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Investigating meaning in life, perceived social support, and suicide ideation among community-residing older adults

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INVESTIGATING MEANING IN LIFE, PERCEIVED SOCIAL SUPPORT, AND SUICIDE IDEATION AMONG COMMUNITY-RESIDING OLDER ADULTS

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Abstract

Older adults have high rates of suicide, necessitating enhanced models of suicide risk in later life. Previous cross-sectional findings suggest that suicide ideation is positively associated with psychological risk factors and negatively associated with resilience factors, including recognition of meaning in life (MIL) and perceptions of social support (PSS). We designed the current longitudinal study to replicate and extend these findings and to test a multidimensional model of suicide ideation (SI), which incorporates consideration of risk and resilience factors, among a sample of 173 community-residing older adults. Using Structural Equation Modeling, both MIL and PSS, which were measured at the baseline and 6-12 month interview, respectively, were significantly negatively associated with SI at a 12-24 month interview, controlling for baseline social hopelessness and intervening depressive symptom severity. The data fit the model well, which suggests that fostering MIL and PSS may reduce risk for late life suicide.

Keywords

Older adults, suicide ideation, resilience, meaning in life, perceived social support

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List of Abbreviations

ACSS	Acquired Capability for Suicide Scale
AMOS	Analysis of Moment Structures
BHS	Beck Hopelessness Scale
CES-D	Center for Epidemiological Studies Depression Scale
CFI	Comparative Fit Index
CI	Confidence Interval
CR	Critical Ratio
DSSI-PSS	Duke Social Support Index – Perceived Social Support Subscale
EMIL	Experienced Meaning in Life Scale
GDS	Geriatric Depression Scale
GSIS	Geriatric Suicide Ideation Scale
HRSD	Hamilton Rating Scale for Depression
HSREB	The University of Western Ontario Health Sciences Research Ethics Board
IFI	Incremental Fit Index
INQ	Interpersonal Needs Questionnaire
IPT	Interpersonal Psychotherapy
ISEL	Interpersonal Support Evaluation List
LES	Life Experiences Survey
MCGP	Meaning Centered Group Psychotherapy

MIL	Meaning in Life
ML	Maximum Likelihood
MMSE	Mini Mental State Examination
MPS	Multidimensional Perfectionism Scale
MSPSS	Multidimensional Scale of Perceived Social Support
PERI	Psychiatric Epidemiology Research Inventory
PSS	Perceived Social Support
RFL	Reasons for Living Inventory
RMSEA	Root-Mean-Square-Error of Approximation
SBQ	Suicidal Behaviors Questionnaire
SCID-I	Structured Clinical Interview for the DSM-IV Axis I Disorders
SD	Standard Deviation
SDS	Self-Rating Depression Scale
SEM	Structural Equation Modeling
SGP	Supportive Group Therapy
SHQ	Social Hopelessness Questionnaire
SPS	Suicide Probability Scale
SPSS	Statistical Package for the Social Sciences
SSI	Scale for Suicide Ideation
STAI	State-Trait Anxiety Inventory

List of Terms

Older adult – An individual who is 65 years or older

Suicide terms: death by suicide, suicidal behaviour, suicide ideation, suicidality

> **Death by suicide** – fatal outcome where there is evidence of intent, either explicit or implicit, that the injury was self-inflicted and that the decedent intended to kill himself/herself (O'Carroll et al., 1996). We have chosen to use this term, rather than **completed suicide**, **committed suicide**, or **successful suicide**, to reduce potential stigmatization (Canadian Coalition for Seniors' Mental Health, 2006).
>
> **Suicidal behaviour** – "Potentially self-injurious behavior with a nonfatal outcome, for which there is evidence (either explicit or implicit) that the person intended at some (nonzero) level to kill himself/herself. Suicidal behavior may or may not result in injuries" (O'Carroll et al., 1996); equivalent term: suicide attempt, attempted suicide, self-harm behaviour
>
> **Suicide ideation** – "Any self-reported thought of engaging in suicide-related behavior" (O'Carroll et al., 1996); equivalent terms: thoughts of suicide
>
> **Suicidality** – "A spectrum of activities related to thoughts and behaviors that include suicide thinking, suicide attempts, and death by suicide" (U.S. Department of Health and Human Services, 2001)

Chapter 1

1 Introduction

Older adults have high rates of death by suicide, necessitating enhanced models of late life suicide risk. Enhanced models may provide a better understanding of how an individual may develop thoughts of suicide and may indicate variables increasing suicide risk among older adults.

Existing suicide research has focused on assessing the risk factors for late life suicide (Heisel, 2006). Studies of current practice show that suicide assessment is prompted by clinical cues and risk factors, such as mental illness or disorders (Schulberg, Bruce, Lee, Williams, & Dietrich, 2004). Although there is an emphasis on exploring risk factors of suicide ideation, additionally investigating factors associated with resilience against suicide may provide a better understanding of suicide ideation to identify at-risk older adults (Johnson, Wood, Gooding, Taylor, & Tarrier, 2011).

Models that incorporate both risk and resilience factors may illustrate a more detailed depiction of the pathway toward death by suicide compared to examination of risk factors alone. Identification of high risk groups may indicate potential target points for suicide prevention initiatives. Some high risk groups may not express suicide ideation or display signs of suicidal behaviour, but are exposed to losses and life transitions that can make them vulnerable to suicide, including being recently retired or bereaved (Lapierre et al., 2011).

Psychological resilience factors, such as finding meaning in life and perceiving social support, have been found to lower suicide risk (Heisel & Flett, 2008). Primary care interventions, community-based outreach programs, telephone counseling, and clinical treatments have attempted to reduce suicidality in older persons; however, interventions aimed at decreasing risk factors or improving resilience have been shown to be effective in reducing suicide risk (Heisel, Duberstein, Talbot, King, & Tu, 2009; Lapierre, Dubé, Bouffard, & Alain, 2007). A brief introduction to previous research that has assessed the

associations among perceived social support, meaning in life, and suicide risk will be provided.

1.1 Perceived Social Support as a Resilience Factor

Social support has been associated with increased physical and psychological well-being among older adults (Krause, 1986; McAuley et al., 2000; Park, 2009). Social support has been also associated with decreased mortality (Blazer, 1982; Hanson & Isacsson, 1989; Sugisawa, Liang, & Liu, 1994) and may be a source of resilience against death by suicide. In case control studies, those who died by suicide were less likely to be married, have children, live with family, and have high levels of social interactions, compared to community controls (Beautrais, 2002; Chiu et al., 2004; Duberstein et al., 2004; Préville, Hébert, Boyer, Bravo, & Seguin, 2005; Turvey et al., 2002).

Perceived social support is a strong correlate of suicide ideation (Alpass & Neville, 2005; Bossé, Préville, & Vasiliadis, 2011; Chen et al., 2008; Clarke et al., 2004; Corna, Cairney, & Streiner, 2010; Ekramzadeh et al., 2012; Mellqvist-Fässberg et al., 2012; Purcell et al., 2012; Ramdeen, 2009; Raue, Meyers, Rowe, Heo, & Bruce, 2007; Rowe, Conwell, Schulberg, & Bruce, 2006; Tavasoli, 2011; Vanderhorst & McLaren, 2005; Vanderwerker et al., 2007). Researchers have found that higher levels of perceived social support was associated with lower levels of suicide ideation (Ekramzadeh et al., 2012; Ramdeen, 2009; Rowe, Conwell, et al., 2006; Tavasoli, 2011).The perception of being understood and supported by friends and family may confer resilience against suicide; however, experiencing low perceptions of support may confer vulnerability towards suicidal behaviour and/or death by suicide. Case control studies have shown that older adults who died by suicide (Rowe, Bruce, & Conwell, 2006) or engaged in suicidal behaviour (Dennis, Wakefield, Molloy, Andrews, & Friedman, 2005; Szanto et al., 2012) were less likely to perceive social support, compared to controls.

1.2 Meaning in Life as a Resilience Factor

Finding meaning and purpose in one's life may be a source of resilience that provides older adults the motivation to continue living (Bennett, 2005; Fitzpatrick, 2009).

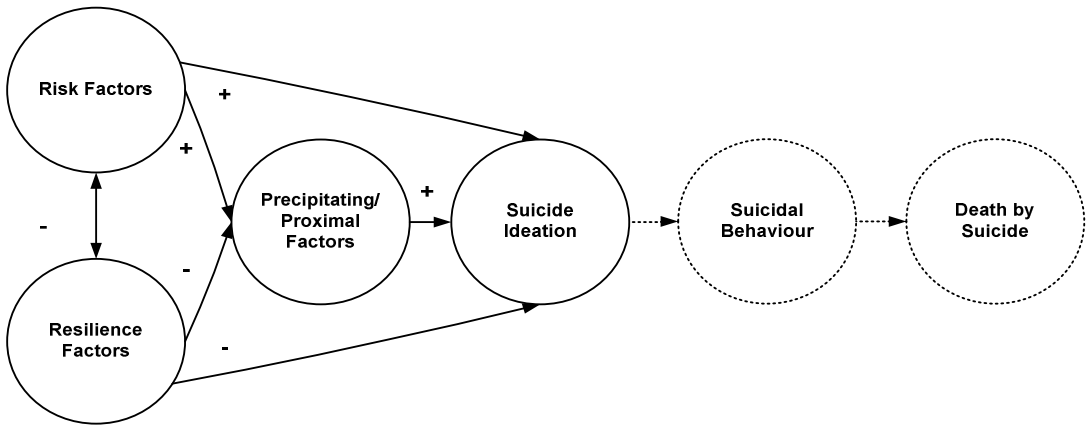
Researchers have reported that the perceived lack of meaning in life and a general sense of meaninglessness were influencing factors for contemplating suicide (Courage, Godbey, Ingram, Schramm, & Hale, 1993; Moore, 1997) and death by suicide (Kjølseth, Ekeberg, & Steihaug, 2010). Developing new interests and experiencing a change in attitude provided meaning to some older adults. These older adults had few thoughts of suicide, despite facing negative life events or stressors (Bennett, 2005; Crocker, Clare, & Evans, 2006). This is consistent with research studies that have shown that higher levels of meaning in life were associated with lower levels of suicide risk among older adults (Buchanan, 1993; Heisel & Flett, 2007, 2008; Waern, Rubenowitz, & Wilhelmson, 2003).

1.3 A Theoretical Multidimensional Model of Late life Suicide Ideation

1.3.1 A Theoretical Model of Suicide Ideation

Our lab group proposed a theoretical model of suicide ideation that focuses on risk and resilience factors (see Figure 1). This multidimensional model extends previous theoretical models of suicide risk by incorporating factors that confer resilience to suicide ideation, as well as considering the contributing role of risk factors. The inclusion of resilience factors may increase the complexity of the model, and may provide more detail in explaining factors that may increase or decrease suicide ideation among older adults.

Figure 1 A General Theoretical Model of Suicide Ideation



1.3.2 Risk and Precipitating Factors

Risk factors are biological, psychological or social variables that are associated with increased likelihood of death by suicide (U.S. Department of Health and Human Services, 2001). In our theoretical model, the presence of these factors may increase the likelihood of an older adult experiencing thoughts of suicide and eventually dying by suicide. In the model, the relation between risk factors and suicide ideation is denoted by a positive association, suggesting that as risk factors increase, the likelihood of suicide ideation may increase.

Precipitating/proximal factors are factors that develop closer to an event, such as suicide ideation, and may increase risk for suicide. Precipitating factors may involve a recent loss of a loved one or a negative social interaction. The likelihood of suicide may be elevated when these precipitating factors are combined with pre-existing risk factors. In our complex multi-process model, both risk and precipitating factors confer susceptibility to suicide ideation. Our model illustrates the associations among risk and precipitating factors, and suicide ideation; however, an older adult who experiences thoughts of suicide may be at increased risk of suicidal behaviour and/or death by suicide.

1.3.3 Resilience Factors

Researchers have focused on examining risk factors for suicide; however, additionally investigating factors associated with resilience may provide an enhanced understanding of suicide ideation and may assist in identification of at-risk older adults (Johnson et al., 2011). Luthar (2006) defined resilience as a dynamic process of positive adaptation despite adversity. Similarly, Hochhalter & Smith (2011) defined resilience as an extraordinary and positive response to a challenge or stressor. Mehta and colleagues (2008) described late life resilience as being able to maintain physical and psychological health despite being exposed to risk factors. Older adults may experience different challenges from other age groups, including the loss of loved ones and declining health.

In our theoretical model of late life suicide ideation, we use the term resilience factor to describe variables that may be associated with positive responses or maintenance in the face of challenges (Hochhalter & Smith, 2011; Luthar, 2006; Mehta et al., 2008).

Resiliency factors can be thought of as independent variables or predictors, as dependent variables or outcomes, as buffering variables or moderators, or as process variables or mediators (Johnson et al., 2011; Luthar, Cicchetti, & Becker, 2000). Resilience is not simply conceived of as the opposite of risk (Rutter, 1985), but rather reflects strength in the face of challenges (Hochhalter & Smith, 2011; Luthar, 2006; Mehta et al., 2008). Resilience factors may be conceptualized as a factor that can attenuate the strength of the association between a risk factor and an outcome, such as suicide ideation.

In the model, the relation between resilience factors and suicide ideation is represented by a negative association, which suggests that as resilience factors increase, suicide ideation may decrease. We hypothesized that resilience factors may decrease thoughts of suicide among community-residing older adults, even in the presence of risk factors.

1.4 Study Rationale

Suicide ideation is associated with an increased likelihood of death by suicide (Heisel, 2006) and may be a surrogate endpoint for suicide among older adults (Links, Heisel, & Quastel, 2005), and thus a potential target for suicide prevention programs (Conwell & Thompson, 2008). Although not all older adults who experience suicide ideation engage in suicidal behavior or die by suicide, suicide may exist along a continuum starting from suicide ideation, which could lead to suicidal behavior and/or death by suicide (Johnson et al., 2011). Researchers have found that those who died by suicide were more likely to have a history of suicide ideation, compared to community controls (Rowe, Bruce, et al., 2006). Exploring factors that exacerbate or attenuate thoughts of suicide may enhance existing research on pathways leading to suicidal behaviour and/or death by suicide. Enhanced explanatory models for suicide ideation may identify potential areas of intervention to prevent the onset or exacerbation of suicide ideation, which may thus prevent suicidal behaviour and/or deaths by suicide.

Cross-sectional empirical findings suggest that suicide ideation is positively associated with psychological risk factors and negatively associated with resilience factors (Heisel & Flett, 2008). We designed the current study to replicate and extend these findings by using longitudinal analyses and focusing on a community-residing older adult sample.

Our longitudinal study followed a sample of community-residing older adults over a period of 12-24 months, which may assist in establishing temporality of events and strengthen evidence for causation. Research with a community-residing sample, rather than a clinical sample, may help to identify potential targets for early community interventions or encourage the implementation of prevention strategies to reduce risk factors and the development of suicide ideation.

1.4.1 Research Objective

The purpose of this study was to assess the contribution and interplay of a set of risk and resiliency factors on suicide ideation over time, in order to enhance understanding of contributing factors and to potentially enhance risk detection. The study objective was to test our multidimensional model of suicide ideation, which incorporates risk and resilience factors, among community-residing older adults. We specifically hypothesized that individuals reporting greater meaning in life would report less intervening depressive symptomatology and suicide ideation over a 2-year period of follow-up. We additionally hypothesized that higher levels of social hopelessness would be associated with higher levels of depressive symptomatology, which would be associated with higher levels of suicide ideation. We also hypothesized that individuals reporting greater intervening depressive symptomatology would report less perceived social support, and greater suicide ideation over a 2-year period of follow-up.

Chapter 2

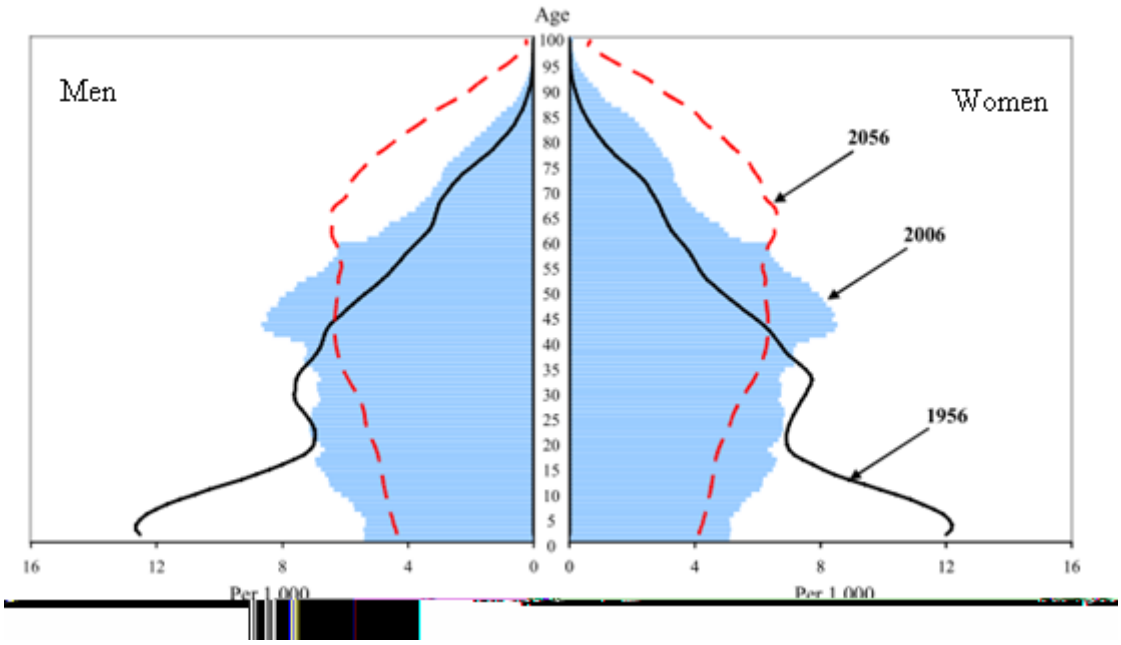
2 Review of the Literature

The following chapter is a review of the literature, which has contributed to the development of our multidimensional model of late life suicide ideation. First, the changing Canadian demographic structure and the potential impact on late life suicide risk will be discussed. Second, the prevalence of death by suicide, suicidal behaviour and suicide ideation among older adults in Canada will be reported. Third, we will examine risk and resilience factors that are associated with suicide. Fourth, existing theories and models of suicide risk will be discussed. Lastly, we will present a multidimensional model of suicide ideation, which builds on existing theories and models of suicide risk and examines the effect of perceived social support and meaning in life on suicide ideation among older adults.

2.1 Canadian Demographics and the Aging Population

The Canadian population is growing older. Canada experienced a growth in population partly due to the birth cohort born from 1946 to 1964. This cohort, which is known as the baby boom generation, is presently 48 to 66 years of age. Figure 2 illustrates demographic changes from 1956 to 2006 and projected changes for 2056, with the arrow in each year indicating the baby boom cohort. As this cohort grows older, there will be an increase in the proportion of older adults, defined as adults over 65 years old. Older adults represented 14.1% of the Canadian population in 2010 and this proportion is expected to increase to one fifth of the population by 2026 and over one fourth by 2056 (Milan & Statistics Canada, 2011).

Figure 2 Observed and anticipated changes in the age structure of the Canadian population by sex, 1956, 2006 and 2056



Source: Statistics Canada (2005)

2.2 Prevalence of Late Life Suicide, Suicidal Behaviour, and Suicide Ideation

Suicide rates among older adults increase with age. This section will examine the current Canadian trends for death by suicide, suicidal behaviour and suicide ideation among older adults.

2.2.1 Death by Suicide

The Canadian 2009 suicide rate for older adults was 10.4 per 100,000, which translated into 1.3 deaths daily. Table 1 compares the rate of death by suicide for all ages, individuals under 65 years old, and older adults. The overall rate for older adults has remained relatively constant since 2004, ranging from 10 to 11 per 100,000 older adults (Statistics Canada, 2012a).

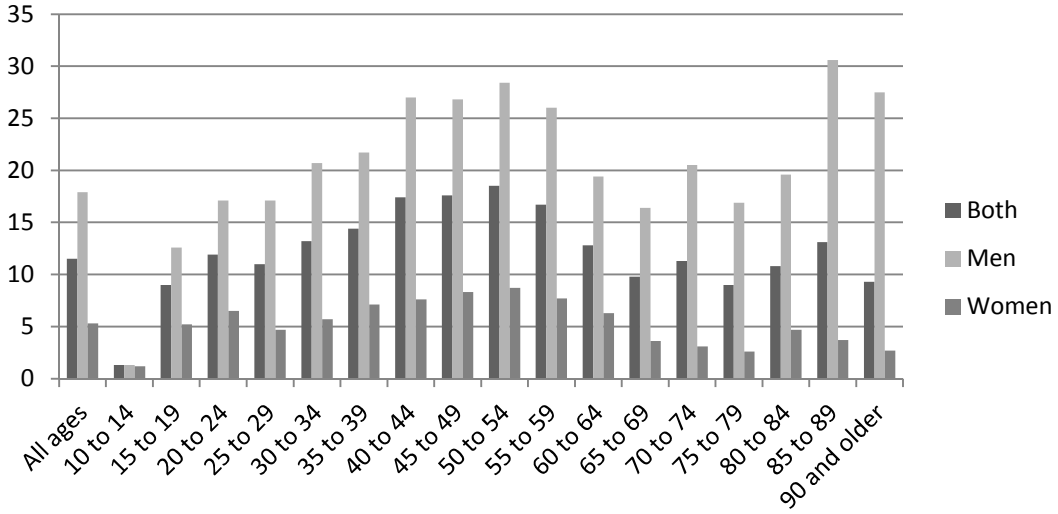
Table 1 Age standardized suicide rates per 100,000 in Canada from 2004 to 2009

Age Group	2004	2005	2006	2007	2008	2009
All ages	11.3	11.6	10.8	11.0	11.1	11.5
< 65 years	13.2	13.4	12.2	12.7	12.8	13.4
65+	10.3	10.9	11.2	10.2	10.8	10.4
Men 65+	17.8	19.2	19.1	17.9	19.7	19.2
Women 65+	4.6	4.5	5.1	4.2	3.7	3.4

Source: Statistics Canada (2012a)

The suicide rates for older adults vary by sex. The rate for men over 65 years old has consistently been almost double that of the national average suicide rate and over five times their female counterparts (Statistics Canada, 2012a). As shown in Table 1, the 2009 suicide rate for older men was 19.2 per 100,000, compared to a rate for older women of 3.4 per 100,000. Figure 3 displays the differences across age groups in the 2009 suicide rate. The suicide rate of men increases with age, a finding that was obscured by collapsing age categories in Table 1. In 2009, men 85 to 89 years had a suicide rate of 30.6 per 100,000, which was the nation's highest suicide rate, compared to all of the age categories. These findings suggest that older men are at high risk of suicide.

Figure 3 Canadian suicide rates per 100,000, by sex and by age group (2009)



Source: Statistics Canada (2012a)

2.2.2 Suicidal Behaviour

Suicidal behaviour among older adults is a strong predictor of death by suicide (Canadian Coalition for Seniors' Mental Health, 2006; The Mood Disorders Society of Canada, 2002). A psychological autopsy study is a method to collect data on individuals who have died by suicide and involves interviewing significant friends and relatives of the deceased (Canadian Coalition for Seniors' Mental Health, 2006). Psychological autopsy studies have shown that older adults who died by suicide were more likely to have a history of self-harm behaviour, compared to controls (Beautrais, 2002; Chiu et al., 2004; Rowe, Bruce, et al., 2006).

Older adults who engage in suicidal behaviour are more likely to die as a result of this behaviour than are adolescents (Conwell & Thompson, 2008). Older adults experience an increased fatality that may be attributed in part to the increased frailty associated with physical aging and the lethality of methods used, which may increase the likelihood that the individual will die as a result of a self-inflicted injury compared to younger age groups (Conwell et al., 1998). A systematic review of research on late life suicidal behaviour found that methods that were high in lethality, including firearms, hanging, and carbon monoxide poisoning, accounted for a higher proportion of deaths by suicide compared to methods that were less lethal, such as self-poisoning (Fung & Chan, 2011). In Canada, older adults have a higher proportion of firearm-related suicides compared to different age groups. In 2008, firearms were responsible for approximately 29% of deaths by suicide among older Canadian adults, which was higher than the national percentage of 13% and 11.7% for individuals under 65 years old (Statistics Canada, 2008). Older adults who engage in suicidal behaviour may die as a consequence of their behaviour.

2.2.3 Suicide Ideation

Suicide ideation is a risk factor for suicidal behaviour and death by suicide (Canadian Coalition for Seniors' Mental Health, 2006). Case-control studies have shown that suicide ideation was higher among individuals who engaged in suicidal behaviour (Dennis et al., 2005; Harrison et al., 2010) and those who died by suicide were more

likely to have a history of suicide ideation, compared to community controls (Rowe, Bruce, et al., 2006).

Published studies have reported the prevalences of suicide ideation in community-dwelling older adults ranging between 2.6% to 17% worldwide (Awata et al., 2005; Cook, Pearson, Thompson, Black, & Rabins, 2002; Raue, Meyers, Rowe, Heo, & Bruce, 2007; Rowe, Conwell, Schulberg, & Bruce, 2006; Scocco & De Leo, 2002; Yip et al., 2003). In Canada, over 2% of community-dwelling adults reported experiencing thoughts of suicide (Corna et al., 2010).

The variability among the reported prevalence of late life suicide ideation between studies may be a result of regional or cultural factors; however, variability may also be contributed by differing study methodology, including participant age inclusion criteria, definition of suicide ideation, and use of different scales. Age inclusion criteria for older adult samples have ranged from 50 to 65 years and older across studies (Britton et al., 2008; Heisel et al., 2009; Yen et al., 2005). Varying definitions of suicide ideation have ranged from passive thoughts of death, thoughts of taking one's own life, and serious thoughts of taking one's own life, which have resulted in estimates of 4.2%, 2.1%, and 0.7% respectively, in a study of community-dwelling older adults (Scocco & De Leo, 2002).The use of different scales and potentially inappropriate use of measurement tools, such as the use of a scale not developed for or validated with an older adult sample, may have influenced the variability in prevalence estimates. Differences in study methodology may lend to the variability in the prevalence of suicide ideation reported in studies.

2.3 Risk Factors for Late Life Suicide

2.3.1 Social Hopelessness

Hopelessness has been widely examined in suicide research (Johnson et al., 2011) and is associated with suicide ideation and behaviour among older adults (Heisel, Flett, & Besser, 2002; Hill, Gallagher, Thompson, & Ishida, 1988; Lau, Morse, & Macfarlane, 2010; Rifai, George, Stack, Mann, & Reynolds, 1994; Uncapher, Gallagher-Thompson, Osgood, & Bongar, 1998; Wiktorsson, Runeson, Skoog, Ostling, & Waern, 2010). Hopelessness has been defined as negative expectancies toward the future (Beck,

Weissman, Lester, & Trexler, 1974) and as negative expectancies about changing the probability of events (Alloy, Abramson, Metalsky, & Hartlage, 1988). Social hopelessness has been defined as the negative perceptions and beliefs about one's interpersonal relationships and future interpersonal expectancies (Flett, Hewitt, Heisel, Davidson, & Gayle, 2003).

Hopelessness can be thought of as a separate set of beliefs that influences how a person perceives and interprets information and behaves (Uncapher et al., 1998). Researchers have suggested that hopeless thoughts can be chronic and persistent in certain individuals or stimulated in acute, specific situations in other individuals. Among older adults, the activation of hopelessness is thought to influence the development of depression (Uncapher et al., 1998).

A systematic review of the literature exploring factors affecting suicide, suicidal behaviour, and suicide ideation found that hopelessness predicted suicide risk (Johnson et al., 2011). A majority of the studies in this review found a significant interaction between hopelessness and a risk factor, including past suicidal behaviour, which suggests that hopelessness may moderate the association between a risk factor and suicide risk. Consistent with the findings from the systematic review and the notion that hopelessness may influence the development of depression, researchers found a statistically significant interaction between hopelessness and depressive symptom severity on suicide ideation among older adults. This suggests that the association between hopelessness and suicide ideation was primarily so during high levels of depressive symptoms (Uncapher et al., 1998).

Social hopelessness has been found to better discriminate between individuals experiencing higher and lower suicide risk, compared to general measures of hopelessness (Heisel, Flett, & Hewitt, 2003; Hewitt, Norton, Flett, Callander, & Cowan, 1998). In a sample of 78 adult inpatients diagnosed with alcohol dependence (M= 32.63 years, SD = 9.02), social hopelessness differentiated between individuals with a serious suicide attempt and those with no history of suicide attempt, unlike general measures of hopelessness (Hewitt et al., 1998). Researchers reported a similar finding regarding

suicide ideation among a sample of 143 college students (M = 20.5 years, SD = 2.8); social hopelessness and depressive symptomatology were the only variables that discriminated between individuals with higher and lower levels of suicide ideation (Heisel et al., 2003). Researchers have found that social hopelessness is positively associated with suicide ideation among older adults (Heisel et al., 2002; Heisel & Flett, 2006), with higher levels of social hopelessness predicting higher levels of suicide ideation.

2.3.2 Mental Illness

Mental illness is a risk factor for death by suicide (Canadian Coalition for Seniors' Mental Health, 2006). Psychological autopsy studies in the United Kingdom (Harwood, Hawton, Hope, & Jacoby, 2001), Sweden (Waern et al., 2002), Hong Kong (Chiu et al., 2004), and Canada (Préville et al., 2005) have shown that those who died by suicide were up to more than 59 times more likely to have had a diagnosis of depressive episodes, mood disorder, depressive disorder, and affective disorders than community controls.

The 2011 prevalence of mood disorders among older Canadian adults was 5.6%. The prevalence for men and women was 4.8% and 6.5%, respectively (Statistics Canada, 2012b), suggesting that older women report higher levels of mood disorders than older men. The data were based on The Canadian Community Health Survey question that asked about being diagnosed by a health professional for having a mood disorder, such as depression, bipolar disorder, mania or dysthymia. Individuals with mood disorders may suffer significant distress or impairment in social, occupational, educational or other important areas of functioning (The Mood Disorders Society of Canada, 2002).

Depression may cause individuals to feel worthless, sad, and empty to the extent that these feelings impair effective functioning (First, Spitzer, Gibbon, & Williams, 1995). Individuals may lose interest or pleasure in their usual activities, experience weight loss or gain and changes in appetite, suffer from disturbed sleep or have decreased energy. They may have a diminished ability to think or concentrate, or may experience recurrent thoughts of death, suicide ideation or suicidal behaviour.

Elevated suicide risk is associated with the diagnosis of major or minor depression (Alexopoulos, Bruce, Hull, Sirey, & Kakuma, 1999; Britton et al., 2008; Clarke et al., 2004; Raue et al., 2007; Rifai et al., 1994; Rowe, Conwell, et al., 2006; Szanto, Prigerson, Houck, Ehrenpreis, & Reynolds, 1997; Waern et al., 2003), depressive symptom severity (Alexopoulos et al., 1999; Awata et al., 2005; Britton et al., 2008; Clarke et al., 2004; Cukrowicz et al., 2009; Fitzpatrick, 2005; Jahn, Cukrowicz, Linton, & Prabhu, 2011; Malfent, Wondrak, Kapusta, & Sonneck, 2010; Pfaff & Almeida, 2004; Rowe, Conwell, et al., 2006; Szanto et al., 2012, 1997), and depressed mood (Rowe, Bruce, et al., 2006). Although depression is highly associated with suicide risk, most people with a mental disorder do not die by suicide and over 10% of older adults who die by suicide do not have a diagnosable mental illness (Canadian Coalition for Seniors' Mental Health, 2006).

2.4 Resilience in Older Adults

2.4.1 Perceived Social Support

Social support is negatively associated with suicide risk (Alexopoulos et al., 1999; Cook et al., 2002; Duberstein et al., 2004; Turvey et al., 2002; Waern et al., 2003; Yip et al., 2003). Social support can be conceptualized as the quality, utilization, meaning, and availability of and satisfaction with one's support network (Berkman, Glass, Brissette, & Seeman, 2000; Ramdeen, 2009). It can also be operationalized as the size of one's social network, and frequency of contact with family members and friends who live in close proximity (Chronister, Johnson, & Berven, 2006).

Researchers have suggested that perceptual measures of social support are stronger predictors of suicide ideation compared to other measures of social support (Landerman, George, Campbell, & Blazer, 1989). Perceptual measures of social support are subjective assessments of one's support network, satisfaction of the available support, and feeling of being cared for and respected (Chronister et al., 2006; Ramdeen, 2009). Measures may be global or specific to a given relationship or type of support (Vaux, 1988). The type of interpersonal supportive behaviour that is provided by one's social network may include emotional support, which is the extent to which one feels listened to or cared for

(Chronister et al., 2006), and instrumental support, which is the extent that help is received from family and friends on various tasks, including cleaning or shopping, or providing material resources, such as financial assistance (Cohen, 1984; Harrison et al., 2010).

2.4.1.1 A Closer Look at Perceived Social Support and Suicide Ideation

In 2008, Ramdeen (2009) conducted a systematic review of the literature as part of a Master's thesis to examine the association between social support and suicide risk among older adults. This review differentiated studies that used proxy support variables, such as marital status, living arrangement, presence of a confidant, 'loneliness', and number of living children, instrumental support, and social interaction, from studies that used perceived social support variables. A total of 15 studies were identified using MEDLINE, Cumulative Index to Nursing & Allied Health Literature (CINAHL), PsychINFO and Web of Science databases. Among these studies, eight studies examined perceived social support as a protective factor against suicide in older adults. I repeated the same search strategy to identify recently published studies and completed thesis projects, which included the terms "suicide AND social support AND older adult$" (MEDLINE), "suicid$ AND social support AND older adult$" (CINAHL), "social support and suicide and senior*" (PsychINFO), and "TS=(social support +suicide + older adult)" (Web of Science). Searches were limited to studies published in English and setting the time period from 2008 to present.

The search identified 70 studies from MEDLINE, 35 studies from PsychINFO, 33 from CINAHL, and 34 from Web of Science. Titles and abstracts of the studies were reviewed and six studies examined the effect of perceived social support on late life suicide risk. Table 2 is a summary of 14 studies, which includes eight studies identified in Ramdeen (2009) and six studies identified when the search strategy was repeated, examining the effect of perceived social support on late life suicide ideation and provides information on study design, sample characteristics, and study findings.

The studies reviewed reflect a global perspective of the effect of perceived social support on suicide ideation with one study conducted in New Zealand, one in Australia, three in Canada, seven in the United States of America, one in Taiwan, and one in Iran.

Measures of perceived social support have generally been found to be stronger predictors of suicide ideation than objective measures of social support. In a sample of 522 older adults using home health care services, researchers found that perceptions of social support were negatively associated with suicide ideation, whereas social network size was not associated with suicide ideation (Rowe, Conwell, et al., 2006). This finding may suggest that the perceived quality of social support is a stronger predictor of suicide ideation than the quantity of relationships. Researchers have also found that perceived social support remained a strong predictor of suicide ideation, even after adjusting for marital status, sense of belonging, instrumental support, or living arrangements (Bossé et al., 2011; Corna et al., 2010; Purcell et al., 2012; Ramdeen, 2009; Vanderhorst & McLaren, 2005).

Seven measures were used to assess perceived social support among the studies reviewed. These included survey items measuring the presence of a confidante and someone who cares in times of difficulty, satisfaction with social relationships, and general lack of social support (Bossé et al., 2011; Chen et al., 2008; Clarke et al., 2004), the Social Support Questionnaire (Sarason, Sarason, Shearin, & Pierce, 1987), Coping Resources Inventory (CRI)-Social Support subscale (Hammer & Marting, 1988), Duke Social Support Index/Duke Social Support Index Perceived Social Support subscale (DSSI/DSSI-PSS; Koenig et al., 1993), Interpersonal Support Evaluation List (ISEL; Cohen, Mermelstein, Kamark, & Hoberman, 1985), Medical Outcomes Survey (MOS)-Social Support (Sherbourne & Stewart, 1991), and Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988).

Among the studies reviewed, perceived social support was significantly negatively associated with suicide ideation (Chen et al., 2008; Clarke et al., 2004; Ekramzadeh et al., 2012; Purcell et al., 2012; Ramdeen, 2009; Raue et al., 2007; Rowe, Conwell, et al., 2006; Vanderhorst & McLaren, 2005; Vanderwerker et al., 2007), negative findings

notwithstanding (Alpass & Neville, 2005; Bossé et al., 2011; Tavasoli, 2011). Alpass and Neville (2005) conducted a cross-sectional study to examine the correlates of suicide ideation among older men and found that the association between perceived social support and suicide ideation approached statistical significance. These researchers used a convenience sample of 217 older men and the Social Support Questionnaire as a measure of satisfaction with social support. Bossé and colleagues (2011) explored the association between suicide ideation and use of benzodiazepines among a sample of 2,494 community-residing older adults. Perceived social support was not the primary variable of interest, but was a covariate in the model examining the effect of benzodiazepine use on suicide ideation. Three items were used to measure perceived social support and specifically assessed the whether individuals felt as if they had someone to confide in about problems, assist in times of need, and felt close to. These researchers did not find that older adults who reported suicide ideation were more likely to perceive a lack of social support, compared to those who did not experience suicide ideation.

Two studies have used the MSPSS to measure the effect of perceived social support on suicide ideation (Ekramzadeh et al., 2012; Tavasoli, 2011). The MSPSS is a multidimensional measure of perceived support and focuses on the perceived availability of support, specifically whether there is someone to share joys and sorrows, and will provide emotional support, help with problems, and make decisions (Zimet et al., 1988). There have been inconsistent results in studies that have used this scale. Tavasoli (2011) conducted a cross-sectional study to examine the associations among religion, spirituality and suicide ideation among 173 community-residing older adults. Perceived social support was not the main variable of interest; however, it was included as a covariate in the statistical model. Researchers found that perceived social support was not associated with suicide ideation, which may have been a result of the inclusion of several robust predictors, including religiosity, spirituality, depressive symptom severity, and perfectionism. In contrast to Tavasoli (2011), Ekramzadeh and colleagues (2012) found that the lack of perceived social support predicted higher levels of both suicide ideation and suicidal behaviour in a sample of 570 inpatients over the age of 60 years.

A negative association between perceived social support and suicide ideation has been consistently found in studies that have used single item measures of perceived social support (Chen et al., 2008; Clarke et al., 2004). Clarke and colleagues (2004) used a single item to assess the satisfaction with existing social relationships and found that it was associated with decreased likelihood of reporting suicide ideation, compared to individuals who were not satisfied with their social relationships in a sample of 530 depressed Holocaust survivors over the age of 50 years. Chen and colleagues (2008) also used a single item to measure perceived social support as a correlate of suicide risk. In a sample of 1,347 women over the age of 60 years old, individuals who experienced suicide ideation during the past month suffered from a lack of support from friends and family, compared to those that did not report suicide ideation (Chen et al., 2008).

The ISEL, CRI-Social Support subscale, and MOS-Social Support have been used to assess the perceived availability of social support. There is consistency among the results that show that the perceived availability of social support has been associated with suicide ideation (Corna et al., 2010; Vanderhorst & McLaren, 2005; Vanderwerker et al., 2007). Using the ISEL as a measure of perceived availability, researchers have found that perceiving a greater availability of social support was associated with fewer thoughts of suicide in a sample of 131 older adults experiencing substance abuse and medical frailty (Vanderwerker et al., 2007). This association was replicated in a sample of 110 community residing- older adults, where researchers used the CRI-Social Support subscale to assess whether support would be provided during times of stress (Vanderhorst & McLaren, 2005). Using the MOS-Social Support to measure the perceived presence of tangible support, affection, positive social interaction, and emotional-informational support, researchers found that individuals who perceived support was available were less likely to report suicide ideation in the last 12 months, compared to those who felt that support was unavailable in a sample of 11,456 adults over the age of 55 years (Corna et al., 2010).

Five studies have examined the impact of perceived social support on suicide ideation using the DSSI-PSS (Koenig et al., 1993). The DSSI-PSS measures the extent to which family and friends understand them, the extent to which they feel useful and connected to

family and friends, feel listened to and are able to share their deepest problems and their satisfaction with their relationships. There is consistency in the results, such that lower levels of perceived social support was associated with higher levels of suicide ideation in a sample of 522 older adults using home health care services (Rowe, Conwell, et al., 2006), a sample of 539 older adults receiving home health care services (Raue et al., 2007), a sample of 664 older primary care patients (Ramdeen, 2009), a sample of 204 depressed patients over the age of 50 years old (Ramdeen, 2009), and a sample of 130 mood disordered inpatients and outpatients age 50 years old (Purcell et al., 2012).

The majority of the studies reviewed have thus shown that perceived social support is negatively associated with suicide ideation. Differences in study findings may be attributed in part to differing study methodology, such as participant age inclusion criteria that ranged from 50 to 65 years, and measurement differences, ranging from a single or multiple survey items to multidimensional measures of perceived social support. Among the measurement tools that were used, the DSSI-PSS has consistently shown a significant negative association between perceived social support and suicide ideation. The longitudinal association between perceived social support and suicide ideation using data collected from community-residing older adults has not yet been reported and this longitudinal relation in the presence of risk factors has not been explored.

2.4.1.2 A Closer Look at Perceived Social Support and Depression

Although studies have shown that perceived social support is negatively associated with suicide ideation, it has been hypothesized that these variables may have a bidirectional relation. Perceived social support may decrease the deleterious effects of depressive symptom severity (Takizawa et al., 2006), but depressive symptom severity may erode the perception of social support among older adults (Maher, Mora, & Leventhal, 2006). Furthermore, Meeks, Vahia, Lavretsky, Kulkarni, & Jeste (2011) conducted a systematic review on the epidemiology and illness course of subthreshold depression among older adults. The researchers reviewed studies that measured any depressive condition with the proposed criteria other than major depressive disorder, dysthymia, or bipolar depression. The researchers found that subthreshold depression was generally at least 2-3 times more prevalent than major depression among older adults and that low social support was a risk

factor for subthreshold depression. Vanderhorst & McLaren (2005) also found that lower levels of perceived social support were associated with higher levels of depressive symptomatogy among communtiy-residing older adults.

Among the reviewed studies exploring the effect of perceived social support on suicide ideation in this current literature review, eight studies observed that the diagnosis of depression and/or depressive symptom severity was a statistically significant covariate in the models (Corna et al., 2010; Ekramzadeh et al., 2012; Ramdeen, 2009; Raue et al., 2007; Rowe, Conwell, et al., 2006; Tavasoli, 2011; Vanderwerker et al., 2007). In each of these studies, perceived social support and the presentation of depression were cross-sectional measures, preventing firm conclusions regarding the direction of the causal relation between perceived social support and depression.

There may be a need for research to clarify the causal relation between perceived social support and depression; however, researchers have shown a negative association between perceived social support and depressive symptom severity (Maher et al., 2006; Vanderhorst & McLaren, 2005). This suggests that as perceived social support increases, depressive symptom severity may decrease, and as depressive symptom severity increases, perceived social support may decrease.

The presentation of depression differs in older adults compared to young adults. Older adults are more likely to display cognitive changes and loss of interest than are younger adults (Fiske, Wetherell, & Gatz, 2010). These cognitive changes may have an effect on the perception of being supported by friends and family, which supports the notion that depressive symptom severity may erode the perception of social support among older adults (Maher et al., 2006).

Table 2 Summary of studies examining perceived social support and suicide ideation

Study	Study design	Country	Sample	Measure of Perceived Social Support	Measure of Suicide Ideation	Study/Model fit Findings
Clarke et al. (2004)	Retrospective Cross-sectional	Canada	530 depressed older Holocaust survivors in a day hospital age 50 + years (M=75.90 years, SD= 6.97)	Survey items measuring current marital status, having a confidante, and both the number of social ties and satisfaction with social relationships	The suicide ideation item from the Hamilton Depression Rating scale (HRSD; Hamilton, 1967)	-having a confidant [OR=0.49, CI=0.31-0.78], having social relationships [OR=0.52, CI=0.30-0.90], and reporting satisfaction with existing social relationships [OR=0.56, CI=0.34-0.94] were associated with not reporting suicide ideation
Alpass & Neville (2005)	Cross-sectional	New Zealand	217 older adult men (M=75.4 years, SD=4.96)	Social Support Questionnaire (Sarason et al., 1987)	Adult Suicidal Ideation Questionnaire (Reynolds, 1987)	-neither number of social supports nor satisfaction with social support was significantly associated with suicide ideation [r=-0.011, p=0.882 and r=-0.122, p=0.099, respectively]
Vanderhorst & McLaren (2005)	Cross-sectional	Australia	110 Community-residing older adult (M=76.67 years, SD=8.11)	Coping Resources Inventory- Social Support subscale (Hammer & Marting, 1988)	General Health Questionnaire-Suicide Subscale (Goldberg & Hillier, 1979)	-fewer PSS resources significantly predicted higher levels of suicide ideation [β=-0.32, B=0.00, p<0.001], after adjusting for sex, age, education level, marital status, and sense of belonging
Rowe, Conwell, et al. (2006)	Cross-sectional	U.S.A.	522 older adults using home healthcare services (range= 65 to 102 years)	Duke Social Support Index including the social network size, instrumental support, social interaction, perceived social support subscales (DSSI; Koenig et al., 1993)	Suicide items from the Structured Clinical Interview for the DSM-IV (SCID-I; First et al., 1995) and the HRSD	-social network size and instrumental support were not significantly associated with suicide ideation [B=-0.056, p=0.18 and B=-0.027, p=0.68, respectively], whereas PSS and social interaction patterns were significantly associated with suicide ideation [B=-0.234, p<0.01 and B=-0.120, p=0.04, respectively] - PSS were significantly associated with suicide ideation [B=-0.143, p=0.02], after adjusting for age, sex, educational status, race, living alone, marital status, cognitive status, diagnosis of depression, depressive symptom severity, medical morbidity and disability

Study	Study design	Country	Sample	Measure of Perceived Social Support	Measure of Suicide Ideation	Study/Model fit Findings
Raue et al. (2007)	Longitudinal study over a one year period	U.S.A.	Total sample: 539 older adults recently receiving visiting nurse homecare for medical/surgical problems (M=78.4 years, SD=7.5) Completed 1 year follow up interview: 400 older adults	DSSI	Suicide items from the SCID and HRSD	- low PSS was significantly associated with having reported active or passive suicide ideation during the past month [OR=0.87, CI= 0.77-0.98, p=0.006], adjusting for sex, major depression, depressive symptom severity, anxiety disorder, # of ADL and IDL limitations, medical co-morbidity, and pain - PSS at baseline was significantly associated with having reported active or passive suicide ideation during the past year [OR=0.80, CI= 0.66-0.98, p=0.038], adjusting for major depression, depressive symptom severity, # ADL limitations, and education level at baseline
Vanderwerker et al. (2007)	Cross-sectional	U.S.A.	131 "older adults" (63 white and 68 African American) experiencing substance abuse and medical frailty *age cut off not stated* (M=46.7 years, SD=11.8)	Interpersonal Support Evaluation List (ISEL; Cohen et al., 1985)	Yale Evaluation of Suicide scale (Latham & Prigerson, 2004), which assesses suicide ideation and suicidal behaviour	- lower reported levels of PSS were significantly associated with suicide ideation [African American: β=-0.23, F(1,66)=-2.36, p<0.05; White: β=-0.21, F(1,61)=-1.77, p<0.05], after adjusting for gender, age, major depressive disorder, anxiety, and stressful life events
Chen et al. (2008)	Cross-sectional	Taiwan	1,347 community-residing women age 60+ years (M=69.4, SD=5.4)	Perceived social support survey item, "Is there any friend or family who care about you when you face difficulty?"	Survey item, "Did you wish or want to be dead during the past month?"	- descriptive comparisons showed that older women who experienced suicide ideation suffered from a lack of PSS compared to older women who did not report thoughts of suicide [χ^2 =233.8, p<0.001]
Ramdeen (2009)	Cross-sectional	U.S.A.	664 older adults primary care patients (M=74.58 years, SD=6.61)	DSSI-Perceived Social Support subscale	Suicide items from the SCID and HRSD	- PSS was a significant correlate of suicide ideation [OR=0.84, p=0.014], after adjusting for age, sex, cognitive functioning, physical functioning, depressive symptom severity, instrumental support, marital status, and living arrangement, which suggests that the odds of reporting suicide ideation decreased 16% for every one point increase in PSS

Study	Study design	Country	Sample	Measure of Perceived Social Support	Measure of Suicide Ideation	Study/Model fit Findings
Ramdeen (2009)	Cross-sectional	U.S.A.	204 depressed patients age 50+ years recruited from inpatient and outpatient psychiatric services (M=61.00, SD=10.38)	DSSI-Perceived Social Support subscale	Scale for Suicide Ideation- Current Episode (SSI; Beck, Kovacs, & Weissman, 1979)	- PSS was a significant correlate of suicide ideation [B=-0.19, p=0.015], after adjusting for age, sex, cognitive functioning, physical functioning, depressive symptom severity, marital status, and living arrangement
Corna et al. (2010)	Cross-sectional nationally representative community study	Canada	11,456 adults age 55+ years	Medical Outcomes Survey- Social Support (Sherbourne & Stewart, 1991)	Suicide ideation & Suicidal behavior items from the Canadian Community Health Survey	- PSS predicted suicide ideation in the last 12 months [OR=0.98, CI=0.96-0.99,p<0.001], after adjusting for age, sex, marital status, income, education, living arrangement, chronic health problems, limits in ADLs, psychological distress, poor self-rated mental health, major depression, social phobia, and panic disorder
Bossé et al. (2011)	Cross-sectional	Canada	2,494 community-residing older adults	3 Survey items measuring perceived social support, ie someone to confide in about problems, assist in times of need, feel close to/shows affection	2 Survey items	- older adults with a lack of PSS were not more likely to report presence of suicide or death ideations, compared to older adults who experienced PSS [OR=1.48, CI=0.98-2.24], adjusting for sex, age, marital status, living region, income, education, daily hassles, # of psychological distress symptoms, # of chronic illnesses, and Benzodiazepine use (daily dose and length of use)
Tavasoli (2011)	Cross-sectional	Canada	173 community-residing older adults	Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988)	Geriatric Suicide Ideation Scale (GSIS; Heisel & Flett, 2006)	- PSS did not predict suicide ideation [B=-0.08, p=0.29], after adjusting for sex, age, religiosity, spirituality, depressive symptom severity, perfectionism, and meaning in life

Study	Study design	Country	Sample	Measure of Perceived Social Support	Measure of Suicide Ideation	Study/Model fit Findings
Ekramzadeh et al. (2012)	Cross-sectional	Iran	570 inpatients age 60+ years (M=70.5 years, SD=7.5)	MSPSS	**Suicide ideation:** SSI **Suicidal behaviour:** Harmful Behavior Scale (Draper et al., 2002)	- lack of PSS predicted higher levels of both suicide ideation [B=-0.094, p=0.005] and behaviour [B=-0.153, p=0.001], after adjusting for age, sex, depressive symptom severity, increased burden on medical conditions, marital status, history of substance use, history of traumatic life events, poor education, and employment status
Purcell et al. (2012)	Cross-sectional	U.S.A	130 mood disordered inpatients and outpatients age 50+ years (M=59.7 years, SD=9.5)	DSSI-Perceived Social Support subscale	SSI	- patients who perceived a greater degree of social support were less likely to endorse contemplating suicide [OR=0.747, CI=0.643-0.867, p=0.001], after adjusting for age, marital status, sex, and living arrangement - the interaction between PSS and living alone on suicide ideation was not statistically significant [OR=0.960, CI=0.830-1.111, p=0.586]

Note: study participants were 65 years or older unless otherwise specified, PSS = perceived social support

2.4.2 Meaning in Life

Meaning in life has been negatively associated with suicide risk (Buchanan, 1993; Heisel & Flett, 2007, 2008). As individuals age, physical, psychological, and social challenges may develop. Older adults may be able to adapt and move beyond these changes by finding meaning in life; however, some older adults may not be able to integrate these changes into their lives, which may lead them to question their meaning in life and contemplate suicide when they perceive there are few available options and choices (Courage et al., 1993; Kjølseth et al., 2010).

Viktor Frankl was a psychiatrist and holocaust survivor and the founder of Logotherapy, a form of existential therapy that focuses on finding meaning. Frankl (1963) posited that individuals have the freedom to choose their actions, behaviours, and reactions to situations. The actions, behaviours, and reactions of individuals are primarily motivated by the will to meaning or to find meaning in their personal experience, rather than power or pleasure, as suggested respectively by Adler and Freud (Frankl, 1963).

Meaning in life has several properties. It is multidimensional, composed of the individual's knowledge, abilities, experiences, desires, beliefs, and values. The meaning in one's life is subjectively unique to each individual and may be discovered in broad sources, including creative, experiential, and attitudinal values. Creative values may be found in creative pursuits, artistic endeavours or undertaking a deed. Experiential values may be discovered when experiencing something or encountering someone we value, which includes loving another individual.

Attitudinal values may come from adopting a positive attitude toward unavoidable suffering, such as death and guilt. Meaning in life involves personal choices and decisions. Individuals choose their own actions, behaviours, and reactions to situations and are responsible for these choices. Individuals may not responsible for choices and actions of others; however, individuals have the choice of how to respond to their circumstances. Frankl (1963) also discussed super-meaning, an ultimate meaning or transcendence that surpasses the intellectual capacities of human beings.

Meaning in life may be a source of resilience that may lower suicide risk among older adults. Frankl (1963) emphasized the words of Nietzsche, “He who has a *why* to live for can bear with almost any *how*”. Older adults who have a something to live for or have meaning in life may endure even the most difficult hardships, whereas older adults who experience the perception of meaninglessness may be at an increased risk of suicide.

2.4.2.1 A Closer Look at Meaning in life and Suicide Risk

Researchers have examined associations between meaning in life and suicide risk among older adults. I conducted a literature search using MEDLINE, Cumulative Index to Nursing & Allied Health Literature (CINAHL), PsychINFO and Web of Science databases. The search strategy used terms “suicide AND meaning in life AND older adult$” (MEDLINE), “suicid$ AND meaning in life AND older adult$” (CINAHL), “meaning in life AND suicide AND senior*” (PsychINFO), and “TS=(meaning in life+suicide + older adult)” (Web of Science). Additional word terms included life meaning, personal meaning, and meaninglessness. Searches were limited to studies published in English and the time period was unspecified..

The search identified 17 studies from MEDLINE, 66 studies from PsychINFO, 22 from CINAHL, and 29 from Web of Science. An additional search was conducted using the Google Scholar database. A total of 11 studies explored the association between meaning in life and suicide risk among older adults Titles and abstracts of the studies were reviewed. Table 3 is a summary of the 11 studies that were identified and reviewed.

The review identified five qualitative studies and six quantitative studies that examined the relation between meaning in life and suicide risk. Among the qualitative studies, losing the will to live, interpersonal factors, and autonomy emerged as themes that influenced whether older adults contemplated suicide.

<u>Theme: Losing the Will to Live</u>

Three studies noted that some older adults felt as if they had nothing left to live for and had lost the will to live (Courage et al., 1993; Kjølseth et al., 2010). For some adults, the perceived a lack of meaning in life led to the contemplation of suicide (Moore, 1997).

Courage and colleagues (1993) performed a qualitative study to investigate the attitude towards suicide ideation among 18 independently living older adults. Participants, who were recruited from geriatric outpatient clinics, answered open ended questions, including “tell me your thoughts and feelings about suicide" and "what does suicide mean to you?" Participants emphasized that having “nothing to live for" and lacking meaning was a motivator for suicide. One participated stated, "I don't think it's that the pressures are so great on the older people but that they have not so much to look forward to". These quotes suggest that older adults who feel that losing the will to live or meaning in life may lead older adults to contemplate suicide.

Kjølseth and colleagues (2010) conducted a cross-sectional psychological autopsy study to examine life experiences in the period before death of 23 Norwegian older adults who died by suicide. Qualitative interviews were conducted with informants who knew the deceased well and included relatives, family doctors and homecare nurses. Informants noted that the older adults experienced notions that there was nothing left to live for, everything that had given value to their life had been lost, and a lack of will to live prior to their death. One daughter described her father’s change as “slowly but surely he saw no meaning in the life he was living”. Some informants reported that there was an acceptance of death and some older adults expressed a wish to die and that death was better than life.

Moore (1997) conducted a hermeneutical phenomenological study to examine meaning in the lives of older adults who were experiencing thoughts of suicide. The sample was composed of 11 participants who had been voluntarily admitted to a Canadian inpatient psychiatric unit for depression and suicide ideation. General open-ended questions were used to measure past meaningful experiences, disappointments, successes and changes in how meaning is experienced currently, which included “If you were to tell your life story, how would you describe the things, the events, or whatever that have given you a sense of meaning and purpose in your life?” and “How did these influence or relate to your feeling that life is not worth living?”. Participants often described what was meaningful in their lives by describing meaninglessness. For some older adults, deep psychological pain and suffering lead to a sense of meaninglessness. One participant expressed, “I don’t

seem to care anymore. Nothing seems to have any meaning." Researchers reported that suicide ideation emerged from a sense of meaninglessness and it was suggested that health care professionals could explore life enhancing strategies, such as renewing the sense of purpose and meaning, as a means of suicide prevention.

Theme: Interpersonal Factors

Four qualitative studies identified that perceiving one's self as a burden on loved ones (Courage et al., 1993; Kjølseth et al., 2010), perceiving one's self to be "invisible" (Crocker et al., 2006) and feeling that friends and family did not care (Moore, 1997) increased suicide risk.

Crocker and colleagues (2006) conducted a qualitative study to examine the psychological pathway to suicidal behaviour and how thoughts of suicide change over time among older adults. Prior to engaging in suicidal behaviour, participants expressed feelings of invisibleness to others, isolation, loneliness and a general sense of less connectedness with the outside world. One participant noted, "I didn't think anybody would miss me. I thought no one will care, I'll end it all." Some participants felt that fatigue and functional decline reduced their ability to stay connected with friends and family.

Courage and colleagues (1993) found that being a burden on family emerged when discussing the timing of death and acceptability of suicide. Additional reasons in favour of ending one's life included being "too much of a drain on the family [and] on the finances". Consistent with Courage and colleagues (1993), Kjølseth and colleagues (2010) found that life was perceived as a burden for many participants. This view revolved around illness.

Moore (1997) found that the perceived lack of connection with friends and family and the perceived lack of caring from friends and family emerged as a common theme for factors influencing suicide ideation. Several participants felt that friends and families "who were supposed to care" no longer cared about them. Some participants desired a sense of

connection with individuals and relationships from the past and experienced a sense of alienation.

Theme: Autonomy

Three studies found that the perceptions of losing oneself, needing assistance (Kjølseth et al., 2010), powerlessness (Moore, 1997), and losing control (Crocker et al., 2006) increased risk for suicide among many older adults.

Crocker and colleagues (2006) observed that loss of control over important aspects of their lives and functioning, and an overall reduction in independence and autonomy were themes that emerged as possible risk factors contributing to decisions to engage suicidal behaviour. A participant expressed, "I've been independent since I was born […] I never really depended on anybody or relied on anybody". When this sense of independence was combined with the perceived loss of control, participants began to experience feelings of helplessness and depression. As noted by one participant, "Once I retired, I had no further aim, and had nothing to get up for. I didn't know what to do with my day." Suicidal behaviour was an attempt to escape desperation and helplessness.

Similar to Crocker and colleagues (2006), Kjosleth (2010) observed that many older adults were "action-oriented persons" throughout their lives, and functional decline took away their freedom of action. Moore (1997) found that failing health and feelings of powerlessness caused participants to perceive that they had no role. One participant expressed that, "I got nothing and I gotta depend on them [my children]. I got no place." Health, functional dependency and control may be of importance for individuals in advanced old age and may elevate risk for suicide.

Theme: Meaning in Life as a Source of Resilience

Two qualitative studies found that discovering new interests and attitudes provided older adults with meaning and contributed to a decision to live (Bennett, 2005; Crocker et al., 2006).

Bennett (2005) conducted a qualitative study to examine the feelings and changes during bereavement among 60 widowed men. Participants had been widowed between three months and 25 years (M=7 years, SD=unreported). Questions regarding the time during the death of their spouse assessed the emotions they experienced and the support they had from their friends and family. Questions also measured changes, including what they did and how they felt one year on and currently. Several men thought at least to some degree about suicide and consciously thought about the decision to end one's life. Although some men explicitly spoke about suicide, other widowers discussed that they had made a firm decision to continue living. The men who made a decision to live also experienced changes in their behaviour, emotion, and attitude. Some men began participating in activities and attending concerts. Other men felt as if they were once lost and then found and described this as an emotional turning point.

Crocker and colleagues (2006) observed that participants felt a re-engagement with society or felt more visible to others and experienced a change in attitude after engaging in suicidal behaviour. As one had said, "since I've come back from the hospital it's opened up like a flower […] I've had a great many people do wonders for me, who have given me a new lease of life." Participants experienced a renewed energy and interest in life from the growing sense of being connected with others and being "visible" to others.

Consistent with the qualitative research findings, quantitative studies have shown that meaning in life is negatively associated with suicide ideation, after controlling for suicide risk factors (Buchanan, 1993; Heisel & Flett, 2007, 2008). Buchanan (1993) conducted a cross-sectional study among 160 older adults. Among the participants, 80 were non depressed older adults and 80 were depressed older adults. Meaning in life was measured with the Life Attitude Profile-Revised (Reker, 1990). Suicide risk was assessed using items on past, current suicide ideation, and the presence of a suicide plan. Results showed that higher levels of meaning in life were associated with higher levels of social support, and lower levels of past suicide ideation and current suicide ideation. Older adults with current and/or past suicide ideation had lower levels of meaning in life and higher levels of depressive symptomatology, compared to adults without suicide ideation.

Heisel and Flett (2008) examined the association between suicide ideation and meaning in life among a sample of older adults. Meaning in life remained a significant correlate of suicide ideation, after adjusting for the suicide risk and resilience factors, including purpose in life and social variables. Similar to Heisel and Flett (2008), Heisel and Flett (2007) found that resilience factors were negatively associated with suicide ideation and risk factors were positively associated with suicide ideation in a sample of 107 older adults recruited from community centers, nursing residence, and general hospital settings. Meaning in life was significantly associated with suicide ideation, controlling for sex, age, health rating, depressive symptom severity, social hopelessness, purpose in life and satisfaction with life. These findings suggested that meaning and purpose in life are related, but distinct constructs. The researchers suggested that purpose in life may have a future orientation. Heisel and Flett (2007) also observed a significant interaction among meaning in life, depressive symptom severity, and suicide ideation, after adjusting for sex and age. This finding may suggest that the negative effects of depression on suicide ideation may be greater when perceptions of meaning in life are low.

Finding meaning in life has been used as a therapeutic approach among patients (Fitzpatrick, 2008). Researchers have found that interventions aimed at decreasing risk factors or improving resilience have been shown effective in reducing suicide risk (Breitbart, Rosenfeld, & Gibson, 2010; Heisel et al., 2009; Lapierre et al., 2007).

Lapierre and colleagues (2007) conducted a case-control study to evaluate an intervention primarily aimed at helping the participants set, plan, pursue, and realize their personal goals among early retirees who were 50 to 65 years old and considered ending their lives. Participants were recruited through associations of retirees and ads in the local newspaper. Individuals were non-randomly divided into two groups; 10 individuals who received the intervention and 11 controls that did not. The intervention was composed of 10 to 12 meetings of two hour weekly sessions discussing various goal- related topics, such as goal setting, planning and evaluation. Individuals who received the intervention and developed meaningful goals experienced lower levels of depressive symptomatology and suicide ideation at the post-intervention and the six month follows up, compared to individuals who did not receive the intervention.

Heisel and colleagues (2009) conducted a study to examine the effects of Interpersonal Psychotherapy (IPT) for older adults who were 60 and older at risk for suicide. This study examined the change in suicide ideation and perceived meaning in life after receiving psychotherapy among eleven patients that were recruited and underwent a 16 week course of IPT. Preliminary study findings showed significant differences were found for GSIS total scores and meaning in life approached significance between pre and post treatment. Full study findings showed significant improvement in meaning in life (Heisel, Duberstein, Talbot, King, & Tu, 2010), which suggests that older adults experienced an increase in meaning in life and decrease in suicide ideation after receiving therapy.

Breitbart and colleagues (2010) conducted a randomized controlled trial to examine the effect of an 8-week course of Meaning Centered Group Psychotherapy (MCGP), which was influenced by the work of Viktor Frankl, to help patients with advanced cancer to enhance or sustain a sense of meaning in life. Ninety patients were randomly assigned to receive either MCGP or supportive group psychotherapy (SGP). The results showed that individuals who received MCGP experienced significantly greater improvements in a sense of meaning and desire for death after receiving the 8-week intervention and at a 2-month follow-up interview. Although this study measured desire for death, researchers have suggested that suicide ideation may be shown in requests for hastened death (Filiberti & Ripamonti, 2002). Significant improvements were not found for patients receiving SGP. Incorporating meaning centered therapy into interventions may be beneficial for patients at the end of life.

Past research has shown that meaning in life may lower suicide risk. Qualitative studies have revealed that losing the will to live, interpersonal factors, and autonomy were factors that influenced whether older adults contemplated suicide; however, discovering new interests and attitudes provided older adults with meaning and contributed to a decision to live. Quantitative studies have shown that meaning in life is negatively associated with suicide ideation and researchers have also found that interventions aimed at decreasing risk factors or improving resilience have been shown effective in reducing suicide risk among samples of retired adults age 50 years old experiencing suicide ideation, inpatients and outpatients, and terminally ill cancer patients. The longitudinal

association between meaning in life and suicide ideation using data collected from community-residing older adults has not yet been reported and this longitudinal relation in the presence of risk factors has not been explored.

Table 3 Summary of studies examining meaning in life and suicide risk

Study	Study design	Country	Sample	Measure of meaning in life	Measure of suicide risk	Study findings/Model fit
Kjølseth et al. (2010)	Psychological autopsy study	Norway	23 older who died by suicide (M = 78 years, Range = 65 to 90) 63 informants that knew the deceased well		Open ended questions regarding examine life experiences in the period before death	-themes: nothing left to live for (perceived lack of MIL), life was perceived as a burden, and losing oneself/needing assistance
Courage et al. (1993)	Qualitative	USA	18 independently living older adults (range = 67 to 84 years)		Open ended question, "Tell me your thoughts and feelings about suicide. What does suicide mean to you?"	-themes: losing the will to live (perceived lack of MIL) and being a burden on family were motivators for contemplating suicide
Moore (1997)	Qualitative hermeneutical phenomenological study	Canada	11 voluntary inpatients of a psychiatric unit admitted for depression and suicide ideation (range = 64 to 92 years)	Open ended questions regarding past meaningful experiences, disappointments, and factors influencing the feeling that life was not worth living		-participants often described what was meaningful in their lives by describing the meaninglessness -themes: the perception that friends and family no longer cared, feelings of powerlessness, and deep psychological pain and suffering led to feelings of despair and perceived meaninglessness
Bennett (2005)	Qualitative	United Kingdom	60 widowed men (M=79 years, range=55 to 98)	Questions regarding the changes that have occurred in widowhood (emotions, hobbies, etc.)		-although several men thought at least some degree about suicide, others made a firm decision to continue with life -themes: carelessness of life, the decision to live, and finding new sources of MIL (emotional or behavioural turning points, discovering a new interests)

Study	Study design	Country	Sample	Measure of meaning in life	Measure of suicide risk	Study findings/Model fit
Crocker et al. (2006)	Qualitative	United Kingdom	9 older women and 6 older men diagnosed as depressed at the time of the suicidal behaviour within the last 20 weeks and recommended by mental health services (M=69.5 years, range = 65-91)	Open ended questions exploring the psychological pathway and factors contributing to suicidal behaviour and changes in suicide ideation over time	**Suicidal behaviour**	-themes: struggle (experiencing life as a struggle before and in relation to growing older), control (trying to maintain control over life), visibility (feeling invisible or disconnected), and discovering MIL
Buchanan (1993)	Cross-sectional	Canada	Total: 160 older adults (M=74 years, range = 65 to 95) 80 non depressed older adults (M=73.1 years, SD=6.6) 80 depressed older adults (M=74.6years, SD=6.2)	Life Attitude Profile-Revised (Reker, 1990)	**Suicide ideation:** Questions regarding past, current suicide ideation, and presence of suicide plan	-higher levels of MIL were associated with higher levels of social support [r=0.619, p<0.0005], and lower levels of past suicide ideation [r=0.415, p<0.0005] and current suicide ideation [0.236, p<0.005] -older adults with current and/or past suicide ideation had lower levels of MIL [t(158)=-5.73, p<0.001] and higher levels of depressive symptom severity [t(158)=4.59, p<0.001], compared to adults without suicide ideation
Heisel & Flett (2007)	Cross-sectional	Canada	107 older adults living independently or in care-providing facilities (M=81.5 years, SD=7.7)	GSIS-Meaning in life item, "I feel that my life is meaningful"	**Suicide ideation:** GSIS	-MIL was associated with suicide ideation [B=-3.59, p=0.022], after adjusting for sex, age, health rating, depressive symptom severity, hopelessness, purpose in life, and satisfaction with life -the interaction between MIL and depressive symptom severity on suicide ideation was statistically significant [B=-.27, p=0.048 one-tailed], after adjusting for sex, age, and the main effects of meaning in life and depressive symptom severity

Study	Study design	Country	Sample	Measure of meaning in life	Measure of suicide risk	Study findings/Model fit
Heisel & Flett (2008)	Cross-sectional	Canada	107 older adults living independently or in care-providing facilities (M=81.5 years, SD=7.7)	GSIS-Meaning in life item, "I feel that my life is meaningful"	**Suicide ideation:** GSIS	-MIL was associated with suicide ideation [β=-0.25, B=-4.97, p=0.002], after adjusting for sex, age, cognitive functioning, mental health status, psychological well-being, religious involvement (attended service, conducted rituals), # of children and grandchildren, depressive symptom severity and number of perceived physical health problems
Lapierre et al. (2007)*	Case-control	Canada	Total: 21 retired adults age 50+ years who experienced suicide ideation, (M=56.7 years, SD=2.36) 10 individuals receiving intervention 11 control individuals	Psychological Well-being Scale - Purpose in life subscale (Ryff, 1989)	**Suicide ideation:** Survey item, "During the last week, did you think about ending your life?"	-individuals who received the intervention reported higher levels of purpose in life post treatment [p=0.006] compared to older adults who did not receive the treatment and at the 6-month follow up approached statistical significance [F(2,38)=3.06, p=0.058] -a greater proportion of the experimental group [80%] reported the absence of suicide ideation at the 6-month follow-up, compared to the control group [30%], pvalue=unreported
Heisel et al. (2009)*	Pre-post treatment study	Canada	11 adults age 60+ years referred by clinical staff in inpatient, outpatient, and outreach geriatric mental health and/or medicine services (M=69.4, SD=4.9)	GSIS-Perceived Meaning in life subscale	**Suicide ideation:** GSIS and SSI-C	-after receiving 16-session course of interpersonal psychotherapy, individuals experienced decreased levels of suicide ideation [GSIS Δ=13.0, CI=2.5 to 23.5, p=0.02; SSI-C Δ=1.6, CI=-0.6 to 3.9, p=.14] and increased levels of MIL that approached statistical significance [Δ=3.0, CI=-0.3 to 6.3, p=0.07]

Study	Study design	Country	Sample	Measure of meaning in life	Measure of suicide risk	Study findings/Model fit
Breitbart et al. (2010)*	Randomized controlled trial	U.S.A	90 terminally ill cancer patients age 18+ (M=60.1, SD= 11.8, range=21-84) 49 individuals received Meaning Centered Group Psychotherapy (MCGP) 41 individuals received Supportive Group Psychotherapy (SGP)	FACIT Spiritual Well-Being Scale-Meaning subscale (Brady, Peterman, Fitchett, Mo, & Cella, 2000)	**Suicide ideation:** Schedule of Attitudes toward Hastened Death (Rosenfeld, Breitbart, & Stein, 1999)	-after receiving the 8-week intervention, individuals receiving MCGP resulted in significantly greater improvements in a sense of MIL[$t(36)=4.51$, $p<0.0001$] and desire for death [$t(50)=1.76$, $p=0.09$] - improvements in MIL [$t(25)=5.29$, $p<0.0001$] and desire for death [$t(25)=2.09$, $p=0.04$] continued to be present at a 2-month follow-up interview among patients receiving MCGP -no significant improvements in MIL [$p=0.26$] and desire for death [$p=0.71$] were found for patients receiving the SGP

Note: study participants were 65 years or older unless otherwise specified; MIL = Meaning in life; *interventions that have incorporated meaning and/or purpose in life to reduce suicide risk

2.5 Existing Models/ Theories of Suicide Risk

A number of theories have been developed in recent decades outlining potential causal pathways to suicide with applicability to at-risk older adults (e.g., Baumeister, 1990; Clark, 1993; Heikkinen, Aro, & Lönnqvist, 1993; Joiner, 2005). Each of these theories focuses on predisposing risk factors, such as unrealistic self-expectations, perceived interpersonal isolation, and lack of adaptive character traits, to explain the factors that may increase suicide risk. These theories all posit that an interaction of these predisposing risk factors with acute stressors may increase risk for suicidal thoughts and/or behaviour. In this section, I will discuss four theories and provide a summary of study results that were based upon each theory.

2.5.1 Baumeister's (1990) Escape From Self Theory of Suicidal Behaviour

In his Escape From Self Theory, Baumeister (1990) describes suicide as a method of escaping painful self-awareness that results from a perceived inability to meet one's unrealistically high self-expectations (see Figure 4). Baumeister (1990) posits that an individual experiences six main stages before engaging in suicidal behaviour, including 1) *Falling short of standards*, 2) *Attributions to self*, 3) *High self-awareness*, 4) *Negative affect*, 5) *Cognitive deconstruction*, 6) *Reduced inhibitions*.

Figure 4 Escape From Self Theory of Suicidal Behaviour (Baumeister, 1990)

This process begins when an individual perceives that he/she has *fallen short of standards*, which may involve personal goals imposed on oneself or by others. This belief of falling below a standard may be contributed by high expectations, and/or recent setbacks, failures or stressors. If these expectations were low or if these stressors did not occur, feelings of perceived unmet expectation may not develop and may decrease the risk of engaging in suicidal behaviour.

Risk of suicidal behaviour is elevated when the individual makes *negative self-attributions*, such that he/she is personally responsible for *falling short of standards*. Baumeister (1990) posits that these self-attributions can be characterized by negative self-perceptions. When these events are internalized, the individual may experience self-blame and low esteem; however, when events are perceived as a result of external causes, a person's sense of self-image may be unaffected.

After an individual's unmet expectations are attributed to personal factors, the individual may become *highly self-aware* and extremely self-focused. The high frequency of first-person pronouns in suicide notes is consistent with the notion that high self-awareness is associated with suicide risk (Baumeister, 1990). This state of high self-awareness may come from self-comparisons with particular standards, which may cause a perception of inadequacy, incompetency, unattractiveness and guilt, and lead to the fourth stage of this theory, *negative affect*. In this phase, the individual may experience feelings of depression and anxiety.

To escape these negative emotions, this individual may enter a state of *cognitive deconstruction*, in which the individual becomes numb to these negative thoughts. Baumeister (1990) posits that there are three signs of deconstruction: time perspective, concreteness, and proximal goals. Having a time perspective involves a focus on the present with little attention placed on the future. Measures of hopelessness may be indicators of one's lack of future awareness and emphasis on the present time (Baumeister, 1990). Concreteness is the focus on immediate movements and sensations rather than broader ideas associated with high-level thinking. Proximal goals focus on immediate action, rather than distal and future goals.

Prior to engaging in suicidal behaviour, the individual may experience disinhibition, passivity, absence of emotion and irrational thought, which are all consequences of cognitive deconstruction. This state may reduce inhibitions, such that normally irrational behaviour may seem rational and may increase willingness to die by suicide. Individuals may experience passivity, which may involve evading responsibility and implications for the self, rather than taking initiative and considering the meaning and implication of actions. Feelings of helplessness may be indications of passivity (Baumeister, 1990). Lack of emotion may be an indication of escaping painful emotions and avoiding meaningful comparisons with self. Lastly, individuals may experience irrational thoughts of escaping reality. As a result, suicide becomes a means of escape from these negative feelings caused by an inability to meet high personal expectations.

Baumeister's (1990) theory incorporates underlying risk factors and stressors to describe why an individual may engage in suicide-related behavior; however, Baumeister (1990) does not discuss the potentially protective effect of resilience factors. This theory may explain why some individuals engage in suicidal behaviour and has been partially supported among studies that have tested this theory (Dean, Range, & Goggin, 1996; Dean & Range, 1996, 1999; Reich, Newsom, & Zautra, 1996).

2.5.1.1 A Closer Look at Studies That Have Tested Baumeister's (1990) Escape From Self Theory of Suicidal Behaviour

Although Baumeister (1990) provides evidence for each stage when describing his Escape From Self Theory of Suicide, there are few empirical studies that have explicitly tested his model. Appendix A lists studies that have tested Baumeister's (1990) theory and provides information regarding the study population, operationalization of constructs, suicide-related outcome, and study findings.

Baumeister's (1990) theory has been tested among older adults experiencing suicide ideation (Reich et al., 1996). This study used data from the Life Events and Aging Project, a project that examined life stressors, including physical disability and bereavement, and mental health among 212 older adults. The sample was composed of older adults who were selected for having recently experienced poor health events or

bereavement and age- matched controls. The model provided a good fit with the data and all hypothesized paths were significant, except the path from helplessness to suicide ideation, which suggests that *reduced inhibitions and increased willingness for suicide* does not lead to suicide ideation. Although these findings may appear to be inconsistent with Baumeister's (1990) theory, his theory describes suicidal behaviour, rather than suicide ideation.

Among studies that have tested Baumeister's (1990) theory, two studies were composed of samples of undergraduate students and one study was composed of clinical outpatient adults. Although the overall model fit statistics were unreported in a study of 168 undergraduate students (Dean & Range, 1996), researchers have reported a good model fit in another study of 114 undergraduate students (Dean et al., 1996). This finding was also observed in a sample of 132 clinical outpatient adults (Dean & Range, 1999). Although the reviewed studies may support Baumeister's (1990) theory, the study design and validity of these studies are further discussed in Appendix A.

Baumeister's (1990) Escape From Self theory has been partially supported by studies (Dean et al., 1996; Dean & Range, 1996, 1999; Reich et al., 1996). Baumeister (1990) focuses on excessively high expectations as an initiating factor, which may explain suicide risk for a subset of individuals. A broader theory may model suicide risk for a greater number of older adults, compared to a theory with a narrow perspective, focusing exclusively on high expectations.

The focus on suicide risk factors is important; however, incorporating resilience factors in a theory may provide an enhanced the understanding of suicide risk. Baumeister (1990) posits that risk factors may have an effect on the likelihood of engaging in suicidal behaviour and his theory may be improved with the inclusion of factors that may confer resilience to suicide. Similar to Baumeister (1990), Clark's (1993) Wedding Cake Model also incorporates underlying risk factors and stressors to describe why an individual may engage in suicide-related behaviour.

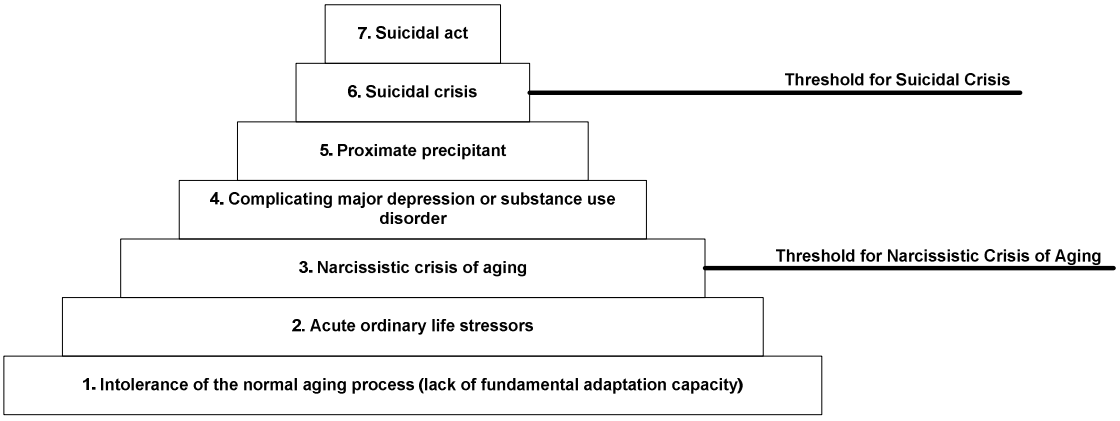
2.5.2 Clark's (1993) Wedding Cake Model of Suicidal Behaviour

In his Wedding Cake Model of Suicidal Behaviour (see Figure 5), Clark (1993) theorizes that a large proportion of older adults who die by suicide *lack the character trait of adaptation*, which is only visible during age-related changes, such as physical decline. These individuals are proud, independent, and choose not to rely on other people for basics. These individuals may experience *ordinary daily stressors* of aging, which may include physical decline, increasing limitations on physical and mental functioning, and increasing unwanted needs to rely on others for assistance with activities of everyday living.

These ordinary daily stressors may increase and accumulate, and the older adult may experience a "*narcissistic crisis of aging*" if their tolerance for age-related changes is exceeded. In this state, one may express suicide ideation or the capability for suicidal behaviour. Suicide risk is further elevated if this older individual experiences a *mental disorder*, such as major depression or a substance use disorder, and experiences feelings of despair and loss of insight.

An ordinary life stressor may then overwhelm the older adult's capacity to cope with the age-related changes and may act as a triggering event, also known as a "*proximate precipitant*", for a "*suicidal crisis*". The older adult may experience panic and rage during a "*suicidal crisis*" and Clark (1993) posits this older adult may take one's life to escape the painful distress inherent in a suicidal crisis.

Figure 5 Wedding Cake Model of Late Life Suicidal Behaviour (Clark, 1993)



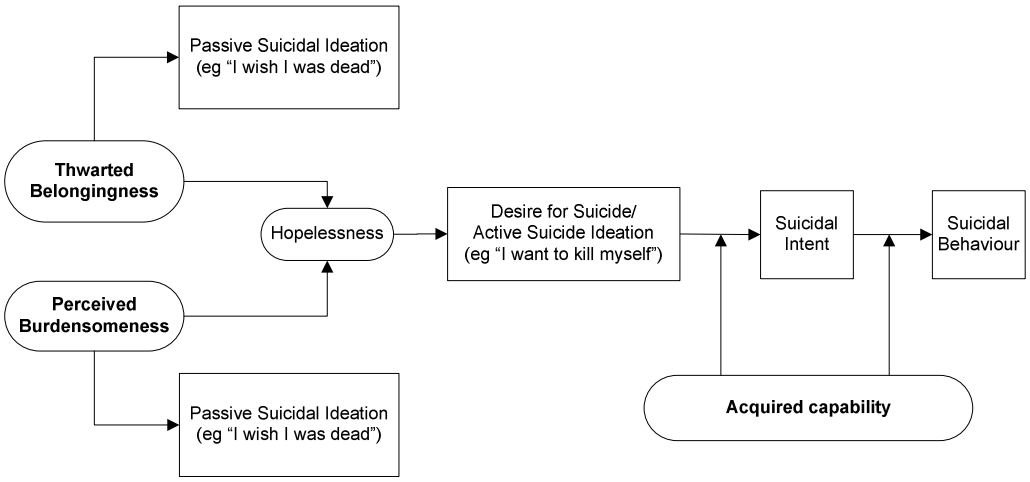
Clark's (1993) Wedding Cake Model of Suicidal Behaviour has been mentioned in research on physician-assisted suicide (Conwell, 1994) and late life suicide (Cohler & Jenuwine, 1995), and has been explored among older adults (see Appendix B for summary). In a sample of 538 older adult psychiatric patients, narcissistic personality disorder conferred suicide risk among depressed older adults (Heisel, Links, Conn, Van Reekum, & Flett, 2007).

Clark (1993) developed this Wedding Cake Model of Suicidal Behaviour to emphasize certain recurring clinical features to alert the clinician to potential warning signs of suicide. Clark's (1993) theory, similar to Baumeister's (1990) Escape From Self Theory of Suicide, explains the stages leading up to suicidal behaviour, beginning with a predisposing risk factor related to self-image, high expectations and personality. In both theories, feelings of negative affect develop and suicide risk is further elevated when the individual turns to either cognitive deconstruction (Baumeister, 1990) or substance abuse (Clark, 1993) to cope with these negative feelings. Theories and models that focus on predisposing risk factors related to self-image, high expectations and personality may not explain reasons for engaging in suicidal behaviour for many older adults. Harwood and colleagues (2001) conducted a psychological autopsy study and found that 56% of older adults who died by suicide did not have a personality disorder or maladaptive personality traits. Theories of suicide risk may be further enhanced with the inclusion of both risk and resilience factors.

2.5.3 Joiner and colleagues' (2005) Interpersonal Theory of Suicide

Psychological factors have been shown to play a key role in contributing to the onset and/or exacerbation of suicidal thoughts among older adults. In the Interpersonal Theory of Suicide, also known as the Interpersonal- Psychological Theory, Joiner and colleagues (Joiner, 2005; Van Orden et al., 2010) discuss three main theoretical constructs to illustrate the negative impact that interpersonal factors may have on suicide. Two of these theoretical constructs focus on interpersonal variables, *perceived burdensomeness* and *thwarted belongingness*, and one focuses on personal ability, *acquired capability* (see Figure 6).

Figure 6 Interpersonal Theory of Suicide (Joiner, 2005; Van Orden et al., 2010)



Older adults who perceive that they are a burden upon loved ones or on society may experience passive thoughts of suicide. Joiner and colleagues (2005) posit that this *perception of burdensomeness* may be promoted by feelings of self-hate (e.g. low self-esteem, self-blame) and liability (e.g. my death is worth more than my life to others). Older adults may also experience passive suicide ideation if they feel that they do not belong among a valued social group or significant others. Joiner and colleagues (2005) call this feeling *thwarted belongingness* and hypothesize that low belongingness may be fostered by feelings of loneliness (e.g. feeling disconnected from others) and lack of reciprocal care (e.g. having no one to turn to and not supporting others).

Suicide risk is elevated when the on-going *perceptions of burdensomeness* and *thwarted belongingness* lead to hopelessness regarding the likelihood of ever experiencing satisfying interpersonal relations, and thus precipitate a strong desire for suicide or active suicide ideation. When such an older adult *acquires the capability for suicide*, by continued exposure to suicidal thoughts and/or behaviour, he or she might ultimately kill his or her self.

The focus on interpersonal factors reflects the strong association between social factors and suicide risk. Joiner and colleagues' (2005) Interpersonal Theory of Suicide has been partially supported among studies that have tested this theory.

2.5.3.1 A Closer Look at Studies That Have Tested Joiner and Colleagues' (2005) Interpersonal Theory of Suicide

The reviewed studies cover the life span with two study samples composed of undergraduates, two studies composed of young adults, one study of adult outpatients, one study of adults 55 years or older, and one study of adults 60 years or older. Appendix C lists these studies and shows the constructs included in the model, the scales used to operationalize these constructs, study design and findings.

Two studies have examined the associations between *perceived burdensomeness* and suicide ideation among community-residing adults (Cukrowicz, Cheavens, Van Orden, Ragain, & Cook, 2011). Both cross-sectional studies that explored this association used the Interpersonal Needs Questionnaire (INQ) as a measure of *perceived burdensomeness* and the 10 item Suicide Ideation Subscale of the Geriatric Suicide Ideation Scale as a measure of suicide ideation. The first study was composed of a sample of 57 community-residing adults 55 years and older (M=74.14 years, SD=7.51) and results showed that the association between *perceived burdensomeness* and suicide ideation was statistically significant, after adjusting for age, depressive symptom severity, and loneliness (Cukrowicz et al., 2011). The second study was composed of 105 adults over 60 years old (M=70.89 years, SD= 7.63), who were recruited from a primary care setting, and replicated findings from the first study, such that *perceived burdensomeness* predicted suicide ideation, after adjusting for age, depressive symptom severity, loneliness, health and sex (Cukrowicz et al., 2011). Older adults who perceive that they are a *burden* to others may experience thoughts of suicide, which provides partial support for Joiner's (2005) Interpersonal Theory of Suicide.

There is a lack of consistency in the results of studies testing Joiner's (2005) Interpersonal Theory of Suicide among samples of young adult and adult populations. In a sample of 309 undergraduate students, sense of belongingness, a measure of *thwarted belongingness*, was found to be a significant predictor of suicide ideation (Van Orden, Witte, James, et al., 2008). In contrast, Van Orden, Witte, Gordon, Bender, and Joiner (2008) observed that *thwarted belongingness* was not statistically significant in predicting suicide ideation when *perceived burdensomeness* was included in the model in the same

sample of 309 undergraduate students. The interaction between *thwarted belongingness* and *burdensomeness* did predict suicide ideation, suggesting that the sense of *thwarted belonging* is associated with suicide ideation, only at high levels of *perceived burdensomeness*.

Similar to the findings reported by Van Orden, Witte, Gordon, and colleagues (2008), Joiner and colleagues (2009) found that the interaction between *perceived burdensomeness* and *thwarted belongingness* was associated with suicide ideation in sample of 815 young adults who endorsed sadness or anhedonia. Building on the findings of Joiner and colleagues (2009), researchers observed a statistically significant three-way interaction among *perceived burdensomeness*, *thwarted belongingness*, and *acquired capability* in predicting suicidal behaviour among 313 young adults (Joiner, et al., 2009). The main effects of *perceived burdensomeness* and *thwarted belongingness* and the two-way interaction were not statistically significant in the study.

The findings regarding acquired capability from Joiner and colleagues (2009) were partially replicated in a sample of 153 adult psychiatric outpatients. Although *thwarted belongingness* was not assessed and the main effects of both *perceived burdensomeness* and *acquired capability* were not statistically significant, the interaction between *perceived burdensomeness* and *acquired capability* predicted suicide risk (Van Orden, Witte, Gordon, et al., 2008). The study design and validity of these studies are further discussed in Appendix C.

Although Joiner's (2005) Interpersonal Theory of Suicide has been partially supported by studies (Cukrowicz et al., 2011; Joiner et al., 2009; Van Orden, Witte, James, et al., 2008), Joiner and colleagues' (2005) Interpersonal Theory of Suicide seems to be incomplete. The previously discussed theories of suicide posit that predisposing factors, such as unrealistically high self-expectancies (Baumeister, 1990) and personality traits (Clark, 1993), may increase suicide risk when combined with stressors. Although Joiner doesn't seem to articulate predisposing factors in his model, predisposing attachment difficulties may increase suicide risk when combined with perceived interpersonal stressors. Similar to Baumeister's (1990) theory and Clark's (1993) model, the

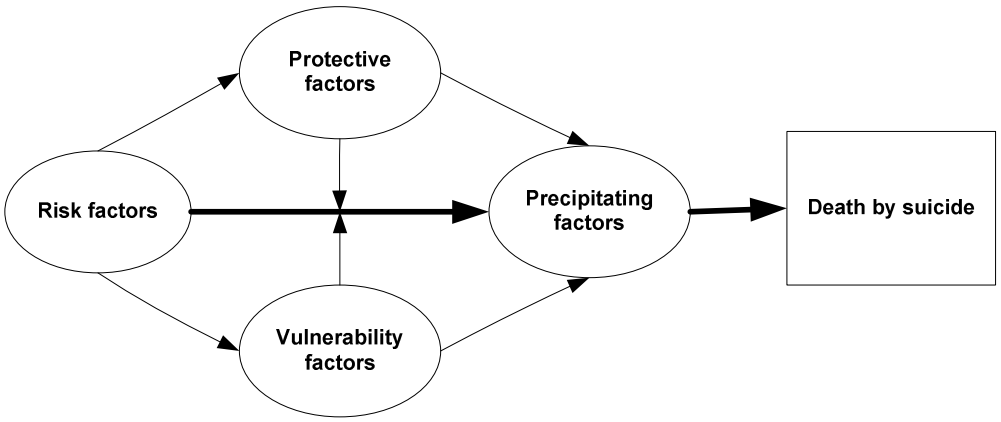
understanding of suicide risk among older adults may be enhanced with the inclusion of resilience factors in Joiner and colleagues' (2005) Interpersonal Theory of Suicide.

2.5.4 Heikkinen and colleagues' (1993) Process Model of Suicide

Heikkinen and colleagues (1993) incorporate underlying risk factors, stressors, and protective factors in their Process Model of Suicide (see Figure 7). These theorists posit that suicide results from a combination of predisposing biological, psychological, and social risk factors together with precipitating factors, such as adverse life events or other psychosocial stressors.

Heikkinen and colleagues (1993) posit that protective factors, such as having strong social support, available relatives, or being married, may potentially buffer the negative impact of risk and precipitating factors. Supportive social networks may provide the meaning for living or buffer the effects of adverse experiences. Heikkinen and colleagues (1993) posit that individuals balance risk and protective factors over the course of their life and if protective factors begin to diminish, the factors become unbalanced, which may increase the vulnerability for death by suicide. The lack of protective factors or the presence of predisposing vulnerability factors, such as living alone, may increase suicide risk.

Figure 7 The Process Model of Suicide (Heikkinen et al., 1993)



Although the model has not been empirically tested, Heikkinen and colleagues' (1993) Process Model of Suicide incorporates protective factors that are theorized to counteract

the negative risk/precipitating factors in a model to explaining suicide risk. The Process Model was developed based on the literature on life events and social support. It focuses primarily on social support in protecting against risk and vulnerability factors to decrease suicide risk. Heikkinen and colleagues (1993) suggest that social support may decrease suicide risk by providing meaning in life; however, sources of meaning in life that are unrelated to interpersonal relationships are not further discussed.

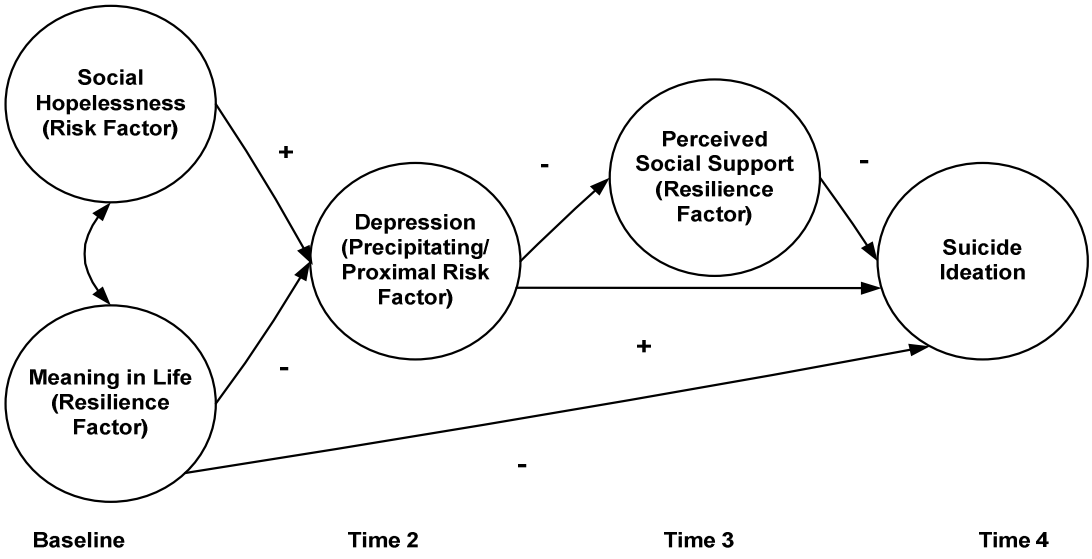
2.5.5 Summary of Models/Theories of Suicide Risk

We examined Baumeister's (1990), Clark's (1993), Joiner and colleagues' (2005), and Heikkinen and colleagues' (1993) models/theories of suicide risk. Each of these models/theories focus on risk factors, such as unrealistic self-expectations, perceived interpersonal isolation, and lack of adaptive character traits, to explain the experiences that may increase the likelihood of engaging in suicidal behaviour or dying by suicide. Among these model/theories, only Heikkinen and colleagues' (1993) model incorporates protective factors to lower suicide risk; however, these researchers focus primarily on social support as a source of resilience and the model has not been empirically tested.

2.6 Our Proposed Multidimensional Model of Late Life Suicide Ideation

We have developed a model of late life suicide ideation. Our model builds upon and extends the previously discussed theories and is consistent with the reviewed literature on the associations among risk and resilience factors, and suicide ideation (See Figure 8).

Figure 8 Our Proposed Theoretical Model of Suicide Ideation



Similar to Heikkinen and colleagues' (1993) Process Model of Suicide, we have incorporated resilience into our model to suggest that the inclusion of these factors will assist in the understanding of suicide risk. Heikkinen and colleagues (1993) and Joiner and colleagues (2005) have posited that social factors, including social support and perceptions of thwarted belongingness and burdensomeness, may have an effect on suicide risk. In our model, we examined the perception of being supported by others; however, we also posited that the inclusion of meaning in life in our model may extend these theories, recognizing that social support may be a source of resilience for some individuals, but not for all. Meaning in life may be a broader source of resilience for individuals to draw upon when experiencing life stressors, challenges, and difficulties.

Comparable to Baumeister's (1990) Escape from Self Theory of Suicide and Clark's (1993) Wedding Cake Model of Suicidal Behaviour, we included predisposing risk factors in our model. We posited that individuals who experience a pre-existing sense of hopelessness regarding their social situation may develop suicide ideation over time if these individual also experience a depressed mood. This depressed mood may result from recent stressors, loss of loved ones, or family discord. We posited that the perception of being supported by friends and family is coloured by mood, such that individuals with a depressed mood may feel a lack social support.

In this study, we incorporated risk, precipitating/proximal, and resilience factors in our proposed model, which may explain why some older adults experience suicide ideation. We have included the stories of hypothetical older adults to further illustrate how an older adult may develop thoughts of suicide over time.

Imagine that William, the first hypothetical older adult, has recently retired from his job, where he has been a loyal employee for 25 years. Because of his demanding career, he had little time to develop many satisfying and strong relationships. Although he has been surrounded by his children, his wife has recently passed away. They had been married at a young age and she was the closest person with whom he had ever connected. Since her passing, he has felt utterly alone and has lost hope that this situation will change. As time goes on, William experiences several physical and cognitive problems. In addition, he has begun to feel a multitude of emotions, from helplessness and frustration to sadness and anger, because he has not been able to do the things that were once very easy to do. He has felt that there are few people in his life whom he could count on, felt invisible, and disconnected from friends and family. Occasionally, William would contemplate the idea of ending his life or falling asleep and not waking up. In addition to these negative feelings, he has realized that there are few things that bring joy and meaning to his life. Suicide risk is high for this particular older adult, who has few social connections and interactions and few sources of meaning in life to confer resilience against suicide.

Ellie, the second hypothetical older adult, may be considered to be the opposite case of William. Ellie has a large supportive network, frequently engages in volunteer work, and is actively involved in the community. Although she has experienced occasional difficulties with activities of daily living, such as cleaning and cooking, she has found hobbies to provide enjoyment, including occasionally gardening, knitting, and dancing at the local community center. This older adult is exposed to factors that confer resilience against suicide and, therefore, this person may be a lower risk for suicide compared to the first hypothetical older adult.

Thomas, the third hypothetical older adult, is an individual who is a combination of the first and second hypothetical older adults. Similar to William, Thomas has few satisfying

social connections; however, this has been a common feeling throughout his life. Over the years, Thomas has found ways to cope with the lack of social relations by focusing on leisure pursuits, including reading, writing, listening to music, and occasional wood-working projects. This older adult may be at risk for suicide, but he has found sources of meaning to confer resilience against suicide, despite having few social resources.

These fictional vignettes of hypothetical older adults illustrate how risk, precipitating, and resilience factors may influence the onset or exacerbation of suicide ideation among community-residing older adults. In this current study, we longitudinally examined these associations by measuring each variable at a different time point. For example, social hopelessness was assessed at time 1 to test whether it may be a pre-disposing risk factor. Depression and perceived social support were measured at times 2 and 3, respectively, to demonstrate their development over time in the model. Meaning in life was assessed at time 1 to indicate that it may be an enduring source of resilience, present from the beginning. Lastly, suicide ideation, the outcome of interest, was measured at time 4.

2.7 Summary

Our review of the literature examined the associations among meaning in life, perceived social support, and suicide ideation and explored existing theories and models of suicide risk. In the current thesis, we test our multidimensional model of late life suicide ideation, which builds on the existing theories and models of suicide risk, in a sample of community-residing older adults. We use longitudinal data, advanced statistical techniques, and psychometrically evaluated scales for suicide ideation.

Chapter 3

3 Methods

In this chapter the methods and procedure of this study will be discussed and will include a description of the 1) study design, 2) study sample, 3) measures that were used, and 4) statistical analyses.

3.1 Study Design

Data were collected in the context of a longitudinal cohort study investigating risk and resiliency to the onset/exacerbation of depression and suicide ideation among community-residing older adults. Information regarding health and socio-demographic information of the Canadian older adults was collected.

Data collection began in 2007and ended in 2012. There were four cycles of interviews: baseline, 2-4 week, 6-12 month, and 12-24 month follow up interviews. Each cycle of interviews was composed of multiple measures of key variables that assessed risk and resiliency factors.

Participants in this study were required to provide written informed consent, a procedure approved by The University of Western Ontario Health Sciences Research Ethics Board (HSREB). The sample included 173 persons over the age of 65, with the same persons interviewed at each wave. Compensation of 25 dollars and parking validation was provided at the completion of each assessment stage.

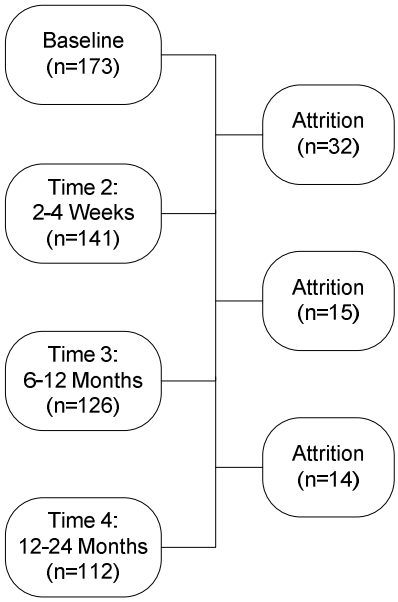
This study was funded by project funding from the Ontario Mental Health Foundation (M.J. Heisel, P.I.), a Canadian Institute of Health Research New Investigator Award (M.J. Heisel), Ontario Ministry of Research and Innovation Early Researcher Award (M.J. Heisel), Lawson Health Research Institute Internal Research Fund (M.J. Heisel, P.I.), The University of Western Ontario Graduate Scholarship (J.L. Cheng), and Queen Elizabeth II Graduate Scholarship in Science and Technology (J.L. Cheng). The Principal Investigator (Dr. Marnin Heisel) supervised data collection, analyses and interpretation and was assisted by trained research personnel.

3.2 Research Participants

A convenience sample of 173 older adults was recruited from community locations in Southwestern Ontario including libraries, community centres, senior's organizations, educational programs, exercise and wellness programs, faith communities, and newspaper advertisements. Figure 9 summarizes the sample size and attrition at the baseline, 2-4 week, 6-12 month, and 12-24 month interview phases.

Participants were included if they were 65 years of age or older and capable of speaking and understanding English. They needed to be capable of providing informed consent and of meaningfully completing study measures. This was determined using the Mini Mental State Examination (MMSE≥21), a measure of cognitive functioning (Folstein, Folstein, & McHugh, 1975). Participants were excluded if they appeared distraught, agitated, otherwise emotionally overwhelmed, intoxicated, psychotic, delirious, delusional, aggressive or intimidating to study personnel.

Figure 9 Sample size and attrition at the baseline, 2-4 week, 6-12 month, and 12-24 month interview phases



Note: Some participants might not have completed an interview, but did not leave the study entirely. For example, a participant might not have been interviewed at time 2, but completed an interview at time 3.

3.3 Study Measures

Participants were administered a battery of measures the majority of which had either been developed with or validated with older adults. Measures assessed demographic, risk, intervening, and resiliency factors. Demographic variables were measured to provide a description of the sample at the initial interview. The scales that were used to measure the variables in the proposed model are described in greater detail (See Table 4). All test materials were administered orally by the principal investigator or by a trained research assistant. Completion of the scales during each interview required approximately 90 to 120 minutes and multiple sittings and/or breaks were allowed.

3.3.1 Demographics

Demographic characteristics, including age, sex, marital status, number of children and grandchildren, living arrangements, current employment status, and self-rated physical health, were measured at the baseline interview with a demographics form that has been used in our previous research with older adults (See Appendix D). Information on the highest level of education was gathered and was used to estimate the number of years of education. Cognitive functioning was assessed using the Mini Mental State Examination at the baseline interview (Folstein, Folstein, & McHugh, 1975).

3.3.2 Geriatric Suicide Ideation Scale

The Geriatric Suicide Ideation Scale (GSIS) is a multidimensional measure of suicide ideation (Heisel & Flett, 2006), comprising 31 items with total scores ranging from 31 to 165. Items were rated with a 5 point Likert scale (1 = strongly disagree to 5 = strongly agree). The GSIS incorporates positive and negative statements, and is composed of four subscales: Suicide Ideation (e.g. "I want to end my life."), Death Ideation (e.g. "I often wish I would pass away in my sleep"), Loss of Personal and Social Worth (e.g. "I generally feel pretty worthless"), Perceived Meaning in Life (e.g. "Life is extremely valuable to me"), and one additional item accessing previous suicidal behaviour (e.g. "I have tried ending my life in the past"). One item from the Meaning in Life subscale, “I feel that my life is meaningful”, directly assessed meaning in one’s life and was excluded in all analyses in this study.

The GSIS has been shown to be reliable and valid for use with older adults. In the original validation study, internal consistency reliability of the GSIS was assessed with Cronbach's alpha (α) and with mean corrected item-total correlations (r), such that GSIS total scores (α = 0.93, r = 0.54) and Suicide Ideation (α = 0.82, r = 0.60), Death Ideation (α = 0.84, r = 0.57), Loss of Personal and Social Worth (α = 0.82, r = 0.57), and Perceived Meaning in Life (α = 0.82, r = 0.57) subscales had strong internal consistency (Heisel & Flett, 2006). In this current study, Cronbach's alpha was .925 and .920, suggesting strong internal consistency in the original 31-item GSIS and modified 30-item version, respectively.

Test–retest reliability, a measure of reliability over time, was calculated for the GSIS by having 32 nursing home residents complete the questionnaire 1-2 months after initial assessment (Heisel & Flett, 2006). Strong reliability was found for GSIS totals, Suicide Ideation, Death Ideation, Loss of Personal and Social Worth, and Perceived Meaning in Life subscales (r = 0.86, 0.78, 0.76, 0.77, and 0.75; all $p < 0.001$). In our current study, test-retest reliability was calculated using the baseline and 2-4 week follow up interviews (r = 0.67, 0.50, 0.69, 0.64, and 0.65; all $p < 0.001$). The GSIS showed construct validity, such that GSIS totals and subscale scores were positively associated with the Scale for Suicide Ideation (Beck, Kovacs, & Weissman, 1979), a clinician-administered measure of suicide ideation (Heisel & Flett, 2006).

3.3.3 Geriatric Depression Scale

The Geriatric Depression Scale (GDS) is a 30-item screening test designed for rating depression in the elderly (Yesavage et al., 1983). Responses are dichotomous (yes/no) with scores ranging from 0 to 30. Questions included, "Have you dropped many of your activities and interests?", "Do you feel that your life is empty?", and "Do you prefer to avoid social gatherings?". None of the items measure somatic complaints (e.g. sleep disturbances, weight loss) since they were not strongly correlated in the original scale development study (Yesavage et al., 1983). Yesavage and colleagues (1983) produced a measure that was not conflated with somatic complaints as these are common among older adults and not restricted to depressed older adults.

The GDS was found to be a reliable and valid measure of depressive symptom severity among older adults in the original validation study of community residing older adults (Yesavage et al., 1983), nursing home residents (McGivney, Mulvihill, & Taylor, 1994), and primary care patients (Evans & Katona, 1993). The GDS was found to be a reliable and valid measure of depressive symptom severity among older adults in this current study. Internal consistency and test-retest reliability of the 2-4 week interviews were strong (α=0.83; r=0.78, p<0.001). Concurrent validity of the GDS was assessed with the Hamilton Rating Scale for Depression (Hamilton, 1967) in this current study (r=0.702, p<0.001at time 2).

3.3.4 Social Hopelessness Questionnaire

The Social Hopelessness Questionnaire (SHQ) is a 20-item scale measuring future interpersonal expectations, negative interactions, lack of support and hopelessness (Flett et al., 2003). Items were rated on a 5-point Likert scale, with scores ranging from 20 to 100. Items include, “Some people do little to inspire hope in me” and “my social relationships will never be as good as I would like them to be”.

The Social Hopelessness Questionnaire has been shown be reliable and valid among older adults (Flett et al., 2003). Internal consistency and test-retest reliability were strong in this current study (α=.862, r=0.712, p<0.001). The SHQ was positively correlated with the GDS (r=0.372, p<0.001 at time 1), suggesting convergent validity in this study.

3.3.5 Duke Social Support Index - Perceived Social Support Subscale

The abbreviated Duke Social Support Index (DSSI) is 23-item scale that measures dimensions of social support (Landerman et al., 1989). The DSSI was originally developed for the National Institute of Mental Health Epidemiological Catchment Area survey (Piedmont area, North Carolina). The abbreviated DSSI is composed of three subscales: Social Interaction, Perceived Social Support, and Instrumental Support. Social interaction was measured using 4 questions, including “how many persons, during the past week, did you spend time with someone who is not living with you, that is you went to see them or they came to visit you, or you went out together?” Each item from the social interaction subscale had 3 possible responses: 0, 1-4, and >5. The Instrumental

Support Subscale consisted of 12 dichotomous yes/no items, including "do your friends or family shop or run errands for you? Provide transformation? Prepare or provide meals for you?" The Perceived Social Support subscale was composed of 7 items, such as "When you are talking with your family and friends, do you feel you are being listened to?" Responses of the Perceived Social Support subscale were presented in a 3-point Likert-type scale, ranging from (1) hardly ever, (2) some of the time, and (3) most of the time. In the current study, perceived social support was the variable of interest, rather than social support in general, and therefore only the Perceived Social Support subscale was used in the analyses.

The Duke Perceived Social Support subscale has been found to be reliable and valid for use with older adults. In the original validation study, internal consistency of the original 35 item DSSI was reported using Cronbach's alpha (α) with strong internal consistency for the Perceived Social Support subscale (α=.80) (Landerman et al., 1989). Internal consistency of the abbreviated DSSI was also reported using Cronbach's alpha (α), such that the Perceived Social Support subscale had strong internal consistency among healthy older adults with no chronic illness (α=.75) and older adults having two or more chronic illnesses (α=.71) (Koenig et al., 1993), older adults receiving primary health care (α=.75) (Ramdeen, 2009), and depressed adults 50 years of age and older (α=.66) (Ramdeen, 2009). In the current study, internal consistency was also strong (α=0.70). Test-retest reliability was 0.47 ($p<0.001$) and was conducted using the baseline and 6 to 12 month interviews.

3.3.6 Experienced Meaning in Life Scale

The Experienced Meaning in Life Scale (EMIL) is a 40 item multidimensional measure of the four sources of meaning in life consistent with Frankl's theory, including Creative (e.g. "I enjoy participating in recreational activities"), Experiential (e.g. "Being loved gives my life purpose"), Attitudinal (e.g. "I try to find meaning in life even when I am suffering or in pain") and Ultimate meaning (e.g. "I believe that a deeper meaning exists in the mysteries of life") (Heisel, 2009). Items were rated with a 5-point Likert scale, ranging from "strongly disagree" to "strongly agree". Potential scores ranged from 40 to 200 with higher scores suggest more meaning in life.

The EMIL has been found to be reliable and valid among older adults (Heisel, 2009). In the current study, internal consistency and test-retest reliability were strong (α= .932; r=0.76, p<0.001). The EMIL demonstrated strong construct validity, including convergent validity with other meaning in life scales, life satisfaction, purpose in life, spirituality, and psychological well-being (Heisel, 2009). The EMIL also showed discriminant validity with measures of suicide ideation, depressive symptom severity, hopelessness, and physical health complaints (Heisel, 2009).

Table 4 Measures used in the analyses

Measure Name	Number of Items	Item Type	Potential Range of Total Scores	Time	Missing Cases (%)
Experienced Meaning in Life Scale (EMIL)	40	Likert (1 to 5)	40 to 200	1	0 (0.0)
Duke Social Support Index - Perceived Social Support Subscale (DSSI-PSS)	7	Likert (1 to 3)	7 to 21	3	37 (21.4)
Social Hopelessness Questionnaire (SHQ)	20	Likert (1 to 5)	20 to 100	1	5 (2.9)
Geriatric Depression Scale (GDS)	30	Dichotomous (Y/N)	0 to 30	2	49 (28.3)
Geriatric Suicide Ideation Scale (GSIS, item 9 removed)	30	Likert (1 to 5)	30 to 150	4	61 (35.3)

3.4 Statistical Analysis

Descriptive statistics for the sample at baseline will be reported as frequencies and percentages for categorical variables and means, standard deviations, and ranges (minimum and maximum values) for continuous variables.

The means, standard deviations, ranges (minimum and maximum values), and the correlation matrix of the variables in the model will be presented.

Structural equation modeling (SEM) was used to examine the associations among risk and resiliency factors, and suicide ideation at 12-24 months after the initial interview. SEM statistically extends multiple regression analysis by simultaneously testing all

equations in a proposed theoretical model, which allows for evaluation of entire models (Kline, 2011, p.13). Emphasis is placed on model fit, rather than on statistical tests of individual effects. This current study will use path analysis in the context of SEM to examine the effects of meaning in life and perceived social support on suicide ideation among community-residing older adults.

3.4.1 Components of Path Analysis

A path model is a structural model for observed variables, which represents a hypothesis about effect priority (Kline, 2011, p.103). Path models are composed of exogenous, endogenous, and error variables. An **exogenous variable** is similar to an independent variable in multiple regression, such that the variability of the variable is determined by causes outside of the causal model and not examined in the model. In our model, meaning in life and social hopelessness are exogenous variables (see Figure 8, p.49). An **endogenous variable** is similar to a dependent variable in multiple regression in that the variance of the variable is explained by other exogenous or endogenous variables in the model. All endogenous variables have an error variable, comprising a residual term that represents unexplained variance in the endogenous variable. It reflects both omitted causes and score unreliability. In our model, depressive symptom severity, perceived social support and suicide ideation are endogenous variables with residual terms.

Each model contains paths that indicate the causal pattern from one variable to another. **Direct effects** are indicated by the path from one variable to another variable. For example meaning in life has a direct path to depressive symptom severity in Figure 8 (p.49). **Path coefficients** indicate the strength of the direct effect from one variable to another and are interpreted similar to the regression coefficients in multiple regression analysis. Models are composed of **indirect effects**, also known as mediator effects, and involve one or more intervening variable (mediator variables) that are presumed to pass on some of the causal effects of prior variables onto subsequent variables. Indirect effects can be calculated from the product of each direct effect and are also interpreted like regression coefficients in multiple regression analysis. For example, meaning in life has an indirect effect on perceived social support, through the intervening variable of depressive symptom severity and can be calculated by multiplying the direct

effect of meaning in life and depressive symptom severity with the direct effect of depressive symptom severity and perceived social support. **Total effects** combine the **direc**t and **indirect effects** from one variable to another variable.

Data from the measured variables are transformed into a correlation or covariance matrix and are reported through a sequence of direct effects in the form of regression equations. Models, which should stem from a theoretical perspective, are analyzed by a computer program to determine how well the entire specified model fits the population from which the sample has been taken (Fassinger, 1987). When the model "is consistent with a set of data, the theory is confirmed to the extent that the proposed model is not rejected by the data" (Harlow, Newcomb, & Bentler, 1986, p.364).

In this study, Statistical Package for the Social Sciences (SPSS; version 19) and Analysis of Moment Structures (AMOS; version 5) were used to perform the statistical analyses. First, model fit indices were used to evaluate how well the data fit the proposed model. Hypothesized direct and indirect pathways were then examined. The results of each pathway were reported as the estimated standardized coefficients. Unstandardized path coefficients with the corresponding Critical Ratio (CR), the ratio between the estimated coefficient over its standard error (Kline, 2011), were also reported. CR greater than 1.95, which corresponds to a p-value of less than 0.05, were considered statistically significant and used to evaluate parameter estimates.

3.4.2 Interpretation of Model Fit Indices

Assessment of model fit indices of the structural model included a combination of absolute fit indices and incremental fit indices. Table 5 summarizes the reported model fit indices and acceptable values.

Absolute fit indices measure how well an a priori model fits the sample data without comparison to a null model of independence (McDonald & Ho, 2002). The Chi-Squared (χ^2) test and the Root-Mean-Square-Error of Approximation (RMSEA) were used as absolute fit indices. The Chi-Square test is a dichotomous test that assesses the degree of fit between actual and predicted covariance matrices (Hu & Bentler, 1999). A non-

significant value at a p=0.05 threshold indicates a good model fit and therefore is referred to as 'badness of fit' (Kline, 2011). Although the Chi-Square statistic is traditionally reported, it is sensitive to sample size. Non-significant values are difficult to attain with large samples sizes, whereas the test statistic in small samples may lack power, contributing to the inability to discriminate between good and poor fitting models (Kenny & McCoach, 2003). Therefore other indicators of fit, such as RMSEA, were used in conjunction with the chi-square fit statistic. The RMSEA is a continuous measure that ranges from 0 to 1.0 and indicates a standardized summary of the average covariance residuals. Values that are close to zero indicate better fit. Values that are less than 0.07 are considered acceptable threshold levels (Steiger, 2007).

Incremental fit indices, also known as comparative fit indices, can be used in conjunction with absolute fit indices to determine model fit. Incremental fit indices compare the researcher's model to the baseline model, which has a null hypothesis of zero correlation among all variables (Kline, p196). They reflect the comparison with a hypothetical null value where all the correlations are zero and independent of each other. The Incremental Fit Index (IFI) and the Comparative Fit Index (CFI) were reported to provide a variety of incremental fit indices. Both IFI and CFI perform well even when sample size is small (Tabachnick & Fidell, 2007). The incremental fit indices are continuous measures of model that have potential values ranging from 0 to 1.0 (Hooper, Coughlan, & Mullen, 2008).

Table 5 Cut-off points of model fit indices suggesting good fit

Fit indices	Test statistic	Potential range of scores	Acceptable values
Absolute fit indices			
Chi-Square Fit Statistic (χ^2)	Dichotomous	No upper limit	Non-significant p- value at a 0.05 threshold
Root-Mean-Square-Error of Approximation (RMSEA)	Continuous	0 to 1.0	Values that are less than 0.07
Incremental fit indices			
Incremental Fit Index (IFI)	Continuous	0 to 1.0	Values greater than 0.95
Comparative Fit Index (CFI)	Continuous	0 to 1.0	Values greater than 0.95

3.4.3 Missing Data

SEM analyses with missing data were adjusted using full information analysis maximum likelihood (ML) estimation, a special form of ML estimation for incomplete data sets, which does not delete cases or impute missing observations (Kline, 2011, p.57) and allows the use of all available data points (Little & Rubin, 1987). ML separates cases in a raw data file into subsets that have the same pattern of missing observations. This special form of ML estimation method avoids issues such as loss of power associated with listwise deletion, and decreased variance that may occur with mean substitution. ML is better than more common techniques, such as available case methods and single imputation, which have no theoretical rationale, and make strong assumptions that the data loss pattern is missing completely at random and may produce biased estimates when data are not missing completely at random (Kline, 2011, p.57).

3.4.4 Normality

Normality of each variable was assessed using univariate analysis. A transformation was performed on the DSSI-PSS, a measure showing extreme skewness and kurtosis at ≥ 2. The transformation was an exponentiation, with DSSI-PSS raised to the power of 4. Although this transformation did not eliminate departures from normality, the

transformation lowered skewness and kurtosis values to < 2. The final reported models incorporated the transformed variable.

3.4.5 Outliers

There were five individuals with model variable values that were greater than 3 standard deviations from the mean, which would suggest that these values may be outliers (D'Agostino, Sullivan, & Beiser, 2006). Models were tested using the full sample and repeated without these five participants. Estimates did not change significantly. Models using the full sample were presented to minimize information loss and preserve the variability of the sample.

Chapter 4

4 Results

In this chapter, the results of the study will be reported. First, baseline descriptive statistics for the total sample will be presented, which will include categorical and continuous general demographic and social variables measured at the initial interview. Means and standard deviations of the variables in the proposed model will also be reported. Second, the correlation matrix of the model variables measured over time will be presented. Lastly, results of the model testing will be reported, which will include model fit indices and the direct, indirect and total effects.

4.1 Descriptive Statistics

4.1.1 General Descriptive Statistics of the Baseline Sample

Frequencies and percentages for categorical descriptive statistics, and means and standard deviations for continuous descriptive statistics are reported for general demographic and social factors in Tables 6 and 7, respectively.

The study sample was composed of 173 older adults (M=73.9 years, SD=6.1; 71% of the sample were women). Approximately 45% of the sample was married, 19% was legally separated/ divorced, and 28% widowed. The average number of children was 3 and the majority of the sample was not living alone (52%).

Seventy-six percent of the sample received at least some university/college education and had an average of 16 years of education. A large proportion of the sample was retired (90%); however, some individuals continued to work either part or full time (8%). The average score of the MMSE was high (M=28.9, SD=1.4), close to the maximum possible score of 30. The majority of the participants also rated their physical health as good or better (87%), which translates into an average continuous score of 5.7 (SD=1.1).

4.1.2 Attrition Analysis

An attrition analysis was conducted to compare the baseline demographic variables between participants who completed all four interviews and individuals who were lost to follow up and were not interviewed at time 4 (see Table 6 and 7 for general and social variables, respectively). A statistically significant t-test or chi square statistic for a continuous or categorical variable, respectively, would suggest that older adults who completed all four interviews differed at baseline from those who did not complete the study.

The Levene's test was used to assess the equality of variances between individuals who completed the entire study and those who did not. If the p-value of the test statistic is less than 0.05 or statistically significant, it suggests that that the obtained differences in the sample variance are unlikely to have occurred based on random sampling and the null hypothesis of equal variance is rejected (Munro, 2005, p. 143). This would suggest that there is a difference between the variances in the sample. A modified t-test was used when the Levene's test was significant.

Among the general demographic variables, older adults who completed the study had higher levels of self-rated physical health as a continuous variable, compared to older adults who did not complete the study. When treated as a categorical variable, the level of self-rated physical health did not differ between groups, but approached statistical significance. Although there were no differences between groups among the remaining general demographic and social variables, the test for age differences approached statistical significance.

Although there may be few differences between the older adults who completed the study and those who did not, the SEM analyses with missing data were adjusted using a special form of ML estimation for incomplete data sets.

Table 6 General demographic variables measured at baseline

Variable	Total Sample (n=173)		Completed Time 4 Follow Up Interview (n=112)		Lost to Follow Up [b] (n=61)		T-test/ χ^2(df) [c]	P - value
Age, M (SD)	73.9	(6.1)	73.2	(5.8)	75.1	(6.6)	1.906 (171)	.058
Sex, n (%)								
Male	51	(29.5)	30	(26.8)	21	(34.3)	1.109 (1)	.292
Female	122	(70.5)	82	(73.2)	40	(65.6)		
Birthplace, n (%)								
North America	112	(64.7)	70	(62.5)	42	(68.9)		
United Kingdom	25	(20.2)	24	(21.4)	11	(18.0)		
Europe (other than U.K.)	17	(9.8)	14	(12.5)	3	(4.9)	4.649 (5)	.460
South America	2	(1.2)	1	(0.9)	1	(1.6)		
Asia	3	(1.7)	1	(0.9)	2	(3.3)		
Africa	4	(2.3)	2	(1.8)	2	(3.3)		
Religion, n (%)								
Jewish	10	(5.8)	4	(3.6)	6	(9.8)		
Catholic	30	(17.3)	23	(20.5)	7	(11.5)		
Protestant/other Christian	97	(56.1)	65	(58.0)	32	(52.5)	6.220 (5)	.285
Humanist	5	(2.9)	3	(2.7)	2	(3.3)		
Agnostic, Atheist, None	26	(15)	14	(12.5)	12	(19.7)		
Other (includes Muslim, Buddhist, Hindu)	5	(3)	3	(2.7)	2	(3.3)		
Years of education, M (SD)	15.5	(2.4)	15.3	(3.1)	15.8	(3.8)	.953 (170)	.342
Highest education level, n (%)								
Some high school	15	(8.7)	8	(7.2)	7	(11.5)		
Completed high school	25	(14.5)	18	(16.2)	7	(11.5)	2.679 (4)	.613
Some university/college	30	(17.3)	19	(17.1)	11	(18.0)		
Completed university/college	64	(37.0)	44	(39.6)	20	(32.8)		
Post graduate	38	(22.0)	22	(19.8)	16	(26.2)		
Employment Status, n (%)								
Working -full time	4	(2.3)	2	(1.8)	2	(3.3)		
Working - part time	10	(5.8)	7	(6.3)	3	(4.9)	.895 (3)	.827
Retired	155	(89.6)	101	(90.2)	54	(88.5)		
Other (includes Volunteer, Student)	4	(2.3)	2	(1.8)	2	(3.3)		
Cognitive functioning [a], M (SD)	28.9	(1.4)	29.0	(1.3)	28.8	(1.4)	-.678 (170)	.499
Self-Rated Physical health, M (SD)	5.7	(1.1)	5.9	(0.9)	5.4	(1.3)	-2.738 (90.906)*	**.007**
Self-Rated Physical health, n (%)								
Extremely poor	2	(1.2)	0	(0.0)	2	(3.3)		
Very Poor	0	(0.0)	0	(0.0)	0	(0.0)		
Poor	2	(1.2)	0	(0.0)	2	(3.3)	10.893 (5)	.054
Neutral	19	(11.0)	11	(9.8)	8	(13.3)		
Good	36	(20.8)	21	(18.8)	15	(25.0)		
Very good	72	(41.7)	49	(43.8)	23	(38.3)		
Extremely good	41	(23.7)	31	(27.7)	10	(16.7)		

Note: * Levene's test for Equality of Variances was significant ($p<0.05$), equal variances not assumed

[a] measured using the Mini Mental State Examinations (Folstein et al., 1975)

[b] did not complete Time 4 follow up interview

[c] t-test/χ^2 test comparing older adults who completed a time 4 follow up interview and those who did not complete a time 4 follow up interview

Table 7 Social variables measured at baseline

Variable	Total Sample (n=173)		Completed Time 4 Follow Up Interview (n=112)		Lost to Follow Up [a] (n=61)		T-test/ χ^2 (df) [b]	P - value
Marital Status, n (%)								
Single, never married	7	(4.0)	3	(2.7)	4	(6.6)		
Married	78	(45.1)	53	(47.3)	25	(41.0)	3.384 (4)	.496
Legally Separated/divorced	33	(19.1)	21	(18.8)	12	(19.7)		
Widowed	48	(27.7)	32	(28.6)	16	(26.2)		
Other	7	(4.0)	3	(2.7)	4	(6.6)		
Currently Involved in a Romantic Relationship, n (%)								
Yes	93	(53.8)	60	(53.6)	33	(54.1)	.004 (1)	.947
No	80	(46.2)	52	(46.4)	28	(45.9)		
Living Arrangement, n (%)								
Alone	84	(48.6)	52	(46.4)	32	(52.5)	.575 (1)	.448
Not alone	89	(51.4)	60	(53.6)	29	(47.5)		
Number of siblings, M (SD)	3.1	(2.6)	3.2	(2.7)	3.1	(2.6)	-.259 (157)	.796
Number of children, M (SD)	2.9	(1.3)	2.9	(1.4)	2.9	(1.2)	-.153 (159)	.878
Number of grandchildren, M (SD)	5.4	(3.9)	5.8	(4.2)	4.8	(3.1)	-1.450 (144)	.149
Number of great-grand children, M (SD)	3.0	(3.1)	3.1	(3.4)	2.9	(2.9)	-.120 (25)	.905

Note: [a] did not complete Time 4 follow up interview

[b] t-test/χ^2 test comparing older adults who completed a time 4 follow up interview and those who did not complete a time 4 follow up interview

4.1.3 Descriptive Statistics for Variables in the Model

The descriptive statistics for the endogenous and exogenous variables are presented in Table 8, which included meaning in life and social hopelessness at baseline, depressive symptom severity at time 2, perceived social support at time 3, and suicide ideation at time 4.

The sample had high levels of meaning in life and perceived social support, and low levels of social hopelessness, depressive symptom severity, and suicide ideation. The average score of the EMIL at baseline was high (M=171.5, SD=19.9) and approached the maximum score of 200. The sample scored high on the DSSI-PSS at time 3 (M=20.0, SD=1.7), which approached the maximum score of 21. Table 9 provides the results of the transformation that was performed on DSSI-PSS, which lowered the skewness and kurtosis values to be less than 2. The average score of the SHQ at baseline

(M= 46.7, SD=11.2) and GDS at time 2 (M=3.4, SD=3.8) were low, and close to the minimum score of 20 and 0, respectively.

The average score of the GSIS at time 4 was low (M=41.6, SD=10.1), which is lower than previous samples of older adults (M=57.2, SD=16.3) (Heisel & Flett, 2008), community residing older adults (M=47.6, SD=19.1), and psychiatric inpatients (M=67.4, SD=13.8) (Heisel & Flett, 2006). The 25th, 50th, and 75th percentile in this study was 34.0, 38.0, and 48.0, respectively. This study sample of community-residing older adults was generally quite healthy and experienced low levels of negative affect, including social hopelessness and depressive symptomatology. Although the majority of individuals was healthy, there was variability among the sample, suggesting that some individuals also experienced lower levels of health.

Table 8 Descriptive statistics for endogenous and exogenous variables in proposed model

Variable	Time	N	Minimum Value	Maximum Value	Percentiles			Mean	Standard Deviation
					25th	50th	75th		
EMIL	1	173	120.0	200.0	158.0	173.0	187.0	171.5	17.9
SHQ	1	168	20.0	83.0	39.0	46.5	55.0	46.7	11.2
GDS	2	136	0.0	21.0	1.0	2.0	5.0	3.4	3.8
DSSI-PSS	3	124	13.0	21.0	20.0	21.0	21.0	20.0	1.7
GSIS	4	112	30.0	79.0	34.0	38.0	48.0	41.6	10.1

Note: EMIL = Experienced Meaning in Life Scale (Heisel, 2009); SHQ = Social Hopelessness Questionnaire (Flett, Hewitt, Heisel, Davidson, & Gayle, 2003); GDS = Geriatric Depression Scale (Yesavage et al., 1983); DSSI-PSS = Duke Social Support Index – Perceived Social Support Subscale (Landerman et al., 1989); GSIS = Geriatric Suicide Ideation Scale minus item 9 (Heisel & Flett, 2006)

Table 9 The original and transformed skewness and kurtosis values of perceived social support measured at time 3

Variable	Skewness (Standard Error)	Kurtosis (Standard Error)
DSSI-PSS	-2.2 (0.2)	4.8 (0.4)
$(DSSI\text{-}PSS)^4$	-1.5 (0.2)	1.6 (0.4)

Note: DSSI-PSS = Duke Social Support Index – Perceived Social Support Subscale (Landerman et al., 1989)

4.2 Model Correlation Matrix

It is recommended to report either a covariance or correlation matrix of observed variables include in the SEM analyses (Kline, 2011). The model correlation matrix was presented in Table 10, which included the endogenous and exogenous model variables that were measured at different time points.

4.2.1 Correlations With Meaning in Life and Perceived Social Support

Meaning in life was positively associated with perceived social support ($r=0.24$, $p<0.001$) and negatively associated with social hopelessness ($r=-0.22$, $p<0.001$), depressive symptom severity ($r=-0.36$, $p<0.001$), and suicide ideation ($r=-0.36$, $p<0.001$). This suggests that higher levels of meaning in life are associated with higher levels of perceived social support, and lower levels of social hopelessness, depressive symptom severity and suicide ideation.

Perceived social support was negatively associated with social hopelessness ($r=-0.22$, $p<0.05$), depressive symptom severity ($r=-0.34$, $p<0.001$) and suicide ideation ($r=-0.30$, $p<0.001$), in addition to the positive association with meaning in life that was presented in the previous section. This may indicate that higher levels of perceived social support are associated with lower levels of social hopelessness, depressive symptom severity, and suicide ideation.

4.2.2 Correlations With Social Hopelessness and Depressive Symptom Severity

Each risk factor was negatively associated with each resiliency factor and positively correlated among themselves, such that social hopelessness was positively associated with depressive symptom severity (r=-0.44, p<0.001) and suicide ideation (r=0.32, p<0.001). Depressive symptom severity was also positively associated with suicide ideation (r=0.40, p<0.001). This suggests that higher levels of social hopelessness and/or depressive symptom severity are associated with higher levels of social hopelessness, depressive symptom severity, or suicide ideation.

Table 10 Correlation matrix of endogenous and exogenous variables in the proposed model

Variable	Time	1.	2.	3.	4.	5.
1. EMIL	1	1.000				
2. SHQ	1	-.217**	1.000			
3. GDS	2	-.355***	.440***	1.000		
4. DSSI – PSS	3	.238**	-.222*	-.338***	1.000	
5. GSIS	4	-.357***	.322**	.400***	-.301**	1.000

Note: ***p<0.001, ** p<0.01, * p<0.05 (2-tailed)

EMIL = Experienced Meaning in Life Scale (Heisel, 2009); SHQ = Social Hopelessness Questionnaire (Flett, Hewitt, Heisel, Davidson, & Gayle, 2003); GDS = Geriatric Depression Scale (Yesavage et al., 1983); DSSI-PSS = Duke Social Support Index – Perceived Social Support Subscale (Landerman et al., 1989); GSIS = Geriatric Suicide Ideation Scale minus item 9 (Heisel & Flett, 2006)

4.3 Hypothesis Testing

The proposed model of why some older adults develop suicide ideation is summarized in Figure 8 (p.49). The individual who experiences an underlying sense of social hopelessness when combined with depressive symptoms may be at an increased risk for

suicide. This risk may be compounded by having a poor perception of social support; however, the recognition of meaning in life may counteract these negative factors and decrease suicide risk.

The path model was tested using the full sample. Model fit indices for the model, which included the Chi-Square fit statistic, RMSEA, IFI, and CFI are presented in Table 11. Maximum likelihood estimates and critical ratios are provided for each path in Table 12. A critical ratio represents the parameter estimate divided by its standard error (Kline, 2011). Values greater than 1.96 were considered statistically significant.

4.3.1 Testing the Proposed Model

Model fit statistics for the proposed model suggested that there was a good fit between the sample data and the proposed model. Although the RMSEA value was slightly above the 0.07 cut off (.079), the Chi-Square test statistic was non-significant ($\chi^2 = 6.245$, df=3, p=0.100), suggesting a good global model fit. In addition, the IFI (.968) and CFI (.963) both exceeded the 0.95 cut off, demonstrating an appropriate fit. A good model fit is needed before examining the path coefficients of the direct effects in the proposed model.

Table 11 Model fit indices for the proposed model

Model	Model Fit Indices					
		Absolute Fit Indices			Incremental Fit Indices	
	df_M	Chi-square	p-value	RMSEA	IFI	CFI
Proposed Model	3	6.245	.100	.079	.968	.963

Note: RMSEA=Root-Mean-Square-Error of Approximation; IFI= Incremental Fit Index; CFI=Comparative Fit Index

The unstandardized and standardized path coefficients in the proposed model are presented in Table 12. All direct effects were statistically significant and in the directions that were hypothesized. Figure 10 showed that social hopelessness at baseline directly influenced depressive symptom severity measured during the 2-4 week interview (B=0.383), which had a direct effect on suicide ideation at the 12-24 month interview (B=0.319). Depressive symptom severity also had a direct effect on perceived social

support at the 6-12 month interview (B=-0.398), which had a direct effect on suicide ideation (B=-0.183). Meaning in life at baseline had a direct effect on both depressive symptom severity (B=-0.282) and suicide ideation (B=-0.239).

Table 12 Maximum Likelihood (ML) estimates of the direct effects in the proposed path model

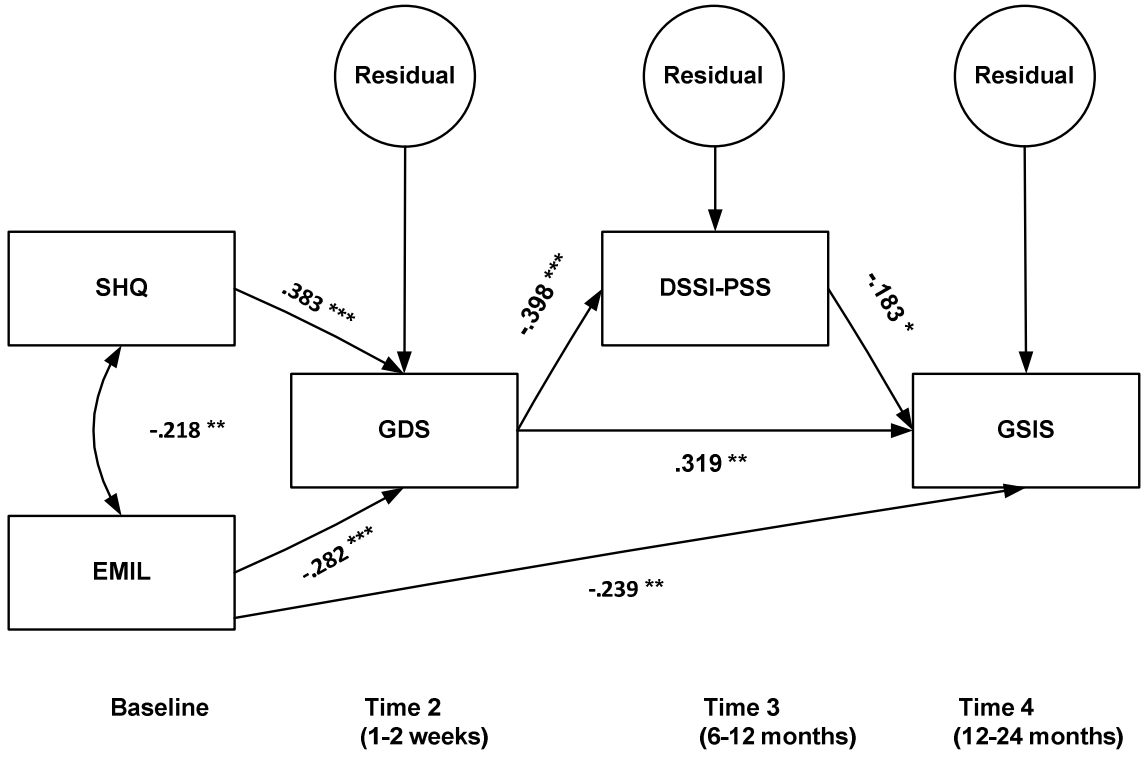
Parameter	Unstandardized Estimates	Standard Error	Standardized Estimates	Critical Ratio
SHQ → GDS	0.129 ***	0.025	0.383	5.168
EMIL → GDS	-0.059 ***	0.016	-0.282	-3.805
GDS → DSSI-PSS [a]	-4590.515 ***	1000.029	-0.398	-4.590
DSSI-PSS [a] → GSIS	.000 *	0.000	-0.183	-2.049
GDS → GSIS	0.884 **	0.271	0.319	3.263
EMIL → GSIS	-0.139 **	0.050	-0.239	-2.781

Note: ***p<0.001, ** p<0.01, * p<0.05

[a] An exponentiation transformation was performed on DSSI-PSS and was raised to the power of 4.

EMIL = Experienced Meaning in Life Scale (Heisel, 2009); SHQ = Social Hopelessness Questionnaire (Flett, Hewitt, Heisel, Davidson, & Gayle, 2003); GDS = Geriatric Depression Scale (Yesavage et al., 1983); DSSI-PSS = Duke Social Support Index – Perceived Social Support Subscale (Landerman et al., 1989); GSIS = Geriatric Suicide Ideation Scale minus item 9 (Heisel & Flett, 2006)

Figure 10 Standardized path coefficients of the proposed model



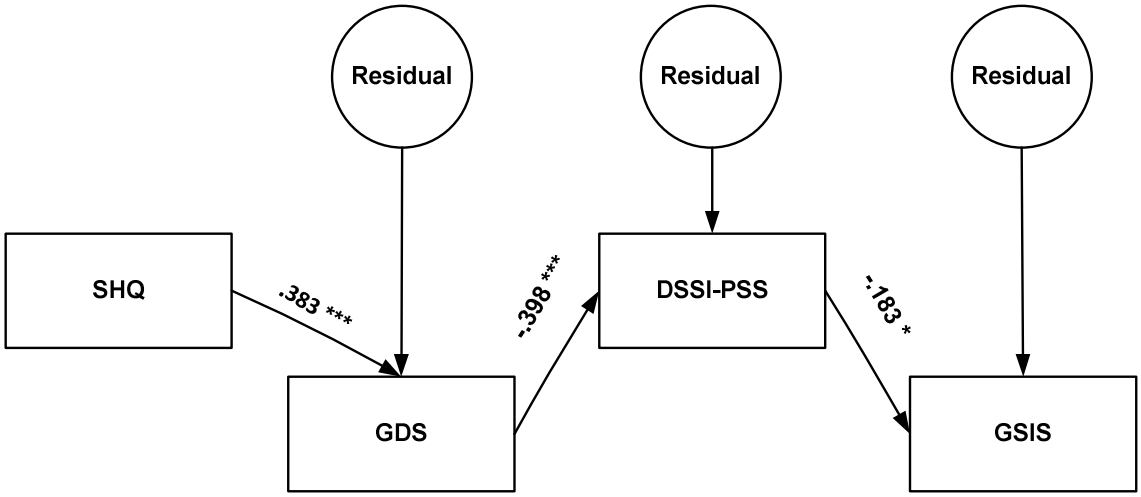
Note: ***p<0.001, ** p<0.01, * p<0.05 for unstandardized coefficients
EMIL = Experienced Meaning in Life Scale (Heisel, 2009); SHQ = Social Hopelessness Questionnaire (Flett, Hewitt, Heisel, Davidson, & Gayle, 2003); GDS = Geriatric Depression Scale (Yesavage et al., 1983); DSSI-PSS = Duke Social Support Index – Perceived Social Support Subscale (Landerman et al., 1989); GSIS = Geriatric Suicide Ideation Scale minus item 9 (Heisel & Flett, 2006)

A decomposition of the direct, indirect, and total standardized effects of the variables in the model is presented in Table 13. Social hopelessness, depressive symptom severity, and meaning in life had indirect effects on suicide ideation. Figure 11 is an example of an indirect path from social hopelessness to suicide ideation and illustrates how the effects of social hopelessness have transmitted through subsequent variables to influence suicide ideation. In the figure, the effect of social hopelessness has passed through depressive symptom severity and perceived social support, before influencing suicide ideation (B=0.150). Our results showed that social hopelessness was positively associated with

depressive symptom severity, depressive symptom severity was negatively associated with perceived social support, and perceived social support was negatively associated suicide ideation. This finding suggests that increases in social hopelessness may increase depressive symptom severity, which may decrease perceived social support and may increase suicide ideation.

Our results also showed that depressive symptom severity had an indirect effect on suicide ideation, which passed through perceived social support (B=0.073). Meaning in life had an indirect effect on suicide ideation, through depressive symptom severity and perceived social support (B=-0.111).

Figure 11 An example of a standardized indirect path in the proposed model



Note: ***p<0.001, ** p<0.01, * p<0.05 for unstandardized coefficients
SHQ = Social Hopelessness Questionnaire (Flett, Hewitt, Heisel, Davidson, & Gayle, 2003); GDS = Geriatric Depression Scale (Yesavage et al., 1983); DSSI-PSS = Duke Social Support Index – Perceived Social Support Subscale (Landerman et al., 1989); GSIS = Geriatric Suicide Ideation Scale minus item 9 (Heisel & Flett, 2006)

Table 13 A decomposition of direct, indirect, and total standardized effects of predictor variables on suicide ideation

Predictor variables	Direct	Indirect	Total
EMIL	-.239	-.111	-.350
SHQ	-	.150	.150
GDS	.319	.073	.392
DSSI-PSS	-.183	-	-.183

Note: EMIL = Experienced Meaning in Life Scale (Heisel, 2009); SHQ = Social Hopelessness Questionnaire (Flett, Hewitt, Heisel, Davidson, & Gayle, 2003); GDS = Geriatric Depression Scale (Yesavage et al., 1983); DSSI-PSS = Duke Social Support Index – Perceived Social Support Subscale (Landerman et al., 1989); GSIS = Geriatric Suicide Ideation Scale minus item 9 (Heisel & Flett, 2006)

Chapter 5

5 Discussion and Conclusion

Older adults have high rates of suicide, necessitating enhanced models of suicide risk in later life. Previous cross-sectional findings suggest that suicide ideation is positively associated with psychological risk factors and negatively associated with resilience factors, including recognition of meaning in life and perceptions of social support (Heisel & Flett, 2008). The purpose of this study was to replicate and extend previous cross-sectional findings.

This study used longitudinal analyses and focused on a community sample. Our longitudinal study followed a sample of community-residing older adults over a period of 12-24 months, which may assist in establishing temporality of events and strengthen evidence for causation. Research with a community-residing sample, rather than a clinical sample, may improve the understanding of suicide risk and may identify potential targets for early community interventions or encourage the implementation of prevention strategies to reduce risk factors and the development of suicide ideation.

We tested our late life multidimensional model of suicide ideation and clarified the longitudinal associations among risk factors, such as social hopelessness and depressive symptom severity, resilience factors, including meaning in life and perceived social support, and suicide ideation over a 12-24 month period. Our proposed model of late life suicide ideation may enhance the understanding of suicide risk by exploring the relations among these risk and resilience factors and suicide ideation.

5.1 Summary of Sample Characteristics

Our sample was composed of 173 healthy community-residing older adults and differed from nationally representative studies using the Canadian Community Health Survey (Fiest, Currie, Williams, & Wang, 2011). The participants in our sample were younger (M=73.9, SD=6.1), compared to the Canadian community-residing older adult population

(M=74.5, SD=6.4). Our sample had a lower percentage of men (29%) than nationally representative older adult samples (43.8%, CI=43.8-43.8).

Our sample was more highly educated than the Canadian older adult population. Approximately 36.3% of the adults over 65 years old had some post-secondary education or greater (CI=34.7-37.8), whereas 76.3% of our sample had some university or college education or greater. The participants in our sample also had a higher level of physical health than nationally representative older adult samples. Among the Canadian older adult population, 74.8% rated their health as good, very good, or excellent (CI=73.5-76.1), compared to 86.2% of the older adult participants in our study. In summary, our sample was on average younger, better educated, and more physically healthy, compared to the Canadian population.

5.2 Summary of Model Findings

We tested a multidimensional model of late life suicide ideation, incorporating risk and resilience factors. There was a good fit between the data and our proposed model, which suggests that risk factors may confer vulnerability to suicide; however, resilience factors may lower this risk. The model indicates that suicide risk may increase if feelings of social hopelessness are combined with depressive symptoms and/or low perceptions of social support, which may have developed after recent relationship losses or negative interpersonal experiences. Our proposed model may identify at-risk older adults who have not explicitly expressed suicide ideation, but experience few satisfying social relationships and connections, and few sources of meaning in life. Identifying at-risk older adults may have implications in providing early intervention to prevent the onset or exacerbation of suicide ideation. Interventions that foster a sense of meaning in life and/or the perception of social support may provide older adults with a source of resilience that may lower risk for suicide.

5.2.1 A Closer Look at Risk Factors in the Model

We hypothesized that depressive symptom severity would be positively associated with suicide ideation. We found that depressive symptom severity had a direct effect on suicide ideation, consistent with the literature (Alexopoulos et al., 1999; Awata et al.,

2005; Britton et al., 2008; Clarke et al., 2004; Cukrowicz et al., 2009; Fitzpatrick, 2005; Jahn et al., 2011; Malfent et al., 2010; Pfaff & Almeida, 2004; Rowe, Conwell, et al., 2006; Szanto et al., 2012, 1997). Using the GDS, Malfent and colleagues (2010) found that those who experienced suicide ideation had higher levels of depressive symptom severity, compared with those who did not have thoughts of suicide in a sample of adults over the age of 60 years old living in residential care homes. Awata and colleagues (2005) reported similar findings as Malfent and colleagues (2010) in a sample of community-residing adults over the age of 70 years old. Consistent with these research findings, Fitzpatrick (2005) conducted a retrospective chart review and observed that depressive symptom severity was positively associated with suicide ideation in a sample of older adult patients. This current study builds on these study results by using longitudinal data to examine the associations between depressive symptom severity and suicide ideation over a 12-24 month period in a sample of community-residing older adults.

We hypothesized that social hopelessness may increase suicide ideation by way of depressive symptom severity. Findings of our path analysis indicate that social hopelessness had an indirect effect on suicide ideation through depressive symptom severity, which suggests that as social hopelessness increases, depressive symptomatology may increase, which may increase suicide ideation among community-residing older adults.

Uncapher and colleagues (1998) explored the cross-sectional associations among depression, hopelessness, and suicide ideation and found that higher levels of hopelessness were associated with higher levels in suicide ideation, only at moderate to high levels of depressive symptomatology in a sample of older adult psychiatric inpatients and nursing home patients. An assumption of path analysis is that the relations among the variables in the model are linear and additive, and therefore, interaction effects are excluded from the model (Olobatuyi, 2006, p. 67). In the current study, we conducted a post-hoc multiple regression analysis and did not find a statistically significant interaction of social hopelessness and depressive symptom severity on suicide ideation.

5.2.2 A Closer Look at Resilience Factors in the Model

We hypothesized that meaning in life would be negatively associated with suicide ideation. In our model, we showed that meaning in life had a direct effect on suicide ideation. Cross-sectional findings have shown that meaning in life was negatively associated with suicide ideation among older adults living independently or in care-providing facilities (Heisel & Flett, 2008). Our longitudinal study replicated and extended these findings by using the EMIL, a 40 item multidimensional scale measuring meaning in life, rather than the one meaning in life item that was used by Heisel and Flett (2008). A multidimensional scale may provide more measurement detail. Our findings showed that higher levels of meaning in life were associated with fewer thoughts of suicide ideation 12 to 24 months later.

Although our focus was on exploring associations between risk and resilience factors on suicide ideation, we also hypothesized that meaning in life would be negatively associated with depressive symptom severity. We found that meaning in life had a direct effect on depressive symptom severity. There is a lack of consistency in the results of previous studies examining meaning or purpose in life and depression. Researchers have found that greater meaning in life was associated with less depressed affect at baseline and with declines in depressed affect among a national representative sample of retired adults over 65 years of age (Krause, 2007). In contrast, Hedberg, Gustafson, Aléx, and Brulin (2010) did not observe an association between purpose in life and risk of developing depression after five years in a sample of adults 85 to 103 years of age. This apparent lack of consistency in study findings may have been a result of conceptual differences. Researchers have suggested that purpose in life and meaning in life are related but distinct concepts (Heisel & Flett, 2008). In this current study, we did not examine the associations between purpose in life and depression; however, our study finding was consistent with the findings of Krause (2007), suggesting that higher levels of meaning in life were associated with lower levels of depressive symptom severity. We extended the findings from Krause (2007) by examining the association among meaning in life, depressive symptomatology, and suicide ideation over a 12-24 month period.

We hypothesized that depressive symptom severity would be negatively associated with perceived social support and we found that depressive symptom severity had a direct effect on perceived social support. Researchers have found that a cognitive component of depression may influence the perception of interpersonal relationships among older adults living in a retirement community, such that individuals with depressive symptomatology may experience the perception of low social support (Maher et al., 2006). Although each component of depression, including the cognitive, mood, and somatic elements, were associated with cross-sectional measures of perceived social support, only the cognitive expectations and beliefs predicted perceived social support over a 2 year period in the findings of Maher and colleagues (2006). This current study used the GDS, which incorporates cognitive expectations and excluded items measuring somatic symptoms, as a measure of depression symptom severity. Our study was consistent with the findings from Maher and colleagues (2006), in suggesting that higher levels of depressive symptom severity may be associated with lower levels of perceived social support.

Perceived social support and depression may have a bidirectional relation (Maher et al., 2006; Meeks et al., 2011; Takizawa et al., 2006; Vanderhorst & McLaren, 2005). We found that depressive symptom severity may erode the perception of social support among older adults; however, researchers have also found that poor perceived social support may lead to depression (Meeks et al., 2011). As discussed in the previous section, we found that social hopelessness had a direct effect on depressive symptomatology, supporting the influence of social perceptions on depressive symptom severity. Older adults reporting higher levels of negative perceptions about one's interpersonal relationships and future interpersonal expectancies may develop higher levels of depressive symptomatology.

We also hypothesized that perceived social support would be negatively associated with suicide ideation and we found that perceived social support had a direct effect on suicide ideation. This is consistent with findings from the literature that emphasized a strong association between perceived social support and suicide ideation among older adult samples. Using the DSSI-PSS, we found that lower levels of perceived social support were associated with higher levels of suicide ideation in a sample of 522 older adults

using home health care services (Rowe, Conwell, et al., 2006) , a sample of 539 older adults recently receiving home health care services (Raue et al., 2007), a sample of 204 depressed patients over the age of 50 years old (Ramdeen, 2009), and a sample of 664 older primary care patients (Ramdeen, 2009). Our study findings build on previous cross-sectional findings and show that as perceived social support increases, suicide ideation may decrease; however, as perceived social support decreases, suicide ideation may increase among community-residing older adults.

We have discussed the individual paths in our proposed model; however, we used SEM to simultaneously test all of the equations in our model. This allowed us to evaluate the entire model. Our findings showed that the data fit our proposed model well, which suggests that risk factors, such as social hopelessness and depressive symptom severity, and resilience factors, including perceived social support and meaning in life, may influence the onset or exacerbation of suicide ideation among community-residing older adults.

5.3 Clinical Implications

These study results suggest that higher levels of meaning in life and/or perceived social support may have an enduring protective effect against thoughts of suicide. These findings provide support for our late life model of suicide ideation, which builds on previous theoretical and empirical models of suicide that have focused primarily on predisposing risk factors and/or vulnerability factors, such as depression. Our model suggests a value in the inclusion of resilience factors to improve understanding of late life suicide risk. We have found that meaning in life confers resiliency to the development or exacerbation of suicide ideation, even in the face of the chain of events leading from social hopelessness through depressive symptoms to low perceived support.These findings may have implications for clinical practice with at-risk older adults who may be experiencing social hopelessness, depressive symptoms, or low perceived social support. These at-risk older adults may benefit from the potentially salutary role of meaning-centered and/or interpersonal interventions (Heisel et al., 2009).

5.4 Strengths of the Study

The combination of the reliable and validated scales for older adults, advanced statistical techniques, and a longitudinal study design, allowed us to extend and replicate cross-sectional findings and test a model of late life suicide ideation. All the measures that were used in the analyses, including the EMIL, SHQ, GDS, DSSI-PSS, and GSIS, had high internal reliability and validity for older adults. Through the use of multidimensional scales, we explored complex constructs and extended studies that have used single items to measure entire constructs.

The longitudinal study design is a strength of this study and assists in establishing the temporal sequence of events (Koepsell & Weiss, 2003). Although temporality is not sufficient for causal inferences, it is necessary in establishing cause and effect among variables. In our model, variables measured at different time points establish a temporal sequence of events and provide initial evidence for causation.

Although SEM is also referred to as causal modeling, it does not test causality between variables. SEM simultaneously tests all equations in a proposed theoretical model, allowing for evaluation and testing of entire models (Kline, 2011, p.13) and strengthening the initial evidence suggesting a causal inference.

5.5 Limitations of the Study

Despite the contributions of this study, there were limitations that should be discussed, including potential sampling bias, sample size, and missing data. A convenience sampling strategy, a type of non-probability sampling approach, was used to recruit older adult volunteers to participate in the study, which may have contributed to a potential sampling bias. Convenience sampling is the simplest form of sampling, but may lead to the under-representation or over-representation of particular groups within the sample (Ellison, Barwick, & Duguid Farrant, 2009, p.198). There were differences between the demographic characteristics in our study sample and Canadian older adult population. Although these differences were not tested, our sample was on average younger, better educated, and more physically healthy, compared to the Canadian older adult population.

In addition, the majority of our sample included healthy older adults, with low levels of risk factors and high levels of resilience factors. Our results may not be generalizable to older adults at greater risk for clinically significant levels of suicide ideation, such as those with a mental disorder.

Our study used SEM to examine the associations among variables and to test the direction of these associations. A potential drawback of SEM is the requirement of a large sample size; however, the exact number of participants depends on model complexity and the number of parameters that are estimated in the model, such as the estimated covariances, direct effects and residuals. A general guideline that is used to determine the required sample size is the N:q rule (Jackson, 2003), which is the ratio of the number of cases needed over the number of model parameters that require statistical estimation. It is suggested that an ideal ratio is 20 cases to 1 model parameter. There are 11 model parameters that are estimated in our proposed model and our sample size of 173 is very close to ideal standards. Our total sample was large enough to conduct SEM analyses; however, subgroup analyses, such as separate models for men (n=51) and women (n=122), were not possible since it has been suggested that small sample sizes of 50 produce unstable estimates (Fan, Thompson, & Wang, 1999).

Researchers may encounter attrition or missing data among study participants when conducting longitudinal research. Although our variables ranged from 0 to 35% missing, we used a special form of ML estimation for incomplete data sets. This type of ML did not delete cases or impute missing observations (Kline, 2011, p.57) and has been found to outperform classical methods that are used to deal with missing data, such as available case methods and single imputation (Arbuckle, 1996; Enders & Bandalos, 2001; Peters & Enders, 2002).

5.6 Conclusions and Future Directions

This longitudinal study tested a proposed model to provide support for a theoretical model of late life suicide ideation, incorporating multiple risk and resilience factors over time. The data fit the proposed model well and associations among the risk and resilience factors in both the proposed model are largely consistent with previous research findings

on risk and resilience factors. Our study has shown that both meaning in life and perceived social support may confer resilience to late life suicide ideation.

This study may identify points of intervention for mental health outreach and clinical practice with at-risk older adults. In addition to screening for suicide ideation, it may be beneficial to assess whether at-risk older adults are experiencing few satisfying social relationships, low perceptions of social support, or few sources of meaning in life. Community outreach programs are needed to screen and identify for at-risk older adults. These older adults may be encouraged to participate in programs that foster meaning in life, which may include recreational hobby groups, exercise activities, or weekly men's/women's social groups. Early recognition of older adults with low resilience factors may have implications in preventing the onset or exacerbation of suicide ideation. This research is consistent with studies examining interventions that foster a sense of meaning in life and/or perceived support, which may enhance older adults' psychological resilience and lower risk for suicide (Breitbart et al., 2010; Heisel et al., 2009; Lapierre et al., 2007).

We investigated the effect of risk and resilience factors, which were assessed at various time points, on suicide ideation 12 to 24 months after an initial interview among healthy community-residing older adults. The current study did not examine the pattern of change in suicide ideation, such as the potential onset or increase in suicide ideation over time. Future work should build on the findings of the current study and explore the changes in risk and resilience factors that may be associated with the changes in suicide ideation over time. Changes in meaning in life and other resilience factors may potentially confer resiliency to the onset or exacerbation of suicide ideation among community-residing older adults, accounting for changes in predisposing risk factors and intervening losses, challenges, and transitions. Research should also continue with various older adult samples to understand the long-term effects of risk and resilience factors on suicide ideation, particularly among those who are experiencing recent changes in life, such as retirement or bereavement.

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Appendices

Appendix A: Summary of Research Testing Baumeister's (1990) Escape From Self Theory of Suicidal Behaviour

Study Design The cross-sectional study design of each study may have limited the ability to make causal inferences, which may be valuable during causal testing (Dean et al., 1996; Dean & Range, 1996, 1999; Reich et al., 1996).

Internal Validity Among the studies that have tested Baumeister's (1990) Escape From Self Theory, researchers have excluded Baumeister's main steps in the their statistical models, such as *1) falling short of standards; 2) attribution to self; 3) high self-awareness; and 4) negative affect* (Dean et al., 1996; Dean & Range, 1996, 1999). The exclusion of stages from Baumeister's (1990) theory may suggest these studies have completed only a partial test of his theory.

Researchers have deviated from testing Baumeister's (1990) theory by using proxy measures, which may be potentially inappropriate measures that may not have captured the constructs in his theory. Researchers have used fatalism as a measure of *high self-awareness* (Reich et al., 1996). The authors suggest that fatalism may be related to sense of powerlessness and may lead to poor self-thoughts. Although fatalism may be related to *self-awareness*, these constructs may be distinct from each other and fatalism may not be appropriate indication of being highly self-aware. In the same study, confused thinking was used to operationalize *cognitive deconstruction*; however, the one item that was used, "How often have you felt confused and had trouble thinking", may not have accessed the same construct that Baumeister (1990) described in his theory. Baumeister (1990) described cognitive deconstruction as being focused on the present time and having proximal goals, rather than distal goals. Cognitive deconstruction may be associated with confused thinking; however, these constructs are different from one another. Researchers have also used perfectionism, which involves the belief that unrealistic expectations must be met in order to obtain approval, as a measure of having high expectations (Dean et al., 1996; Dean & Range, 1996, 1999). Although perfectionism is consistent with Baumeister's (1990) ideas, he does not explicitly discuss perfectionism. Studies that have

excluded or used potentially inappropriate variables may have only partially tested Baumeister's (1990) Escape From Self Theory.

Researchers have used different study outcomes to test this theory, including suicide ideation (Dean et al., 1996; Dean & Range, 1999; Reich et al., 1996) and suicidal behaviour (Dean & Range, 1996). Although Baumeister's (1990) theory was originally developed for suicidal behaviour, researchers have found partial support for this theory predicting suicide ideation.

Statistical Analyses Although Baumeister described the steps in his theory in a linear pattern, models that have tested this linear pattern had poor model fit indices (Dean & Range, 1996). Revised models that allowed variables hypothesized to occur earlier, such as high expectation or stressors, to influence later occurring variables, including cognitive deconstruction or increased willingness, provided a better model fit (Dean et al., 1996; Dean & Range, 1996). This may suggest that underlying risk factors may influence variables directly proceeding and later on the causal pathway for a suicide-related outcome, which differs from Baumeister's (1990) hypothesized theory.

External Validity The majority of the study samples that have tested Baumeister's (1990) theory were composed of undergraduate students or clinical outpatient adults. Although Baumeister's (1990) theory has been tested among older adults experiencing suicide ideation (Reich et al., 1996), the results may not be generalizable to community-residing older adults. This study non-random sample was composed of older adults who were selected for having recently experienced poor health events or bereavement and age- matched controls, which may not be generalizable to a healthy community-residing older adult population.

Summary of studies examining Baumeister's (1990) Escape From Self Theory of Suicidal Behaviour

Study	Study design, Sample, & Country	Precipitating variables		Steps of the theory						Outcome	Study findings/ Model fit
		High expectation	Stressor	Step1: Falling short of standards	Step 2: Attribution to self	Step 3: High self-awareness	Step 4: Negative affect	Step 5: Cognitive deconstruction	Step 6: Reduced inhibitions, increased willingness for suicide		
Dean & Range (1996)	Cross-sectional; 168 Undergraduate students (M=21.9 years, SD=9.34); U.S.A.	**Socially-prescribed & Self-oriented perfectionism:** Multi-Dimensional Perfectionism Scale; MPS (Hewitt & Flett, 1991)	**Negative life stress:** Life Experiences Survey; LES (Sarason, Johnson & Siegel, 1978)	Not assessed	Not assessed	Not assessed	**Anxiety:** State- Trait Anxiety Inventory; STAI (Spielberger, Gorsuch & Lushene, 1970) **Depression:** Self-Rating Depression Scale; SDS (Zung, 1965)	**Hopelessness:** Beck Hopelessness Scale; BHS (Beck, Weissman, Lester & Trexler, 1974)	**Reasons for living:** Reasons for Living Inventory; RFL (Linehan, Goodstein, Nielsen, & Chiles, 1983)	**Suicidal behaviour:** Suicidal Behaviors Questionnaire; SBQ (Linehan & Nielsen, 1981)	Overall model fit statistics unreported
Dean, Range, & Goggin (1996)	Cross-sectional; 114 Undergraduate students (M=24.4 years, SD=7.2); U.S.A.	**Socially Prescribed perfectionism:** MPS	**Negative life events:** LES	Not Assessed	Not Assessed	Not assessed	**Depression:** SDS	**Hopelessness:** BHS	**Reasons for living:** RFL	**Suicide ideation:** SSI	Proposed model: GFI =.78, χ^2 (9,114) = 125.21, p<0.001; RMSR =.176 Revised model with deleted paths: GFI =.978, χ^2 (7,114) = 7.91, p<0.34; RMSR=.038
Dean & Range (1999)	Cross-sectional; 132 Clinical outpatients (M=21.9 years, SD=9.34); U.S.A.	**Socially Prescribed perfectionism:** MPS	**Negative life events:** LES	Not assessed	Not assessed	Not assessed	**Depression:** SDS	**Hopelessness:** BHS	**Reasons for living:** RFL	**Suicide ideation:** SSI	GFI =.96, χ^2 (14,130) = 26.14, p<0.025; RMSR =.047

Study	Study design, Sample, & Country	Precipitating variables		Steps of the theory						Outcome	Study findings/ Model fit
		High expectation	Stressor	Step1: Falling short of standards	Step 2: Attribution to self	Step 3: High self-awareness	Step 4: Negative affect	Step 5: Cognitive deconstruction	Step 6: Reduced inhibitions, increased willingness for suicide		
Reich, Newsom, & Zautra (1996)	Cross-sectional; 212 Older adults (M=70.1 years); U.S.A.	Not assessed	**Life events - poor health:** Psychiatric Epidemiology Research Inventory; PERI (Dohrenwend, Krasnoff, Askenasy, & Dohrenwend, 1978)	Not assessed	**Self-esteem:** PERI	**Fatalism:** Personal Mastery Scale (Pearlin & Schooler, 1978)	Not assessed	**Confused thinking:** PERI	**Helplessness:** PERI	**Suicide ideation:** Mental Health Scale (Veit & Ware, 1983)	χ^2 (158) = 7.91, $p<0.001$; TLI=.919; IFI=.934

Appendix B: Summary of Research Testing Clark's (1993) Wedding Cake Theory of Suicidal Behaviour

Study	Study design & Country	Sample	Main constructs of the theory			Outcome	Study findings/Model fit
			Intolerance to normal aging process	Narcissistic personality factors	Complicating mental disorder		
Heisel et al. (2007)	Cross-sectional; Canada	538 older adult psychiatry patients diagnosed with depression or related disorders (M=76.1 years, SD=6.2)	Not Assessed	Presence of narcissistic personality disorder or traits	**Depression:** GDS, HRSD	**Suicide ideation:** SSI	-narcissistic personality disorder conferred suicide risk among depressed older adults [B=0.358, t = 2.24, p=.03], after adjusting for age, sex, and depressive symptom severity

Appendix C: Summary of Research Testing
Joiner and Colleagues' (2005) Interpersonal Theory of Suicide

Study Design A limitation among the studies that have attempted to validate Joiner's (2005) Interpersonal Theory of Suicide, is the cross-sectional study design. All of the studies that have tested this causal theory were cross-sectional in nature, which may limit the ability make causal inferences (Cukrowicz et al., 2011; Joiner et al., 2009; Van Orden, Witte, James, et al., 2008).

Internal Validity The majority of studies that have tested Joiner's (2005) Interpersonal Theory of Suicide provide only partial support because all the main constructs, including thwarted belongingness, perceived burdensomeness, and acquired capability, were not included in the model (Cukrowicz, Cheavens, Van Orden, Ragain, & Cook, 2011; Joiner et al., 2009; Van Orden, Witte, James, et al., 2008; Van Orden, Witte, Gordon, Bender, & Joiner, 2008). The exclusion of constructs may limit the inference regarding the entire theory and raises questions as to why key factors were not included in the model.

Studies used a variety of proxy measures to operationalize constructs and suicide-related outcomes. Although many of the studies used the Interpersonal Needs Questionnaire (Van Orden, Witte, Gordon, et al., 2008), a scale designed to measure thwarted belongingness and perceived burdensomeness, some studies may have used proxy scales that may not have measured the appropriate constructs, such as Rosenberg's Mattering Scale as a measure of perceived burdensomeness (Joiner et al., 2009). Studies also differed among suicide-related outcomes, which ranged from suicide ideation (Cukrowicz, Cheavens, Van Orden, Ragain, & Cook, 2011; Joiner et al., 2009; Van Orden, Witte, James, et al., 2008; Van Orden, Witte, Gordon, et al., 2008), though suicidal behaviour (Joiner et al., 2009) to suicide risk, which was measured with a standardized assessment protocol (Van Orden, Witte, Gordon, et al., 2008). Variability among the scales and suicide-related outcomes may influence the comparability between studies.

Both the exclusions of constructs and the differing scales among studies may have contributed to the variability in study results. Thwarted belongingness, was found to be a

significant predictor of suicide ideation (Van Orden, Witte, James, et al., 2008); however, was not statistically significant when perceived burdensomeness was included in the model (Joiner et al., 2009; Van Orden, Witte, Gordon, Bender, & Joiner, 2008). The two-way interaction between thwarted belongingness and perceived burdensomeness was found to predict levels of suicide ideation (Joiner et al., 2009; Van Orden, Witte, Gordon, Bender, & Joiner, 2008) and the two-way interaction between perceived burdensomeness and acquired capability was also statistically significant in predicting suicide risk (Van Orden, Witte, Gordon, et al., 2008). The three-way interaction between the burdensomeness, belongingness and acquired capability did predict current suicide attempt; however, the main effect and two-way interaction between perceived burdensomeness and belongingness were not statistically significant (Van Orden, Witte, Gordon, et al., 2008). It appears most of the studies did not test all of the constructs from the hypothesized theory.

Statistical Analyses Certain statistical techniques may be more appropriate for theory testing. Although multiple regression may test the association among variables, it may be of limited use when exploring a chain of casual events. Structure equation modeling allows for simultaneous testing of causal pathways and may be more appropriate for theory testing. Studies testing Joiner and colleagues' theory used multiple regression, which may provide only partial support for this theory (Cukrowicz et al., 2011; Joiner et al., 2009; Van Orden, Witte, James, et al., 2008; Van Orden, Witte, Gordon, et al., 2008).

External Validity The majority of the published work that has tested the Interpersonal Theory of Suicide has been completed using undergraduate students (Van Orden, Witte, Gordon, et al., 2008; Van Orden, Witte, James, et al., 2008) and clinical populations (Joiner et al., 2009; Van Orden, Witte, Gordon, et al., 2008), with the exception of two studies testing associations with perceived burdensomeness among adults over age of 55 years old and 60 years old (Cukrowicz et al., 2011).

Summary of studies examining Joiner and colleagues' (2005) Interpersonal Theory of Suicide

Study	Study design & Country	Sample	Main constructs of the theory			Outcome	Study findings/Model fit
			Thwarted belongingness	Perceived burdensomeness	Acquired capability		
Van Orden, Witte, James, Castro, et al. (2008)	Cross-sectional; U.S.A.	309 undergraduates (M=19 years, range= 17-51 years)	Interpersonal Needs Questionnaire; INQ (Van Orden, Witte, Gordon, et al., 2008)	Not assessed	Not assessed	**Suicide ideation:** SSI	-Sense of belonging significantly predicted suicide ideation [B=-.79, t(305) = -6.35, p<0.001]
Van Orden, Witte, Gordon, Bender, & Joiner (2008)	Cross-sectional; U.S.A.	309 undergraduates (M=19 years, range= 17-51 years)	INQ	INQ	Not assessed	**Suicide ideation:** SSI	-Perceived burdensomeness significantly predict current suicide ideation [semipartial r=.28, t(303)=5.62, p <0.001] -Thwarted belongingness did not predict current suicide ideation -The interaction between burdensomeness and belonging was statistically significant and predicted current suicidal ideation, suggesting that sense of belongingness predicted suicide ideation, only at high levels of perceived burdensomeness [semipartial r = .18, t(302) =3.78, p<0.001]
Joiner et al. (2009)	Cross-sectional; U.S.A.	815 young adults who endorsed sadness or anhedonia (M=20.02, SD=0.95)	Provisions for Social Relations Scale (Turner & Marino, 1994)	Rosenberg's Mattering Scale (DeForge & Barclay, 1997)	Not assessed	**Suicide ideation:** Michigan Composite International Diagnostic Interview	-Interaction of mattering and family social support significantly predicted the severity of suicide ideation [partial r = .08, t(809)=2.15, p<0.05]
Joiner et al. (2009)	Cross-sectional; U.S.A.	313 young adults who had a recent suicide attempt or hospitalization evaluation for suicide ideation (M=22.17, SD=2.76)	Suicide Probability Scale; SPS (Cull & Gill, 1988)	SPS	Previous suicide attempt	**Suicidal behaviour:** Recent suicide attempt	-The main effects of and 2 way interaction between perceived burdensomeness and low belonging did not predict current suicide attempt -The 3 way interaction of perceived burdensomeness, low belonging and number of previous suicide attempts predicted current suicide attempt [B=.615, wald χ^2 (313)=8.57, p=0.003]

Study	Study design & Country	Sample	Main constructs of the theory			Outcome	Study findings/Model fit
			Thwarted belongingness	Perceived burdensomeness	Acquired capability		
Van Orden, Witte, Gordon, Bender, & Joiner (2008)	Cross-sectional; U.S.A.	153 adult psychiatric outpatients (M=exact values unreported but similar to another study with M=26.21 years, SD = 9.56)	Not assessed	INQ	Acquired Capability for Suicide Scale; ACSS (Bender, Gordon, & Joiner, 2007)	**Suicide risk:** psychology clinical standardized assessment protocol	-Perceived burdensomeness significantly predicted severity of suicide risk, [semipartial r= .22, t(147) =3.10, p=0.002] -Acquired capability did not predict suicide risk -The interaction for perceived burdensomeness and acquired capability predicting suicide risk was statistically significant [semipartial correlation= .16, t(147) =2.26, p=0.026]
Cukrowicz, Cheavens, Van Orden, Ragain, & Cook (2011)	Cross-sectional; U.S.A.	57 community- residing adults age 55+ years (M=74.14 years, SD=7.51)	Not assessed	INQ	Not assessed	**Suicide Ideation:** GSIS – Suicide Ideation Subscale	-Perceived burdensomeness predicted suicide ideation [B=.11, wald $\chi^2(57)$ =7.21, p=0.007]
Cukrowicz et al. (2011)	Cross-sectional; U.S.A.	105 adults 60 + years (M=70.89 years, SD= 7.63)	Not assessed	INQ	Not assessed	**Suicide Ideation:** GSIS – Suicide Ideation Subscale	-Perceived burdensomeness predicted suicide ideation [B=.06, wald $\chi^2(105)$ =4.15, p=0.042]

Appendix D: Demographics Questionnaire

Before completing the questionnaires, please complete the following questions.

I.D. #____ Please indicate if you are: Right-handed or Left-handed (circle one)

Location: ____ Interviewer Initials: ____

Date of Interview: Day ____ Month ____ Year____

Sex (please select one): Male ____ Female ____

Date of Birth: Day ____ Month ____ Year____

Place of Birth: ____

What is your ethnic/racial background? : ____

What is your cultural background? : ____

How many brothers and sisters do you have? :_ ___

What are their ages? ____

Where do they live? ____

What is your Marital Status? (please mark with an X):

____ Single, Never Married

____ Married, Living with Spouse Year Married: ____

____ Married, Not Living with Spouse Year(s) re-married: ____ ____

____ Legally Separated Year Separated: ____

____ Divorced Year Divorced: ____

____ Widowed Year Widowed: ____

____ Other (please indicate) _____

Are you currently involved in a romantic relationship? : Yes ____ No ____

Do you live alone? : Yes ____ No ____

If no, who lives with you? _

How many children do you have? : ____

What are their ages? ____

Where do they live? ____

How many grandchildren do you have? : ____

What are their ages? ____

Where do they live? ____

How many great-grandchildren do you have? : ____

What are their ages? ____

Where do they live? ____

How many great-great-grandchildren do you have? : ____

What are their ages? ____

Where do they live? ____

What is your religious faith? : ____

Do you practice a particular religion? : Yes ____ No ____

How often do you attend religious services? : _

How often do you engage in religious rituals (e.g. prayer)? : ___

Do you consider yourself a religious person? : Yes ____ No ____

Do you consider yourself a spiritual person? : Yes ____ No ____

What is your primary or spoken language? : ____

What is your employment status (please check all that apply)? :

Full-time work ____ Part-time work ____ Retired ____

Volunteer ____ Unemployed ____ Student ____

Disability ____

Occupational title (please indicate): ____

If no current occupational title, please indicate past title: ____

How are you supporting yourself now? : ____

What is the highest level of education that you have achieved? :____

Has there ever been a period of time when you were unable to go to school or work, or finish a program of study, because of a mental health problem? :

What is your Family Doctor's name? : ____ Phone #: ____

If no Family Doctor, check here ____

If no Family Doctor, where do you go for healthcare? : ____

What is your Psychiatrist's name? ____ Phone #: ____

Please list any physical programs/illnesses that you currently have:

_____

_____

_____

Please rate your current state of physical health by circling one of the numbers below:

1	2	3	4	5	6	7
Extremely Poor			Neutral			Extremely Good

Curriculum Vitae

Name: Joyce Cheng

Post-secondary Education and Degrees:

The University of Western Ontario
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2010-2012 M.Sc.

The University of Western Ontario
London, Ontario, Canada
2005-2010 B.H.Sc.

Honours and Awards:

Western Graduate Scholarship
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Related Work Experience:

Research Assistant
The University of Western Ontario, Epidemiology and Biostatistics
2010 – 2012

Research Assistant
Lawson Health Research Institute
2010

Research Assistant
The University of Western Ontario, Health Sciences
Children's Health and Activity Modification Program (C.H.A.M.P)
2008 – 2010

Presentations:

Cheng J, Heisel M, & Flett G. (2012, October). Investigating the associations between meaning in life and perceived social support on late-life suicide ideation. Paper presented at the Canadian Association for Suicide Prevention annual conference, Niagara Falls, ON.

Cheng J, Heisel M, & Flett G. (2012, June). Investigating the associations between meaning in life and perceived social support on late-life suicide ideation. Poster presented at the annual Academic Research Day symposium of The University of Western Ontario Department of Psychiatry, London, ON.

Cheng J, Heisel M, & Flett G. (2012, March). Investigating the potentially protective role of meaning in life and perceived social support on suicide ideation community residing older adults. Poster presented at the annual London Health Research Day of Lawson Health Research Institute and the Schulich School of Medicine & Dentistry, The University of Western Ontario, London, ON.

Cheng J, Heisel M, & Flett G. (2012, February). Investigating the potentially protective role of meaning in life and perceived social support on suicide ideation community residing older adults. Paper presented at the annual symposium of Lawson Health Research Institute Aging Rehabilitation and Geriatric Care Program and The University of Western Ontario Faculty of Health Sciences, London, ON.

Cheng J, & Wilk, P. (2011, March). The perceived availability of health care in Southwestern Ontario: Results from the Canadian Community Health Survey. Paper presented at the Middlesex-London Health Unit and The University of Western Ontario, London, ON.