SOCIAL SUPPORT AND THE PROBABILITY OF DEPRESSION AMONG CANADIANS: A LONGITUDINAL ANALYSIS

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ABSTRACT

Using longitudinal data from the National Population Health Survey (NPHS), the effects of four different forms of social support on the trajectory of the predicted probability of depression (DPP) over time were analyzed. Differences in the effects of social support by *sex* and *age* were also explored. The analyses indicate that higher scores on three out of the four components of social support – *affection, positive social interaction,* and *emotional and informational support* – led to lower DPP scores over time. Further analyses revealed no sex differences in the effects of social support on the trajectory of DPP scores. *Affection* was the only form of social support to have different effects based on the respondent's age, with stronger effects on the trajectory of DPP scores among younger adults and weaker effects on those who were older.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

CCHS	Canadian Community Health Survey
CIDI-SF	Composite International Diagnostic Interview Short Form
CIDI-SFMD	Composite International Diagnostic Interview Short Form for Major Depression
COR	Conservation of resources
DPP	Depression Predicted Probability
DSM	Diagnostic and Statistical Manual of Mental Disorders
DSM-IV	Diagnostic and Statistical Manual of Mental Disorders (fourth edition)
GBD	Global Burden of Disease
ICPE	International Consortium of Psychiatric Epidemiology
MDE	Major depressive episodes
MDD	Major depressive disorders
minD	Minor depressive disorder
MOS	Medical Outcomes Survey
NCS-R	National Comorbidity Survey Replication
NPHS	National Population Health Survey
RBD	Recurrent brief depressive disorder
RDC	Research Data Centre
RRT	Relational regulation theory
sD	Sub-threshold depression
SST	Socio-emotional selectivity theory

CHAPTER 1: INTRODUCTION

Depression is one of the most prevalent forms of mental illness throughout the world and poses a significant burden to both physical and psychological well-being (Cassano & Fava, 2002; Goldney, Fisher, Wilson, & Cheok, 2000; Health Canada; Wells et al., 1989). According to Health Canada, 11% of men and 16% of women will experience major depression at some point in their lives. Data also suggest that over 300 million people suffer from depression worldwide (World Health Organization, 2017). According to the World Health Organization, it is estimated that by 2030 depression will be the biggest burden of disease worldwide according to the criteria established by the Global Burden of Disease (GBD) study (Lancet, 2012; World Health Organization, 2008). Therefore, given the scope of this issue, it is important to understand what factors can contribute to or mitigate feelings of depression.

There are many studies that have examined the underlying factors that contribute to feelings of depression. These factors are broad and can include biological phenomena such as genetics and chemical imbalances as well as social factors such as discrimination, financial instability, or family issues (Belle & Doucet, 2003; Flint & Kendler, 2014; Williams et al., 2017). One factor that has been shown to have a significant impact on depression is the level of social support an individual receives (Grav et al., 2012). However, there are multiple components to social support. For instance, social support can include various sub-categories such as emotional support, tangible support, and informational support (Wills, 1985). Furthermore, social support can be separated into *structural support,* defined as the extent one is connected within a social network, and *functional support,* which describes the various roles that people in a network can provide, such as emotional or tangible support (Wills, 1998). It is possible that certain

aspects of social support may be more beneficial in reducing the rate and severity of depression than others. There is also evidence to suggest that social support might have different effects depending on various sociodemographic factors such as age or sex. Therefore, using multilevel models, this thesis explores how various measures of social support included in the National Population Health Survey (NPHS) influence the probability of depression over time while controlling for the effects of sex and age.

1.1 RESEARCH OBJECTIVES AND RESEARCH QUESTIONS

1.1.1 REASEARCH OBJECTIVES

The main objective of this thesis is to examine whether different sub-categories of social support influence the trajectory of the probability of having depression over time. This thesis also examines whether any longitudinal effects of social support on depression differ by sex or age. To accomplish this, multilevel models using longitudinal data from the NPHS are analyzed. The various measures of social support being used are based on questions derived from the Medical Outcomes Study Social Support Survey (the MOS scale). The present study differentiates itself from other studies looking at the relationship between social support and depression as this study compares how different aspects of social support laid out in the MOS scale, including tangible support, affection, positive social interaction, and emotional/informational support, influence the trajectory of depression over time. Additionally, this study compares how the effects of social support on depression differ among men and women, as well as adults of different ages. The final aspect that differentiates this study from most prior research is that it uses longitudinal data to examine how social support influences the trajectory of depression over time, whereas most studies on this topic have relied on cross-sectional data.

By controlling for the effects of both sex and age, as well as time, this study will add to the literature pertaining to what factors can potentially prevent feelings of depression and how these effects differ based on various sociodemographic characteristics. Furthermore, the findings from this study can potentially be used to influence the direction of future socially policy aimed at improving mental health outcomes of individuals who are prone to depression.

1.1.2 REASEARCH QUESTIONS

This study seeks to answer three primary research questions:

1. Do higher scores on various components of social support lead to lower probabilities of depression over time?
2. Do the effects of the various components of social support on the probability of depression over time differ between men and women?
3. Do the effects of the various components of social support on the probability of depression over time differ depending on respondent's age?

1.2 THESIS ORGANIZATION

Chapter Two provides a comprehensive literature review of the research of social support and depression. The chapter starts out with a description of how depression is typically measured as well as reviewing the epidemiology of depression among the Canadian population. A description of social support and the subcategories being employed in this study are also provided. The literature review then examines the previous studies examining how each component of social support used in this study is related to depression, including studies that have looked at the effects of age and sex. The chapter concludes by stating the gap in the literature and justifies the topic at hand by

differentiating this study from previous studies examining the relationship between social support and depression.

Chapter Three reviews the theoretical frameworks that will help guide and interpret the findings in this study. The theoretical frameworks in this chapter include research using the life course and lifespan perspective, concepts of masculinity and femininity and how they apply to other theories such as the conservation of resources and the norm of reciprocity, and psychological theories. The chapter concludes by stating the research hypotheses that are based upon the theoretical frameworks and the previous literature on this topic.

Chapter Four describes the methods used in this study. The chapter begins with a description of the NPHS and the participants from whom the data was collected. The chapter also provides a summary of the variables being employed in this study including what questions were asked and how the variables were scaled and coded. The chapter ends by outlining the specific statistical analyses and procedures which are used in this study.

Chapter Five reports on the results of the taxonomy of multilevel models analyzing the trajectory of depression over time based on the respondent's level of social support, sex, and age. The chapter begins with descriptive statistics, and then reports the results of the baseline growth model without controls for social support. This is then followed by the results for each specific component of social support provided by the NPHS, without and with controls for sex and age.

Chapter Six is the final chapter which summarizes the research findings. Here the implications of the study are mentioned. The chapter also reviews the limitations of the study and offers guidance on future research directions.

CHAPTER 2: BACKGROUND AND SUMMARY OF THE LITERATURE

2.1 WHAT IS DEPRESSION AND HOW IS IT MEASURED?

To have a better understanding of the dependent variable being used in this study, it is important that the concept of depression be discussed and clarified. The term depression is often associated with feelings of sadness, but where does one draw the line between being sad or upset and being clinically depressed? As a clinical term, depression refers to a condition that must meet certain criteria established by the Diagnostic and Statistical Manual of Mental Disorders (DSM). The DSM is a handbook for mental illness published by the American Psychiatric Association. The first edition was originally published in 1952, with newer editions being released in subsequent years. The fifth edition is currently the latest version, which was published in 2013, after the last wave of the NPHS was conducted. Therefore, this study mainly will deal with the third and fourth editions of the DSM designated as DSM III and DSM IV as these were the editions published during the time the NPHS was conducted.

Major depressive disorders (MDD) and major depressive episodes (MDE) are two common diagnoses of depression. According to the DSM-IV, to become diagnosed with MDE, a patient needs to experience a depressed mood or a loss in pleasure of any activity for at least two weeks within the past year and experience at least five out of nine specified symptoms during that time period (Horwitz & Wakefield, 2007). These nine symptoms include: a depressed mood, decreased interest in pleasure, change in weight or appetite, change in sleep pattern, change in activity, fatigue, feelings of worthlessness or guilt, decreased concentration, and thoughts of suicide (American Psychiatric Association, 2000). Exceptions are made for those experiencing bereavement if their symptoms do not last for more than two months (Horwitz & Wakefield, 2007).

It is important to acknowledge that the medical definition of depression is a social construct as its definition is affected by western social and cultural processes (Horwitz, 2011). Furthermore, someone may experience a depressed mood while not meeting all the requirements for clinical depression. Certain individuals may suffer from some depressive symptoms without meeting the full requirements to be diagnosed with MDE, a condition known as sub-threshold depression (sD). Furthermore, the distinction between sD and MDE based on the criteria outlined in the DSM-IV can be split into two separate categories: minor depressive disorder (minD), where one exhibits fewer than five symptoms outlined in the DSM, and recurrent brief depressive disorder (RBD), where one exhibits depressive symptoms for less than two weeks (Bertha & Balázs, 2013). Among adolescents, sD has shown to have a negative impact on their quality of life and is a significant indicator for MDE later in life (Bertha & Balázs, 2013). Given the various definitions and diagnostic criteria, it has been argued that a more appropriate definition of depression treats it as a spectrum rather than a discrete category (Rodriguez, Nuevo, Chatterji, & Ayuso-Mateos, 2012).

In this study depression will be measured using the predicted probability that an individual experienced a major depressive episode (DPP) during the past year which is measured using the Composite International Diagnostic Interview Short Form (CIDI-SF). The instructions in the CIDI-SF are based on the diagnostic criteria in the fourth edition of the DSM. While researchers have traditionally used a dichotomous measure of depression, with a score of 0.9 being the cut off for clinical depression, using DPP scores allows depression to be treated as a continuous variable in the statistical analyses. More detail regarding this variable can be found in Chapter Four.

2.2 THE PREVALANCE OF DEPRESSION

The literature regarding the prevalence of depression has been well established, especially in Canada. Researchers exploring data from the Canadian Community Health Survey (CCHS) looked at the prevalence of major depressive disorders (MDD) among Canadians in 2002 (Patten et al., 2006). They found that 4.8 percent of respondents reported at least one episode of depression over a span of a year, while the life-time prevalence of having an episode of depression was 12.2 percent (Patten et al., 2006). A more recent study comparing results from the 2002 and 2012 CCHS and found that rates of annual and lifetime prevalence of depression among Canadians has remained consistent over time (Patten et al., 2016). International studies have found that the prevalence of depression varies throughout the world. Through exploring the results from the International Consortium of Psychiatric Epidemiology (ICPE) surveys, researchers compared the epidemiology of MDE among various countries including Canada (Andrade et al., 2003). Results varied significantly between different countries with a lifetime prevalence estimate ranging from 3 percent in Japan to almost 17 percent in the United States, with Canada somewhere in the middle at around 8 percent (Andrade et al., 2003). Research also suggests that the rate of MDD is somewhat lower in Canada than in the United States. According to the National Comorbidity Survey Replication (NCS-R), the 12-month prevalence of depression is 6.6 percent in the United States, compared to 4.8 percent in Canada (Kessler et al., 2003; Patten et al., 2006).

The overwhelming consensus in the literature is that depression is more common among women than men. For example, Patten et al. (2006) found that depression was more prevalent among Canadian women than men, although, they also found that this sex difference was less pronounced among older respondents. Using data from the NPHS,

Wang et al. (2010) looked at rates of depression among Canadian adults aged 18 to 65 who were not diagnosed with major depressive episodes (MDE) between the 1994/95 and 2000/01 cycles. The researchers analyzed new cases of MDE within three later cycles: 2002/03, 2004/05, and 2006/07 (Wang et al., 2010). During the first wave of data analyzed, there were no significant differences in depression between men and women. However, during the next two waves, women experienced higher rates of depression than men, with an estimated 9 percent of new cases among women in the final cycle compared to 5.5 percent among men (Wang et al., 2010). Most studies have also shown that various forms of sD are more prevalent among women than men (da Silva Lima & de Almeida Fleck, 2007; de Graaf, Huibers, Cuijpers, & Arntz, 2010).

There have been explanations for this disparity between the sexes. One explanation, known as the 'sex role hypothesis', suggests that the higher rates of depression among women arise from the various roles which they often need to adhere to (Gove, 1972; Gove & Tudor, 1973). For example, it has been argued that women experience depression more than men since women more often find themselves in subordinate positions such as being financially dependent on their significant other (Bluhm, 2011). Another explanation for the gender difference given by Nolen-Hoeksema (1987) suggests that men are more likely to engage in behaviours that distract them from their depression whereas women are more likely to engage in ruminating behaviours, and it is argued that such ruminating behaviours increase the severity of depressive symptoms. It has also been argued that this epidemiological sex difference in part arises from biology. It has been demonstrated that this sex difference exists across cultural settings and begins during puberty, indicating that hormones may play an important role (Kuehner, 2003).

At the same time, some caution should be used when claiming that depression is more prevalent among women. It has been argued that men experiencing depression are often under-diagnosed (Kellett, 2017). One explanation for this difference in diagnosis suggests that men are more reluctant to admit that they have depression, since feelings of depression show weakness and do not align with the dominant notions of masculinity (Kellett, 2017). Prior research by Griffiths, Christensen, and Jorm (2008) seems to support this idea as they found that men feel more personal stigma associated with depression than women. This study also found that men experiencing depression were less likely to seek out help.

Regarding the prevalence of depression among certain age groups, the literature suggests that depression is more common among younger individuals. A study using data from the 2012 CCHS found that Canadians aged 15 to 24 experienced the highest levels of depression (Findlay, 2017). According to this study, 7 percent of this age group experienced depression within the last year, compared to 5 percent of Canadians between the age of 25 and 64 and 2 percent of Canadians aged 65 and over (Findlay, 2017). Similar findings are reported by Patten et al. (2006) where the peak annual presence of depression was found in those aged 15 to 25.

Some explanations for why depression is more common among younger individuals are biological. Depression is very rare among children and generally develops during adolescence (Kuehner, 2003). This line of reasoning argues that hormones play a role in making the brain more sensitive to stressors, which leads to higher perveances of mental illness including depression (Thapar et al., 2012). However, rates of depression among young western individuals have increased dramatically throughout the twentieth century (Klerman & Weissman, 1989; Twenge, 2011). Since these changes have

happened over a relatively short period of time, it is unlikely that the high prevalence of depression is entirely due to biological differences between younger and older adults.

Depression among the elderly has also become much more prevalent over the past few decades and there is evidence that depressive episodes among the elderly are more persistent and chronic compared to depressive episodes among younger individuals (Wittchen & Uhmann, 2010). Indeed, while the number of adolescents with depressive symptoms is rising, many do not meet the full criteria of having MDE and instead suffer from sD (Bertha & Balázs, 2013). While depression is less prevalent among the elderly than the young, due to a rapidly aging population, there has been a growing concern over late-life depression as it is detrimental to both the individual as well as society at large because of the rising costs of health care (Aziz & Steffens, 2013).

2.3 WHAT IS SOCIAL SUPPORT AND HOW IS IT DEFINED?

Social support can be defined as the various ways in which help or assistance is provided by others. Social support is a difficult concept to measure as it can take on many different forms such as providing tangible/instrumental support, emotional support, social integration support, esteem support, as well as informational support (Cutrona & Russell, 1990). Furthermore, people can receive social support from various sources, including parents, partners or spouses, children, friends and peers, coworkers, or caregivers. The main source of social support also depends on the period of life one is experiencing (Umberson, Crosnoe, & Reczek, 2010). Given the broad definition and sources of social support, there have been many different instruments which have attempted to capture the concept, ranging from single-item surveys to more extensive surveys that try to measure the various aspects of both functional and structural social support, with varying levels of validity and reliability (Undén & Orth-Gomér, 1989).

The questions in the NPHS regarding social support are adopted from the Medical Outcomes Survey of Social Support (the MOS study), which is an instrument consisting of 19 questions which can be combined to measure 4 different types of *functional* social support: tangible support, affection, positive social interaction, and emotional and informational support. In this survey, tangible social support is defined as having someone who can help you out with daily tasks or be of any assistance. Affection is defined as having someone in your life who makes you feel loved and wanted. Positive social interaction involves having someone who you can enjoy your time with. The last subcategory of social support examined here is informational and emotional support. These two types of social support have been combined to form one subscale in the NPHS. This subscale includes questions regarding whether the respondent has someone to talk to about problems or fears or someone who can give advice regarding a given situation. More specific details about the questions regarding social support can be found in Chapter Four.

2.3.1 HOW IS SOCIAL SUPPORT RELATED TO SEX AND AGE?

Although epidemiological studies have consistently found depression to be more common among women than men, the literature seems to suggest that women tend to receive more social support (Kendler, Myers, & Prescott 2005). It is often assumed that women give and seek out social support more than men. However, the relationship between sex and social support may be more complicated. Prior literature suggests that women provide more social support than men do (Belle, 1982; Thoits, 1995). While somewhat outdated, a study conducted by Burda, Vaux, and Schill (1984) suggests that men and women do not differ in terms of received tangible or informational support. However, on average, women seem to receive more emotional support than men

(Klerman & Weissman, 1989; Twenge, 2011). When dealing with life stressors, some studies indicate that women seek out emotional support at a higher rate than men (Day & Livingtone, 2003; Tamres, Janicki, & Helgeson, 2002). A study looking at the relationship between gender and social support found that higher levels of femininity in both men and women were associated with receiving more emotional support while masculinity in both men and women was associated with receiving more tangible support (Reevy & Maslach, 2001).

2.4 PRIOR RESEARCH EXAMINING THE RELATIONSHIP BETWEEN SOCIAL SUPPORT AND DEPRESSION

In this section I will review the relevant studies that have examined the relationship between social support and depression. Each sub-section will review the relevant literature pertaining to the various subscales of social support being used in this study and their relationship with depression.

2.4.1 THE RELATIONSHIP BETWEEN TANGIBLE SOCIAL SUPPORT AND DEPRESSION

While there have not been many longitudinal studies looking at how tangible social support effects depression, a number of cross-sectional studies have examined the relationship between tangible social support and depression. For instance, Grav et al. (2012) found higher risks of depression among those with lower levels of tangible social support. According to the results from Fowler, Wareham-Fowler, and Barnes, (2013), tangible social support was a significant predictor of the duration of depression, with higher levels being associated with shorter durations. Overall, the literature suggests that there is a negative relationship between tangible social support and depression.

Prior research examining whether and how the relationship between tangible social support and depression differs for men and women has yielded inconsistent results. One study that compared the effects of social support between men and women regarding the duration and severity of depression found that receiving tangible forms of social support was positively correlated with the severity of depression among women, suggesting that tangible social support may worsen the condition of depression (Wareham, Fowler, & Pike, 2007). The authors suggest that women may feel inadequate if they cannot play the role of a mother, wife, or employee without help from others (Wareham et al., 2007). In contrast, the same study also found that receiving tangible social support was associated with a decrease in the duration of depression among men. The authors of the study state that their results were contrary to the previous findings by Pretorius (1996) who found that tangible social support was associated with higher levels of depression among men. Pretorius (1996) theorized that tangible social support made men feel less adequate by affecting their feelings of competence and masculinity. Fowler et al. (2013) found results similar to Wareham et al. (2007) in that tangible social support was associated with higher risks of depression among women, but not men. It was argued that this might be the case because women feel inadequate given that they are often in the role of providing tangible support (Fowler et al., 2013). Lastly, a study conducted by Grav et al. (2012) found that the prevalence of depression was most common in men who lacked tangible support. While these studies do compare the effect of tangible social support on depression between men and women, none of these studies examined the interacting effects of age. Furthermore, all of these studies looking at sex differences were based on cross-sectional data.

While to my knowledge there have not been any studies comparing the effects of tangible social support among younger and older adults, there have been a few studies that have found that tangible social support reduces symptoms of depression in the elderly (Grav et al., 2012; Oxman, Berkman, Kasl, Freeman & Barrett, 1992). For example, using data on those living in Hong Kong over the age 60, Chi and Chou (2001) found that instrumental/tangible support was more important than emotional support in preventing depression. Furthermore, there has been a longitudinal study looking at how social support influences the risk of MDE among Canadian Community Dwelling seniors over the age of 65 (Cook, 2015). Among the seniors, tangible social support was associated with a higher prevalence of MDE over time among those who were not experiencing pain, but no longitudinal effects were found among those experiencing pain (Cook, 2015, p. 65).

2.4.2 THE RELATIONSHIP BETWEEN AFFECTION AND DEPRESSION

In the studies conducted by Wareham et al. (2007) and Fowler et al. (2013), affection was not a significant predictor of either the severity or duration of depression among Canadians overall. However, these same studies do suggest that the effects of social support in the form of affection on symptoms of depression are different between men and women. Wareham et al. (2007) found that affection was positively related to the duration of depression among men and negatively related to the duration of depression among women. One explanation provided by the authors suggests that men are socialized to be less accepting of displays of affection, and therefore affection may prolong depression among men. Furthermore, affection was negatively associated with the severity of depression among females, but not males (Wareham et al., 2007). Fowler et al. (2013) also found affection to have a greater effect on reducing the duration of depression

in women compared to men. While these studies directly compared the effect of affection on men and women in terms of depression, neither of these studies compared how these effects differed by age, and both were based on analyses of cross-sectional data.

Based on my search of the literature, there were no studies that compared the relationship between affection and depression among adults of different ages, however there have been studies focusing on specific age groups. Interestingly, some studies have shown that intimacy and affection may worsen depression among younger individuals (Davila, 2008; Joyner & Udry, 2000; Quatman, Sampson, Robinson, & Watson, 2001). For instance, Bajoghli et al. (2014) examined the effect of romantic love, a component of the affection subscale, on mental health outcomes among young adults and found that romantic love was associated with elevated levels of depression. Results of studies examining older adults paint a different picture of the association between forms of affection and depression. Ganong and Larson (2011) found that sexual activity, along with other forms of intimacy, were associated with lower rates of depression for both older men and women. Furthermore, Cook (2015) found that over time, higher levels affection was associated with a lower prevalence of MDE among those without a pain problem, but not those with pain problems.

2.4.3 THE RELATIONSHIP BETWEEN POSITIVE SOCIAL INTERACTION AND DEPRESSION

In the literature examining the relationship between positive social interaction and depression, an inverse relationship between the two variables is commonly found. The study by Wareham et al. (2007) found that higher levels of positive social interaction were associated with less severe symptoms of depression, as well as shorter durations of depression among Canadians overall. Similar results were encountered by Fowler et al.

(2013) where an increase in the positive social interaction subscale was associated with a decrease in the severity of depression.

These same studies also compared the relationship between positive social interaction and depression among men and women. Wareham et al. (2007) found that higher levels of positive social interaction were associated with both lower severity and duration of depression for both men and women. Similar results were found by Fowler et al. (2013), where positive social interaction was associated with less severe symptoms of depression among men and women. Consistent with these findings, qualitative studies have found that for both men and women, interactions with others were an important coping mechanism for dealing with depression (Skarsater et al., 2003; Skarsater, Dencker, Haggstorm, & Fridlund, 2003).

While there has not been any research studying age differences in the effects of positive social interaction on depression, there have been some studies looking at adults of specific ages. One study of older adults between the ages of 60 and 92 found that positive social interaction partially mediated the relationship between disability and depression (Hui, Tengku, Ibrahim, & Haron, 2018). In another study, Cook (2015) found that among Canadian Community Dwelling seniors those with low positive social interaction were more likely to develop MDE as opposed to those with high positive social interaction. No studies that examine the relationship between positive social interaction and depression among younger adults currently exist.

2.4.4 THE RELATIONSHIP BETWEEN EMOTIONAL AND INFORMATIONAL SUPPORT AND DEPRESSION

Research suggests that emotional and informational support may have beneficial effects regarding depression. One study, examining individuals who sought out help for

dealing with depression, looked at the advantages and disadvantages of seeking help from friends and family members. Both emotional support and informational support were cited by participants as advantages of seeking support from friends (Griffiths, Crisp, Barney, & Reid, 2011). An analysis of patients who previously met the criteria for major depression and were later interviewed found that those who had recovered reported receiving more emotional support from their friends and family than those who had not recovered (Nasser & Overholser, 2005). Similarly, a longitudinal study on adults who were survivors of childhood sexual abuse, found that emotional support from friends or caregivers was associated with lower risks of depression (Musliner & Singer, 2014). Researchers also found that emotional support indirectly benefits the respondent's satisfaction with their romantic relationship through reducing rates of depression (Cramer, 2004).

Prior research looking into the relationship between emotional or informational support and depression suggests that this type of social support is more beneficial for women than men. For example, while a lack of emotional support in a study by Grav et al. (2012) was associated higher levels of depression among both men and women, the effects were stronger among women. Using data from the 2002 CCHS, Wareham et al. (2007) found that for men, increased levels of emotional/informational support were associated with more severe symptoms of depression while emotional and informational support did not impact the severity of depression among women. In addition, emotional and informational support was associated with a decrease in the duration of depression among women, but not men (Wareham et al., 2007).

While there have been fewer studies regarding the effects of age, Grav et al. (2012) found that the relationship between emotional and informational support and

depression becomes weaker with age. Furthermore, a longitudinal study conducted by Cook (2015) found that those with less emotional and informational support were more likely to develop MDE over an 8-year period compared to those with more emotional and informational support.

2.5 FILLING IN THE RESEARCH GAP

As my review of the literature suggests, there have been a number of studies that have examined the relationship between social support and depression. However, there are several aspects to this study that differentiate it from other studies on this topic. These aspects include comparing the effects of different forms of social support, how the effects of social support differ based on the respondent's sex and age, as well as relying on longitudinal data as opposed to cross-sectional data for the analysis.

There is one study which examined the longitudinal effects of these measures of social support on depression (Cook, 2015). This study also used data from the NPHS and focused on how social support influenced the likelihood of MDE over an 8-year period. While this study provided valuable information on which forms of social support may reduce the likelihood of depression among older adults, it does not directly compare how the relationship between social support and depression differs among adults under the age of 65. Furthermore, this study directly compares how the longitudinal effects of social support on depression differ between men and women.

Two notable studies conducted by Wareham et al. (2007) and Fowler et al. (2013) compared how different categories of social support affect the severity and duration of depression among men and women. While these studies did compare the effects of different forms of social support and how the effects differed depending on the respondent's sex, these studies did not include any information on how the relationship

between social support and depression may differ by age. Furthermore, both studies were based on cross-sectional data, specifically the 2002 Canadian Community Health Survey (CCHS). While these and other prior cross-sectional studies have offered important insights into the association between social support and depression, studies using longitudinal data are able to offer a more robust assessment of the association, since analyses of longitudinal data are able to speak to change in depression over time, as well as assess levels of social support as a possible predictor of this change. In addition, longitudinal data with a large number of data collection points, such as the NPHS, are particularly robust, as the likelihood of measurement error – where baseline scores may be erroneously too low, or follow-up scores erroneously too high, for example – relative to data with fewer collection points, is reduced (Singer & Willett, 2003, p. 10).

CHAPTER 3: THEORETICAL FRAMEWORKS

There are various theoretical frameworks which serve as a guiding lens to interpret the findings of this study. These theoretical frameworks have been taken from multiple disciplines, including sociology, psychology, health and medicine, and gender studies. Specifically, the frameworks being incorporated in this study include life course and lifespan theories, theories relating to gender studies, and psychological theories. Each theoretical framework will be discussed in the context of this study below.

3.1 LIFE COURSE AND LIFESPAN THEORIES

3.1.1 LIFE COURSE THEORY AS A TOOL FOR UNDERSTANDING DEPRESSION

The life course perspective/life course theory looks at how individual trajectories unfold differently and how their lives are linked to social, cultural, and historical contexts (Elder & Giele, 2009; McDaniel & Bernard, 2011). It states that the lives of individuals are linked to one another and that relationships with family, friends, or other groups of people can have a profound effect on their life trajectory (Elder & Giele, 2009; McDaniel & Bernard, 2011). Life course theory is an interdisciplinary framework which can help guide researchers examining issues such as development, health, well-being, and aging (Burton-Jeangros, Cullati, Sacker, & Blane, 2015).

Life course theory has been utilized as a tool to understand depression (Colman & Ataullahjan, 2011; Kellet, 2017). For instance, a study conducted by Colman and Ataullahjan (2011) examined some of the potential risk factors that could lead to the development of depression throughout the life course. These risk factors include being in poverty, low educational attainment, as well as certain events in life such as a loss of a loved one or a traumatic event (Colman & Ataullahjan, 2011). Protective factors, which

can act as a buffer and prevent the development of depression were also identified. One of these factors was social support (Colman & Ataullahjan, 2011).

The life course literature may be useful in explaining any age differences encountered in this study. According to the life course literature, there has recently been the emergence of a new term to describe the prolonged transition into adulthood known as "emerging adulthood." Emerging adulthood can be a turbulent period where one experiences the transition from adolescence to adulthood. This includes the process of identity formation, entering post-secondary school, moving out of a parents' home, and finding a loved one (Arnett, 2000; Schwartz, Cote, & Arnett, 2005). This transition from adolescence to adulthood can be challenging and uncertain, and it is likely that having someone to talk to and get advice from is beneficial to the well-being of young adults and could potentially lead to a lower likelihood of depression. One study found that among emerging adults, dissatisfaction with psychosocial support was associated with higher risks of depression, whereas no significant relationship was found between dissatisfaction with instrumental support and depression (Martinez-Hernaez, Carceller-Maicas, DiGiacomo, & Ariste, 2016). This indicates that emotional and informational support is more likely to be associated with lower probabilities of depression over time than tangible social support. Furthermore, it has been argued by researchers that during this period of life, forming a romantic relationship provides an identity that leads to a more positive conception of oneself (Montgomery, 2005; Simon & Barrett, 2010). Given that affection is a crucial component of romantic relationships, there is the possibility that younger respondents who receive more affection may be at a lower risk for depression relative to those who receive less.

3.1.2 SOCIOEMOTIONAL SELECTIVITY THEORY AS AN EXPLANATION FOR AGE DIFFERENCES

Socioemotional selectivity theory (SST) argues that the perceived time one has left in their life shifts their motivations away from goal-oriented decisions such as learning new things, or working towards a future career, to decisions revolving around managing their emotional well-being (Carstensen, 2006; Carstensen, Fung, & Charles, 2003). This includes moving away from superficial social ties and acquaintances to focusing more on relationships which are emotionally meaningful (Carstensen, 2006; Scheibe & Carstensen, 2010). Prior research on SST has demonstrated that there is a strong inverse relationship between age and perceived time one has left in their life (Fung, Lai, & Ng, 2001; Lang & Carstensen, 2002). This theory has an important implication for this study. Given that older adults generally have less perceived time left in their lives, emotional connections may be more important for their own wellbeing. Therefore, it could be the case that lower scores on the emotional/informational support subscale may lead to higher probabilities of depression among older respondents.

3.2 THEORIES OF GENDER, SEX, AND DEPRESSION

3.2.1 PREVAILING NOTIONS OF MASCULINITY AND FEMININITY AND HOW THEY RELATE TO SOCIAL SUPPORT AND DEPRESSION

When comparing the effects of social support on the likelihood of depression between Canadian men and women, it is important to consider how the prevailing notions of masculinity and femininity within Western culture influence what one values. Hegemonic masculinity, which refers to the dominant forms of masculinity that perpetuate the goals of patriarchy through the domination of women and feminine men (Connell, 2005), may influence how one feels about emotional support. Aspects of

hegemonic masculinity include the narratives that men must be stoic, competent, and have complete control over their own emotions. This control of emotions as an element of hegemonic performance that exists to create the illusion of strength (Cleary, 2012; Emslie, Ridge, Ziebland, & Hunt, 2006). Based on these dominant notions of masculinity, the presence of depression may be threatening to an individual's sense of masculinity since emotions are feminized and are associated with a "lack of control" (Emslie et al., 2006; Warren, 1983). Consequently, these prevailing ideologies of masculinity and femininity are likely to affect whether and how people seek out help and deal with depression. In the following subsections, the concepts of masculinity and femininity will be connected to two other theories: the conservation of resources (COR) and the norm of reciprocity. Both were adopted by Wareham et al. (2007) to explain the difference between men and women regarding the effects of social support on the severity and duration of depression.

3.2.2 THE CONSERVATION OF RESOURCES AND THE NORM OF RECIPROCITY

In their study of the effects of social support on the severity and duration of depression, Wareham et al. (2007) proposed theoretical explanations for why different components of social support would affect the severity and duration of depression among men and women differently. This explanation involved the use of two theories: the conservation of resources (COR) theory and the norm of reciprocity.

COR theory was originally proposed by Hobfoll (1998, 2002). The theory suggests that social support might be a specific aspect of a more broadly defined term known as the *reservoir of resources,* which are a set of resources which one can draw from in order to deal with certain life events. According to COR theory, one may draw

from their external resources such as material possessions or wealth, as well as from their internal reservoir, which can include personal characteristics and ways of dealing with events (Hobofoll, 1998; Wareham et al., 2007). Furthermore, the theory states that resource depletion occurs when a person's resources are used to manage their situation. If the available resources are depleted during a time of crisis, more discomfort may develop. Hobfoll (1998) stresses that not only are our resources limited, but they vary among individuals. Due to the prevailing notions of masculinity and femininity it can be argued that men have more tangible resources at their disposal whereas women have more informational/emotional resources at their disposal given the more nurturing role they often find themselves in (Wareham et al., 2007). Consequently, men would experience resource depletion more easily through reciprocating emotional support whereas women would experience resource depletion more easily through reciprocating tangible support, resulting in discomfort and which may lead to higher risks of depression. Therefore, from the standpoint of COR theory, men would benefit more from tangible forms of social support whereas women would benefit more from informational/emotional support.

In their study, Wareham et al. (2007) connected COR theory with another theory known as the norm of reciprocity. The norm of reciprocity theory was initially developed by Gouldner (1960) based on the work of previous sociological theorists such as Howard Becker and George Simmel on the topic of reciprocity as a social phenomenon. According to the norm of reciprocity, when people derive some form of benefit from the actions of others, they tend to feel obligated to return the favor or reciprocate back (Gouldner, 1960; Uehara, 1995). Building on COR theory, it has been hypothesized that one can be hindered from too much social support if they feel obligated to return that resource (social support) which is in limited supply, leading to detrimental effects on their

mental health (Jou & Fukada, 2002; Uehara 1995 Wareham et al., 2007). For men, having to reciprocate emotional support may lead to more detrimental mental health outcomes as their resource reservoir of that form of social support is limited, since talking about emotions works against current notions of hegemonic masculinity, which includes stoicism and the avoidance of emotions (Emslie et al., 2006; Warren, 1983). At the same time, having to reciprocate tangible support may have more detrimental effects on women since it has been argued that women generally have a shallower reservoir of tangible support at their disposal (Wareham et al., 2007).

3.3 PSYCHOLOGICAL THEORIES

3.3.1 THE BUFFER HYPOTHESIS

According to the 'buffer hypothesis', social networks and social support affect mental health outcomes by moderating the effects of stress, as opposed to the 'direct effect hypothesis' which claims that social support directly influences mental health outcomes regardless of stress levels. Many studies have supported the buffer hypothesis by testing whether social support influences mental health outcomes, including depression, directly or indirectly after controlling for levels of stress (Dalgard, Bjork, & Tambs, 1995; Frese, 1999; Olstad, Sexton, & Søgaard, 1999; Peirce, Frone, Russell, & Cooper, 1996; Ren, Qin, Zhang, & Zhang, 2018). For instance, Olstad et al. (1999) analyzed the relationship between social support and mental distress while controlling for levels of stress. When stress was accounted for, social support seemed to have no significant effect on mental distress (Olstad et al., 1999). At the same time, other studies that have tested the buffer effect have encountered results that are contrary to the hypothesis (Dekker and Schaufeli, 1995; Ingledew, Hardy, & Cooper, 1997). There have been multiple explanations for why this is the case, including a lack of consensus around

the definition of social support and stress, as well as not taking sociodemographic factors such as age and sex into consideration (Fiori, Windsor, Pearson, & Crisp, 2012; Olstad et al., 1999).

It has also been argued that one reason why there is conflicting evidence for the buffer hypothesis is due to the inconsistent definitions of social networks and social support utilized across various studies (Olstad et al., 1999; Winemiller, Mitchell, Sutliff, & Cline, 1993). It is possible that various forms of social support might have different buffering effects against stress. There have been some studies that have compared the buffering effect of different forms of social support. For instance, in a three-year longitudinal study, Peirce et al. (1996) studied how various forms of social support (tangible, appraisal, and belonging) may be related to financial stress and alcohol consumption. It turned out that tangible social support was the only form of social support that buffered against both forms of stress (Peirce et al., 1996). Another study conducted by Himle, Jayaratne, and Thyness (1991) examined the buffering effects of various components of social support given by co-workers and supervisors among social workers. The researchers found that instrumental (tangible) social support as well as informational support buffered the effects of burnout related to stress among social workers. Given the results of these studies which indicate that tangible social support seems to buffer the effects of stress, higher scores on tangible social support could potentially lead to lower probabilities of depression over time due to its stress buffering effects.

Another explanation for the inconsistent results is that the extent to which social support buffers the effect of stress depends on sociodemographic characteristics such as age and gender (Fiori et al., 2012). Based on this explanation, Fiori et al. (2012) looked at whether the buffering effect of social support differed among adult men and women aged

55 to 63 and 64 to 94. Specifically, they looked at how ‘positive social exchanges’, defined as the receipt of informational support, instrumental support, emotional support, and companionship buffered the effects of ‘negative social exchanges’ such as unwanted advice, rejection, and insensitive behaviour on mental health outcomes. They found that positive exchanges buffered the effect of negative exchanges among women, but not men. As for age groups, the buffering effect of positive social exchanges were stronger among ‘younger old adults’ aged 55 to 63 than ‘older old adults’ aged 64 to 94 (Fiori et al., 2012).

3.3.2 RELATIONAL REGULATION THEORY

The relational regulation theory (RRT) is another alternative explanation for the inconsistent findings regarding the buffer hypothesis. RRT states that the relationship between social support and mental health outcomes occur when an individual’s thought process is regulated through social interaction, as opposed to conversations regarding how to cope with issues (Lakey & Orehek, 2011). In their discussion of RRT, Lakey and Orehek (2011) define social interaction as positive events, shared activities, as well as routine conversation. This term reflects some of the criteria for the positive social interaction subscale, which includes having someone to have a good time with, someone to relax with, and someone to do something enjoyable with (Sherbourne & Stewart, 1991). Therefore, according to RRT it is likely that regulating thoughts through positive social interaction may be an effective way of lowering the probability of depression over time.

3.4 RESEARCH HYPOTHESES

Based on the theoretical frameworks and the previous literature on this topic, four primary hypotheses as well as eight secondary hypotheses will be tested.

Hypothesis 1: The tangible component of social support will be negatively related to DPP trajectories over time among respondents in general. Tangible social support has been found to be one of the few functional aspects of social support to act as a buffer to the harmful effects of certain kinds of stress (Himle, Jayaratne, & Thyness, 1991; Peirce et al., 1996). Consequently, it is possible that the buffering effect of tangible social support may lead to improved mental health outcomes including lower probabilities of depression.

a. The tangible component of social support will be negatively related to DPP trajectories over time, but this effect will be stronger for men than for women. This hypothesis is based on multiple studies which have found that higher levels of tangible social support were associated with lower risks of depression for men, but a higher risk and more severe symptoms of depression for women (Grav et al., 2012; Fowler et al., 2013; Wareham et al., 2007).

b. The tangible component of social support will be negatively related to DPP trajectories over time, but this effect will be stronger among older adults. Although no studies directly examine how age influences relationship between tangible social support and depression, several studies have found that higher levels of tangible social support among the elderly is associated with lower risks of depression (Chi & Chou, 2001; Cook, 2015; Grav et al., 2012; Oxman et al., 1992). Among younger adults, dissatisfaction with tangible aspects of social support was not an associated with higher risks of depression (Martinez-Hernaez et al., 2016).

Hypothesis 2. The affection component of social support will not be related to DPP trajectories over time among respondents in general. When examining Canadians overall,

researchers have failed to find any relationship between affection and depression (Fowler et al., 2013; Wareham et al., 2007)

a. The affection component of social support will be negatively related to DPP trajectories over time for women, but not for men. This hypothesis is based on the results from Wareham et al. (2007) who found that for men higher levels of affection were associated with longer durations of depression. As for female respondents, higher levels of affection were associated with less severe symptoms of depression.
b. The affection component of social support will not be related to DPP trajectories over time regardless of age. Research seems to suggest that affection will be more beneficial among older adults in terms of lowering probabilities of depression (Cook, 2015; Ganong & Larson, 2011). On the other hand, the literature on the relationship between affection and depression shows mixed results among younger adults. Some studies have found that romantic relationships may lead to increased risk of depression among young adults, which suggests that affection may not be beneficial in reducing depression over time (Bajoghli et al., 2014; Davila, 2008; Quatman et al., 2001). However, according to life course theory, young or emerging adulthood is a unique period in a person's life where they take on new roles and discover themselves (Arnett, 2000; Schwartz et al., 2005). It has been argued that during this period of life, forming a loving romantic partnership helps one form one's self identity (Montgomery, 2005; Simon & Barrett, 2010).

Hypothesis 3. The positive social interaction component of social support will be negatively related to DPP trajectories over time among respondents overall. According to RRT, an individual's feelings are influenced by day-to-day interactions and shared

activities as opposed to having conversations about thought processes (Lakey & Orehek, 2011). This theory is relevant since the positive social interaction subscale involves engaging in activities with others. Furthermore, prior studies have found negative relationships between positive social interaction and the duration and severity of depression (Fowler et al., 2013; Wareham et al., 2007).

a. The positive social interaction component of social support will be negatively related to DPP trajectories over time for both men and women. Previous studies comparing the relationship between positive social interaction and depression between men and women have shown negative associations between the two variables for both men and women (Fowler et al., 2013; Wareham et al., 2007).
b. The positive social interaction component of social support will be negatively related to DPP trajectories over time regardless of age. Currently there have been no studies comparing the effects of positive social interaction on depression based on one's age, however Cook (2015) found that among Canadians over 65, those with low emotional and informational support were more likely to develop MDE over a period of 8 years. There is currently no evidence which suggest the relationship between positive social interaction and depression would be different among young adults.

Hypothesis 4: The emotional and informational component of social support will be negatively related to DPP trajectories over time among respondents in general. This hypothesis is based on one study that found that emotional and informational support was negatively related to the duration of depression (Wareham et al., 2007).

a. The emotional and informational component of social support will be negatively related to DPP trajectories over time for women, but not for men. Previous studies

have found that higher levels of emotional and informational support are associated with a lower risk of depression for women, but not men (Grav et al., 2012; Wareham et al., 2007).

b. The emotional and informational support component of social support will be negatively related to DPP trajectories over time regardless of age. The hypothesis that emotional and informational support will influence depression among older adults is based on the socioemotional selectivity theory which suggests that with less perceived time left in life, an individual begins to focus on developing emotional connections (Carstensen, 2006; Carstensen et al., 2003). Without such emotional support, older individuals may be more susceptible to depression. While there have been no studies examining whether the effects of emotional and informational support on depression differ by age, one study looking at noninstitutionalized adults over the age of 65 found that adequacy of emotional support was the most important component of social support in terms of reducing the severity of depression (Oxman et al., 1992). As for younger adults, it is hypothesized that emotional and informational support will be beneficial towards reducing depression among younger adults, especially those transitioning from adolescence to adulthood. Martinez-Hernaez et al. (2016) found that dissatisfaction with psychological support was strongly associated with symptoms of depression among emerging adults who are currently transitioning from different life stages.

CHAPTER 4: METHODS

4.1 DATA SOURCE

The data used in this study came from the National Population Health Survey (NPHS) master files, accessed through the Research Data Centre (RDC) located at the University of Lethbridge. Developed by Statistic Canada, the National Population Health Survey is a Canadian longitudinal survey that follows a representative sample of Canadians over nine cycles, which makes it well suited for studying change over time. Over 17,000 Canadians from across the country of all ages were selected to be part of the initial longitudinal panel in 1994/1995 with certain limitations for children, such as excluding certain questions and including proxy interviews for children under the age of 12. While the NPHS is representative of most of the Canadian population, the NPHS does not include those living on First Nations Reserves, Canadian force bases, and those living in remote areas of the country. The NPHS was designed to capture data that would assist in helping understand how various factors affect public health and to collect various information about the respondent's health as well as socio-demographic variables. The NPHS has nine cycles which were conducted every two years spanning a total of 16 years from 1994/1995 to 2010/2011. Since the questions regarding social support were not included in the first two cycles, this study only includes the last 7 cycles of the NPHS, ranging over a span of 12 years, from 1998/1999 to 2010/2011.

4.2 WORKING SAMPLE

This study is based on adults over the age of 18. As such, respondents under the age of 18 were excluded from the analysis. Respondents who did not have at least one valid response to the predicted probability of depression measure in any of the seven cycles were also excluded. As a final sample restriction, respondents who scored zero on

the predicted probability of depression measure were also excluded since I am interested in those respondents who are more prone to depression. These sample restrictions resulted in a working sample of 8,921 respondents.

4.3 VARIABLES

4.3.1 DEPRESSION

For the analyses conducted in this study, the dependent variable was depression, or more specifically the predicted probability of having depression (DPP). In the NPHS, depression was measured by a derived depression scale, which consists of multiple questions pertaining to various depressive symptoms. These questions were taken from the Composite International Diagnostic Interview Short Form for Major Depression (CIDI-SF-MD) which was based on diagnostic criteria in the DSM-IV. The CIDI-SF-MD includes two different series of questions, where one series of questions is followed up for those who experienced a two-week period of a depressed mood and the other series of questions is for those who experienced a two-week period of loss of interest (Patten, 2001). Each series contains eight questions about other depressive symptoms which relate to the DSM-IV definition of a major depressive episode (American Psychiatric Association, 2000). The derived depression scale can be further calculated into the depression predicted probability (DPP) score. DPP is calculated based on the answers to the short-form interview, which states the probability that the respondent would have been diagnosed with major depressive disorder within the past year if they had completed the Long-Form Diagnostic Interview. DPP scores range from 0 to 0.9, with higher scores suggesting an increased probability a respondent experienced an MDE in the past 12 months. Traditionally, epidemiologists have considered a probability score of 0.9 as the cut-off marker for diagnosing someone with depression (Kessler, Andrews, Mroczek,

Ustun, & Wittchen, 1998). However, given recent work suggesting that depression is best treated as a spectrum rather than a discrete category (Rodriguez, 2012), in this study depression is treated as a continuous variable as opposed to a dichotomous categorical variable. Therefore, I have used the raw DPP scores based on the CIDI-SF-MD as opposed to categorizing people as having MDE or not based on the cut off probability of 0.9.

4.3.2 SOCIAL SUPPORT

The measures of social support in the NPHS were based off the Medical Outcomes Study Social Support Survey (the MOS scale). Here Statistics Canada reduced 51 items to 19 items, which cover five dimensions of social support: *tangible social support, affection, positive social interaction,* and *emotional and informational support*. Statistics Canada combined two dimensions, emotional support and informational support, into one category. For the longitudinal analysis, these social support variables were entered as time variant variables, meaning that an individual's score may vary from cycle to cycle. The psychometric properties of these questions have been tested and multiple papers have concluded that the 19 items allow for a comprehensive and accurate measurement of social support (Giangrasso & Casale, 2014; Moser, Stuck, Silliman, Granz, & Clough-Gorr, 2012; Priede et al., 2018). As well, each of the social support subscales have been shown to be reliable with Cronbach's alpha scores over 0.91 (Sherbourne & Stewart, 1991). Tangible social support consists of 4 questions which include: "Do you have someone to help you if you were confined to bed?", "Do you have someone to go to the doctor with?", "Do you have someone to prepare meals?", and "Do you have someone to help with daily chores when sick?". The affection support subscale includes three questions which ask: "Do you have someone who gives hugs?", "Do you

have someone who shows love and affection?", and "Do you have someone who makes you feel loved and wanted?". The positive social interaction subscale also contains three question which include: "Do you have someone to have a good time with?", "Do you have someone to count on to listen to?", "Do you have someone to get together and relax?", and "Do you have someone to do something enjoyable with?". The final subscale, emotional and informational support, consists of eight questions which ask: "Do you have someone you can count on to listen to you when you need to talk?", "Do you have someone to give you good advice about a crisis?", "Do you have someone to give you information to help you understand a situation?" "Do you have someone to confide in or talk to about yourself or your problems?", "Do you have someone whose advice you really want?", "Do you have someone to share your most private worries and fears with?", " Do you have someone to turn to for suggestions about how to deal with a personal problem?" and "Do you have Someone who understands your problems?" Responses for each question are coded as: (0) "none of the time", (1) "little of the time", (2) "some of the time", (3) "most of the time", and (4) "all of the time." In order to obtain an identical range of scores for each of the 4 subscales, scores from each item within the subscale were summed and this summed score was divided by the number of items within the subscale (RAND Health Communications). This results in possible scores of 0 to 4 on each subscale, with higher scores indicating more social support.

4.3.3 SEX AND AGE

This study also examines how the relationship between social support and depression differs between men and women and by age. As such, sex (coded as 0 = male and 1 = female) and age (coded continuously) were included in the analysis. In order to

give the coefficients associated with age more intuitive meaning, age 18 was recoded as 0, 19 recoded as 1, 20 recoded as 2, and so on.

4.4 STATISTICAL PROCEDURES

To examine the predicted probability of depression of Canadians over time, multilevel modeling was used. Since not all respondents contributed to every NPHS cycle, multilevel modeling is a particularly appropriate procedure to use for this analysis because it accommodates unbalanced data (where respondents do not have the same number of data points) and makes use of all available data (where respondents missing at one or more data points are not excluded). The most common multilevel model for longitudinal data, which is used for the present analysis, uses a level-1 and level-2 structure, where individuals (level-2) are nested within time (level-1) and where level-1 assesses within-person change (i.e., the degree to which an individual's predicted probability of depression changes over time) and level-2 assesses between-person change (i.e., the degree to which there are differences in depression trajectories between individuals). In subsequent analyses, the 4 measures of *social support* (all coded as 0 to 4) are entered into the multilevel model as time-varying predictors, whereas *sex* (coded as *male* = 0 and *female* = 1) and *age* (coded continuously, from 18 to 99) are entered as non-time-varying. These predictors are entered as level-2 predictors to test their predictive ability to account for interindividual differences in depression trajectories over time. With the earlier sections of this thesis that highlight the prior relevant research on depression as well as the theoretical rationale for this study in mind, there is both empirical and theoretical support to suggest that depression trajectories differ systematically by these specific level-2 predictors.

For all analyses, the R statistical package was used. For the estimation of multilevel models, the *lme* command was used, with full maximum likelihood and the covariance structure set to unstructured. Across all models, both the variance components and the Bayesian Information Criterion (BIC) statistics are reported, as these provide readers with a sense of the variance explained in the dependent variable across different models and model fit, respectively. With respect to the BIC statistic, models with lower values of BIC are suggestive of closer correspondence between the observed data and the predictive model, or better model fit, while at the same time penalizing for model complexity (Singer & Willett, 2003, p. 121-122).

CHAPTER 5: RESULTS

This chapter covers the results of the multilevel models examining the trajectory of DPP scores over time with controls for *social support*, *sex* and *age*. Four different models were analyzed for each measure of social support. The results are displayed in Tables 2-5, with each table representing the output for each specific component of *social support*. In addition, the trajectories of DPP scores over time have been plotted in Figures 2-5 based on minimum (0) and maximum (4) scores for each *social support* subscale. The chapter begins with a report on the proportion of respondents who report a DPP score of 0.9, which is traditionally used as the cut-off value for clinical depression. This will be followed by a description of the multilevel model without social support as well as the results of the multilevel models for each component of social support.

Table 1 presents the sociodemographic characteristics of respondents whose DPP score was equal to 0.9 compared to respondents who scored below 0.9 during the first cycle used in this study. According to this table, the majority of respondents scored below 0.9. The table shows that depression is more common among younger and middle-aged adults than older adults over the age of 65. Sex differences were also present where the percentage of women with DPP scores at 0.9 were almost twice as high as the percentage of men. This was expected and is similar to the results of previous studies (Patten et al., 2006; Wang et al., 2010). Finally, those who scored 0 to 2 on all four social support subscales were more likely to have a high probability of depression compared to those who scored 3 to 4. Additional demographic characteristics of the working sample include: mean *age* = 47.45; mean *tangible social support* = 3.26; mean *affection* =3.38; mean *positive social interaction* = 3.26; and mean *emotional and informational support* = 3.25.

Table 1.
Percentage of respondents with DPP scores equal to 0.9 and less than 0.9 by sociodemographic variables

	DPP < 0.9	DPP = 0.9
Age (avg. 47.45)		
18-25	92.18%	7.82%
26-40	91.41%	8.59%
41-65	92.72%	7.28%
65<	97.29%	2.71%
Sex (44.86% male, 55.14% female)		
Male	95.56%	4.44%
Female	91.52%	8.48%
Tangible Social Support (avg. 3.26)		
0-2	85.83%	14.17%
3-4	94.87%	5.13%
Affection (avg. 3.38)		
0-2	84.23%	15.77%
3-4	94.87%	5.38%
Positive Social Interaction (avg. 3.26)		
0-2	84.38%	15.63%
3-4	95.04%	4.96%
Emotional and Informational Support (avg. 3.25)		
0-2	85.34%	14.66%
3-4	94.68%	5.32%

5.1 MODEL A: THE BASELINE GROWTH MODEL

This section begins with a summary of model A, the initial model assessing the trajectory of DPP scores over time. This model has been given its own subsection since the fixed effects are consistent across all four measures of social support. Model A shows the growth trajectory of DPP scores over time without accounting for *social support*, *sex*, or *age*. According to this model, the intercept score for the probability of having depression is 0.0754 ($p < 0.001$). Time, measured by each cycle of the NPHS, is associated with an increase of 0.01 ($p < 0.001$) in DPP scores. However, analyzing time as a quadratic variable revealed that the trajectory of DPP scores takes on a curvilinear trajectory over time. That is, time treated as a quadratic variable is associated with a 0.0012 ($p < 0.01$) decrease in the probability of having depression. When plotted on a

graph, the trajectory takes the shape of an arch, with DPP scores initially increasing, followed by scores plateauing and then falling. Every model ran in this study encountered a curvilinear trajectory of DPP scores over time, taking on a similar arched shape. The trajectory of DPP scores based on Model A has been plotted in Figure 1.

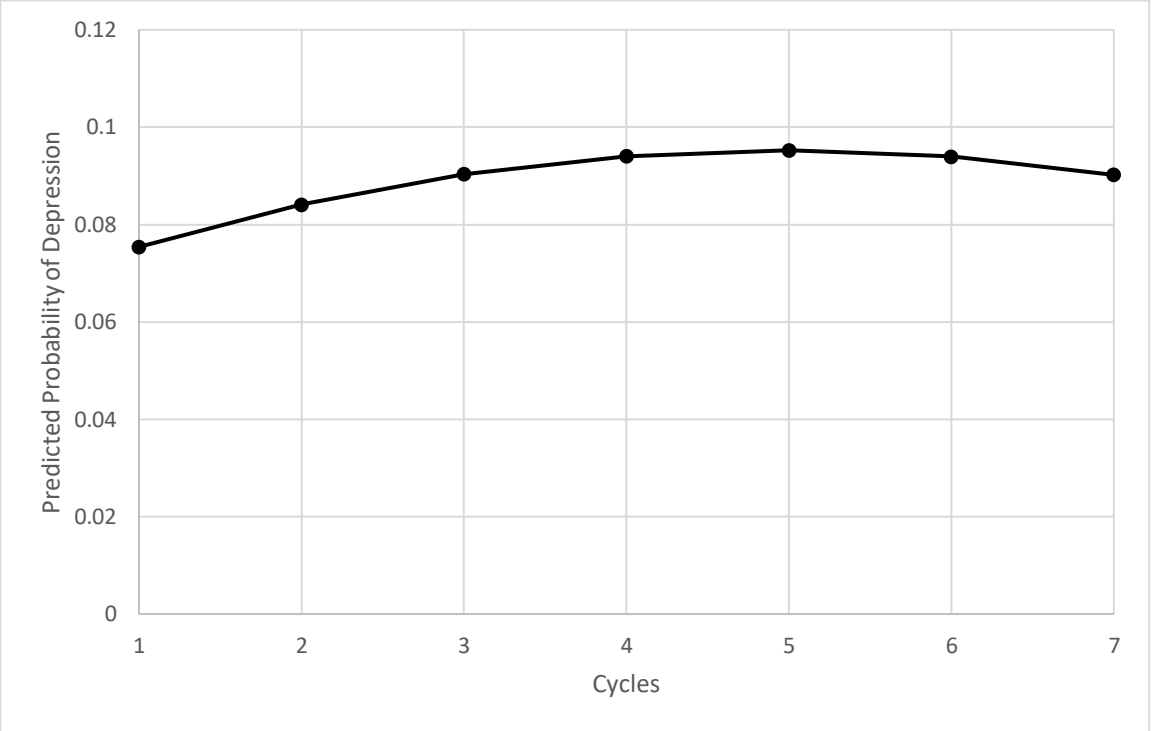

Figure 1: Graphical representation of Model A plotting the trajectory of DPP scores over time without controls for *social support*, *sex* or *age*

5.2 ASSESSING THE CHANGE IN THE PROBABILITY OF DEPRESSION OVER TIME BY TANGIBLE SOCIAL SUPPORT

The results of the multilevel models assessing the change in DPP scores over time *by tangible social support* are presented in Table 2. In Table 2, model B tests whether higher scores of *tangible social support* lead to lower DPP scores over time. According to the model, *tangible social support* is associated with a 0.038 ($p < 0.001$) decrease in baseline probability of depression. However, the coefficient for the interaction between tangible social support and time, which is of particular interest in this study since it

speaks to changes in depression that may be due to changes in social support over time is associated with a 0.0015 decrease in DPP scores and is not statistically significant. Therefore, there is no evidence that higher *tangible social support* lowers the trajectory of DPP scores over time. The effect of *tangible social support* on the trajectory of DPP scores has been plotted in Figure 2.

Table 2.
Results for a taxonomy of multilevel models assessing change in the probability of depression over time by *tangible social support* (TSS), with controls for *sex* and *age*

	Model A	Model B	Model C	Model D
Fixed Effects:				
Intercept	0.0754 ***	0.2006 ***	0.1644 ***	0.3291 ***
Time	0.01 ***	0.0156 ***	0.0146 **	0.02 **
Time^2	-0.0012 **	-0.0014 ***	-0.0014 ***	-0.0015 ***
TSS		-0.038 ***	-0.0331 ***	-0.0646
TSS*Time		-0.0015	-0.0013	-0.004
Sex			0.0575 ***	
Sex*Time			0.0014	
Sex*TSS			-0.0068	
Sex*TSS*Time			-0.0003	
Age				-0.0039 ***
Age*Time				-0.0003
Age*TSS				0.0008 ***
Age*TSS*Time				0.0001
Variance Components:				
Between-person				
Intercept	0.1036	0.0962	0.0947	0.0914
Between-person				
Slope	0.0213	0.0197	0.0197	0.01942
Covariance	-0.237	-0.185	-0.194	-0.173
Model fit (BIC)	5486.67	5217.76	5146.3	4906.12

*p < 0.05; **p < 0.01; ***p < 0.001.

The purpose of Model C in Table 2 is to test for sex differences in the trajectories of depression by social support. In this model, the findings for men (*sex* = 0) were similar to that of Model B. That is, while higher levels of *tangible social support* were associated

with a lower probability of depression at baseline (0.0331; $p < 0.001$), its interaction with *time* was not significant (-0.0015; nonsignificant). Consequently, *tangible social support* did not seem to affect the trajectory of DPP scores over time among male respondents. The coefficient for *sex* was 0.0575 ($p < 0.001$) higher at baseline, meaning that on average women (*sex* = 1) started out with higher DPP scores at baseline relative to men. Both the two-way interaction between *sex* and *tangible social support* and the three-way interaction between *sex*, *tangible social support* and *time* had relatively small coefficients and did not meet the criteria for statistical significance. The lack of significance of any of the interaction terms suggests that the effects of *tangible social support* on the trajectory of DPP scores over time are no different between men and women.

The final model, Model D, tests for age differences in the effect of *tangible social support* on DPP over time. The intercept score as well as the coefficients for all variables that do not interact with age reflect the estimated probability of depression for someone of the age of 18. Here the results indicate the intercept score for DPP is approximately 0.33 ($p < 0.001$) which is considerably higher than previous intercept scores, and indicates that younger adults have a higher probability of depression at baseline relative to their older counterparts. For each year added to a person's age we see a 0.0039 ($p < 0.001$) decrease in the probability of depression. While the coefficient for the *time-tangible social support* variable is slightly larger in Model D than in the previous models, the coefficient is not statistically significant. This model also fails to find significant results regarding the three-way interaction between *time*, *tangible social suppor*t and *age*. Therefore, there is no evidence that the effects of *tangible social support* on the trajectory of DPP scores over time differ based on the respondent's age.

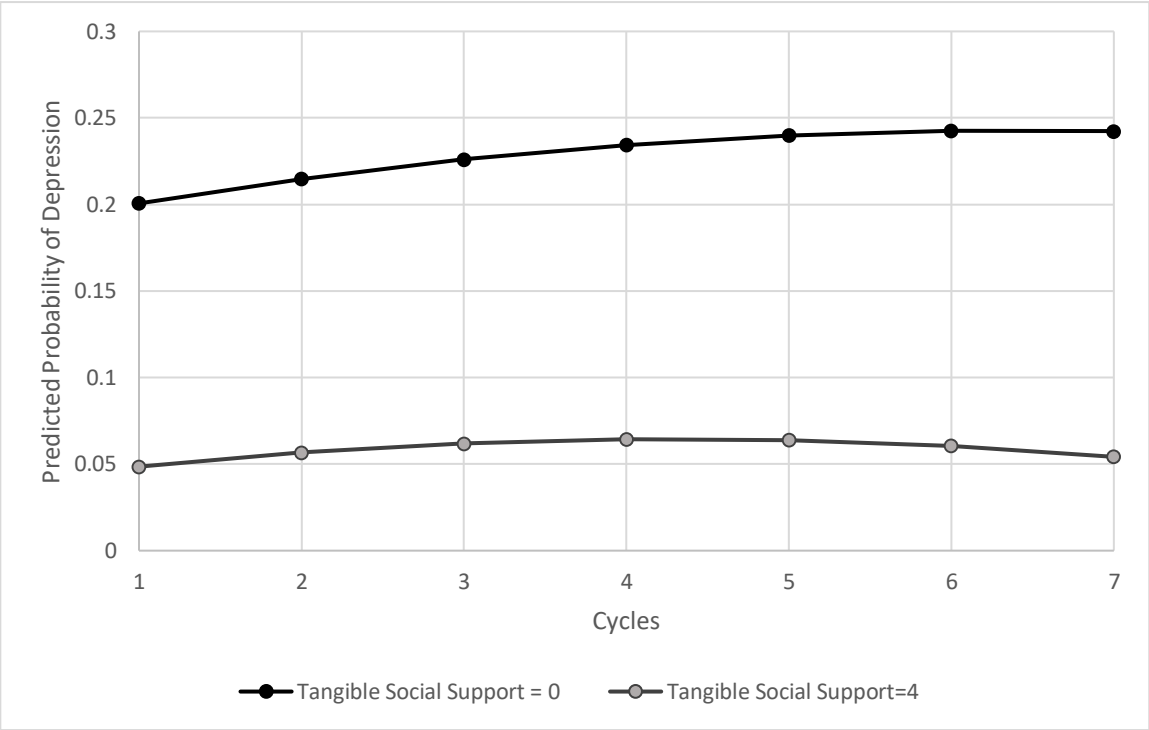

Figure 2: Graphical representation of Model B plotting the trajectory of DPP scores over time among respondents with maximum and minimum scores on the *tangible social support* subscale

5.3 ASSESSING THE CHANGE IN THE PROBABILITY OF DEPRESSION OVER TIME BY AFFECTION

The results of the multilevel models assessing the change in DPP scores over time by *affection* are presented on Table 3, without and with controlling for *sex* and *age*. Like Table 2, model B in Table 3 examines how *affection* influences the trajectory of DPP scores over time. As the table shows, higher scores on the *affection* subscale are associated with lower baseline probabilities of depression (-0.0365; $p < 0.001$). The interaction variable between *affection* and *time,* unlike the interaction between *tangible social support* and *time* in Table 2, is statistically significant (-0.0029; $p < 0.001$). According to these results, higher affection scores lead to lower probabilities of

depression over time. However, this interaction effect appears to be small. The effect of *affection* on the trajectory of DPP scores over time has been plotted in Figure 3.

Table 3.
Results for a taxonomy of multilevel models assessing change in the probability of depression over time by *affection* (AFF), with controls for *sex* and *age*

	Model A	Model B	Model C	Model D
Fixed Effects:				
Intercept	0.0754 ***	0.1998 ***	0.1643 ***	0.3565 ***
Time	0.01 ***	0.0211 ***	0.0172 ***	0.0285 ***
Time^2	-0.0012 **	-0.0015 ***	-0.0015 ***	-0.0016 ***
AFF		-0.0365 ***	-0.0331 ***	-0.0694
AFF*Time		-0.0029 ***	-0.0019	-0.0047 **
Sex			0.0717 ***	
Sex*Time			0.0069	
Sex*AFF			-0.0086	
Sex*AFF*Time			-0.0018	
Age				-0.0044 ***
Age*Time				-0.0005 **
Age*AFF				0.0009 ***
Age*AFF*Time				0.0001 *
Variance Components:				
Between-person Intercept	0.1036	0.0987	0.0963	0.0931
Between-person Slope	0.0213	0.0201	0.0201	0.0197
Covariance	-0.237	-0.216	-0.227	-0.202
Model fit (BIC)	5486.67	5246.58	5111.7	4860.03

*p < 0.05; **p < 0.01; ***p < 0.001

Model C in Table 3 examines the trajectory of DPP scores over time while controlling for both *affection* and *sex*, to test whether the effects of affection are different between men and women. The results show that being female is associated with a (0.0717; $p < 0.001$) higher probability of depression at baseline. Furthermore, higher levels of *affection* are associated with lower probabilities of depression at baseline. While the negative coefficient for the three-way interaction between *affection*, *time* and *sex*

suggests that the effects of *affection* on the trajectory of DPP scores may be greater among women, the coefficient is not statistically significant. Therefore, there is no evidence that the effects of *affection* on the trajectory of DPP scores is different between men and women.

Model D in Table 3 looks at the trajectory of DPP scores over time while controlling for the effects of both *affection* and *age.* One notable finding is that the effects of the interaction between *affection* and time is stronger relative to prior models with a coefficient of -0.0047 and reaching statistical significance ($p < 0.01$). This score reflects the interaction between *time* and *affection* for an individual who is 18 years old. The positive coefficient for the three-way interaction between *age*, *affection* and *time* does reach the threshold for significance ($p < 0.05$), which suggests that the strength of *affection* on reducing the probability of depression over time is weaker among older adults.

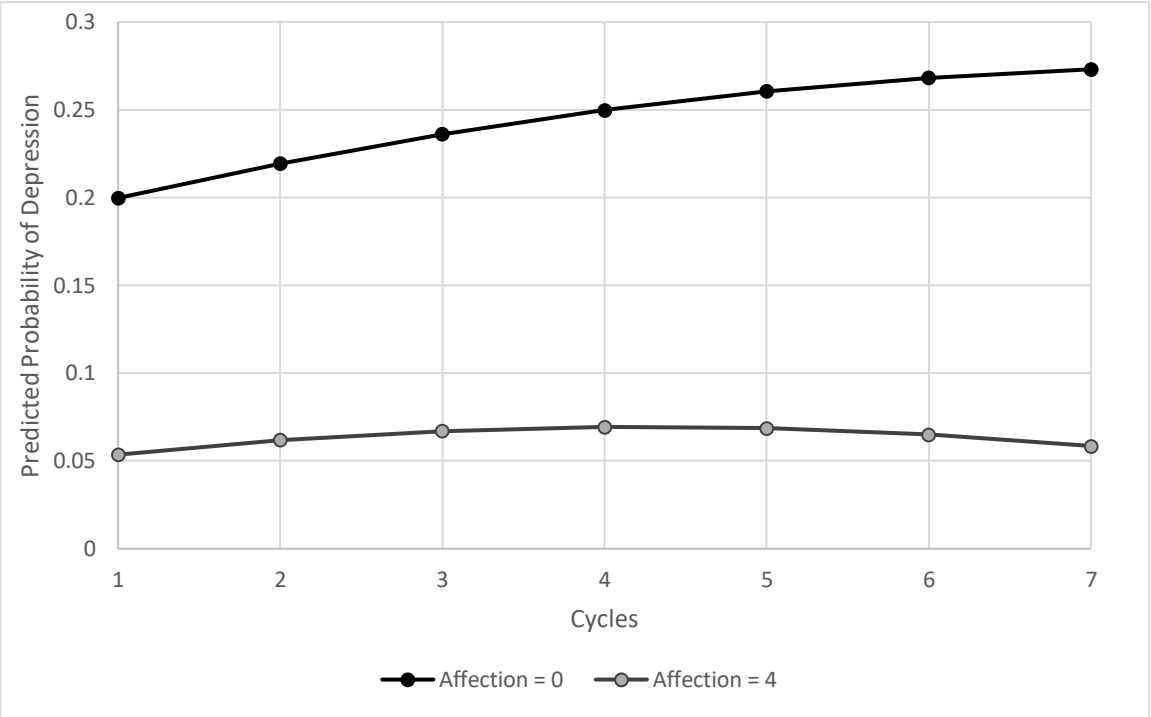

Figure 3: Graphical representation of Model B plotting the trajectory of DPP scores over time among respondents with maximum and minimum scores on the *affection* subscale

5.4 ASSESSING THE CHANGE IN THE PROBABILITY OF DEPRESSION OVER TIME BY POSITIVE SOCIAL INTERACTION

The results of the multilevel models assessing the change in DPP scores over time by *positive social interaction* are presented in Table 4, without and with controls for *sex* and *age*. In Table 4, Model B reveals that higher scores on the *positive social interaction* subscale is associated with lower baseline DPP scores as well as a declining trajectory of DPP over time. The coefficient of -0.002 for the interaction between *time* and *positive social interaction* is statistically significant ($p < 0.05$), therefore there is evidence that higher scores on the *positive social interaction* subscales leads to lower DPP scores over time. But again, although statistically significant, this interaction effect appears to be small. The effects of *positive social interaction* on the predicted probability of depression have been plotted on Figure 4.

When assessing the change in DPP scores by *positive social interaction* and *sex*, model C shows that the coefficient for *sex* is 0.0729 ($p < 0.001$), meaning women have a higher predicated probability of depression at baseline relative to men. The negative coefficient for the interaction between *positive social interaction* and *time* remains statistically significant ($p < 0.05$), again suggesting that higher scores on *positive social interaction* lead to a declining DPP trajectory over time. However, the three-way interaction between *positive social interaction*, *sex* and *time* shows no significant effects. Therefore, the effects of *positive social interaction* on the trajectory of DPP scores over time do not differ statistically between men and women.

Results for model D show significant age effects regarding the impact of *positive social interaction* on the starting probabilities of depression but shows no *age* differences in the effect of *positive social interaction* on the trajectory of DPP over time as the results for the three-way interaction are nonsignificant.

Table 4.
Results for a taxonomy of multilevel models assessing change in the probability of depression over time by *positive social interaction* (PSI), with controls for *sex* and *age*

	Model A	Model B	Model C	Model D
Fixed Effects:				
Intercept	0.0754 ***	0.2324 ***	0.1897 ***	0.4275 ***
Time	0.01 ***	0.0184 ***	0.0194 ***	0.0185 **
Time^2	-0.0012 **	-0.0017 ***	-0.0016 ***	-0.0017 ***
PSI		-0.0477 ***	-0.0412 ***	-0.0921 ***
PSI*Time		-0.002 *	-0.0025 *	-0.002
Sex			0.0729 ***	
Sex*Time			-0.0017	
Sex*PSI			-0.0107 *	
Sex*PSI*Time			0.0007	
Age				-0.0055 ***
Age*Time				-0.0003
Age*PSI				0.0012 ***
Age*PSI*Time				0.0001
Variance Components:				
Between-person Intercept	0.1036	0.0952	0.0934	0.0884
Between-person Slope	0.0213	0.0196	0.0197	0.0192
Covariance	-0.237	-0.191	-0.202	-0.175
Model fit (BIC)	5486.67	4962.22	4867.17	4467.45

*p < 0.05; **p < 0.01; ***p < 0.001

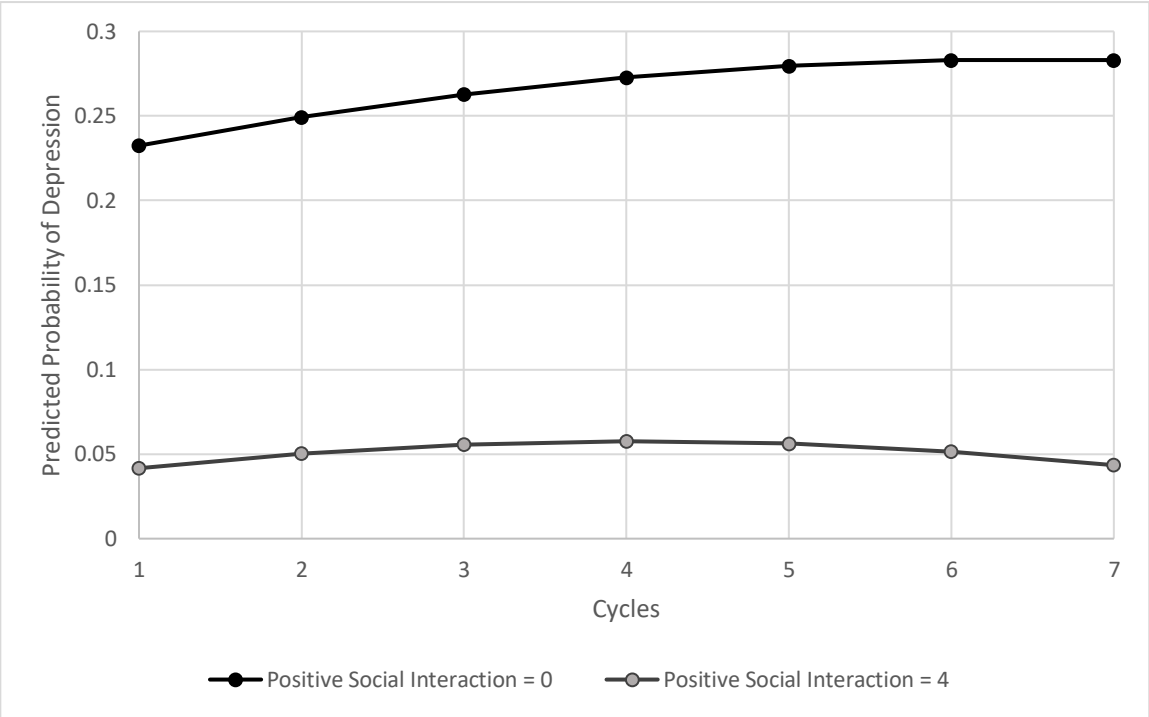

Figure 4: Graphical representation of Model B plotting the trajectory of DPP scores over time among respondents with maximum and minimum scores on the *positive social interaction* subscale

5.5 ASSESSING THE CHANGE IN THE PROBABILITY OF DEPRESSION OVER TIME BY EMOTIONAL AND INFORMATIONAL SUPPORT

The results of the multilevel models assessing the change in DPP scores over time by *emotional and informational support* are presented in Table 4, without and with controls for *sex* and *age*. Model B assessing change in the trajectory of DPP scores by *emotional and informational support* finds significant negative coefficients for both the effects of this subscale on its own (-0.0426; $p < 0.001$) as well as its interaction with *time* (-0.0018; $p < 0.05$). This suggests that having more *emotional and informational support* leads to lower probabilities of depression over time. But again, this interaction effect remains small and comparable in size to the social support x time interaction effects from prior models.

Table 5.
Results for a taxonomy of multilevel models assessing change in the probability of depression over time by *emotional and informational support* (EIS), with controls for *sex* and *age*

	Model A	Model B	Model C	Model D
Fixed Effects				
Intercept	0.0754 ***	0.2156 ***	0.1761 ***	0.3838 ***
Time	0.01 ***	0.0176 ***	0.0173 ***	0.023 **
Time^2	-0.0012	-0.0015 ***	-0.0015 ***	-0.0016 ***
EIS		-0.0426 ***	-0.0377 ***	-0.08 ***
EIS*Time		-0.0018 *	-0.0018	-0.0031
Sex			0.0766 ***	
Sex*Time			-0.0017	
Sex*EIS			-0.0105 *	
Sex*EIS*Time			0.0001	
Age				-0.0049 **
Age*Time				-0.0004 *
Age*EIS				0.001 ***
Age*EIS*Time				0.0001
Variance Components:				
Between-person				
Intercept	0.1036	0.0961	0.0937	0.0905
Between-person				
Slope	0.0212	0.0201	0.0201	0.0197
Covariance	-0.237	-0.195	-0.202	-0.182
Model fit (BIC)	5486.67	5268.08	5147.96	4866.14

*p < 0.05; **p < 0.01; ***p < 0.001

When assessing how *emotional and informational support* affects the trajectory of DPP by *sex*, there are again significantly higher probability scores for women compared to men at baseline (0.0766; p < 0.001). No significant effects were found for the three-way interaction between *time, emotional and informational support* and *sex*, which suggests that the effects of *emotional and informational support* on the trajectory of DPP scores over time among men and women do not differ significantly.

Model D in Table 4 assesses the trajectory of DPP over time while controlling for *emotional and informational support* and *age*. The results revealed no significant results regarding the three-way interaction between *time*, *emotional and informational support* and *age*, suggesting that the effects of *emotional and informational support* on the probability of depression over time are the same regardless of age.

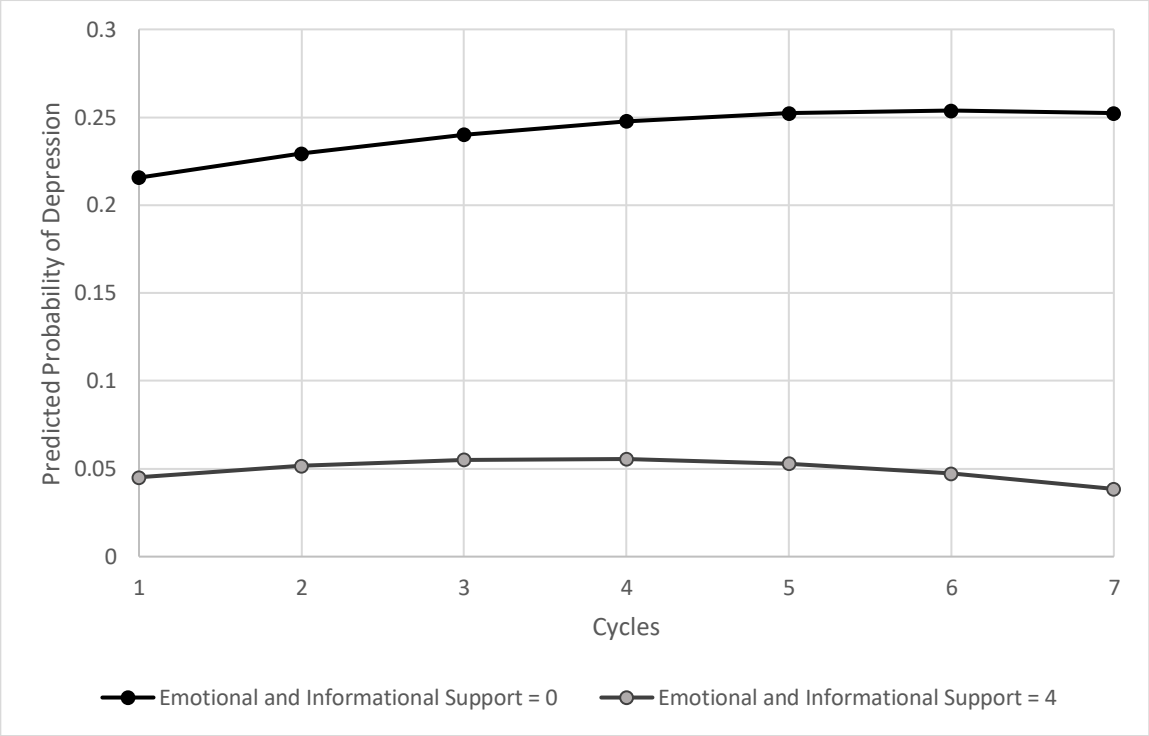

Figure 5: Graphical representation of Model B plotting the trajectory of DPP scores over time among respondents with maximum and minimum scores on the *emotional and informational support* subscale

It should be noted that a fifth model for each social support subscale was explored looking at four-way interactions between *social support*, *time*, *sex* and *age* to determine whether the effects of social support on the trajectory of DPP differed depending on both *sex* and *age*. However, this more advanced model is not shown since the coefficients for all four-way interactions were non-significant.

CHAPTER 6: DISCUSSION AND CONCLUSION

6.1 SUMMARY OF THE RESEARCH

The main objective of this thesis was to examine whether certain functional components of social support influence the trajectory of depression, measured by DPP scores, over time. Two additional objectives were to examine whether the effects of social support on the trajectory of DPP scores differed by age or sex. These objectives were accomplished using multilevel analyses treating DPP as the main dependent variable while looking at the effects of time and its interaction with various components of social support, sex and age.

The statistical analyses found that three out of the four components of social support used in this study decreased the likelihood of having depression over time. Tangible social support was the only component found not to influence DPP scores over time. While the longitudinal effects of social support were relatively small and fairly similar, affection seemed to have the strongest effect on reducing the probability of depression over time since the coefficient for the time interaction in model B was larger for the affection subscale than the other social support subscales Further analyses found no differences regarding the impact of social support on the trajectory of DPP scores between men and women regardless of which social support subscale was accounted for. Finally, out of the four components of social support, affection was the only measure of support where age differences were found. Specifically, affection seemed to have a stronger effect on reducing the probability of depression over time among younger respondents relative to their older counterparts.

6.2 DOES SOCIAL SUPPORT INFLUENCE THE PROBABILITY OF DEPRESSION?

In Tables 2 through 5, Model B sets out to examine how or whether various components of social support found in the NPHS influence DPP scores over time. The results showed that higher scores on three out of the four measures of social support – affection, positive social interaction, and emotional and informational support – led to lower probabilities of depression over time. However, the effects of these different components of social support on depression appear to be small.

Based on the findings in Table 2, while a significant negative relationship between tangible social support and DPP was present at baseline, the coefficient for the interaction between tangible social support and time was not. The finding regarding the effects of tangible social support on the baseline probability of depression is consistent with some previous studies that have found lower levels of depression among those who score higher on tangible support (Grav et al., 2011; Oxman et al., 1992). While no studies have examined the longitudinal effects of tangible social support on depression, this component of social support has been shown to work as buffer to specific kinds of stress, such as financial difficulty (Aslund, Larm, Starrin, & Nilsson, 2014; Himle et al., 1991; Peirce et al., 1996). Therefore, it was hypothesized that the buffering effects of tangible social support on various forms of stress would influence the trajectory of DPP scores over time. However, the results did not support this hypothesis. This implies that providing tangible forms of social support may not be the most effective method for treating depression, relative to other components of social support. While it is unclear based on the analyses why tangible social support did not have any longitudinal effects on DPP scores, it is possible that providing tangible forms of support takes away an

individual's personal autonomy. It has been argued that some treatments for depression including antidepressants and psychotherapy help combat depression through the promotion of an individual's level of personal autonomy (Biegler, 2008).

In Table 3, Model B revealed that affection was associated with both lower baseline DPP scores as well as declining DPP scores over time. This finding does not support my hypothesis that affection would be unrelated to the probability of depression over time. While no prior longitudinal studies have tested whether affection influences depression over time, the finding that affection has a negative impact on depression trajectories is inconsistent with previous cross-sectional research that has found no relationship between these two variables when examining Canadians in general (Fowler et al., 2013; Wareham et al., 2007). Instead, the present findings suggest the importance of affection when it comes to dealing with depression. For those practitioners dealing with depressed patients, as well as the patients themselves, it may be the case that the positive effects of maintaining a loving relationship on mental health outcomes, including depression, are more important than prior research suggests.

In Table 4, Model B revealed that the higher scores on the positive social interaction subscale were associated with lower probabilities of depression over time. This finding confirms my hypothesis. Using RRT theory, it was theorized that social interaction defined as positive events, shared activities, as well as routine conversation would lead to better mental health outcomes (Lakey & Orehek, 2011), so this finding is consistent with my hypothesis. This finding is also consistent with the previous literature examining the relationship between positive social interaction and depression. Prior studies have found significant negative relationships between positive social interaction and depression (Fowler et al., 2013; Wareham et al., 2007). While there have not been

any studies examining the longitudinal effects of positive social interaction on depression, one study found that high quality friendships were associated with a lower risk of depression in a 10 year follow up (Teo, Choi, & Valenstein, 2013). This finding demonstrates the importance of having a friend or companion with whom one can share activities and how this may help treating depression.

In Table 5, which looked at the effects of emotional and informational support, higher scores were associated with lower probabilities of depression over time. This finding supports the hypothesis stating that higher scores on the emotional and informational support subscale would be associated with lower probabilities of depression over time. While no longitudinal studies have examined how emotional and informational support influences depression over time, one study has shown an inverse relationship between this form of social support and depression (Grav et al., 2012). The findings presented here are consistent with this prior research and show that having someone to talk to could have beneficial effects for those dealing with depression.

6.3 DO THE EFFECTS OF SOCIAL SUPPORT DIFFER BETWEEN MEN AND WOMEN?

Model C from Tables 2 through 5 examines sex differences in the relationship between social support and DPP. Overall, the results show that the effects of social support on the trajectory of DPP over time are not significantly different between men and women regardless of what type of social support subscale was accounted for in the model.

These results are inconsistent with the hypothesis that predicted higher levels of tangible social support would be more beneficial in lowering DPP scores over time among men than women. Several theories were used to justify this hypothesis. Based on

the research conducted by Wareham et al. (2007), two prevailing theories were used to explain why the effects of tangible social support on the severity and duration of depression might differ between men and women. The absence of any difference in the effect of tangible social support between men and women also contradicts some of the previous studies examining sex differences in the relationship between tangible social support on depression. Wareham et al. (2007) found that while tangible social support decreased the duration of depression among men, it increased the severity of depressive symptoms among women. Similar findings were encountered by Fowler et al. (2013) where tangible social support was found to increase the risk of depression among women, but not men. It is unclear why no sex differences were found in this study, when notable sex differences have been found elsewhere. One explanation for why tangible support did not have more beneficial effects among men may be due to reverse causation. In other words, it is possible that men who are more prone to depression are more likely to receive less tangible social support. The reverse may be true for women, where those who are at a higher risk for depression are more likely to receive more tangible social support compared to women who have a lower risk of depression.

As for affection, the results do not support the hypothesis that affection would have an effect on reducing DPP scores among women, but not men. This finding is contrary to the results encountered by Wareham et al. (2007) where higher scores on the affection subscale were correlated with longer duration of depressive symptoms among men and shorter durations among women. Instead, the present finding supports the idea that affection can be effective in reducing symptoms of depression for both men and women over time.

The results support the hypothesis that the effect of positive social interaction on DPP scores over time would be no different between men and women. This finding is consistent with some of the previous studies looking into the relationship between positive social interaction and depression. For example, the study conducted by Wareham et al. (2007) found that higher scores on the positive social interaction subscale were associated with a decrease in severity and duration of depressive symptoms in both men and women. Similar results were found by Fowler et al. (2013) where positive social interaction was negatively associated with depression among male and female respondents.

Finally, since no differences were found between men and women regarding the effects of emotional and informational support over time, the results do not confirm the hypothesis that emotional and informational support would have a stronger effect on reducing the probability of depression over time among female respondents relative to male respondents. This hypothesis was based upon multiple theoretical frameworks used in this study. This study adopted two theories used in Wareham et al. (2007), COR and the norm of reciprocity, and explained how these theories connect with notions of masculinity and femininity and how these notions influence how one reacts to social support. According to COR, everyone has a limited amount of internal resources which can be drawn from during certain events, but may be depleted (Hobofoll, 1998). It was argued based on the study by Wareham et al. (2007) that men would have more tangible resources available to them, whereas women would have more emotional resources at their disposal. This theory is connected to the norm of reciprocity which states that people tend to feel obligated to reciprocate a favor back when they receive some sort of benefit (Gouldner, 1960). With these theories in mind, it was argued that detrimental effects may

occur if one must reciprocate a resource (social support) which is in limited supply, therefore the effects of emotional and informational support would be less beneficial for men (Gouldner, 1960; Wareham et al., 2007). The results are also contrary to the findings from previous studies which suggest that this form of social support is more beneficial for women. Wareham et al. (2007) discovered that higher scores on the emotional and informational component were associated with more severe symptoms of depression among male respondents as well as shorter durations of depression among female respondents. Research conducted by Grav et al. (2012) found that while this component of social support was associated with lower rates of depression among both men and women, the effects were stronger among women.

6.4 DO THE EFFECTS OF SOCIAL SUPPORT DIFFER BY AGE?

The final statistical model ran in each of the tables, Model D, examined the effects of age and whether it interacts with social support. Based on the findings, affection was the only form of social support where the trajectory of DPP differed by the respondent's age. Specifically, the effects were stronger among younger adults and weaker among older adults.

No significant differences were found regarding the effects of age on the relationship between tangible social support and the trajectory of DPP scores over time. This finding does not support the hypothesis claiming that stronger effects would be found among older adults. This hypothesis was based on several studies which found an inverse relationship between tangible support and depression among older adults, but not among young adults. (Chi & Chou, 2001; Grav et al., 2012; Martinez-Hernaez et al., 2016; Oxman et al., 1992). While it is not entirely clear why tangible social support does not affect depression regardless of age, it is possible that this finding is due to the

importance of autonomy. Going back to the idea of personal autonomy being beneficial for mental health, it is possible that this form of social support makes an individual feel as if they have less autonomy. It is been suggested that among older adults, having more restrictions placed on their decisional autonomy contributes to feelings of depression (Boyle, 2005). This finding is especially important for seniors as they are more likely to live in long-term care facilities. While it may seem beneficial to provide tangible services for those living in these facilities, many seniors would prefer to keep their autonomy for as long as possible (McGinn, 2016).

As mentioned, affection was the only component of social support where the effects varied depending on the respondent's age. The results do not support the hypothesis that the effects of affection on the trajectory of DPP scores would be same regardless of age. Interestingly prior studies have found an inverse relationship between affection and depression among older adults, whereas others suggest affection may lead to worse outcomes among younger adults (Bajoghli et al., 2014; Cook, 2015; Davilia, 2008; Gangong & Larson, 2011; Quatman et al., 2001). The life course perspective gives an explanation as to why this was expected. According to the life course literature, emerging adulthood is a term used to describe a unique time in an individual's life where one transitions from adolescence to adulthood. This period involves many important events such as identity development, finding a career and forming a lasting relationship (Arnett, 2000; Schwartz et al., 2005). While love is an important aspect of life for those of all ages, the findings here are suggestive that the long-term effects of love on depression are greater among younger adults than older adults who have transitioned out of this stage in the life course.

As for positive social interaction, the results support the hypothesis that no age differences would be found. There is little evidence that suggests that positive social interaction would have varying effects on the trajectory of DPP scores depending age. To my knowledge, there have been no studies looking at how age influences the relationship between positive social interaction and depression. However, the implication of this finding is that having a friend or companion to interact with can have beneficial effects on depression regardless of age. This finding may be especially important for older adults living in assisted living facilities, as providing shared activities with others may be an important barrier to the onset of depression.

Finally, no age differences were found in the relationship between emotional and informational support and DPP scores over time. This finding supports the hypothesis that the effects of emotional and informational support would have similar effects on reducing the probability of depression over time regardless of age. According to the socioemotional selectivity theory, as an individual's perceived time left in life becomes shorter, the more that individual values and strives for emotional connections as opposed to goal-oriented decisions (Carstensen, 2006; Carstensen et al., 2003). Since there is typically a negative relation between age and the amount of time one has left, it was hypothesized that emotional and informational support would have reduced the probability of depression over time among older adults. At the same time, the literature regarding life course theory suggests that emotional and informal support may be beneficial among younger adults transitioning from adolescence to adulthood. Dissatisfaction with psychosocial support was associated with higher risks of depression among emerging adults (Martinez-Hernaez et al., 2016). Another explanation for this finding is that this last social support subscale consists of two different functions,

emotional support and informational support, which are merged into one category. It might be possible that receiving emotional support may be beneficial among older adults while informational support may be more beneficial for younger adults. Nonetheless providing emotional and informational support decreases the risk of having depression regardless of age.

6.5 RESEARCH IMPLICATIONS

This study has several implications for healthcare professionals as well as those who are experiencing depression as this study contributes to our understanding of how to lessen symptoms of depression over time. This study can provide insight regarding what specific components of social support may be most beneficial for treating depression, which can allow health care professionals to manage their time and resources more effectively. This information can also be valuable to friends and family members of those with depression as they are one of the main sources of social support. Overall, providing social support seems to be beneficial in reducing depression over time. However, tangible social support was the only form of social support found not to affect the probability of depression over time, regardless of sex or age. This latter finding is especially important regarding older adults who often find themselves living in retirement or assisted care facilities. Providing tangible assistance may take away an individual's feeling of autonomy and could conceivably even lead to depressive symptoms. The absence of any sex differences and, for the most part, age differences as well suggests that providing specific types of social support can have beneficial effects on the depression over time for both men and women and people of different ages.

6.6 LIMITATIONS OF THE RESEARCH

While this study has numerous strengths, such as the longitudinal nature of the analysis, the use of a continuous measure of depression rather than a dichotomous one, and the large representative sample that was used, it is not without its limitations. One limitation of this study is that it does not determine the direction of the cause and effect relationship between social support and depression. Although up to this point the causal direction has been implicitly assumed, it is important to be cautious in concluding that a lack of social support leads to depression as there is literature which suggests that depression leads to lower levels of social support over time. In the context of the relationship between social support and depression, interpersonal theories suggest that our understanding of causation may be reversed, where depression may instead lead to an erosion of social support, rather than the reverse (Daley & Hammen, 2002; Ren et al., 2018). According to one explanation for this possibility, the personal behaviours of those with depression, such as social inadequacy, complaining, and self-reassurance, disrupt social relationships and this in turn drives others away (Joiner, 2002; Ren et al., 2018). This idea is supported by a study which randomly assigned people to interact with either depressed or non-depressed individuals, that found that those who were depressed were more likely to be rejected (Coyne, 1976). A second explanation suggests that those suffering from depression are lacking in social skills and may avoid social interaction, which may lead to less social support (Daley & Hammen, 2002; Ren et al., 2018). Multiple studies seem to support this theory. For instance, a longitudinal study on adolescents conducted by Stice, Ragan, and Randall, (2004) tested whether deficits in social support predicted higher rates of depression and whether higher levels of depression predicted lower levels of social support. The results of their study were partly

consistent with the idea that depression leads to an erosion of social support as higher initial depressive symptoms predicted a decrease in peer support, but not parental support (Stice et al., 2004).

Another limitation is the question of whether a finding is both statistically significance *and* substantively significant. With a working sample size over 8,000 respondents, very small effects can be statistically significant, but this does not necessarily mean the effects are strong. Therefore, the question arises whether social support really matters when dealing with depression. In model B, the three measures of social support which had significant interactions with time – affection, positive social interaction, and emotional and informational support – only decreased the predicted probability of depression over time by 0.0029, 0.0020, and 0.0018 respectively. As such, it is unclear if the predicted changes in depression over time that are associated with changes in social support amount to *clinically* important changes. While Figures 3-5 do show some deviation in the trajectory of DPP between those with maximum and minimum social support scores, visually the main difference between the two trajectories is the level of social support at baseline rather than changes in social support over time.

The last limitation of this study has to do with the issue of attrition. Attrition can be a major methodological issue in longitudinal analysis and occurs when respondents drop out (Gustavson, von Soest, Karevold, & Roysamb, 2012). Attrition can reduce the ability to generalize findings to the population at large if the respondents who drop out are fundamentally different from those who stay, thus resulting in unrepresentative or biased results. Across all 9 cycles of the NPHS, from 1994 to 2010, there were declining response rates, ranging from a high of 92.8% in cycle 2 to a low of 69.7% in cycle 9. As such, the loss of respondents due to attrition was not modest over the study time period

used here (Statistics Canada, n.d.). However, although the impact of the loss of respondents in the NPHS goes beyond the scope of this study, the nature of a multilevel modeling approach and its ability to accommodate unbalanced data and make use of all available data points does help minimize the potential effect of respondent attrition.

6.7 FUTURE DIRECTIONS

There are a number of future directions researchers could pursue based on this work. One direction for future research is to examine how social support influences depression over time among those who do not identify as either male or female. Due to the design of the sex variable in the NPHS, those who do not fall under the male/female sex binary were not represented in this study. This lack of data is problematic as those in the LGBTQ+ community often experience higher rates of mental illness when compared to the general population (Krehely, 2009; Meyer, 2003). It has been argued that this stems from many underlying factors including stigma, discrimination, barriers to medical care and a lack of support (Meyer, 2003; Shankle, 2006). Unfortunately, there is limited public data regarding the experiences of non-binary individuals as many surveys do not include further options beyond the male/female dichotomy (Abramovich & Cleverly, 2018; Loewy, 2017). Furthermore, we are talking about a diverse group of people. As such, simply adding an additional response option, such as “non-binary, and thus categorizing non-conforming individuals into a single non-binary group, is also problematic, as doing so would not capture the diversity within this group (Abramovich, 2016; Abramovich & Shelton, 2017; Bauer, Braimoh, Scheim, & Dharma, 2017). This adds to the difficulty for surveyors to construct appropriate questions that capture the diversity within this group. Of course, these are issues that speak to the more nuanced and complex nature of gender

that traditional survey methods have failed to capture, and that more researchers today are increasingly paying attention to.

While the longitudinal nature of this study helps examines the relationship between social support and depression over time, it does not determine whether social support causes probabilities of depression to decline or higher probabilities of depression lead to lower levels of social support. In other words, the causal direction between social support and depression remains unclear. As was already noted, researchers have argued that depression can reduce the amount of social support an individual receives (Daley & Hammen, 2002; Ren et al., 2018). It is quite possible that the results of this study are due to the effect that depression has on a person's level of social support rather than the reverse. As such, future studies are needed to help clarify the causal direction between depression and levels of social support. At the same time, determining the causal direction between these two variables is a challenging task with survey data, since in most cases neither cross-sectional data nor longitudinal data can unequivocally determine the temporal ordering of "cause" and "effect". Instead, to determine the causality between these two variables may require a more experimental approach. For example, one could envision a clinical experiment involving depressed patients being provided social support opportunities, and then tracking the depression levels of these patients over time relative to patients without theses social support opportunities. While there would be numerous challenges conducting an experiment like this, the findings would likely speak to the question of the direction of causal effects.

Finally, since this study focused only on functional components of social support, another potential avenue for future researchers is to examine how various structural components of social support influences depression over time and how any longitudinal

effects may differ by sociodemographic variables such as age or sex. Structural components of social support measure how integrated an individual is within various networks, and can come from various sources including spouses, friends, family members, and co-workers. A recent longitudinal study by Kail and Carr (2019) found that social support from friends moderated the effects retirement had on increasing depressive symptoms. This study hints at the possibility that structural components may have longitudinal impacts on depression.

Given its complexity there is still a lot that needs to be understood about mental illnesses such as depression. Multiple social and biological forces contribute to feelings of depression, meaning there is no single factor that leads to depression, and thus no easy solution. However, social support has been repeatedly shown to be a factor associated with lower risks of depression. This study adds to the body of literature regarding the relationship between social support and depression by examining which functional aspect of social supports works towards lowering probabilities of depression over time and how such effects may differ depending on various sociodemographic factors such as sex or age.

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