

Cancer and Mental Disorder among Emerging Adults

by

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AUTHOR'S DECLARATION

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

I understand that my thesis may be made electronically available to the public.

STATEMENT OF CONTRIBUTIONS

This thesis is the work of Jennie Tang with the collaboration of her supervisor, Dr. Mark Ferro. Although the research and analysis are based on data from Statistics Canada, the opinions expressed do not represent the views of Statistics Canada. This thesis contains the Canadian Community Health Survey-Mental Health (CCHS-Mental Health) data from Statistics Canada that has been granted access to the South-Western Ontario Research Data Centre (RDC) at the University of Waterloo. All security processes were carried out to ensure confidentiality of the participants in the CCHS-Mental Health dataset.

ABSTRACT

Background: Cancer is the leading disease-cause of mortality among emerging adults aged 15-29 years. In addition to the normative stresses of navigating this critical developmental period, the trauma of living with cancer can have long-term psychiatric consequences for emerging adults. However, there is a lack of information on the adverse psychiatric effects of cancer during emerging adulthood and how mental health outcomes compare to other developmental periods in adulthood.

Objectives: Given the scarce information about how cancer impacts mental health outcomes of emerging adults, this study provided overall and sex-specific prevalence estimates of mental disorders for emerging adults with cancer, compared the risk of mental disorders stratified by sex status, and examined the experiences of mental healthcare utilization needs across emerging adults with cancer.

Methods: The Canadian Community Health Survey—Mental Health (CCHS-MH) was used for this study. The CCHS-MH collected information on mental health outcomes, healthcare utilization, perception of healthcare support and general health statuses among Canadians aged ≥ 15 years. The World Health Organization Composite International Diagnostic Interview (WHO-CIDI) 3.0 was used as a diagnostic measure of mental disorders according to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) criteria. Mental service use was assessed by asking participants whether they had consulted a number of different health professionals for their mental health.

Results: The prevalence of mental disorders for emerging adults with cancer was 42.9% for any mental disorders, 22.9% for substance use disorders (SUD), and 12.5% for mood disorders. Male

emerging adults with cancer had lower odds of reporting any mental disorders [OR = 0.62; CI = (0.16 – 2.35)] compared to female emerging adults with cancer [OR = 1.37; CI = (0.43 – 4.27)].

Female emerging adults with cancer reported higher odds of SUDs and mood disorders compared to their counterparts without cancer. Emerging adults with cancer were shown to be positively associated with a higher risk of reporting unmet perceived needs for care [OR = 7.72; CI = (1.85 – 28.57)].

Conclusion: Emerging adults with cancer require specific mental healthcare services tailored to their unique developmental period. Future interdisciplinary involvement with key stakeholders including healthcare professionals from both the psychiatric and oncology setting will be key for developing numerous intervention techniques to address emerging adults through all stages of their cancer diagnosis. It will be important to invest research into exploring what kind of mental health services is the most effective in reducing the burden of mental disorders for emerging adults with cancer.

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LIST OF ABBREVIATIONS

SUBSTANCE USE DISORDERS.....	(SUD)
POST-TRAUMATIC STRESS DISORDER.....	(PTSD)
CANADIAN COMMUNITY HEALTH SURVEY.....	(CCHS)
NATIONAL HEALTH INTERVIEW SURVEY.....	(NIHS)
CANADIAN COMMUNITY HEALTH SURVEY—MENTAL HEALTH	(CCHS-MH)
WORLD HEALTH ORGANIZATION COMPOSITE INTERNATIONAL DIAGNOSTIC INTERVIEW	(WHO-CIDI)
DIAGNOSTIC AND STATISTICAL MANUAL OF MENTAL DISORDERS, FOURTH EDITION.....	(DSM-IV)
INTERNATIONAL STATISTICAL CLASSIFICATION OF DISEASES AND RELATED HEALTH PROBLEMS 10 TH REVISION	(ICD-10)
ODDS RATIO.....	(OR)
CONFIDENCE INTERVAL.....	(CI)
STANDARD DEVIATION.....	(SD)

LIST OF SYMBOLS

P-VALUE	(P)
CHI SQUARE	(χ^2)
OUTCOME VARIABLE	(Y)
PREDICTOR VARIABLE.....	(X)
THIRD VARIABLE.....	(Z)
BETA.....	(β)
ALPHA.....	(α)
NUMBER OF PARTICIPANTS.....	(n)

CHAPTER 1: INTRODUCTION

1.1. Emerging Adulthood

In recent years, individuals from their late teens to twenties differ from previous cohorts in how they navigate from adolescence to adulthood (Arnett 2000a, Arnett 2000b). Transitional markers used to indicate stages from adolescence to adulthood such as financial independence, moving out from their family's home, employment, and marriage has been delayed (Lowe, Dillon, Rhodes & Zwiebach, 2013; Nelson & Barry, 2005). For instance, 74% of people between the ages of 25 to 29 were married in 1981 and this has decreased dramatically to 27% 30 years later in Canada (Milan, 2015). Accumulated evidence questions whether these transitional markers are still important to the definition of adulthood. In the past 50 years, a new developmental period known as emerging adulthood has been proposed due to the ambiguity of the criteria used to define adulthood (Arnett, 2000a). Emerging adults, defined as individuals between the ages of 15-29 years (Arnett, Zukauskienė, & Sugimura, 2014; Bleyer, 2005; Vivek, 2010), encompass 20% of the global population (Viner et al., 2015). Distinct from adolescence and adulthood, emerging adults vary in their social and physical functioning (Arnett 2000; Newcomb-Anjo, Barker, & Howard, 2017; Westerhof & Keyes, 2010). During the middle stages of emerging adulthood, emerging adults are pursuing opportunities in romantic relationships and work (Arnett, 2000a; Arnett et al., 2014).

Arnett proposed a theory during emerging adulthood which centers around five characteristics: (1) the age of identity explorations, (2) the age of feeling in-between, (3) the age of possibilities, (4) the self-focused age, and (5) the age of instability (Arnett, 2000a; Arnett, 2004; Arnett et al., 2014; Sussman & Arnett, 2014). That is to say, emerging adults are exploring who they would like to become, experience a subjective sense of not being a full adult when one

reaches the age of 18, have an optimistic view about their life, prioritize their own needs and desires above other obligations, and are given many opportunities. In contrast, Arnett introduces seven categories used to define the transition from emerging adulthood to full adulthood: (1) independence, (2) interdependence, (3) role transitions, (4) norm compliance, (5) biological transitions, (6) chronological transitions, and (7) family capacities (Arnett, 1997; Arnett, 2001). Emerging adults would be considered full adults when they perceive themselves to be independent at the psychological (i.e., taking responsibility for one's actions) and physical level (financial independence from parents), become less self-centered and start committing to romantic partners, finish post-secondary education, find a career and settle down with romantic partners, avoid risk-taking behaviours such as alcohol and drugs, raise children, turn the legal age of 18, and run their own household (Arnett, 1997; Arnett, 2001).

In comparison to emerging adults, young adults are more stabilized in the areas of work, romantic relationships, and have a stronger self-identity (Austrian, 2008; Huynh, Caron, & Fleury, 2016). Middle adulthood is a period where individuals are focussed on being positive role models and leaving a legacy for younger generations (Huynh et al., 2016; Erickson, 1950; Levinson, 1978). Older adults begin to experience declines in health and view these life transitions as part of a life cycle (Perry, Ruggiano, Shtompel, & Hassevoort, 2015). As with other developmental periods, emerging adulthood brings prospects in various areas of life, but also difficulties for overall well-being (Newcomb-Anjo et al., 2017).

During emerging adulthood, the initial stages of health and lifestyle habits are developed and influence ongoing health (Sawyer et al., 2012; Webb, Kauer, Ozer, Haller, & Sanci, 2016). Acquired learning through different areas such as personal and social domains initiate many important behaviours related to health (Viner et al., 2015). At this time, emerging adults in

the early stages typically start to experiment with smoking, illicit drugs (Bonar et al., 2017; Mulye et al., 2009), alcohol use (Dworkin, 2005), as well as sexual behaviours (Lam & Lefkowitz, 2013; (Mulye et al., 2009; Viner et al., 2015). The last three characteristics that define emerging adults (the age of possibilities, the self-focused age, and the age of instability) supports the notion that this period heightens risk-taking health behaviours (Arnett et al., 2014). As a result, emerging adults may have a sense of invincibility to life's consequences and take a self-interested view towards lifestyle choices.

Overall, emerging adults display unique challenges in improving health profiles than other developmental periods (Mulye et al., 2009; Park, Scott, Adams, Brindis, & Irwin Jr, 2014; Stroud, Walker, Davis, & Irwin Jr., 2015). Most health problems in this group are preventable (Mulye et al., 2009; Stroud et al., 2015), but are heightened due to unhealthy lifestyle choices (Arnett et al., 2014; Park et al., 2014; Stroud et al., 2015). In fact, the leading cause of death for people aged 15 to 34 are accidents (unintentional injuries), cancer, and suicide (*Statistics Canada*, 2015). While accidents account for the highest death rate in emerging adults, cancer ranks first for the highest number of deaths in Canada due to chronic disease (*Statistics Canada*, 2015) with emerging adults accounting for 0.4% of all deaths due to cancer (*Canadian Cancer Society*, 2017). Although cancer is not as prevalent in emerging adults compared to older adults (*Statistics Canada*, 2015), survival outcomes are still lower than those achieved in the childhood stage (Birch et al., 2002; Eden, 2006; Keegan et al., 2016; Sodergren et al., 2017). Because very little is known about how cancer in emerging adults is linked to other health variables, it is important to examine cancer within emerging adults to gather a more comprehensive understanding of the risks involved in this understudied group.

In Canada, 13,170 emerging adults were diagnosed with cancer between 2009 and 2013 (*Canadian Cancer Society, 2017*). Among those, 300 emerging adults will die from cancer each year (*Canadian Cancer Society, 2017*). Cancers found in emerging adults closely represent those of both childhood and adult cancers (*Canadian Cancer Society, 2017*). Between 2009 and 2013, thyroid was the most common cancer affecting 17% of emerging adults, followed by testicular (14%), Hodgkin lymphoma (11%), and melanoma (7%) (*Canadian Cancer Society, 2017*). Due to medical advances, five-year survival rates have increased to 85% (*Public Health Agency of Canada, 2011*). However, with increased survival emerging adults are exposed to a number of negative sequelae (Ward, DeSantis, Robbins, Kohler, & Jemal, 2014). Common side effects of undergoing treatment include anxiety in relation to the procedure and hospital stays, physical pain, along with psychological symptoms of separation anxiety and distress (Ward et al., 2014). Having a life-threatening illness, such as cancer, adds a considerable burden to individuals navigating this important developmental period.

1.2. Survival Outcomes of Emerging Adults

During emerging adulthood, males are more likely to die from cancer than females between the ages of 15 to 29 years (*Canadian Cancer Society, 2017*). Over 85% of emerging adults with cancer achieve five-year remission; however, advancements in survival rates in this age group have been limited (*Canadian Cancer Society, 2017*). A large proportion of individuals are at risk for additional complications such as malignant neoplasms, chronic diseases, and functioning impairments (De et al., 2011; Ward et al. 2014). As a result, it is essential to understand the different types of adverse outcomes that may occur for emerging adults after a cancer diagnosis.

1.3. Mental Health Outcomes for Emerging Adults

One in five people experiences a mental disorder, with 70% having their initial onset during childhood or adolescence (Smetanin et al., 2011). Half of Canadians will have experienced a mental disorder by the time they are 40 years old (Smetanin et al., 2011), with emerging adults being the most vulnerable age group (Pearson, Janz, & Ali, 2013). Moreover, the prevalence of anxiety disorders is highest in emerging adults compared to other developmental periods (O'Donnell, Cheung, Bennett & Lagacé, 2016). Among emerging adults between the ages of 18 to 29, 30% will suffer from anxiety disorders, 21% from mood disorders, and 17% from substance use disorders (SUDs) (Kessler et al., 2005). Anxiety disorders often co-occur with major depression, where 23% of emerging adults will have both anxiety and a major depressive episode (Pelletier, O'Donnell, McRae & Grenier, 2017). As well, 18% of individuals with both generalized anxiety disorder and major depression will also have a SUD (Pelletier et al., 2017). Both mood and anxiety disorders are common in females, with twice the prevalence of anxiety seen compared to males (O'Donnell et al., 2016). Worse health outcomes are shown in emerging adults with comorbid disorders that typically begins at a young age and continues into older adulthood.

During the stages of emerging adulthood, major life transitions occur. One of the consequences of these changes is poor mental health (Schulenberg, Sameroff & Cicchetti, 2004). Negative life experiences pose an increased risk for the development of mental disorders (Schulenberg, Sameroff & Cicchetti, 2004). The majority of mental disorders are comorbid, where the first onset usually begins during the childhood or adolescent years, although detection and treatment often occur years later (Kessler et al., 2007). Emerging adults who develop mental disorders during their childhood or adolescent years are commonly observed to have secondary

disorders which is defined as new onsets of mental disorders that come after their primary diagnosis. For example, those who develop an anxiety disorder during their childhood years subsequently develop other mental disorders such as a mood disorder or SUD during emerging adulthood (Kessler et al., 2007; Lewinsohn, Rohde, Seeley & Gotlib, 2000). Lewinsohn, Rohde, Klein and Seeley (1999) found that individuals who had an episode of major depressive disorder (MDD) by the time they were 19 had a 45% chance of developing future episodes of MDD over a 5-year period between the ages 19-23. Emerging adults that develop comorbid disorders have poorer psychological health outcomes than those with one mental disorder (Khan, 2017).

Tanner et al. (2007) documented 12-month and lifetime prevalence of mental disorders in emerging adults at three different ages (21, 26, 30) and concluded that unlike other developmental periods such as younger and older adults, sex differences found were not uniform. Emerging male adults were found to be at higher risk for externalizing disorders. In contrast, emerging females are not at high risk for internalizing disorders during the age of 21 and 26, but was found with a higher lifetime prevalence of depression at the age of 30. However, the only difference was that post-traumatic stress disorder (PTSD) was higher in female emerging adults across all three different ages.

The risk for developing SUDs is higher among emerging adults compared to other developmental periods (Arnett et al., 2014; Johnston, O'Malley, Bachman & Schulenberg, 2008; Stone, Becker, Huber, & Catalano, 2012; Viner et al., 2015). The prevalence of SUDs increases up to 49% in emerging adults between 19 to 20 years of age, and up to 72% by the age of 27 (Johnston et al., 2008). Male emerging adults are predicted to have a higher prevalence of SUDs and are at higher risk of becoming alcohol dependent (Chassin, Pitts & Prost, 2002; King & Chassin, 2007; Steihaus, Eschmann, Heimgartner & Metzke, 2008). Dewit, Adlaf, Offord, and

Ogborne (2002) found that the risk of developing alcohol abuse was greatest for individuals who began consuming alcohol between the ages of 11-14 where approximately 13% had progressed to alcohol abuse ten years later, a risk 6 times greater than those who started drinking at the age of 19 and older. Emerging adults who exhibit comorbid disorders are at risk of consuming high levels of alcohol (Henderson, Chaum & Hawke, 2017). Substance use problems including daily alcohol consumption, daily intoxication, and binge drinking are common patterns observed during emerging adult years (Johnston et al., 2008) and is associated with smoking (Jackson, Sher, & Schulenberg, 2005). Among substances, tobacco, alcohol, and cannabis are the most commonly used by emerging adults (Thatcher & Clark, 2008).

Vida et al. (2009) investigated the use of substances, psychiatric symptoms, and comorbid disorders. They found that emerging adults who had an anxiety disorder at the age of 19 consumed higher levels of alcohol later at the age of 25 and were comparable to drinkers who exhibited antisocial traits. Sex differences have been observed with females who are heavy alcohol users as they tend to express higher levels of depressive symptoms compared to male alcohol users (Marmorstein, 2009). A plausible explanation for an increase in SUDs during emerging adulthood is due to stressful life events where individuals who perceive negative changes in their lives are at higher odds of drinking heavily (Steinhausen et al., 2008; Windle & Windle, 2005).

There are several risk factors that predispose emerging adults to mental disorders more than others. Newcomb-Anjo et al. (2017) identified low and high-risk mental health profiles of emerging adult individuals. They found that mental disorders encompass childhood risk factors (i.e., social status, verbal abuse), current situational risk factors (i.e., clothing, food, transportation, bills), dispositional traits (i.e., neuroticism, negative cognitive styles, optimism),

mental health outcomes (i.e., depressive symptoms, anxiety), subjective well-being outcomes (i.e., self esteem, life satisfaction, positive and negative affect), and academic well-being outcomes (i.e., academic performance, academic stress). Based on the given profile, an individual who is considered low-risk would have attributes that consist of a good childhood upbringing with good family social status and low levels of childhood abuse, the means to provide for themselves, and good social support system. In contrast, a high-risk profile of an individual at heightened risk for mental disorders is someone who has the highest levels of childhood verbal abuse, recent negative life events, neuroticism and negative cognitive style. In addition, they also display low levels of optimism and lower social status in their childhood. Interestingly, both low and high-risk profile groups reported that 25% of their participants had a previous mental health diagnosis and nearly 40% had significant levels of depressive symptoms. This suggests that all emerging adults are vulnerable to developing mental disorders regardless of their behavioural profile.

1.4. Mental Health Outcomes for Emerging Adults with Cancer

Rasic, Belik, Bolton, Chochinov and Sareen (2007) reported triple the amount of major depression diagnosis after having cancer during a 12-month prevalence period (16%) compared to healthy controls without cancer (5%). This study was conducted in 36,984 people between the ages of 15 to 54 years which constitute a portion of emerging adults in the Canadian Community Health Survey (CCHS). This is consistent with other studies that depression is 2 to 3 times higher in cancer patients than the general population (Caruso et al., 2016). The study revealed that cancer is associated with the presence of any mental disorders classified in the CCHS, particularly with increased rates of major depression and panic attacks.

Cancer is linked to negative mental health outcomes in those with heightened poor health behaviours. These poor health behaviours may come after a cancer diagnosis or increase their risk of cancer. Temporality is an issue in measuring the direct association between cancer and mental disorders, where risk factors may play a role before, during, and/or after a diagnosis of cancer. Massetti, Thomas, King, Ragan and Lunsford (2017) examined the association between cancer and mental health problems by observing health behaviours in 90,821 participants between the ages of 18 to 39 years of age using the Behavioral Risk Factor Surveillance System in the United States. Variables that were used as risk factors included weight, smoking status, drinking history, activity level, and sleep history. The authors found that both sexes who had an increased risk of developing cancer were more likely to smoke, have had at least one episode of binge drinking, little or no physical activity, and lack of sleep in the past month. In addition, the authors found that men and women with these cancer risk factors were less likely to utilize healthcare services and perceived to have more barriers to accessing health services. Given that young adults with mental health problems are at an increased risk of developing cancer, it is important to provide services to help modify cancer risks by developing interventions for both patients with increased mental health problems and poor health behaviours that could contribute to their cancer development.

In addition to these risk factors, the trauma of living with cancer can have long-term psychological effects for emerging adults. Cancer survivors often report posttraumatic stress when they recall their experience during cancer treatment and the struggles associated with it (Erickson & Steiner, 2001). Langeveld, Grootenhuis, Voûte and De Haan (2004) explored post-traumatic stress disorder (PTSD) symptoms of 500 young adults between the ages of 16 to 49 who had a cancer diagnosis when they were a child (0 to 19 years). The results indicated that a

quarter of the samples had scored in the moderate range of PTSD symptoms, with 12% measured in the severe range. The general pattern found was that young adults with lower educational level or/and unemployment, who had severe health problems were associated with higher levels of PTSD symptoms. In addition, being female was a strong predictor of developing not only PTSD symptoms, but increased severity of symptoms (Langeveld et al., 2004). Other emotions involved include a general sense of anxiety that occur after treatment. Females are more likely to report these stress-related emotions and tend to experience more lack of social support (Erickson & Steiner, 2001).

1.5. Accessing Healthcare Services for Emerging Adults with Cancer

For many emerging adults with cancer, accessing healthcare services are important in reducing the risk of further complications. De et al. (2011) found that cancer detection is often delayed in emerging adults because they do not seek timely medical help. Despite transferring to the adult healthcare system at the age of 18, emerging adults often feel as if they are not prepared to take full responsibility for their healthcare needs. Consequently, young emerging adults may be less inclined to seek healthcare treatments.

Often individuals suffering from mental disorders have to prioritize their mental health needs which prevents them from focusing on their cancer symptoms (Cunningham, Sarfati, Stanley, & Collings, 2015). As a result, when they are diagnosed with cancer, the prognosis is worse than the general population. Kaul et al. (2017) conducted a study using the National Health Interview Survey (NIHS) to evaluate the prevalence of mental disorders among 877 emerging adults with cancer compared to individuals without cancer. The results indicated that mental distress was present for 8% of emerging adults compared to 3% of individuals without cancer. Although cancer survivors reported using mental health services more than individuals

without cancer, 86% of emerging adult cancer survivors have not talked to a mental health professional.

The lack of age-appropriate treatment types offered in mental health services is commonly seen within facilities that treat emerging adults (Bleyer, 2005). Zebrack et al. (2013) assessed 215 emerging adults (aged 14-39 years) with a cancer diagnosis within the past 4 months using a longitudinal survey to understand their use of different healthcare services (i.e., mental health counselling, internet, religious/spiritual counselling). Middle-aged emerging adults (20 to 29 years) and young adults (30 to 39 years) indicate that information related to their cancer were unmet more than teenaged-emerging adults (14 to 19 years). Compared to teenaged-emerging adults, older emerging adults also reported that the healthcare services provided were not age-appropriate (i.e., infertility, sexuality, relational intimacy, diet/nutrition). Middle-aged emerging adults reported that mental health services were unmet and contributed to their low use of mental health counselling compared to the two groups. However, teenaged-emerging adults reported using the most services provided in a pediatric care setting and were less likely to report unmet needs. Overall, the study identified critical age gap differences in the quality of mental health care even for healthcare professionals who tailor support for emerging adults.

Furthermore, age is an important factor that predicts how individuals access mental health services. Huynh et al. (2016) examined the impact of different developmental stages on mental health usage by interviewing 3,295 participants consisting of three age groups: 18 to 29-year-olds (emerging adulthood), 30 to 49-year old's (young adulthood) and 50 to 64-year old's (middle adulthood). The authors used an ongoing longitudinal study in four neighbourhoods of Montreal with different types of mental health services (i.e., psychiatric hospital, social services center, primary care facility). For emerging adults, participants reported using mental health

services more often when they have major depression, are experiencing psychological distress and higher stressful life events. The profile that is typical of this group is a female born in Canada, who reports dissatisfaction with life, have either fair/poor physical and/or mental health with a family history of mental disorder. Risk factors involved being inactive, having lower SES, living in a poor neighbourhood, and having little social support. For 30 to 49-year old's, having major depression is associated with mental health service use. A risk factor is having a family history of major depression, along with living in an unstable neighbourhood. However, having strong social cohesion and an occupation decreases the likelihood of needing to use mental health services. For 50 to 64-year old's, being alcohol dependent and searching information on the internet increases the likelihood of using mental health services. A risk factor is having a family history of major depression, whereas being satisfied with personal relationships and low stigma decreases the likelihood of using mental health services.

In a study conducted by Zebrack (2009), 879 participants who were between 18 to 39 years of age and diagnosed with cancer between 15 to 35 years of age reported that their psychological needs remain largely unmet in the healthcare service sector. In general, those that were diagnosed at a younger age experienced lack of health and supportive care needs compared to the older participants were who diagnosed closer to their late 20's and 30's. The transition between adolescence and adulthood were crucial times as their treatment needs differ between the pediatric and older adult populations. The results indicated that nearly 97% of emerging adults had a desire to access more information about their illness, treatment, and long-term effects of their cancer diagnosis. However, many emerging adults find it difficult to find resources that were age-appropriate. More than half of the samples (67%) wanted mental health counselling, and 91% have used the internet to look up cancer education or support information

that was appropriate to their age group. Interestingly, the author noted that few studies have examined the difference between psychological outcomes and the health needs of emerging adults.

To date, there are limited data examining how emerging adult cancer survivors deal with adverse mental health outcomes. Research examining mental health services use among emerging adults with cancer have been lacking (Chang et al., 2014; Cunningham et al., 2015). More so, it is unclear how the current mental health system meets the needs of the emerging adulthood group (Kaul et al., 2017). As a result, there needs to be broadened research examining the complex context of resources available for mental disorders and cancer.

CHAPTER 2: STUDY RATIONALE AND RESEARCH OBJECTIVES

2.1. Aims of the Study

Recent studies have examined emerging adults with cancer and mental disorder; however, there is a lack of comprehensive knowledge of the different types of mental disorders most common during this developmental period. Many studies comparing emerging adults only investigated the relationship of one variable (i.e., depression) (Huynh et al., 2016; Kaul et al., 2017; Kisely, Forsyth, & Lawrence, 2016; Lang, Davis, Patten, Campbell, 2017; Newcomb-Anjo et al., 2017). In addition, the mental healthcare services of emerging adults may be underestimated or misunderstood when comparing emerging adults with and without cancer. Evidence has shown that mental healthcare services are effective when they treat specific types of mental disorders rather than generalized mental health problems. In this case, emerging adults with mental disorders require specific treatment options and an understanding of the most prevalent mental disorders (Tanner et al., 2007). Similarly, different developmental periods are known to associate with different cancers and mental disorders, but most fail to address these distinctions between emerging adults. When studies investigated emerging adults in Canada, they often do not include large samples representing the diverse Canadian population, limiting the generalizability of results. More importantly, many studies that provide information on mental health service use are found to be relevant for the healthcare system in the United States and not for the universal healthcare system in Canada. In light of recent advances made acknowledging the importance of emerging adulthood, it is important to better understand the association between cancer and mental disorder in this developmental period and how it may differ from other periods in the life course.

2.2. Gaps in Current Emerging Adult Research Examining Cancer and Mental Disorders

Currently, the extent to which the burden of mental disorder among emerging adults with cancer is unknown. Investigating the mental health of emerging adults with cancer and how this experience differs from emerging adults without cancer has important implications. One, expounding the psychiatric sequelae of a cancer diagnosis will provide novel findings in mental disorder-specific associations and fuel etiological research in the intersection of cancer and mental health. Two, contemporary estimates of mental disorder among Canadians with cancer are needed to assess burden at the population-level in order to help inform the allocation of scarce health resources aimed at improving the mental health of individuals with cancer. This can include mental disorder-specific screening for subgroups within the population. Three, examining how emerging adults with cancer and comorbid mental disorder access mental services is key to informing health policy to improve the integration of psychiatry within the oncology setting to best support the mental health needs of individuals with cancer.

2.3. Objectives and Hypotheses

This study examined the extent to which the association between having cancer and a mental disorder were different between emerging adults (15 to 29 years). Specifically, the objectives and hypotheses of this study were as follows:

1. Estimate the overall and sex-specific prevalence of mental disorder in emerging adults with cancer as compared to those without cancer. I hypothesized that the prevalence of mental disorders will be highest for emerging adults with cancer.
2. Compare the sex-specific risk of emerging adults with cancer and a mental disorder.

Adjusting for relevant confounding factors, I hypothesized that male emerging adults

with cancer will be associated with a higher risk of having a SUD; and, female emerging adults with cancer will have a higher risk of having a mood disorder.

3. Examine the association of mental healthcare service needs across emerging adults with and without cancer. I hypothesized that emerging adults with cancer will be positively associated with the highest risk of highest unmet needs of accessing formal mental services (i.e., psychiatrist consults) compared to emerging adults without cancer.

2.4. Pearlin's Stress Process Theoretical Framework

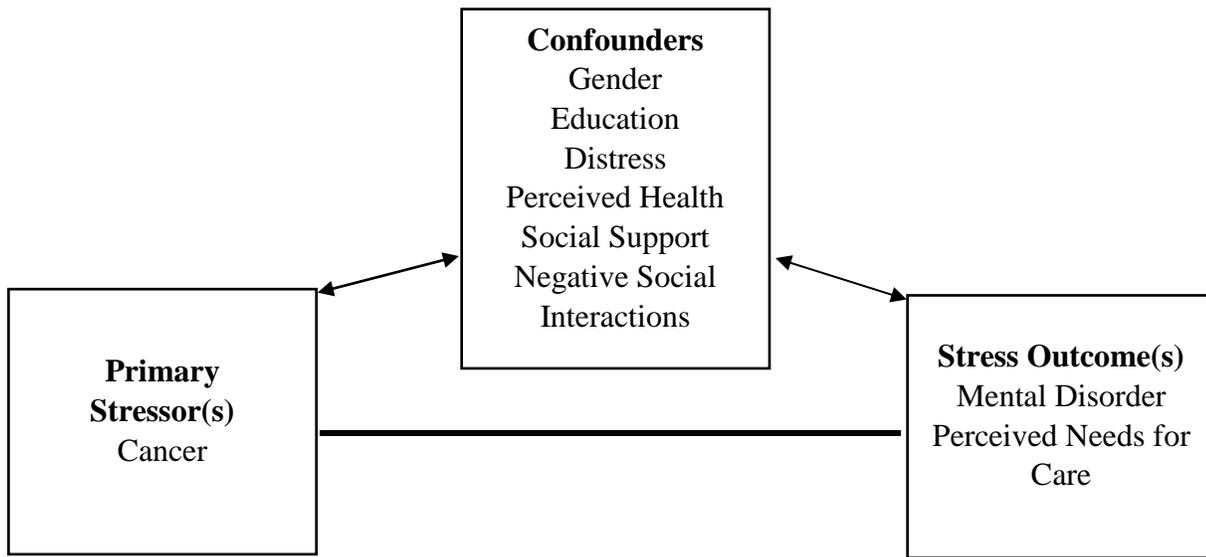
Pearlin's Stress Process Model is a framework that was used in this study to help explain multiple factors that influence an individual's mental health outcome. This included the individual, social interaction, and environment/community level by focusing on differing levels of stressors (Katerndahl & Parchman, 2002). In the primary stressors, life events included the development of chronic conditions (i.e., cancer) which would lead to secondary stressors (i.e., lack of social support, negative social interaction) and then the outcomes (i.e., mental disorders, psychological symptoms). Stressors are defined as circumstances that provoke a stress response (Pearlin, 1989). Primary stressors refer to events that occur first in the individual's experience. These events can be experienced as undesirable and sudden (i.e., the death of a loved one, injury) or a stressor that is long-lasting (i.e., marital stress, unhappy occupation). In contrast, secondary stressors come about as a by-product of the primary stressor and once affirmed, it may produce more stress independently from the primary stressor. Once primary and secondary stressors occur, these produce stress outcomes as the final product (Pearlin, 1989).

Stressful life events are precursors that affect mental health outcomes such as first depressive episodes (Paykel, 2001; Hammen, 2005) and anxiety disorders (Paykel, 2001). Depending on the situation, certain characteristic dictates how some individuals respond to stress

responses. These include features of severity, intensity, and how one responds to the appraisals (Schneiderman, Ironson & Siegel, 2005). For example, an individual who responds with a negative outlook such as social isolation, sadness, and pessimism are more likely to develop depression than someone who responds with confidence, humour, and optimism.

Transitions are considered in the stress process model as it shapes where an individual is in the lifespan development (Pearlin, 2010). Specifically, for emerging adults, this is the time where different new roles and transitions are occurring. This will influence how an individual deal with primary stressors, along with the intermediate pathway that leads to the mental health outcome. This is important as transitions change the timing of events and may exacerbate previous stressors that were hidden and can help explain why some individuals exposed to similar life events do not suffer from adverse health consequences whereas other individuals do. These barriers may serve as protective factors such as social support, self-esteem, and social integration (Pearlin, 2010). Thus, Pearlin's Stress Process Model is an appropriate framework that helped describe emerging adults who are exposed to cancer and their risk for the development of mental disorders. Because the current study is a cross-sectional study design, mediators which are typically involved as secondary stressors in this model will not be analyzed as such but will be considered as confounders. In Figure 1, the factors that make up Pearlin's Stress Process Model is presented to show the primary stressor of cancer, along with the covariates in the study represented as confounders that leads to the stress outcome of mental disorders.

Figure 1. Factors of Pearlin's Stress Process Model



CHAPTER 3: METHODOLOGY

3.1. Study Dataset and Sample

The Canadian Community Health Survey—Mental Health (CCHS-MH) was the dataset used to gather evidence for this study. CCHS-MH offers a collection of data pertinent to measures of mental disorders among emerging adults diagnosed with cancer. Specifically, it provided analyses for variables of interest such as mental disorders, mental health, cancer, general health status, utilization of health care services, and well-being (Statistics Canada, 2012). The CCHS-MH is a cross-sectional survey conducted by Statistics Canada that consists of self-reported responses from participants aged 15 years and older living in the ten provinces (Statistics Canada, 2013). Participants that were not included in the sample were full-time members of the Canadian Forces, persons living on reserves and other Aboriginal settlements, and institutionalized population (Statistics Canada, 2013). The study was conducted over the span between January to December 2012, with a total of 25,113 Canadian samples collected (Statistics Canada, 2013). This sample also includes general information from participants who do not have a mental disorder or mental health problems, making it generalizable to the Canadian population (Statistics Canada, 2013). Responses made by participants regarding any mental disorders or mental health statuses indicated whether it was diagnosed by a health professional. CCHS-MH used the World Health Organization Composite International Diagnostic Interview (WHO-CIDI) for classifying mental disorders and conditions in accordance with the definition and criteria made from the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) and the International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) (Statistics Canada, 2013).

3.2. Population of Interest

The population of interest included Canadian CCHS-MH participants aged 15 to 29 years. Specifically, there were 5,590 weighted participants in the emerging adult age bracket with a total of 42 that have or had been previously diagnosed with cancer.

3.3 Study Variables

The goal of this study was to estimate the prevalence of mental disorders for emerging adults aged 15 to 29 years with and previously diagnosed with cancer compared to emerging adults without cancer. For the interest of the study, perceived health and education was used as a measure of general health. Mental health was measured using variables according to the WHO-CIDI and CCHS-MH classification that included selective disorders which encompass mood disorders (major depressive episode, bipolar disorder) anxiety disorder (generalized anxiety disorder) and substance use disorders (including alcohol/cannabis/other drug abuse or dependence). To measure mental healthcare services utilization, the variable of accessibility to mental health services (overall perceived need) was examined. Lastly, to measure well-being and subclinical psychological symptoms, the variable of distress (chronicity of distress and impairment scale), social support, and negative social interactions was also examined.

3.4. Exposure

Cancer was classified under chronic conditions as defined by CCHS-MH. Participants asked whether they currently have cancer, or if they ever had cancer which was diagnosed by a healthcare professional and is expected to last or have already lasted 6 months or more. There were no further questions that assess the type of cancer, age of diagnosis, duration of cancer, or treatment related to cancer. Specifically, an interviewer would ask a participant: “*Do you have*

cancer?” and *“Have you ever been diagnosed with cancer?”* followed by response options in *“Yes, no, don’t know, refusal”*.

3.5. Outcomes

3.5.1. Mental Disorders

Certain variables in the CCHS-MH such as mental health conditions were collected through self-reported measures based on the recognized WHO-CIDI. For mental health conditions, participants were asked about lifetime diagnoses preceding the interview. The criteria for lifetime diagnoses was chosen to reflect mental disorders in the past that were not reflected in the last 12 months. Mental disorders were collected by questions used for assessment based on the WHO-CID modified for the needs of CCHS- MH with information pertaining to the number of symptoms, overall severity, duration, and intensity. All response options of mental disorders (based on any selected disorder (mental or substance) – lifetime, any substance use disorder (alcohol/drug) – lifetime, and any mood disorder—lifetime had response options in *“Yes, no, don’t know, refusal”*.

3.5.2. Mental Health Services

The variable of overall perceived need was used to measure mental health service needs. This variable measured the respondent’s perceived need for mental health care in the past 12 months. Participants were grouped into one of four categories based on the reported needs (information, medication, counselling, other) and if the needs were met. The original variable had four responses: (1) *“No perceived need for mental health care”*—Did not receive any form of care, and did not perceive a need for care, (2) *“All perceived needs met”*—Received at least one form of care and felt that was enough, (3) *“Perceived needs partially met”*— a) Received care but not enough care, or b) Need met for at least one form of care but not met for another

form of care, and, (4) “*Perceived needs not met*”—Did not receive care that was needed. For the purpose of the study, we wanted to measure whether the mental health service needs of emerging adults were fully met, with responses indicating needs that were all met or needs that were not fully met. The original variable of overall perceived needs was dichotomized into two groups in order to distinguish those who did not require any need for care and those who received enough care versus those who did not receive enough care or the care was not fully met. The nominal variable was re-labelled into a dichotomous variable by combining “*No perceived needs*” and “*All perceived needs met*” as one response and “*Perceived needs partially met*” and “*Perceived needs not met*” as another response option. This was used for the outcome variable in objective 3. The variable was based on the Perceived Need for Care Questionnaire (PNCQ) with an inter-rater reliability of $\kappa = 0.62$ (Meadows, Harvey, Fossey & Burgess, 2000). An inter-rater reliability is a measure of the extent to which data collectors agree upon the same score for the respondents based on the questions provided (McHugh, 2012). The Cohen’s kappa coefficient (κ) is frequently used as a measure between two raters and considers the agreement among respondents occurring by chance. A range of -1 to 1 is possible, with higher values indicating close to perfect agreement (McHugh, 2012).

3.6. Covariates

3.6.1. Sociodemographic Factors

Two variables were used to measure sociodemographic factors—sex and education. Sex was measured by obtaining the sex of the respondent with response options of “*Male*” or “*Female*”. Education was measured by obtaining the highest level of education by each members of the household. The variable had ten different levels consisting of: “*Grade 8 or lower; Grade 9-10; Grade 11-13; Secondary school graduate, no post-secondary education; Some post-*

secondary education; Trade certificate or diploma; Non-university certificate or diploma from a college, cegep, etc. (other than trades certificates or diplomas); University certificate or diploma below bachelor's level; Bachelor's degree; University certificate, diploma or degree above bachelor's level". Household education level was chosen over individual education level. There has been an increased trend of young adults living in at home, with more than 1 in 3 between the ages of 20 to 32 still living with at least one parent in 2016 (Statistics Canada, 2017). Choosing a household level of education was done to control for emerging adults who were still living at home and had their family members guidance towards health decision making. It has been suggested that the process of education is not limited to an educational institution setting but occurs at home with parental educational background having influence on their child's mental capacities, knowledge, and emotional well being even when they have moved out of the house (Hahn & Truman, 2015).

3.6.2. General Health Status

Perceived health was a variable used in the study to rate the respondent's health status where higher scores indicated positive perceived health status. The options were "*Poor, fair, good, very good, excellent*".

3.6.3. Distress Levels

The Chronicity of Distress and Impairment Scale classified participants distress feelings in the last month compared to their usual level. The scale was based on the K6 scale with the addition of an option to skip questions on the chronicity of distress portion if they have not experienced distress symptoms. A sample question that asked participants to compare their distress levels were, "*During the past month, about how often did you feel hopeless?*" (1) *All of the time*, (2) *Most of the time*, (3) *Some of the time*, (4) *A little of the time*, (5) *None of the time*.

The scale was organized to represent diagnoses of major depression and generalized anxiety disorder with distress scores compared to the usual level with responses of “*A lot more distress; Somewhat more distress; A little more distress; About the same distress; A little less distress; Somewhat less distress; A lot less distress; Never had any distress*”. The internal consistency of the K6 scale that formed the current scale has an excellent internal consistency of Cronbach’s alpha (α) = 0.89 (Kessler et al., 2002). A Cronbach alpha is used to measure the internal consistency of test items in a questionnaire and determines whether all the items measures the same concept or construct. The range is between 0 and 1, with higher values indicating a higher correlation between items (Tavakol & Dennick, 2011).

3.6.4. Negative Social Interactions

Participants’ experiences to negative social interactions was measured using the Negative Social Interactions Scale which consisted of 4 questions examining the frequency of the exposure. A sample question taken from the scale was, “*Are there persons with whom you are in regular contact that are detrimental to your well-being because they are a source of discomfort and stress?*” with response options of “*Yes, no, don’t know, refuse to answer*”. The response was converted to a scale from 0-12, with higher scores indicating a greater amount of negative social interactions. The scale has a strong internal consistency of $\alpha = .79$ (Krause, 2007).

3.6.5. Social Support

The Social Provisions Scale (10 items) was used in the study to measure the amount of social support received. A sample from the scale stated, “*There are people I know will help me if I really need it*” with response options of “*Strongly disagree, disagree, agree or strongly agree*”. Based on the response, a range between 10-40 was given with higher scores indicating higher perceived social support. The scale was based on the Social Provisions Scale (24 items) with an

acceptable internal consistency of $\alpha = .70$, which has been shown to be consistent between the current scale used in the study and this shorter version scale (Russell, Cutrona, Rose & Yurko, 1984).

3.7. Selection of Variables

To measure general health, confounders used in the model are known determinants of health outcomes such as perceived health (Shields & Shooshtari, 2001) and education which has been demonstrated to impact health outcomes, how individuals access the healthcare system, and stress exposure (Lynch, 2003; Viner et al., 2012; Zimmerman, Woolf, & Haley, 2015) to control for a spurious association between cancer and mental disorders. For the purpose of the study, the variable of any mental disorder was used to assess for both SUD and mood disorder. In addition, SUD and mood disorder were used to examine sex differences and differentiate between internalizing and externalizing disorders. Past literature has suggested sex differences found amongst male and female emerging adults when it comes to internalizing (i.e., mood disorders, generalized anxiety disorder) and externalizing (i.e., SUD) disorders (O'Donnell et al., 2016; Tanner et al., 2007). Confounders of negative social interaction and distress were used in the models because of the close connection to negative coping mechanisms (Rüsch et al., 2009). Negative coping mechanisms are linked to lack of social support and are often a by-product (Leavy, 1983; Kawachi & Berkman, 2001; Thoits, 2011) amongst emerging adults with diagnosed mental disorders and higher reported distress levels that meet subclinical symptoms of mental disorders (Laposa, Collimore, Hawley & Rector, 2015). Social support can support or attenuate the association between cancer and mental disorder depending on sex. This is supported by the literature that males rely less on social support than women (Harandi, Taghinasab & Naye, 2017) and utilize less mental healthcare services (Harandi, Taghinasab &

Naye, 2017; Rhodes, Goering, To & Williams, 2002). This is the case even when they are diagnosed with a mental disorder such as SUD, whereas females with mood and anxiety disorders rely on higher social support and mental healthcare services to help with their mental health outcomes (Rhodes et al., 2002). Interestingly, perceptions of social support are more important than the existence of social support (Brummet et al., 2017). There are many psychological benefits that are experienced from the existence of social support. Social support through support systems provides people with reduced psychological distress when faced with difficult life events (Brummet et al., 2017).

CHAPTER 4: DATA ANALYSIS

4.1. Data Analyses

In order to address the population of interest, the CCHS-MH dataset was constricted to individuals between the ages of 15-29 years old. Prevalence estimates were conducted by running a survey frequency procedure. The procedure provided the total weighted frequency count, total population, frequency of missing participant responses, and the Rao-Scott Chi-Square test. The same procedure was conducted for sex-specific prevalence with tables separated by male and female for each mental disorder. Binary multivariable logistic regression was used (general logit model) for objectives 2 and 3. Covariates that were categorical variables containing multiple response levels were changed to continuous variables for the ease of interpretation. A significance level of $p < 0.05$ and 95% confidence intervals were used for all cases. All analyses were weighted to ensure the representativeness of the Canadian population. Data were analyzed as follows:

4.1.2. Objective 1

The overall and sex-specific prevalence of mental disorders was estimated by examining the proportion of emerging adults with cancer who was found to have/had a mental disorder compared to the overall emerging adult cancer population with present or absent mental disorder statuses over the course of their lifetime. This was repeated for healthy controls and compared across sexes. To determine the significance between the reported proportions of emerging adults with cancer and a mental disorder, unadjusted chi-square (χ^2) was used.

4.1.3. Objective 2

Preliminary analyses were conducted for each mental disorder outcome (general, SUD, and mood disorder) by testing for moderation using an interaction term to examine the

interaction of sex and cancer. This provided the parameter estimate, p-value and confidence intervals. Significant interaction terms in the model were used to justify stratifying by sex in order to explore for which sex had an effect for cancer and different types of mental disorders.

Stratified analyses were conducted for three models of mental disorders (general, SUD, and mood disorder) by male and female to examine for sex differences. The adjusted odds ratio was compared to see if the effect of sex was significant.

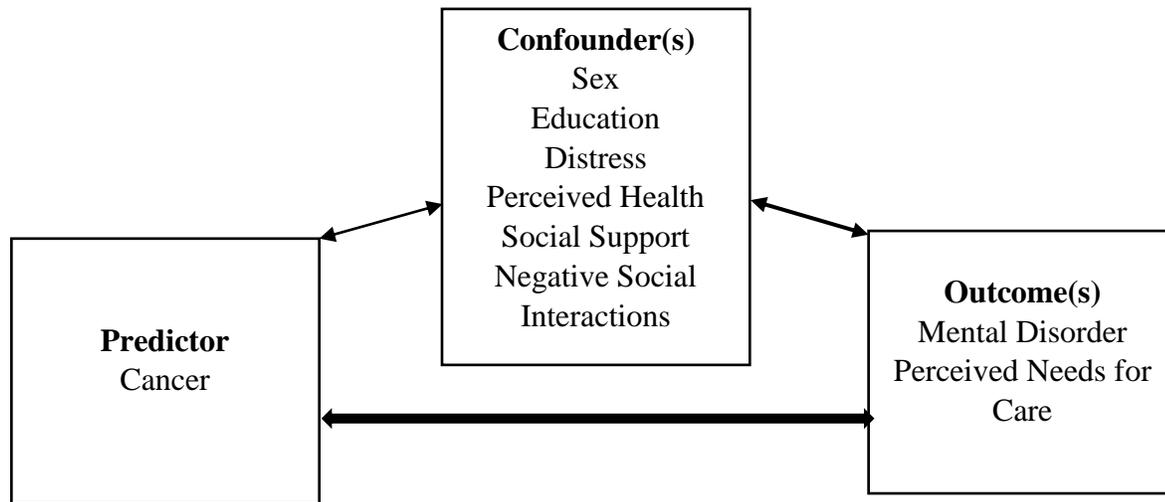
4.1.4. Objective 3

A model was created for the outcome variable of overall perceived needs as a measure of mental healthcare service needs. The risk of reporting unmet perceived needs among emerging adults with cancer was examined using the adjusted odds ratio (OR) to see if the association was significant.

4.2. Confounding Variable

A confounder is a variable that influences both the effect of the exposure and outcome variable (Jager, Zoccali, MacLeod & Dekker, 2008). In order for a variable to be classified as a confounder, the variable must have an association with the exposure where there are different levels between those who are exposed versus those who are not, it needs to be associated with the outcome where it is typically a risk factor, and it must not be an effect of the exposure or be in the causal pathway (van Stralen, Dekker, Zoccali, & Jager, 2010; Jager et al., 2008). In Figure 2, confounding variables is presented to influence the relationship between cancer as an exposure and mental disorders as an outcome.

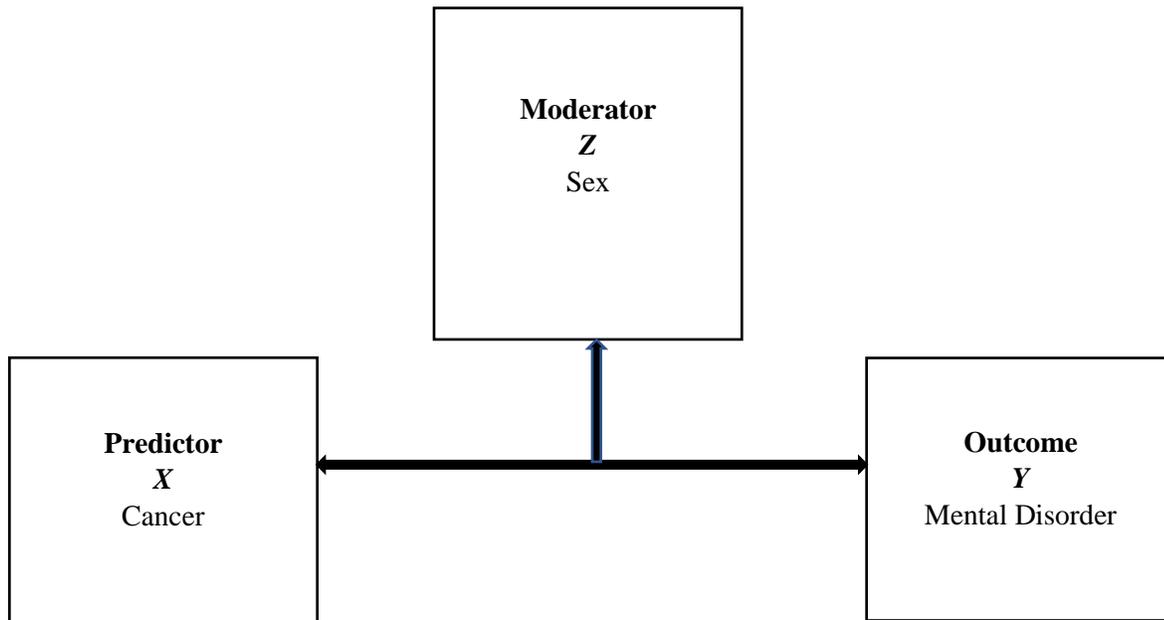
Figure 2. The Influence of Confounding in an Exposure-Outcome Association



4.3. Moderator Variable

Moderators are defined as variables which tests whether the association between the outcome variable, Y , and the predictor variable, X , differs across the third variable denoted by Z (Fairchild & MacKinnon, 2009; Fairchild & McQuillin, 2010). Moderators can affect the strength and/or the direction of the relationship between the association of interest (Fairchild & MacKinnon, 2009) and explains the generalizability of the association dependent on the differing levels (Fairchild & McQuillin, 2010). The three ways that a moderator may affect the relationship between the predictor and outcome variable is through increasing, decreasing, or changing the levels of the predictor variable (Fairchild & MacKinnon, 2009). Moderators are referred to as statistical interactions in model equations (Fairchild & McQuillin, 2010). In Figure 3, the moderator variable of sex (Z) is presented to influence the relationship between cancer as a predictor (X) and mental disorders as an outcome (Y).

Figure 3. The Influence of Moderator(s) in an Exposure-Outcome Association



4.4. Power Analysis

A power analysis was conducted in order to ensure that the sample of interest in the CCHS-MH survey was sufficient to detect an association (Faul, Erdfelder, Lang & Buchner, 2007). A two independent samples t-test (Fisher's exact test) using one tailed was completed based on the unequal sample size between the exposure group of cancer participants and the healthy controls without cancer. Based on a study conducted by Rasic et al (2007), an effect size was determined from the samples in the cancer group (16%) compared to the control group (5%) based on the proportions of depression in cancer versus healthy controls. The parameters for the alpha level was set to the standard $\alpha = 0.05$, and the beta (β) /alpha (α) ratio was determined by dividing the $\beta = .20$ (equivalent to a power of 80%) by $\alpha = 0.05$ to achieve a ratio of 4. Each sample size was based on 43 cancer samples for group 1 and 5,587 healthy control samples for group 2. The overall power achieved was 80%. Therefore, given that the sample size of emerging adults with cancer was small, the effect size was quite large and this allowed an 80% probability

that the study would be able to detect an association. G*Power (3.1.9.2) was the statistical software used to calculate the statistical power that was achieved.

CHAPTER 5: RESULTS

5.1. Sample Characteristics of Emerging Adults

In the CCHS-MH dataset there were a total of 5,548 emerging adults (15-29-year old's) with 42 of the weighted participants who have or ever had cancer (Table 1). The mean age of healthy controls was 21.9 (SD 4.3) years and the mean age of cancer participants was 22.8 (SD 3.3) years with half (53.3%) of healthy controls population consisted of males compared to only one quarter (26.2%) of the cancer population. Nearly three quarters of the population (72.5%) had at least a diploma/degree in the healthy controls with 67% being employed either full-time or part-time compared to 59.5% of the cancer participants who had obtained a diploma/degree with over half (54.8%) being employed either full-time or part-time. Half (49.4%) of the population of healthy controls had an income of over \$70,000 annually compared to only 38% of cancer participants. Compared to healthy controls, cancer participants reported having higher percentages of reported chronic condition (73.8% vs. 41%, $\chi^2 = 9.15$, $p = 0.002$), and unmet perceived needs for care (28.5% vs. 7.3%, $\chi^2 = 6.34$; $p = 0.01$).

Table 1. Sample Characteristics of Emerging Adults (15-29-year-olds) by Cancer Status using the Canadian Community Health Survey—Mental Health 2012 Dataset

	Healthy Controls (n = 5,548)	Cancer (n =42)	χ^2 (P-Value)
Sociodemographic			
Age	21.9 (SD 4.3)	22.8 (SD 3.3)	////////////////////
Sex (male)	2,957 (53.3%)	11 (26.2%)	6.21 (0.01)*
Education (\geq diploma/degree)	3,996 (72.5%)	25 (59.5%)	1.07 (0.30)*
Income (\geq \$70,000)	2,741 (49.4%)	16 (38%)	1.12 (0.29)
Employment (full-time/part-time)	3,719 (67%)	23 (54.8%)	2.45 (0.12)
Health			
Has ever had a chronic condition	2,274 (41%)	31 (73.8%)	9.15 (0.002)*
Perceived need for care	405 (7.3%)	12 (28.5%)	6.34 (0.01)*

Significant findings are shown with an asterisk (*).

5.2. Objective 1

5.2.1. Overall and Sex-Specific Prevalence of Mental Disorders in Emerging Adults

Among healthy controls, 32.2% reported having a mental disorder compared to 42.9% of emerging adults with cancer who reported having a mental disorder ($\chi^2 = 0.72$; $p = 0.39$) (Table 2). The prevalence of healthy male controls who reported having a mental disorder was 34.6% compared to 33.3% of male emerging adults with cancer ($\chi^2 = 0.03$; $p = 0.86$) (Table 3). In comparison to their counterparts, 29.5% of healthy female controls reported having a mental disorder versus 48.4% of healthy female emerging adults with cancer ($\chi^2 = 1.34$; $p = 0.25$) (Table 3).

5.2.2. Overall and Sex-Specific Prevalence of SUDs in Emerging Adults

The overall prevalence of healthy controls who reported having a SUD was 22.9% compared to 35.7% of emerging adults with cancer ($\chi^2 = 0.98$; $p = 0.32$) (Table 2). Amongst healthy male controls, 28% reported having a SUD compared to 16.7% of male emerging adults with cancer ($\chi^2 = 1.55$; $p = 0.21$) (Table 3). Unlike males, we observed that 17.1% of healthy female controls reported having a SUD compared to 42% of female emerging adults with cancer ($\chi^2 = 3.82$; $p = 0.05$) (Table 3). Based on the χ^2 test that suggests that the proportions of female emerging adults who reported having a SUD was significant, this was sufficient for further investigation in examining for sex-specific associations and risks between cancer and SUD.

5.2.3. Overall and Sex-Specific Prevalence of Mood Disorder in Emerging Adults

The overall prevalence of healthy controls who have had a mood disorder was 12.5% compared to 31% of emerging adults with cancer ($\chi^2 = 3.69$; $p = 0.06$) (Table 2). In reference to Table 3, cancer and mood disorders in male emerging adults revealed a χ^2 of 18.56 ($p = <.0001$) and females revealing a χ^2 of 5.36 ($p = 0.02$). Both sexes in the cancer and healthy control group who reported having a mood disorder suggested that the proportions were significant. This

warranted further investigation examining the sex-specific risk between cancer and mood disorder. Due to confidentiality regulations of Statistics Canada, sex-specific prevalence was not provided for mood disorders in emerging adults.

Table 2. Prevalence of Cancer among Emerging Adults (15-29-year-old's) with a Mental Disorder using the Canadian Community Health Survey—Mental Health 2012 Dataset

Mental Disorder	Healthy Controls n = 5,494	Cancer n = 42	χ^2 (P-value)
		1,770 (32.2%)	18 (42.9%)
Total: 5,536 participants (Missing: 117)			
SUD	Healthy Control n = 5,505	Cancer n = 42	χ^2 (P-value)
	1,258 (22.9%)	15 (35.7%)	0.98 (0.32)
Total: 5,547 participants (Missing: 99)			
Mood Disorder	Healthy Control n = 5,553	Cancer n = 42	χ^2 (P-value)
	694 (12.5%)	13 (31%)	3.69 (0.06)
Total: 5,595 participants (Missing: 37)			

Table 3. Sex-Specific Prevalence of Cancer among Emerging Adults (15-29-year-old's) with a Mental Disorder using the Canadian Community Health Survey—Mental Health 2012 Dataset

		Total Males n = 2,926	Male χ^2 (P-value)	Total Females n = 2,610	Female χ^2 (P-value)
Mental Disorder	Healthy Controls	1009/2,914 (34.6%)	0.03 (0.86)	761/2,579 (29.5%)	1.34 (0.25)
	Cancer	4/12 (33.3%)		15/31 (48.4%)	
Missing male participants: 46 Missing female participants: 71					
		Total Males n = 2,925	Male χ^2 (P-value)	Total Females n = 2,623	Female χ^2 (P-value)
SUD	Healthy Controls	815/2,913 (28%)	1.55 (0.21)	443/2,592 (17.1%)	3.82 (0.05)*
	Cancer	2/12 (16.7%)		13/31 (42%)	
Missing male participants: 42 Missing female participants: 57					
Mood	Healthy Controls	////////////////////	18.56 (<.0001)*	////////////////////	5.36 (0.02)*
	Cancer	////////////////////		////////////////////	

Significant findings are shown with an asterisk (*).

5.3. Objective 2

Multivariate logistic regression models consisted of the unadjusted models with the exposure variable of cancer and mental disorder outcomes (mental disorder, SUD, mood disorder) for the crude odds ratio for cancer (Appendix A). Potential confounding variables were added to include sociodemographic factors (i.e., sex, education level, perceived health), and overall well-being factors (i.e., distress level, social support) shown in Appendix B. The adjusted model which comprised of all covariates (Appendix B) were used as a basis to test for interaction (Table 4) and then used to stratify each of the mental disorders by sex (Table 5 and 6).

5.3.1. Examining the Interaction of Sex and Cancer in Emerging Adults

Controlling for relevant confounders, we analyzed the product term of sex and cancer for each mental disorder outcome and found a non-significant interaction with mental disorders ($\chi^2 = 0.74$, $p = 0.39$), a significant interaction with SUD ($\chi^2 = 4.25$, $p = 0.04$), and a significant interaction with mood disorder ($\chi^2 = 13.43$, $p = 0.0003$) (Table 4). Based on two significant interactions, further analyses were conducted to determine sex differences between mental disorders (Table 5 and 6).

Table 4. Adjusted Interaction Model of Cancer and Mental Disorders in Emerging Adults (15-29-year-old's) using the Canadian Community Health Survey—Mental Health 2012 Dataset

Model	Variable	Estimate (Standard Error)	χ^2 (P-value)
Mental Disorder	Intercept	3.69 (0.50)	54.02 (<.0001)
	Cancer (Yes)	- 1.23 (1.46)	0.71 (0.39)
	Sex	- 0.39 (0.09)	15.97 (<.0001)
	Education Level	- 0.18 (0.05)	11.23 (0.0008)
	Distress Level	- 0.20 (0.03)	38.35 (<.0001)
	Perceived Health	- 0.45 (0.06)	56.61 (<.0001)
	Social Support	- 0.03 (0.01)	5.30 (0.02)
	Cancer*Sex Interaction	0.76 (0.88)	0.74 (0.39)
	Mental disorder model c-statistic: 0.66		
SUD	Intercept	2.71 (0.52)	26.94 (<.0001)
	Cancer (Yes)	- 3.04 (1.55)	3.82 (0.05)
	Sex	- 0.81 (0.10)	62.83 (<.0001)
	Education Level	-0.34 (0.06)	34.41 (<.0001)
	Distress Level	-0.16 (0.04)	20.19 (<.0001)
	Perceived Health	-0.41 (0.06)	40.13 (<.0001)
	Social Support	0.008 (0.01)	0.45 (0.50)
	Cancer*Sex Interaction	1.88 (0.91)	4.25 (0.04)*
	SUD model c-statistic: 0.66		
Mood Disorder	Intercept	2.59 (0.58)	19.98 (<.0001)
	Cancer (Yes)	- 8.07 (2.24)	12.94 (0.0003)
	Sex	0.46 (0.13)	12.23 (0.0005)
	Education Level	0.03 (0.07)	0.22 (0.64)
	Distress Level	-0.19 (0.04)	23.63 (<.0001)
	Perceived Health	-0.62 (0.08)	64.45 (<.0001)
	Social Support	-0.08 (0.02)	27.45 (<.0001)
	Cancer*Sex Interaction	4.67 (1.27)	13.43 (0.0003)*
	Mood disorder c-statistic: 0.69		

Significant interactions are shown with an asterisk (*).

5.3.2. Likelihood of Reporting Mental Disorders in Male and Female Emerging Adults

Compared to male healthy controls, male emerging adults with cancer had lower odds of reporting a mental disorder [OR = 0.62; CI = (0.16 – 2.35)] (Table 5). Unlike males, female emerging adults with cancer had higher odds of reporting a mental disorder [OR = 1.37; CI = (0.43 – 4.27)] (Table 6). However, the stratified odds were non-significant. The overall c-statistic for the male and female mental disorder model was 0.65 and 0.66, suggesting that this was a model with a satisfactory fit.

5.3.3. Likelihood of Reporting SUDs in Male and Female Emerging Adults

Compared to male healthy controls, male emerging adults with cancer had lower odds of reporting a SUD [OR = 0.31; CI = (0.07 – 1.32)] (Table 5). Unlike males, female emerging adults with cancer had higher odds of reporting a SUD [OR = 1.95; CI = (0.67 – 5.73)] (Table 6). However, the stratified odds were non-significant. The overall c-statistic for the male and female SUDs model was 0.63 and 0.64, suggesting that this was a model with a satisfactory fit.

5.3.4. Likelihood of Reporting Mood Disorder in Male and Female Emerging Adults

Compared to male healthy controls, male emerging adults with cancer had lower odds of reporting a mood disorder [OR = 0.03; CI = (0.00 – 0.28)] (Table 5). Unlike males, female emerging adults with cancer had higher odds of reporting a mood disorder [OR = 3.58; CI = (0.94 – 13.56)] (Table 6). Overall, there is an effect modification for sex, whereby the association between cancer and mood disorders is significant for males, but not for females. The overall c-statistic for the male and female mood disorder model was 0.69 and 0.68, suggesting that this was a model with a satisfactory fit.

Table 5. Adjusted Model of Cancer and Mental Disorders Stratified by Male Emerging Adults

(15-29-year-old's) using the Canadian Community Health Survey—Mental Health 2012 Dataset

Model	Variable	Estimate (Standard Error)	Odds Ratio (95% Confidence Interval)	χ^2 (P-value)
Mental Disorder	Intercept	2.66 (0.73)	////////////////////	13.24 (0.0003)
	Cancer (Yes)	- 0.47 (0.68)	0.62 (0.16 – 2.35)	0.49 (0.48)
	Education Level	- 0.19 (0.08)	0.82 (0.70 – 0.96)	5.69 (0.02)*
	Distress Level	- 0.22 (0.05)	0.79 (0.72 – 0.88)	20.61 (<.0001)*
	Perceived Health	- 0.41 (0.09)	0.66 (0.56 – 0.79)	20.19 (<.0001)*
	Social Support	- 0.01 (0.01)	0.99 (0.96 – 1.03)	0.25 (0.62)
	Mental disorder model c-statistic: 0.65			
SUD	Intercept	1.04 (0.74)	////////////////////	1.98 (0.16)
	Cancer (Yes)	- 1.16 (0.74)	0.31 (0.07 – 1.32)	2.51 (0.11)
	Education Level	- 0.27 (0.08)	0.76 (0.65 – 0.89)	10.87 (0.001)*
	Distress Level	- 0.19 (0.05)	0.83 (0.75 – 0.92)	13.01 (0.0003)*
	Perceived Health	- 0.35 (0.09)	0.69 (0.58 – 0.84)	14.93 (0.0001)*
	Social Support	0.03 (0.02)	1.03 (0.99 – 1.06)	2.04 (0.15)
	SUD model c-statistic: 0.63			
Mood Disorder	Intercept	3.64 (0.87)	////////////////////	17.24 (<0.0001)
	Cancer (Yes)	- 3.38 (1.07)	0.03 (0.00 – 0.28)	9.83 (0.002)*
	Education Level	- 0.01 (0.12)	0.99 (0.78 – 1.24)	0.02 (0.90)
	Distress Level	- 0.25 (0.07)	0.78 (0.68 – 0.89)	13.41 (0.0003)*
	Perceived Health	- 0.58 (0.14)	0.55 (0.43 – 0.73)	18.56 (<.0001)*
	Social Support	- 0.09 (0.03)	0.92 (0.87 – 0.96)	12.58 (0.0004)*
	Mood disorder model c-statistic: 0.69			

Significant variables are shown with an asterisk (*).

Table 6. Adjusted Model of Cancer and Mental Disorders Stratified by Female Emerging Adults (15-29-year-old's) using the Canadian Community Health Survey- Mental Health 2012 Dataset

Model	Variable	Estimate (Standard Error)	Odds Ratio (95% Confidence Interval)	χ^2 (P-value)
Mental Disorder	Intercept	3.60 (0.60)	////////////////////////////////////	35.52 (<.0001)
	Cancer (Yes)	0.31 (0.58)	1.37 (0.43 – 4.27)	0.29 (0.59)
	Education Level	- 0.16 (0.07)	0.85 (0.74 – 0.98)	5.15 (0.02)*
	Distress Level	- 0.17 (0.04)	0.85 (0.78 – 0.91)	19.98 (<.0001)*
	Perceived Health	- 0.50 (0.08)	0.61 (0.53 – 0.71)	45.21 (<.0001)*
	Social Support	- 0.05 (0.01)	0.95 (0.92 – 0.98)	9.66 (0.002)*
	Mental disorder model c-statistic: 0.66			
SUD	Intercept	2.13 (0.62)	////////////////////////////////////	11.69 (0.0006)
	Cancer (Yes)	0.66 (0.56)	1.95 (0.67 – 5.73)	1.46 (0.23)
	Education Level	- 0.39 (0.07)	0.68 (0.59 – 0.78)	30.78 (<.0001)*
	Distress Level	- 0.11 (0.04)	0.89 (0.82 – 0.97)	8.13 (0.004)*
	Perceived Health	- 0.48 (0.08)	0.63 (0.54 – 0.73)	35.77 (<.0001)*
	Social Support	- 0.01 (0.02)	0.99 (0.95 – 1.02)	0.70 (0.40)
	SUD model c-statistic: 0.64			
Mood Disorder	Intercept	3.09 (0.68)	////////////////////////////////////	17.21 (<.0001)
	Cancer (Yes)	1.27 (0.68)	3.58 (0.94 – 13.56)	3.51 (0.06)
	Education Level	0.06 (0.09)	1.07 (0.89 – 1.27)	0.57 (0.45)
	Distress Level	- 0.15 (0.05)	0.86 (0.78 – 0.94)	10.18 (0.001)*
	Perceived Health	- 0.65 (0.09)	0.52 (0.44 – 0.62)	56.97 (<.0001)*
	Social Support	- 0.07 (0.02)	0.93 (0.89 – 0.96)	15.52 (<.0001)*
	Mood disorder model c-statistic: 0.68			

Significant variables are shown with an asterisk (*).

5.4. Objective 3

The binary multivariate logistic regression model for mental healthcare services need consisted of the unadjusted model with the exposure variable of cancer and perceived needs for care outcome containing the crude odds ratio for cancer (Appendix C), as well as potential confounding variables which were included in the model (Table 7) and were used to examine the association between cancer and mental healthcare service needs in emerging adults with cancer.

5.4.1. Association between Cancer and Mental Healthcare Services in Emerging Adults

Compared to healthy controls, emerging adults with cancer were positively associated with higher odds of reporting unmet perceived needs for care [OR = 7.72; CI = (1.85 – 28.57)]. The c-statistic for cancer and overall perceived needs for care was 0.82, suggesting that this model was a strong fit (Table 7).

Table 7. Adjusted Model for Cancer and Overall Perceived Needs for Care in Emerging Adults (15-29-year-old's) using the Canadian Community Health Survey—Mental Health 2012 Dataset

Model	Variable	Estimate (Standard Error)	Odds Ratio (CI)	χ^2 (P-value)
Overall Perceived Needs for Care	Intercept	1.12 (0.68)	////////////////////	2.68 (0.10)
	Cancer (Yes)	1.98 (0.69)	7.27 (1.85 – 28.57)	8.08 (0.004)*
	Mental Disorder	1.09 (0.37)	2.99 (1.45– 6.19)	8.84 (0.003)*
	SUD	– 0.27 (0.29)	0.76 (0.43 – 1.35)	0.88 (0.35)
	Mood Disorder	0.75 (0.28)	2.12 (1.22 – 3.66)	7.13 (0.007)*
	Sex (Male)	– 0.71 (0.17)	0.49 (0.35 – 0.68)	17.68 (<.0001)*
	Negative Social Interaction	0.22 (0.03)	1.25 (1.17 –1.34)	41.23 (<.0001)*
	Distress Level	– 0.18 (0.05)	0.83 (0.76 – 0.92)	13.53 (0.0002)*
	Social Support	– 0.12 (0.02)	0.89 (0.86 – 0.92)	51.33 (<.0001)*
	Education Level	0.01 (0.08)	1.01 (0.85 – 1.20)	0.02 (0.88)
Model c-statistic: 0.82				

Significant variables are shown with an asterisk (*).

CHAPTER 6: DISCUSSION

There has been an uptake of research on emerging adults and the health implications of this vulnerable developmental period. Given the multifaceted mental health complications of this group, there is evidence to suggest that having cancer can increase the likelihood of reporting a mental disorder. The current study is one of the few Canadian studies found in the literature that has examined the association between having a cancer diagnosis and the development of mental disorders within emerging adults between the ages of 15-29 years of age in Canada. Specifically, this is the only study found that focussed on emerging adults with cancer without the use of other developmental periods. The results suggested that several health and social variables may help decrease the risk of reporting mental disorders in both male and female emerging adults. In addition, this study helped highlight the need for age-appropriate mental healthcare services for emerging adults with cancer.

6.1. Prevalence of Mental Disorders in Emerging Adults with Cancer

Emerging adults were found in this study to have similar prevalence of mental disorders compared to their counterparts without cancer. This was not aligned with the hypothesis made in objective 1. When cancer was examined with the outcome variables of selected disorder, SUD, and mood disorder, the prevalence was non-significant. A plausible explanation for this observation is the fact that the emerging adult participants who presently have a mental disorder and/or cancer are less likely to participate in surveys (Woodall, Morgan, Sloan & Howard, 2010), and this will influence the response rate and prevalence of mental disorders in this study. As well, the CCHS-MH was only able to capture 42 participants with cancer. Based on the study conducted by Rasic et al (2007), those with cancer report a prevalence rate of 16% for depression which was reflected in mood disorders with a higher prevalence in this study of 31% but with only 13 participants compared to a prevalence of 12.5% in healthy controls but included 694

participants. Similarly, cancer is a rare event in this age group so recruiting someone with cancer who would report having a mental disorder is less prevalent than healthy controls with a mental disorder.

6.2. Sex Differences amongst Internalizing and Externalizing Disorders

Mixed results of the study were found with sex differences between mental disorders. Not consistent with the literature, males were found to have a lower chance of reporting mental disorders whereas being a female was a risk factor especially for SUD and mood disorder. A caveat to the study samples was that males with cancer only represented 26.2% of the sample and was not fully representative of mental disorders. In addition, literature has suggested that females are commonly observed to have twice the prevalence of anxiety and mood disorders compared to males (O'Donnell et al., 2016). In SUDs, males who have had cancer were found to have a lower odd of reporting SUD which has not been consistent with the literature (Chassin, Pitts & Prost, 2002; King & Chassin, 2007; Steihaus, Eschmann, Heimgartner & Metzke, 2008). But, the association between cancer and SUD was non-significant for males. Likewise, mood disorders were more commonly observed in females where they had a 3.58 times greater chance of having a mood disorder if they reported ever having cancer. However, sex stratification suggested that the association between cancer and mood disorders for females were non-significant but there was an effect modification where male emerging adults with cancer are at a decreased risk of reporting mood disorders. In the case of SUDs and mood disorders, the odds may have been non-significant due to the small sample size when it was stratified by sex. A prominent key difference between mental disorders in men and women is that men are more likely to seek mental health treatment for their mental disorders when there are comorbid disorders involved (i.e., depression and SUD). However, this is the opposite when it comes to men being diagnosed with just one mental disorder (Vesga-López et al., 2008). As opposed to

men, women are more likely to report higher symptoms that endorse the criteria for a mental disorder and perceive their mental health to be more disabling than men. Despite the high comorbidity with generalized anxiety disorders and other mental disorders observed in men with a SUD, men report less disability with their mental health (Vesga-López et al., 2008). However, it could be that healthcare providers may prioritize the cancer instead of addressing the issue of SUD among males and they are less likely to report these substance use symptoms to healthcare providers (Szalda, Brumley, Danielson & Schwartz, 2013). Another plausible explanation is that men turn to the use of alcohol or drugs to relieve symptoms of internalizing disorders and this creates a perception that their SUD is not as debilitating. A caveat with this coping mechanism is that they rely on self-medication and have more arguments with loved ones which make them deter from social support. On the other hand, women rely more on treatment for their mental disorders and more on their family and friends (Vesga-López et al., 2008).

6.3. Buffering Effects of Perceived Health and Psychosocial Factors

The results of this study found that perceived general health and psychosocial factors were buffering effects for cancer and mental disorders. In particular, how one views their own general health status, education level, and social support were factors in mitigating the effects of mental disorders. The protective factors of these variables are supported by Pearlin's Stress Process Model as these factors are deemed as secondary stressors that may either help alleviate the symptoms of mental distress and mental disorders in emerging adults or increase the severity of mental disorders (Pearlin, 1989). Similar results were shown amongst males and females where mental disorders are reduced when one has a higher education level, lower distress, and social support are perceived. Interestingly, education level was shown to be a risk factor for both male and female mood disorders. Based on the literature, these findings aligned with results that

showed that a multitude of factors come into play with the development of mental disorders such as academic well-being and social support through family and friends (Newcomb-Anjo et al., 2017). These findings could suggest that improving education through awareness and mental healthcare access to age-appropriate resources would improve the mental health of emerging adults with cancer and provide an avenue to better overall physical health. As well, having strong social support systems through personal (i.e., family, friends) and professional relationships (i.e., psychiatrist, employees) could help reduce the severity of mental disorders.

6.4. Perceived Needs and Access to Mental Healthcare Services

Consistent with both the literature and hypotheses, this study showed that there was a significant relationship between cancer and perceived need for care. Emerging adults with cancer had a 7.72 times greater chance of reporting partial or unmet perceived need for care and this need was greater with a mental disorder. Based on the literature, mental disorders are common among emerging adults. However, younger individuals who have cancer are more reluctant to receive treatment as well as displaying difficulties in recognizing and responding to depressive symptoms (Wright, Jorm, Harris & McGorry, 2007). In addition, mental healthcare utilization is lower in male emerging adults with a mental disorder than their counterparts (Biddle, Gunnell, Sharp & Donovan, 2004; Oliver, Pearson, Coe & Gunnell, 2005; Vanheusden et al., 2008) and they exhibit less help-seeking behaviour from healthcare professionals even when they recognize that there is a mental health problem (Klineberg, Biddle, Donovan & Gunnell, 2011). This is a plausible explanation for the observed association of SUDs being less frequently reported in males than female emerging adults in the study. This could be mitigated through mental health education that could help in enabling social support systems and gaining access to appropriate mental health resources.

CHAPTER 7: RESEARCH IMPLICATIONS

7.1. Pearlin's Stress Process Framework

Pearlin's Stress Process Model was used as a framework to examine how emerging adults would respond after having ever received a cancer diagnosis. This study showed that having a life event as cancer contributes to multiple stressors such as having a mental disorder and requiring mental healthcare services. Other factors that were included in the model were buffer/protective factors, so they are not defined as a stressor based on this model. Because my study is based on secondary cross-sectional data, it cannot be proven that the primary stressor of having cancer came first, followed by secondary stressors which are by-products of the primary stressor (Pearlin, 1989). Instead, what can be taken from this is that individual experience and social interaction play an important role during cancer and this can affect their mental wellbeing and risk for mental disorders. Future research should be done to explore the causal relationship between cancer and mental disorders in emerging adults by using other study designs that will measure the life event in chronological order to reduce the issue of temporality and analyze the role of risk factors.

7.2. Examining Cancer and Mental Disorders in other Populations

While this study is one of the first to highlight the importance of cancer and mental disorders in Canadian emerging adults, the relationship remains unclear. It is important to replicate current findings in larger samples of emerging adults with cancer. This will help reduce selection bias and improve on sample power, as well as provide a more comprehensive sample that will help research the causal relationship between cancer and mental disorders with risk factors that has not been focussed on. Notwithstanding the results of this study, using other population studies can help expand to other developmental periods in life will help generalize this relationship across the lifespan and examine the similarities and/or differences that exist not

only between individuals of different ages, but how the healthcare system help plays a role in treating different populations with cancer. This is important in reducing healthcare costs across the lifespan, as well as incorporating both physical and mental health sectors that ensures that post-treatment is effective for individuals with cancer. As a result, more research will need to be initiated in Canadian healthcare systems, as well as comparison studies from other countries that differ in how they help emerging adults with cancer.

7.3. Access to Cancer Surveys

Although the current study used the CCHS-MH, a representative survey of the Canadian population to target emerging adults between the ages of 15-29 years, the results still need to be compared to other study populations to illustrate the causal relationship between cancer and mental disorders. Replications of the current study by using Canadian cancer registries and/or surveys, whether public or private, will be needed to gain more detailed data on cancer prevalence cases, types, duration, and treatment are needed to examine the details of cancer that was not provided in the dataset used for this study. For example, researchers can look at The Canadian Cancer Registry, a database that collects information about the individual's cancer diagnosis and aims at producing incidence rates while helping to identify risk factors, and treatment that involves monitoring, evaluating, and conducting research on cancer (Statistics Canada, 2018). However, there will still need to be mental health variables to examine alongside with cancer databases. The need for access to other public surveys would be motivation in gathering a diverse population group and adding other variables in order to inform both research and clinical areas to target mental health interventions for this vulnerable population. In the United States, The Childhood Cancer Survivor Study (CCSS) was created for research on cancer and survivorship after a cancer diagnosis. Many researchers have utilized the database for

research where the CCSS provides knowledge about various long-term effects of cancer, post-cancer survivorship, siblings of cancer survivors for comparison groups, impact on cancer diagnosis and treatment, and mental health variables (Robison et al., 2002).

To gather information on both cancer and mental disorder diagnosis, data needs to be pooled from Canadian datasets. One of the databases available, the Ontario Mental Health Reporting System (OMHRS), is able to report administrative data on individuals receiving mental healthcare services and submit it to the Canadian Institute for Health Information (CIHI) (*Ontario Mental Health Reporting System Metadata*, n.d.). This would provide the individual's demographic, mental disorder diagnosis, the type of treatment and intervention, care received, and types of providers in contact with the individual (*Ontario Mental Health Reporting System Metadata*, n.d.). By combining personal identifiers such as the Ontario Health Insurance Plan (OHIP) data with the CIHI database where a unique identifier is available, individual information can be reported, and linkage with other data sources may be possible. For example, the Hospital Mental Health Database (HMHDB) is a Canadian database which compiles information of inpatient hospital stays from different psychiatric settings such as hospitals (general and psychiatric), and the OMHRS (*Hospital Mental Health Database Metadata (HMHDB)*, n.d.). It is not limited to only psychiatric diagnoses but also medical diagnoses. In addition, cancer registries available can identify those 15-29-year old's and match them to healthy population controls to get a general population data, and then linked to other databases to get a mental disorder diagnosis. This would have to be linked to OHIP or registered persons database.

Other studies should utilize cancer registries for research and education purposes in order to target prevention in the clinical setting (i.e., oncology and psychiatry setting) as well as individual levels (i.e., through social support systems) that will help reduce the risk of mental

disorders from the emerging adulthood years and onwards. In order to gain momentum for future interdisciplinary involvement with healthcare policymakers, there needs to be more evidence of between cancer and mental disorders before any investment can be made in mental healthcare services to reduce the burden of mental disorders for EAs with cancer.

CHAPTER 8: IMPLICATIONS FOR PRACTICE AND PREVENTION

8.1. Age Appropriate Mental Healthcare Services

Emerging adults represent a unique developmental period that requires tailored mental healthcare needs. The results of this study demonstrated that mental disorders are common amongst emerging adults with cancer, with access to mental healthcare services being an important factor for their mental well-being. In order for emerging adults to receive appropriate mental healthcare, practitioners will be required to be involved in their inpatient and outpatient treatments by providing specialized and multidisciplinary care for those with multiple needs such as a chronic illness and mental disorder. Research has shown that close collaboration with mental health professionals and general practitioners in multiple areas such as education, employment, and accommodation would benefit young adults (Patel, Flisher, Hetrick & McGorry, 2007). This can often include prevention strategies that follow-up with patients after their cancer treatment to help reduce other health consequences such as mental distress that come as a result of their ordeal. Because of the lack of age-appropriate resources, it is common for emerging adults to be put in facilities with other patients that are either younger or older than they are. Ultimately, it is crucial that work focusses on emerging adulthood being a separate developmental group that requires specialized mental healthcare services.

8.2. Universal Psychosocial Prevention Strategies

Cancer patients undergo a process of identity construction to integrate their cancer experience into their self-definition (Cho & Park, 2015). This becomes important especially for emerging adults who not only have to envelope developmental tasks such as identity formation but also manage their cancer diagnosis and treatment.

The importance of identifying the long-term psychosocial consequences of being diagnosed with cancer is growing. For instance, there may be changes in relational dynamics among their parents and peers. Young emerging adults with physical illnesses display more reliance on their parents and may display a regression from their gained independence (Bleyer, 2005). Dialogue with parents may be one-sided, as parents strive to discuss their thoughts and feelings about cancer, which is not reciprocated by their child. Emerging adults have been shown to repress their distress in order to guard their parents against worry (Bleyer, 2005; Zebrack, Chesler, Orbuch, & Parry, 2002). Cognitively, emerging adults often experience a sense of social isolation due to their perception of being different and as a consequence, many form new friendships with peers that can relate to their personal experiences such as cancer patients and survivors (Bleyer, 2005). In fact, these strong social bonds are a key element in developing resiliency.

An element of resiliency in emerging adults is the connection made through families and friends (Harmelen et al., 2017). This reduces life stressors early in emerging adulthood, and later reduces the risk of depression, family conflict, and bullying (Harmelen et al., 2017). Specifically, one area of concern for emerging adults is their psychological well-being (Davis, 2003; Sukhera, Fisman & Davidson, 2015). Many emerging adults experience their first mental disorder episode between the ages of 16 and 25, where changes they encounter causes additional problems for their mental health (Davis, 2003; Sukhera et al., 2015). Because of all of these considerations, it is important for emerging adults with cancer to have access to resources (i.e., support groups) in order to protect against adverse psychological outcomes.

8.3. Mental Health Education

This study found education level to be protective against having a mental disorder for emerging adults with cancer. More importantly, education has been shown to act as a buffer for the wellbeing of emerging adults, regardless of cancer diagnosis (Jorm, 2012). However, people often fail to get professional help due to unfamiliarity with symptom recognition (Gulliver, Griffiths, & Christensen, 2010). It is highly valuable to inform and guide young adults to get help when they need mental health services. Oftentimes when an individual recognizes that they should seek professional help, there has already been a delay from the initial onset of symptoms. For example, the median age of onset and SUD is 20 years and anxiety disorder is 11 years (Kessler et al., 2005). Unfortunately, the median age for those dealing with an anxiety disorder is anywhere from 3-30 years, and 6 to 18 years with a SUD (Marshall et al., 2005). This shows that many individuals do not have the knowledge nor experience to deal with the onset of a mental disorder. In addition, those dealing with cancer often prioritize their physical wellbeing first and their mental well-being suffers consequently. From the current study, emerging adults report more unmet perceived needs and this often aligns with their negative attitudes on receiving mental health treatment and their lack of education towards mental disorders (Gonzalez, Alegria, & Prihoda, 2005). These results suggest that having the appropriate resources and tools through education can help to recognize mental disorders and receiving the appropriate and timely treatment needed for a better recovery. This would require the adoption of referrals and practices from healthcare professionals that encourage emerging adults with cancer to have the opportunity to seek mental health treatment through outpatient services that are trained and tailored to treat age-appropriate mental health problems specific to cancer populations.

CHAPTER 9: STRENGTHS AND LIMITATIONS

Albeit the current study advances the understanding of mental disorder and cancer in both psychiatric and healthcare sectors, there are some limitations. The sample size of emerging adults classified with cancer was only 42, which is a low cell count. This limited the ability to separate emerging adults into groups (i.e., young, middle, older emerging adults). As well, because the proportion of emerging adults with cancer is small, multiple variables used to control for confounding was limited in order to make logistic regression more reliable. In order to provide sufficient statistical power, weights were used to analyze data. However, the c-statistic for some models were below the ideal range of 0.70 due to the small sample size (Austin & Steyerberg, 2012). Similarly, logistic regression models produced high standard error with a wide confidence interval due to the small sample size and results should be interpreted with caution. Nonetheless, there was a large effect size and signal in the dataset given the small sample size. In larger samples, the effect size may remain the same but the confidence intervals would be expected to be narrower. Given that cancer was disproportionately represented by females in the CCHS-MH dataset, current future research will require more equal proportions of male to female ratio to gather a more representative sample.

Next, the outcomes of cancer were not specific such that participants with a history of cancer were not asked the timing, stage, or type of cancer; this limited the ability to do further cancer analyses. Nonetheless, the CCHS-MH is a good dataset for gathering information on simple cancer outcome with measures of mental disorders. However, mental disorder variables only examined lifetime measures, so specific timing was not available. This is one of the disadvantages of using the CCHS-MH as it is secondary data and the variables collected in this survey did not comprehensively cover sufficient details to make in-depth analyses pertaining to

the experience of cancer (i.e., indication of cancer type) and mental health experience (i.e., when a respondent was diagnosed with a mental disorder).

Furthermore, a limitation to the self-report measures in the CCHS-MH survey was that they were not confirmed by administrative health records. Therefore, measures cannot be validated. However, self-reports of health-risk behaviours such as alcohol and drug use have been shown to not affect the validity and can be used as a reliable tool (Brener, Billy & Grady, 2003). Specifically, emerging adults are associated with more accurate self-reports of cancer diagnosis compared to older age adults with overall sensitivity of self-report cancer to be 71.1% (Loh et al., 2014). Furthermore, studies have indicated that there is a moderate agreement for cancer when comparing administrative health records and self-reports (Jang et al., 2015; Fortin, Haggerty, Sanche & Almirall, 2017). In one study conducted in Quebec, cancer was the only chronic condition that did not result in overreporting compared to the other 11 chronic conditions that were assessed (Fortin, Haggerty, Sanche & Almirall, 2017).

Finally, based on the target population and exclusion criteria that CCHS-MH covers, there are limited data to suggest key subgroups of vulnerable populations (i.e., individuals in foster care systems, with intellectual disabilities) are included in the inclusion criteria for the Canadian population. Therefore, these individuals in the 15-29-year-old age bracket may under-represent high risk populations and caution needs to be taken when interpreting the results as it may not be fully representative.

CHAPTER 10: CONCLUSION

The scarcity of research regarding the interplay of cancer and development of mental disorders in emerging adults highlights the need for more studies examining larger samples of EAs with cancer. This will provide opportunities for greater participation in both understanding and development of a system that can provide appropriate follow-up care for individuals with cancer and comorbid mental disorders. The current study findings will help initiate future research in the allocation of appropriate health care resources by providing mental health services targeted towards emerging adults that will help those who are at higher risk of reporting mental disorders, and provide interventions to reduce psychological symptoms in those who have been diagnosed with a mental disorder. Future research beyond the emerging adult period can help examine if the association between cancer and mental disorders are generalizable to other developmental periods. The implications of extending beyond the emerging adult period can help improve coordination of services within the health sector through the integration of mental health services within the oncology setting, through refining transition protocols from the pediatric to adult to the geriatric health system. Understanding differences in how emerging adults with cancer access mental services will help inform policies aimed at helping emerging adults and their families navigate the health system. These preventative and intervention efforts will help to improve the mental health of emerging adults, and provide better long-term outcomes over the life course.

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APPENDIX

Appendix A. Unadjusted Model of Cancer and Mental Disorders in Emerging Adults (15-29-year-old's) using the Canadian Community Health Survey—Mental Health 2012 Dataset

Model	Estimate (Standard Error)	Odds Ratio (CI)	χ^2 (P-value)
Mental Disorder	0.46 (0.54)	1.58 (0.55 – 4.57)	0.71 (0.40)
	Mental disorder model c-statistic: 0.50		
SUD	0.60 (0.62)	1.83 (0.54 – 6.17)	0.95 (0.33)
	SUD model c-statistic: 0.50		
Mood Disorder	1.19 (0.66)	3.29 (0.91 – 11.95)	3.27 (0.07)
	Mood Disorder model c-statistic: 0.51		

Estimates are values for the variable of cancer.

Appendix B. Model of Cancer and Mental Disorders in Emerging Adults using the Canadian Community Health Survey—Mental Health 2012 Dataset

Model	Variable	Estimate (Standard Error)	Odds Ratio (CI)	χ^2 (P-value)
Mental Disorder	Intercept	2.92 (0.48)	////////////////////	36.72 (<.0001)
	Cancer (Yes)	0.05 (0.47)	1.06 (0.42 – 2.65)	0.01 (0.91)
	Sex (Male)	0.38 (0.09)	1.46 (1.21 – 1.77)	15.71 (<.0001)
	Education Level	-0.18 (0.09)	0.83 (0.75 – 0.93)	11.45 (0.0007)
	Distress Level	-0.20 (0.03)	0.82 (0.77 – 0.87)	38.31 (<.0001)
	Perceived Health	-0.45 (0.06)	0.64 (0.57 – 0.72)	56.66 (<.0001)
	Social Support	-0.03 (0.01)	0.97 (0.95 – 0.99)	5.26 (0.02)
	Mental disorder model c-statistic: 0.66			
SUD	Intercept	1.11 (0.51)	////////////////////	4.66 (0.03)
	Cancer (Yes)	0.21 (0.53)	1.23 (0.44 – 3.47)	0.15 (0.69)
	Sex (Male)	0.79 (0.10)	2.22 (1.82 – 2.71)	61.57 (<.0001)
	Education Level	-0.34 (0.06)	0.72 (0.64 – 0.79)	35.15 (<.0001)
	Distress Level	-0.16 (0.04)	0.85 (0.79 – 0.91)	20.13 (<.0001)
	Perceived Health	-0.41 (0.06)	0.66 (0.59 – 0.75)	40.14 (<.0001)
	Social Support	0.008 (0.01)	1.01 (0.98 – 1.04)	0.47 (0.49)
	SUD model c-statistic: 0.66			
Mood Disorder	Intercept	3.54 (0.54)	////////////////////	42.64 (<.0001)
	Cancer (Yes)	0.78 (0.66)	2.17 (0.60 – 7.86)	1.41 (0.24)
	Sex (Male)	-0.48 (0.13)	0.62 (0.48 – 0.80)	13.49 (0.0002)
	Education Level	0.02 (0.07)	1.02 (0.88 – 1.18)	0.11 (0.74)
	Distress Level	-0.19 (0.04)	0.83 (0.76 – 0.89)	23.69 (<.0001)
	Perceived Health	-0.62 (0.08)	0.54 (0.46 – 0.63)	64.42 (<.0001)
	Social Support	-0.08 (0.02)	0.92 (0.89 – 0.95)	27.12 (<.0001)
	Mood disorder model c-statistic: 0.69			

Appendix C. Unadjusted Model Examining Cancer and Overall Perceived Needs for Care Outcome in Emerging Adults (15-29-year-old's) using the Canadian Community Health Survey—Mental Health 2012 Dataset

Model	Estimate (Standard Error)	Odds Ratio (CI)	χ^2 (P-value)
Overall Perceived Needs for Care	1.65 (0.73)	5.18 (1.23 – 21.77)	5.05 (0.02)*
	Overall perceived needs for care model c-statistic: 0.50		

Estimates are values for the variable of cancer. Significant variables are shown with an asterisk (*).