TAY who belong to the highest decile also have the highest percentage of individuals who rated their mental health as very good/ excellent (74.5% [n=714]) and the lowest percentage of individuals who rated their mental health as fair/ poor (4.8% [n=46]). The lowest decile for household income has the lowest percentage of individuals to rate their mental health as very good/ excellent (64.8% [n=939]) compared to the other household income deciles. For rurality, individuals living in rural areas had the highest percentage of respondents who rated their mental as excellent/ very good (75.4% [n=644]) and the lowest percentage of respondents who rated their mental health

to be fair/ poor (4.1% [n=35]) in comparison to respondents living in small population centres, medium population centre and large urban population centre. More than half the respondents who rated their physical health as excellent/very good also rated their mental health as excellent/very good. Regarding common mental disorders, those who do not have a mood disorder, or an anxiety disorder reported better mental health than those who have been diagnosed with a mood and/or anxiety disorder.

Table 4.3: Demographics for self-perceived mental health

	Frequency N (%) for Canadians n= 5,378		
Variable			
Self-perceived Mental Health	Excellent/very good 3,684 (68.5%)	Good 1,260 (23.4%)	Fair/poor 432 (8.0%)
Social connectedness	36.45 ± 3.80	34.23 ± 4.46	33.0 ± 4.98
Age			
15	368 (78.6%)	81 (17.3%)	19 (4.1%)
16	315 (69.2%)	101 (22.2%)	39 (8.6%)
17	348 (73.4%)	103 (21.7%)	23 (4.9%)
18	393 (68.7%)	131 (22.9%)	48 (8.4%)
19	389 (68.7%)	127 (22.4%)	50 (8.8%)
20	321 (60.7%)	151 (28.5%)	57 (10.8%)
21	393 (64.0%)	158 (25.7%)	63 (10.3%)
22	396 (70.5%)	129 (23.0%)	37 (6.6%)
23	424 (69.1%)	134 (21.8%)	56 (9.1%)
24	338 (64.4%)	146 (27.8%)	41 (7.8%)
Sex			
Male	1,960 (71.5%)	607 (22.1%)	174 (6.3%)
Female	1,724 (65.4%)	654 (24.8%)	259 (9.8%)
Immigrant status			
Immigrant	736 (67.8%)	263 (24.2%)	86 (7.9%)
Non-immigrant	2,948 (68.7%)	998 (23.2%)	347 (8.1%)
Sexual Orientation			
Heterosexual	3,553 (70.1%)	1,160 (22.9%)	354 (7.0%)
Homosexual	59 (54.6%)	31 (28.7%)	18 (16.7%)
Bisexual	72 (35.5%)	70 (34.5%)	61 (30.0%)
Rurality			
Rural areas (<1,000)	644 (75.4%)	175 (20.5%)	35 (4.1%)

Small population centre (1,000-29,999)	392 (68.9%)	133 (23.4%)	44 (7.7%)
Medium population centre (30,000-99,999)	255 (62.3%)	106 (25.9%)	48 (11.7%)
Large urban population centre ($\geq 100,000$)	2,393 (67.5%)	847 (23.9%)	305 (8.6%)
Household Income			
Lowest Decile	939 (64.8%)	367 (25.3%)	144 (10.0%)
Lowest-Middle Decile	713 (68.8%)	247 (23.8%)	77 (7.4%)
Middle Decile	641 (69.1%)	209 (22.5%)	78 (8.4%)
High-Middle Decile	677 (67.5%)	238 (23.7%)	88 (13.0%)
Highest Decile	714 (74.5%)	199 (20.8%)	46 (4.8%)
Self-perceived physical health			
Excellent/very good	3,109 (81.2%)	621 (16.2%)	97 (2.5%)
Good	523 (41.1%)	561 (44.1%)	189 (14.8%)
Fair/poor	51 (18.4%)	79 (28.5%)	147 (53.1%)
Psychiatric Conditions			
<i>Mood disorder</i>			
Yes	70 (15.8%)	166 (37.4%)	208 (46.8%)
No	3,614 (73.3%)	1,095 (22.2%)	224 (4.5%)
<i>Anxiety disorder</i>			
Yes	147 (25.1%)	218 (37.3%)	220 (37.6%)
No	3,537 (73.8%)	1,043 (21.8%)	213 (4.4%)

4.1.3 Social connectedness

The results from analysis on the demographics of the exposure variable are presented in *Table 4.4*. Overall the mean for social connectedness for the different demographics was quite similar and there was limited variation. The mean ranges from approximately 33 to 37. Social connectedness was on a continuous scale from 10 to 40, with 10 being the lowest perceived social connectedness and 40 being the highest. The greatest variation within the demographic variable was seen between self-perceived mental health and self-perceived physical health.

Table 4.4: Demographics for social connectedness

	Mean \pm SD for Canadians n= 5,378
Social Connectedness	
Self-perceived mental health	
Excellent/ very good	36.45 \pm 3 .80
Good	34.23 \pm 4.46
Fair/poor	33.00 \pm 4.98
Age	
15	35.05 \pm 4.13
16	35.61 \pm 4.00
17	35.66 \pm 4.02
18	35.37 \pm 4.33
19	35.4 \pm 4.61
20	35.2 \pm 4.33
21	35.8 \pm 4.56
22	36.3 \pm 3.81
23	35.9 \pm 4.23
24	35.9 \pm 4.42
Sex	
Male	35.07 \pm 4.42
Female	36.26 \pm 4.00
Immigrant status	
Immigrant	35.05 \pm 4.34
Non-immigrant	35.81 \pm 4.21
Sexual Orientation	
Heterosexual	35.71 \pm 4.22
Homosexual	35.36 \pm 4.39
Bisexual	34.56 \pm 4.68
Household income	
Lowest Decile	35.14 \pm 4.39
Lowest-Middle Decile	35.23 \pm 4.53
Middle Decile	35.79 \pm 4.26
High-Middle Decile	35.99 \pm 4.01
Highest Decile	36.44 \pm 3.74
Rurality	
Rural areas (<1,000)	35.85 \pm 3.99
Small population centre (1,000-29,999)	35.78 \pm 4.19

Medium population centre (30,000-99,999)	35.69 ± 4.33
Large urban population centre (≥100,000)	35.59 ± 4.30
Self-perceived physical health	
Excellent/very good	36.32 ± 3.89
Good	34.15 ± 4.45
Fair/poor	33.47 ± 5.30
Common mental disorders	
<i>Mood disorder</i>	
Yes	34.16 ± 4.59
No	35.80 ± 4.18
<i>Anxiety disorder</i>	
Yes	34.53 ± 5.03
No	35.80 ± 4.11

4.2 Bivariate Analyses

In addition to the bivariate analyses that were conducted for the outcome, exposure and the selected confounders, the proportional odds assumption for ordered logistic regressions were tested. Because the outcome variable was an ordinal categorical variable, the proportional odds assumptions were tested for the main exposure variable before the model was created. Social connectedness met the proportional odds assumption, meaning that the coefficient for the effect estimate remained consistent between the three categories for the outcome variable.

In the unadjusted model for the association between poor social connectedness and mental health, the odds ratio (OR) was 1.15 (95% CI [1.13, 1.18], $p < 0.001$). The result from this bivariate model is presented in *Table 4.5*. It is important to note that for interpretation purposes a reverse scale was used for the variable measuring social connectedness (SPS). This reflects that for every one-point decrease in social connectedness, TAY have 15% greater odds of rating their self-perceived mental health as good or fair/poor. The reference category for the outcome variable was excellent/very good. The reference category was being compared to the other two ordinal categories, good and fair/poor mental health.

The bivariate analyses were conducted with the selected confounders and self-perceived mental health to determine which variable had a significant ($p < 0.2$) association with the outcome variable. Bivariate analyses were also conducted for the confounders and social connectedness. The confounders for this thesis are theoretically driven, however, the bivariate analyses were conducted to gain a better understanding and to further explore the statistical relationship between the confounders, mental health, and social connectedness. For the analyses that were conducted with the confounders and the outcome variable, the only confounder to have a $p > 0.2$ was immigrant status. All the other confounders had a $p < 0.2$ for their association with self-perceived mental health. For the bivariate analyses that were conducted with the confounders and social connectedness, rurality was the only variable with $p > 0.2$. All the other confounders had a significant ($p < 0.2$) association with social connectedness. Even though $p > 0.2$ for immigrant status and rurality, the variable was included in the study as there is theoretical evidence to show that immigrant status is a correlate for mental health and rurality is a correlate of social connectedness. Refer to *Appendix C* for the tables displaying the bivariate analyses.

4.3 Multivariable Analyses

4.3.1 Partially adjusted model

Results from the partially adjusted models are also presented in *Table 4.5*. The OR of the partially adjusted model differed slightly when adjusted with the three different clusters of confounders: socio-demographic factors, common mental disorders and self-perceived physical health. Adjustment with just the socio-demographic factors (age, sex, immigrant status, sexual orientation, household income and rurality) resulted in an OR= 1.17 (95% CI [1.14, 1.20], $p < 0.001$) that was closest to the crude effect estimate (OR=1.15). Adjustment with self-perceived physical health had an effect estimate that varied the most from the crude effect estimate of the association between the exposure and outcome variable; OR=1.11 (95% CI [1.09, 1.14], $p < 0.001$). Furthermore, before the model was fully adjusted, clusters of confounders were added one at a time to analyze the

change in the effect estimate. When socio-demographic factors and common mental disorders were added to the model the OR presented to be 1.16, (95% CI [1.13, 1.18], $p < 0.001$).

4.3.2 Interaction Terms

Common mental disorders (mood and anxiety disorders), rurality, and self-perceived physical health were explored as potential interaction term for Objective 2 of the thesis. While controlling for the confounding variables, each potential interaction term was added to the model to determine if the variable had a significant ($p < 0.2$) interaction with the association between social connectedness and self-perceived mental health. When the interactions were tested in the multivariable analyses it was found that none of the interactions were significant. Results presented in *Table 4.6*. A three-way interaction was conducted which included common mental health disorders, or self-perceived physical health, or rurality, and social connectedness, and sex (as the third interaction term). A three-way interaction was conducted to determine if there would be a significant interaction with the addition of sex as an interaction term. None of the three interactions were significant when tested in the three-way interaction. Results presented in *Table 4.6*. Since common mental disorders (mood and anxiety disorders), rurality, and self-perceived physical health did not show to be significant interaction terms with the association between social connectedness and self-perceived mental health have, the potential interaction terms were not added to the fully adjusted model.

4.3.3 Fully Adjusted Model

Results from the fully adjusted model are presented in *Table 4.5*. In the fully adjusted model, socio-demographic factors (such as immigrant status, sexual orientation, age and household income), common mental disorders (mood and anxiety disorders), and self-perceived physical health were controlled. The fully adjusted model had an OR of 1.12 (95% CI [1.10, 1.12], $p < 0.001$). Additionally, the fully adjusted model with stratification by sex is presented in *Table 4.7*. The effect estimates between the fully

adjusted model without stratification and with stratification were very similar. Furthermore, the effect estimates between males and females only differed by 1%. The reported OR for males was 1.13 (95% CI [1.09, 1.16], $p < 0.001$). This suggested that for each one-point decrease in social connectedness, Canadian male TAY have 13% more odds to rate their self-perceived mental health as good or fair/poor opposed to excellent/very good. The reported OR for females was 1.12 (95% CI [1.09, 1.16], $p < 0.001$). This suggested that for each one-point decrease in social connectedness, Canadian female TAY have 12% more odds to rate their self-perceived mental health as good or fair/poor.

Table 4. 5: Unadjusted, partially adjusted and fully adjusted model

Unadjusted		
Exposure Variable	OR [95% CI]	p-value
Social Connectedness	1.15 [1.13, 1.18]	$p < 0.001$
Partially adjusted		
Confounder Clusters	OR [95% CI]	p-value
Socio-demographic factors	1.17 [1.14, 1.20]	$p < 0.001$
Common mental disorders	1.15 [1.12, 1.18]	$p < 0.001$
Self-perceived physical health	1.11 [1.09, 1.14]	$p < 0.001$
Addition of clusters		
Confounder Clusters	OR [95% CI]	p-value
Socio-demographic factors + Common mental disorders	1.16 [1.13, 1.18]	$p < 0.001$
Socio-demographic factors + Common mental disorders + Self-perceived physical health	1.12 [1.10, 1.15]	$p < 0.001$
Fully adjusted		
	OR [95% CI]	p-value
Model controlling for socio-demographic factors + common mental disorders + self-perceived physical health	1.12 [1.09, 1.15]	$p < 0.001$

Excellent/very good is treated as the reference category for self-perceived mental health (ordinal outcome)

Table 4.6: Model with interaction terms

Two-way interaction				
Variable 1	Variable 2	OR [95% CI]	p-value	
Common mental disorders:				
Mood Disorder	Social Connectedness	1.01 [0.94, 1.08]	p=0.878	
Anxiety Disorder	Social Connectedness	1.04 [0.97, 1.10]	p=0.299	
Rurality	Social Connectedness	1.01 [0.99, 1.03]	p=0.544	
Self-perceived physical health	Social Connectedness	0.98 [0.95, 1.02]	p=0.411	
Three-way interaction				
Variable 1	Variable 2	Variable 3	OR [95% CI]	p-value
Common mental disorders:				
Mood Disorder	Social Connectedness	Sex	1.00 [0.98, 1.02]	p=0.939
Anxiety Disorder	Social Connectedness	Sex	1.00 [0.98, 1.03]	p=0.824
Rurality	Social Connectedness	Sex	1.00 [0.99, 1.01]	p=0.785
Self-perceived physical health	Social Connectedness	Sex	0.99 [0.97, 1.01]	p=0.356

Excellent/very good is treated as the reference category for self-perceived mental health (ordinal outcome)

Table 4.7: Fully adjusted model with stratification by sex

Fully Adjusted Model with Sex Stratification		
	Odds Ratio [95% CI]	p-value
Male	1.13 [1.09, 1.16]	p<0.001
Female	1.12 [1.09, 1.16]	p<0.001

Excellent/very good is treated as the reference category for self-perceived mental health (ordinal outcome)

Chapter 5

5 Discussion

The main objective of this study was to assess the association between social connectedness and mental health in transitional aged youth (15 to 24 years of age). The study used the Canadian Community Health Survey, a national survey to capture population level data. Contrary to previous studies that assessed social connectedness and its impact on mental health, this study used an extensive questionnaire to measure the exposure, focusing on the population of TAY which has not been widely explored in previous investigations. This study also explored the potential role of rurality, common mental disorders, and self-perceived physical health as effect modifiers in the association between social connectedness and self-perceived mental health.

5.1 Overview of Findings

5.1.1 Self-rated mental health amongst different socio-demographic categories

As stated in the results section, there was a greater percentage of TAY that rated their mental health as excellent/ very good (68.5%) versus good (23.4%) and fair/ poor (8.0%). The statistics seen for Canadian TAY in this study are consistent with the findings from previous CCHS (49). The patterns observed for self-rated mental health amongst different socio-demographic factors of interest align with the patterns seen in literature. More specifically, for sex, a greater percentage of males rated their mental health to be excellent/very good versus females, which aligns with what has been reported in literature (35,44). In regard to immigrant status, the study showed that immigrants and non-immigrants have similar self-perceived mental health. Literature suggests that younger immigrants represent as a vulnerable population thus, tend to have poorer mental health compared to younger non-immigrants however, this is not reflected in the results (75). According to the CCHS, individuals who identified as heterosexual rate their mental health to be better compared to individuals who identified as homosexual or bisexual, similar to prior findings (2,41). Additionally, for rurality, youth

living in rural areas had better self-perceived mental health than those living in highly populated areas. A study by Kitchen and colleagues (2012) shows similar results (39). The results show that individuals living in the highest decile for household income have better self-perceived mental health than those living in lower decile for household income. These results can be supported by findings in other studies (42,48). For self-rated physical health, youth who have better physical health also reported having better mental health, and a similar pattern is found in literature (10,16,49). Individuals who have mood and/or anxiety disorders have worse mental health than those without the diagnosis. There has been extensive research done to support this association (4,11,17,42,50). Although self-perceived mental health encompasses the absence or presence of mental illness and states of mental well-being, the variables for mood and anxiety disorder were included as confounders in the model to account for the impact common mental disorders have on the association between social connectedness and mental health. Additionally, the variation observed between each category of self-perceived mental health and age is very similar. The similarity for age can be explained by the narrow age range selected for the study.

5.1.2 Association between Social Connectedness and Mental Health

The observation of this relationship is supported by the significant ($p < 0.05$) association reported between social connectedness and self-perceived mental health while controlling for the selected confounders (socio-demographic factors, mood and anxiety disorders, and self-perceived physical health). It was found that the effect estimate for the model was $OR = 1.12$ (95% CI [1.09, 1.115], $p < 0.001$). This suggested that for each one-point decrease in social connectedness, Canadian TAY have 12% more odds to rate their self-perceived mental health as good or fair/poor as opposed to excellent/very good. The results seen in this study suggest that increased social connectedness acted as a protective factor for mental health in youth and vice versa. Similar results have been seen in other studies in literature with different populations (16,39,45,53,54). To our knowledge, this is one of the only population-level studies that has been conducted assessing this association in TAY.

In the literature, it has been reported that socio-demographic variables (i.e., age, sex, immigrant status, sexual orientation, and household income, rurality), self-reported mood and anxiety disorder, and self-perceived physical health have an association with both the exposure and outcome variables selected for this study. Thus, it was important to add these confounders in the model to obtain the adjusted effect estimate for social connectedness and mental health. Previous studies have explored the association with the selected confounders and their association with either self-perceived mental health or social connectedness, however there is limited research on the association between social connectedness and self-perceived mental health while controlling for these variables. It is important to note that the selection of the confounders was theoretically driven. Because mental health is multi-dimensional, the inability to capture the various factors that impact mental health in the population of interest can result in deriving an association that is distorted from the true association (76).

5.1.3 Rurality, self-perceived physical health, and common mental disorders as effect modifiers

The findings related to the role of rurality (rural vs. urban), self-perceived physical health, and self-reported mood and anxiety disorder as effect modifiers in the association between social connectedness and self-perceived mental health represent a novel contribution to the literature, as there are no known studies to date that have investigated this relationship. It was interesting to observe that the three effect modifiers had insignificant interaction in the relationship between the exposure and the outcome when tested in the Canadian population. It can be concluded that rurality, self-perceived physical health, and self-reported mood and anxiety disorder do not act as effect modifiers in the association between social connectedness and self-perceived mental health.

5.1.4 Sex-stratified Results

Sex-stratified analysis was provided as *a priori* hypothesis as there are well-established differences in self-perceived mental health between men and women, it is also considered to be the best practice in the fields of epidemiology and public health (35,44,73). When sex was tested in a three-way interaction with self-perceived physical health, rurality, common mental disorders, and social connectedness, the interactions presented to be insignificant ($p>0.2$). Additionally, when the results were stratified by sex, the differences seen in the effect estimates between the strata was negligible. It can be concluded that in this study, male and female TAY in Canada had a similar relationship between social connectedness and mental health.

5.2 Implications of Findings for Health Promotion

Many forms of distress and mental illness first emerge during adolescence and young adulthood (6,7). During this age period, individuals are experiencing several life changes and demands of the social environment changes. Individuals at this development phase are working on sculpting their identities related to occupation, sexual orientation, romantic relationships, and friendships. Studies have repeatedly shown that the youth in Canada and other Western countries are experiencing high volumes of distress, including feelings of being overwhelmed, hopeless, depressed, and anxious (5,57). One in five youth are facing mental health challenges today, and we know that with the evolving societal barriers this is going to get more complex (24). Some of the societal barriers that youth are being faced with today is associated with social media. Social media creates a false sense of reality that is difficult to live up to. High social media engagement is shown to result in negative feedback and upward social comparisons, thus causing lower self-esteem and poor mental health (77).

Mental health is multi-dimensional and complex. It is largely shaped by social, economic, and physical environments (78). Despite recent efforts to increase access to mental health services in communities across Canada, there are still high rates of poor mental health present among the youth. Although there is still a need for services that are

more inclusive, accessible, and readily available, it is also important to consider preventative measures. Evidence from research in mental health supports the importance of social connections and sense of community (11). Furthermore, there is research to suggest that TAY thrive when they are meaningfully engaged in their community, have quality relationships and a strong sense of self (15).

By using a validated questionnaire to measure social connectedness and a self-reported measure of mental health, it was found that there was a significant association between social connectedness and self-perceived mental health in TAY living in Canada. The results observed in this study suggest that as the degree of social connectedness increases in youth, their mental health will also improve. Since temporality was not established due to the cross-sectional study design, it can also be concluded that as mental health improves amongst TAY, their social connectedness will also increase. Additionally, this study explored how perception of mental health varied in communities from various economic backgrounds, sexual orientation, immigration status, rurality, and individuals with a common mental disorder such as mood and/or anxiety disorders. The results presented in the study suggest that individuals who belong to traditionally marginalized communities, such as individuals from low-income households and individuals who identify as homosexual or bisexual report poorer mental health. Additionally, those who live in urban areas and reported a mental disorder diagnosis of mood or anxiety disorders also reported poorer mental health.

The current findings have several implications for health promotion. Firstly, they indicate that promoting social connectedness with TAY can facilitate better mental health. Models of engagement of combining youth decision-making, caring community members, and opportunities to make community contributions ought to be implemented, as such models are associated with long lasting positive effects on mental health (11). TAY that belong to marginalized communities, TAY who have common mental disorders, or TAY living in urban areas can highly benefit from interventions that aim to improve mental health through increasing social connectedness. For example, an out-of-school program implemented in North Carolina was tailored towards providing social

engagement and support for suspended youth (79). Individuals who are economically disadvantaged and who belonged to an ethnic minority group tended to be the most prevalent demographic among the suspended youth. The community-based organization was able to provide not only a safe space for these youth, but also a space where they could feel validated and supported during a time of need (79). Another example of a successful intervention with youth is a relationship-based intervention aimed to improve social connectedness in homeless youth living in Toronto. The intervention consisted of six weekly sessions that were focused around building meaningful relationships that would work towards guiding, supporting and nurturing youth. Youth who went through the six-week intervention felt higher levels of social connectedness and had better mental health scores versus the control group (21). Promoting social connectedness may be a preventive measure for poor mental health, which could ultimately result in a lower burden of disease faced by the healthcare system.

5.3 Strengths

5.3.1 Sample Size

An obvious strength to this study is the use of the large dataset. The 2016 cycle of the CCHS is representative of 97% of the Canadian population 12 years of age or older, thus the survey is representative of the entire transitional aged youth population (58). The 2016 cycle of the survey has over 55,000 respondents across the country. The addition of the SPS as a mandatory module for all provinces and territories in a national population-based survey ensured representation of TAY across Canada on social connectedness. Furthermore, the use of sample weights allows for appropriate adjustments for response rates and to also ensure that the respondents included in the survey are an accurate representation of the overall Canadian population.

5.3.2 Validity in measures

Using the CCHS dataset also allows access to measures with high validity. Social connectedness, the exposure variable in the study, was measured by the Social Provision

Scale (SPS) which is a 10-item questionnaire validated in 1996 and widely used in this area of study (59). In the literature, the SPS is known to be a reliable instrument with high validity for measuring social connectedness (65). In past studies, social connectedness, or similar variables, were assessed through robust measures, this study used a tool that has been constructed to capture the various dimensions of social support (63). Using a tool that is able to capture such a multi-dimensional variable brings high validity to the measurement of this construct.

5.4 Limitations

5.4.1 Self-perceived Mental Health

A limitation of this study is associated with the measure that is used for self-perceived mental health. To reiterate, the variable is measured from a one-item questionnaire that asked respondents to rate their mental health to be excellent, very good, good, fair or poor. Although the response rate for this question was high and had low missingness (<5%) the measure does not do an adequate job at capturing the overall concept of mental health. WHO outlines there to be three core components of mental health: 1) well-being; 2) effective functioning of an individual; and 3) effective functioning for a community (78). The specific question has been used by several studies in the field of mental health, however, it must be noted that the simplicity of the question does not adequately capture the complexity of mental health. The tool used to measure Positive Mental Health would have been more appropriate, as it is a 14-item questionnaire that measures emotional well-being and positive functioning (20). This questionnaire was not included in the 2016 cycle thus was unable to be used for this study.

5.4.2 Missingness

Although the response rate of the CCHS 2016 cycle was 61.3%, which is considered to be relatively high for a national population-based survey, there was a high percentage of non-responses for many of the variables. Variables with high missingness

tend to be ones that measured data on more sensitive topics, such as those related to self-identity and high-risk health behaviours. For this study, Indigenous status was a socio-demographic variable that was initially considered as a confounder, however, due to high missingness (approximately 25%), the variable was not included in the study.

Furthermore, questionnaires for high risk health behaviours such as long term/short term illicit drug use, marijuana or hashish use, and risks due to short term and long term drinking also had missingness in the range of 20% to 60%.

5.4.3 Lack of Generalizability to Population Subgroups

One of the major strengths of this study is the high generalizability and external validity to the overall Canadian population, however, there is low generalizability to specific population subgroups. As outlined in section 5.4.2, there was high missingness present for populations of people engaging in high risk health behaviours and populations belonging to specific identities. Since listwise deletion was used to handle missingness, these specific population subgroups may be underrepresented in the survey, thus the findings from this study may not be generalizable to these groups. National-level studies show that individuals that identify as Indigenous, engage in illicit drug use, high cannabis use, and unsafe drinking habits tend to have worse mental health than those that are non-Indigenous and do not engage in these behaviours (43,80). Therefore, the inability of the survey to collect data from these high-risk subgroup populations is a limitation.

Furthermore, a lack of generalizability can be associated with selection bias in relation to the participants included in the study. It might be expected that people who have low social connectedness and people who have poorer mental health are less likely to participate in the survey. This suggests that the survey will underrepresent socially disconnected people with poorer mental health, thus leading to lack of generalizability in the findings.

5.4.4 Temporality

Due to the cross-sectional study design of the of the survey, the temporality of the relationship between social connectedness and self-perceived mental health cannot be established. The findings from the study were able to conclude that there is a significant association between social connectedness and self-rated mental health, however, due to the inability to establish temporality the findings cannot conclude if poor social connectedness leads to poor mental health, or vice versa. Although the results from this study were unable to establish temporality, the direction of the association was examined through past studies that have researched the impact poor social connectedness has on mental health in adult populations. The relationship between these two variables can be bidirectional, however, research shows that the relationship between social connectedness impacting mental health is stronger (16).

5.4.5 Age Range

The selection of the age range for TAY tends to vary between 15-25 (5). For the purposes of this thesis, ages 15-24 were defined as TAY. There is high diversity in living conditions, health and services utilization and overall lifestyle of youth within this age range. Individuals between the ages of 15-17 may still be in high school and living with their parents. In the healthcare system, specifically the mental health system, they are viewed as youth. Individuals between the ages of 18-24 may have moved away from their parents and may be living more independently in comparison to those between the ages of 15-17. Older TAY (18-24) are also viewed as adults in the mental health system and access different care than those under the age of 18 (81). Furthermore, the CCHS data collection procedure for respondents younger than the age of 18 consisted of a list frame sampling design and phone interviews for the surveys. An area frame sampling design was used for respondents 18 and older and the survey was conducted both over the phone and online (58). The variation seen in the TAY age group associated with data collection of the CCHS, living conditions, access and utilization of health services is not adequately accounted for in the study.

5.5 Future Directions

This section outlines areas that should be considered in future studies. Firstly, a future consideration would be to use a more comprehensive tool to measure self-perceived mental health. A recommendation would be to use a questionnaire that is able to capture the various dimensions of mental health, such as the 14-item Positive Mental Health questionnaire used by CCHS (59). Additionally, the 10-item psychological distress scale by Kessler was found to be an appropriate and comprehensive measure for mental health in youth by a study conducted in Australia (82). Furthermore, to account for the variation amongst the respondents selected in the age bracket, future studies should consider conducting a subgroup analysis for individuals ages 15-17 and 18-24 to explore how the association between social connectedness and self-perceived mental health varies between the two age groups. Using qualitative research to collect individual narratives would also provide insight in further understanding the association between social connectedness and mental health. In future studies, it would be of interest to explore the association between social connectedness and common mental disorders. For this study, mood and anxiety disorders (common mental disorders) were explored as an effect modifier and confounders but were not explored as outcome variables. It would be interesting to analyze the impact poor social connectedness has on individuals who have these and other common mental disorders. Lastly, future studies should use a longitudinal database to address the limitation of establishing temporality.

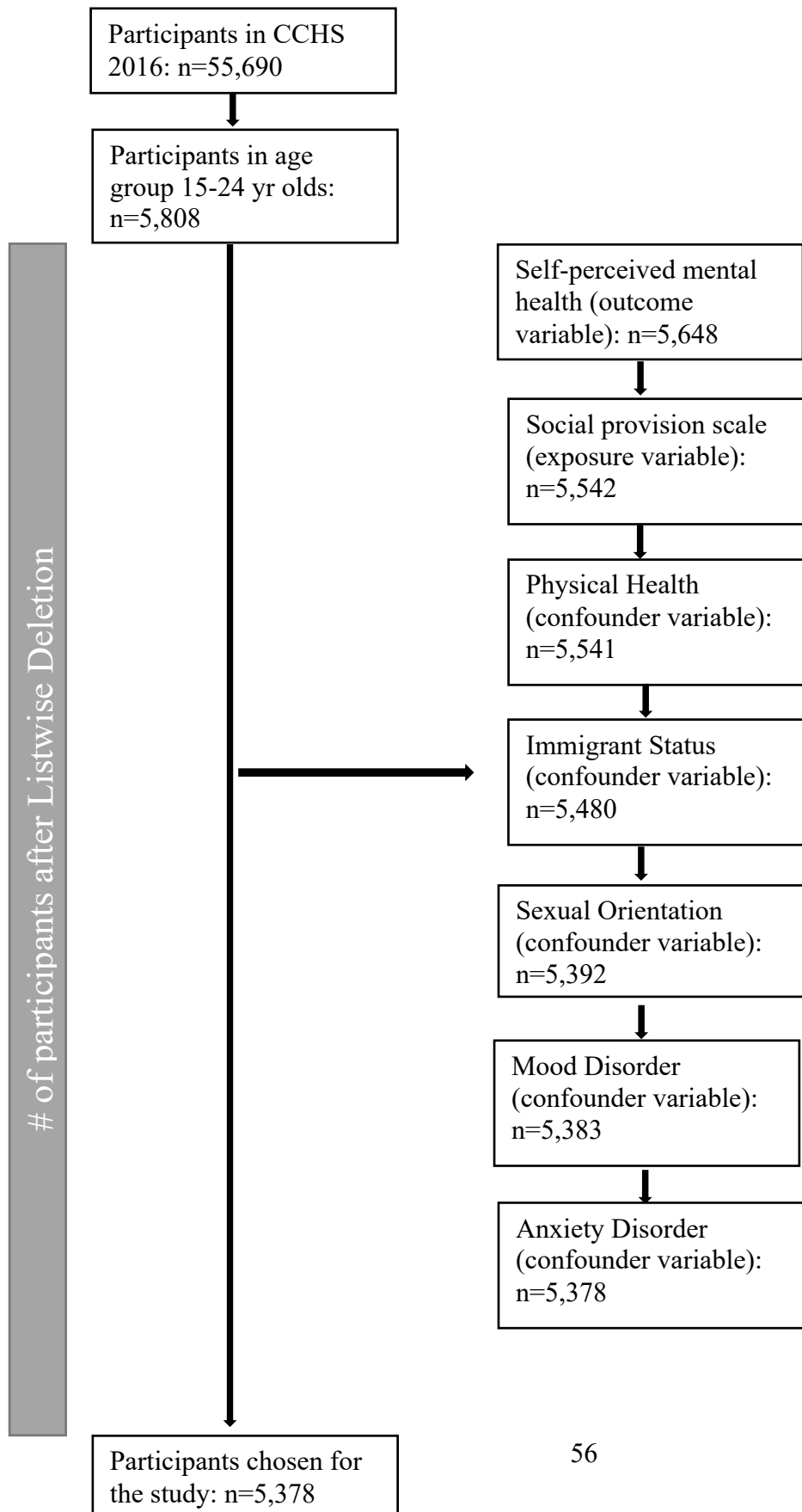
5.6 Conclusion

The present study explored the association between social connectedness and self-perceived mental health using a national population-based survey in transitional aged youth (TAY), a group that is considered to be high risk for poor mental health and mental illness. Although temporality is not established due to the study design of the survey, the adjusted effect estimates in the study suggest that high social connectedness acts as a protective factor for mental health in TAY. The results presented in the study indicate that individuals who belong to traditionally marginalized communities, such as those

living in a low-income household and individuals that identify to be homosexual or bisexual have poorer mental health. Additionally, those who live in more populated areas and have mood and/or anxiety disorders also face poorer mental health. This study provides insight on the role self-reported mood and anxiety disorders, self-perceived physical health, and rurality play on the association of social connectedness and self-perceived mental health. A focus on youth mental health is crucial because their health now predicts their prosperity in the future. This study will contribute to a very important area of research by providing evidence for the need of future interventions aimed to improve mental health in youth through the increase of social connectedness. It is recommended that future research should aim to select a longitudinal database that employs a more comprehensive measure for self-perceived mental health to gain insight on the direction of the relationship between social connectedness and mental health

Appendices

Appendix A: Participant flowchart



Appendix B: Social Provisions Scale

Q1: There are people I can depend on to help me if really need it. (*Reliable alliance*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q2: There are people who enjoy the same social activities I do. (*Social integration*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q3: I have close relationships that provide me with a sense of emotional security and well-being. (*Attachment*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q4: There is someone I could talk to about important decisions in my life. (*Guidance*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q5: I have relationships where my competence and skill are recognized. (*Reassurance of worth*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q6: There is a trustworthy person I could turn to for advice if I were having problems. (*Guidance*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q7: I feel part of a group of people who share my attitudes and beliefs. (*Social integration*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q8: I feel a strong emotional bond with at least one other person. (*Attachment*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q9: There are people who admire my talents and abilities (*Reassurance of worth*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Q10: There are people I can count on in an emergency. (*Reliable alliance*)

1. Strongly agree
2. Agree
3. Disagree
4. Strongly disagree

DK, RF

Appendix C: Bivariate Analyses

Table C.1: Bivariate analysis with the outcome variable (self-perceived mental health)

Variable	OR [95% CI]	p-value
Social connectedness	0.87 [0.85, 0.89]	p<0.001
Age	1.04 [1.01, 1.07]	p=0.003
Sex	1.36 [1.13,1.63]	p<0.001
Immigrant status	0.97 [0.74, 1.26]	p=0.810
Sexuality (<i>Heterosexual used as the reference category</i>)		
Homosexual	2.09 [1.24, 3.52] *	p=0.006
Bisexual	4.80 [3.22, 7.15] *	p<0.001
Household income (<i>lowest decile used as the reference category</i>)		
Lowest-Middle Decile	0.82 [0.62, 1.09]	p=0.168
Middle Decile	0.82 [0.63, 1.08]	p=0.161
High-Middle Decile	0.88 [0.68, 1.15]	p=0.359
Highest Decile	0.62 [0.47, 0.80]	p<0.001
Geographic location (<i>Rural areas (>1,000)</i>)		
Small population centre (1,000-29,999)	1.41 [1.08, 1.85]	p=0.011
Medium population centre (30,000-99,999)	1.95 [1.48, 2.58]	p<0.001
Large urban population centre (≤100,000)	1.52 [1.21, 1.90]	p<0.001
Self-perceived physical health (<i>excellent/very good used as a reference category</i>)		
Good	6.15 [5.06, 7.49] *	p<0.001
Fair/poor	32.60 [19.28, 55.11] *	p<0.001
Psychiatric Conditions: Mood disorder	0.06 [0.04, 0.08]	p<0.001
Psychiatric Conditions: Anxiety disorder	0.10 [0.08, 0.13] *	p<0.001

Excellent/very good is treated as the reference category for self-perceived mental health (ordinal outcome)

**variable does not meet the proportional odds assumption.*

Table C.2: Bivariate analysis with the exposure variable (social connectedness)

Variable	OR [95% CI]	p-value
Age	1.11 [1.04, 1.17]	p=0.002
Sex	3.29 [2.25, 4.85]	p<0.001
Immigrant status	2.14 [1.27, 3.56]	p=0.004
Sexuality (<i>Heterosexual used as the reference category</i>)		
Homosexual	0.67 [0.23, 2.01]	p=0.484
Bisexual	0.31 [0.12, 0.80]	p=0.015
Household income (<i>lowest decile used as the reference category</i>)		
Lowest-Middle Decile	1.03 [0.54, 1.95]	p=0.933
Middle Decile	1.84 [1.02, 3.32]	p=0.043
High-Middle Decile	2.25 [1.31, 3.86]	p=0.003
Highest Decile	3.25 [1.92, 5.53]	p<0.001
Geographic location (<i>Rural areas (>1,000)</i>)		
Small population centre (1,000-29,999)	0.91 [0.58, 1.68]	p=0.974
Medium population centre (30,000-99,999)	0.90 [0.51, 1.57]	p=0.692
Large urban population centre (≤100,000)	0.81 [0.51, 1.27]	p=0.357
Self-perceived physical health (<i>excellent/very good used as a reference category</i>) *		
Good	0.11 [0.07, 0.17]	p<0.001
Fair/poor	0.06 [0.02, 0.20]	p<0.001
Psychiatric Conditions: Mood disorder	5.00 [2.66, 9.40]	p<0.001
Psychiatric Conditions: Anxiety disorder *	3.50 [1.67, 7.24]	p=0.001

*variable does not meet the proportional odds assumption.

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