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Investigating Personality Vulnerability to Suicide Ideation in Community-Residing Older Adults

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Graduate Program in Epidemiology and Biostatistics
A thesis submitted in partial fulfillment of the requirements for the degree in Master of Science
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INVESTIGATING PERSONALITY VULNERABILITY TO SUICIDE IDEATION IN
COMMUNITY-RESIDING OLDER ADULTS

(Spine title: Personality and Suicide Ideation in Older Adults)

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By

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Graduate Program in Epidemiology and Biostatistics

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

The School of Graduate and Postdoctoral Studies
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London, Ontario, Canada

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**Investigating Personality Vulnerability to Suicide Ideation in
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Abstract and Keywords

This study assessed associations between suicide ideation and personality characteristics in a sample of community-residing adults 65 years of age and older. Measures of personality, suicide ideation, and depression were administered at two time points 6-12 months apart. Multiple linear regression analyses were employed to investigate cross-sectional and longitudinal associations between personality characteristics and suicide ideation. A total of 106 older adults (mean age=74.2 years, SD=5.8, including 78 women) completed both phases of the study. The majority of participants included in this study were relatively emotionally and psychologically healthy. Within this sample of older adults, more severe suicide ideations was significantly associated with lower Extraversion and greater Neuroticism and Socially Prescribed Perfectionism, controlling for age, sex, and depression symptom severity. Although findings concerning Neuroticism were not consistent across measures, Extraversion and Socially Prescribed Perfectionism appear to have particularly robust associations with suicide ideation. These personality characteristics may be indicators of vulnerability to suicide ideation among community-residing older adults and should be considered when assessing suicide risk and planning interventions with this population.

Keywords: older adults, suicide ideation, personality, NEO-FFI, HEXACO-60

Dedication and Acknowledgments

This thesis is dedicated to my wife Melissa for her endless support and encouragement and for everything else she does: You hold the nail and I swing the hammer.

I would like to acknowledge my supervisor Dr. Marnin Heisel for his support and guidance throughout my graduate studies. I would also like to thank Dr. Gordon Flett and Dr. Ross Norman for their contributions to this thesis. Finally, I want to thank Laura Allan, Paulina Dykso, and Luke Fera for their assistance with participant recruitment and data collection as well as everyone who participated in this study for volunteering their time.

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Abbreviations

- 1) GSIS: Geriatric Suicide Ideation Scale
- 2) NEO-FFI: NEO Five-Factor Inventory
- 3) NEO-PI-R: NEO Personality Inventory Revised
- 4) HEXACO-60: Honesty/Humility, Emotionality, eXtraversion, Agreeableness, Conscientiousness, and Openness to Experience 60-item Personality Inventory
- 5) TIPI: Ten Item Personality Inventory
- 6) MPS: Multidimensional Perfectionism Scale
- 7) CESD-R: Center for Epidemiologic Studies Depression Scale Revised

Nomenclature

1. Older adult: an individual who is 65 years or older.
2. Suicide ideation: “any self-reported thoughts of engaging in suicide-related behaviours” (pg 247).¹
3. Suicide-related behaviour (or suicidal behaviour): self-injurious behaviour with a non-fatal outcome. This term is synonymous with ‘attempted suicide’, although the word ‘attempted’ is often considered insensitive. It should be noted that suicide-related behaviours may or may not involve intent to die and may or may not result in personal injury.¹
4. Death by suicide: A fatal outcome following self-induced injuries that result from suicide-related behaviours. This term is synonymous with ‘committed suicide’ and ‘completed suicide’ but is thought to be more sensitive and imply less moral judgement.
5. Suicidality: A term encompassing suicide ideation and suicide-related behaviour.
6. Psychological autopsy study: A study that aims to identify psychological features of individuals who have died by suicide.
7. Personality: Although there are many definitions of personality, at a fundamental level the term personality describes “an individual’s characteristic pattern of thinking, feeling, and acting” (pg 578).²
8. Personality trait: “A characteristic pattern of behaviour or a disposition to feel and act, as assessed by self-report inventories and peer reports” (pg 603).²

Chapter I: Introduction

1.1 Introduction

Worldwide, it is estimated that one million individuals die by suicide each year,³ including approximately 3900 Canadians.⁴ The psychological, societal, and economic costs of suicide are immense. Although the scientific community has tended to give more attention to suicide within younger cohorts,⁵ older adults have high rates of suicide in Canada and throughout the world.⁶ Moreover, many researchers predict that the prevalence of late-life suicide will increase in the near future due to the ageing demographics of the North American population.⁶ This increase is anticipated not only because a large cohort will be entering a phase of life in which rates of suicide are high but also because the generation that is approaching older adulthood has tended to have higher rates of suicide across their life course, as compared to previous generations.⁷ Acknowledging that late-life suicide represents a significant public health concern, it is imperative that researchers, clinicians, and policy-makers gain a better understanding of late-life suicide risk to prevent, or at least mitigate, the anticipated increase in deaths due to suicide among older adults.

Several demographic and clinical risk factors have been identified that confer vulnerability for suicide, including male sex, older age, presence of depression, and previous suicidal behaviour, which are some of the most robust indicators of suicide

risk.⁶ Still, these variables are limited in their predictive value. Even depression, which is associated with an up to 60-fold increase in risk for suicide,⁸ is not a sufficient predictor, given that most depressed older adults do not die by suicide. Personality characteristics, which play a prominent role in the way we interact with and interpret our environment, may provide additional explanatory value in predicting vulnerability for suicide. Although recent research has demonstrated consistent associations between personality variables and suicide ideation,⁹ the majority of research exploring such associations has focused on younger individuals and has employed either cross-sectional or retrospective research designs. Studies that have included older adults have tended to control poorly for key potential confounds, such as depression, and have relied nearly exclusively on the Five-Factor Model of personality, which may neglect information that is available from other models of personality. Previous research has also tended to focus on psychiatric patients, excluding non-psychiatric community-residing individuals and thereby neglecting a large percentage of the population who are at-risk for suicide.¹⁰ Research that includes individuals at lower levels of suicide ideation severity allows a more distal approach that can identify variables associated with the onset and/or exacerbation of suicide ideation. Moreover, given the low base rate of suicide and our limited ability to predict death by suicide, interventions directed at those at moderate risk for suicide may be the most effective way to reduce suicide rates.¹⁰

Thus, the purpose of this study is to assess associations between suicide ideation and personality characteristics in a sample of community-residing older adults using longitudinal methods and multiple measures of personality. Results from this study may have implications regarding the detection of older adults who are at risk for suicide by identifying personality traits that cross-sectionally and longitudinally predict the onset and/or exacerbation of suicide ideation severity. Moreover, results from this study may suggest therapeutic considerations for clinicians treating individuals at risk for suicide, such as ensuring that the therapeutic approach is compatible with the patient's personality style. Suicide is a tragic phenomenon affecting not only the individuals who take their own lives but also their family and friends who live on. This study will contribute to our knowledge of suicide ideation among community-residing older adults with the ultimate aim of helping to prevent deaths by suicide within this population.

1.2 Suicide Ideation

Suicide ideation is defined as thoughts of engaging in suicide-related behaviour.¹

Although it is clear that suicide ideation is distinct from both suicidal behaviours and death by suicide (see nomenclature on page xiii for definitions of these terms), there is some debate regarding whether this distinction represents a categorical difference or a continuum of severity. With respect to the categorical perspective, not all those who report suicide ideation will engage in suicidal behaviours or die by suicide. This suggests that risk factors for death by suicide may not necessarily be identified through

investigations of suicide ideation and in fact there are some risk factors for death by suicide that are not associated with suicide ideation, such as male sex.⁶ Conversely, the continuum theory posits that suicide ideation precedes suicide-related behaviours, which precede death by suicide. Suicide ideation can be painful and overwhelming in and of itself, is an indicator of pathology and/or personal crisis, and is associated with risk for death by suicide.¹¹ The focus of this study is on identifying associations between suicide ideation and personality characteristics. This information should provide valuable information regarding suicide risk and may also suggest targets for intervention at early stages of the suicide continuum.

1.3 Epidemiology of Suicide in Canada

1.3.1 Prevalence

Suicide rates in Canada increased dramatically during the second half of the Twentieth Century. During the 1950s, the suicide rate in Canada averaged 7.3 suicides per 100,000 Canadians.¹² By the 1980s, this figure had risen by 86% to an average rate of 13.6 per 100,000.¹² Although this increase was evident for both sexes, the increase was particularly striking for men, with the rate for men reaching 22.8 per 100,000 in 1983 (as compared to 11.9 in 1950).¹² Since the mid-to-late 1980s, the Canadian suicide rate has been slowly declining. In 2009, the most current year for which mortality data are available from Statistics Canada, the age standardized rate was 10.7 suicides per

100,000 Canadians (male = 16.6/100,000; female = 5.0/100,000), comprising 3,890 individuals who died by suicide.⁴ For that year, suicide ranked as the ninth leading cause of death for both sexes (representing 1.6% of all deaths) and the seventh leading cause of death for men (representing 2.5% of deaths).¹³ The suicide rate has been relatively stable over the past few years (ranging from 10.0 – 10.9 during the last 5 years).¹⁴

Suicide rates obtained from national mortality statistics are best interpreted with caution as such figures likely underestimate the number of suicides that occur during any given year due to misclassification. Several factors contribute to suicide misclassification, including jurisdictional regulations, ambiguity of the death as suicide, and knowledge/attitudes of the individual reporting the cause of death.¹² Consequently, an unknown number of suicides are attributed to natural, accidental, or undetermined causes of death.

1.3.2 Suicide and Older Adults

The Canadian suicide rate fluctuates dramatically across age groups. As can be seen in Figure 1, suicide rates tend to increase from young adulthood through the first half of life, peak around age 50, and then decrease through age 65. This pattern is evident for both men and women; however, whereas suicide rates appear to decrease slightly for women over the age of 65, rates for men increase substantially following age 65, with the highest rate of suicide being among men age 90 or older (age specific suicide rate =

28.3 per 100,000, averaged over the years 2000 – 2009).¹⁵ Elevated suicide rates among older adults are explained in part by the fact that they are more likely to employ lethal means, as compared to younger individuals.⁶ Due to a number of factors, including high lethality of means and decreased physical resiliency, older adults are more likely to succumb to their injuries: the ratio of suicidal behaviour to death by suicide is <4:1 for older adults, as compared to 20:1 in the general population and 100-200:1 in younger cohorts.⁶

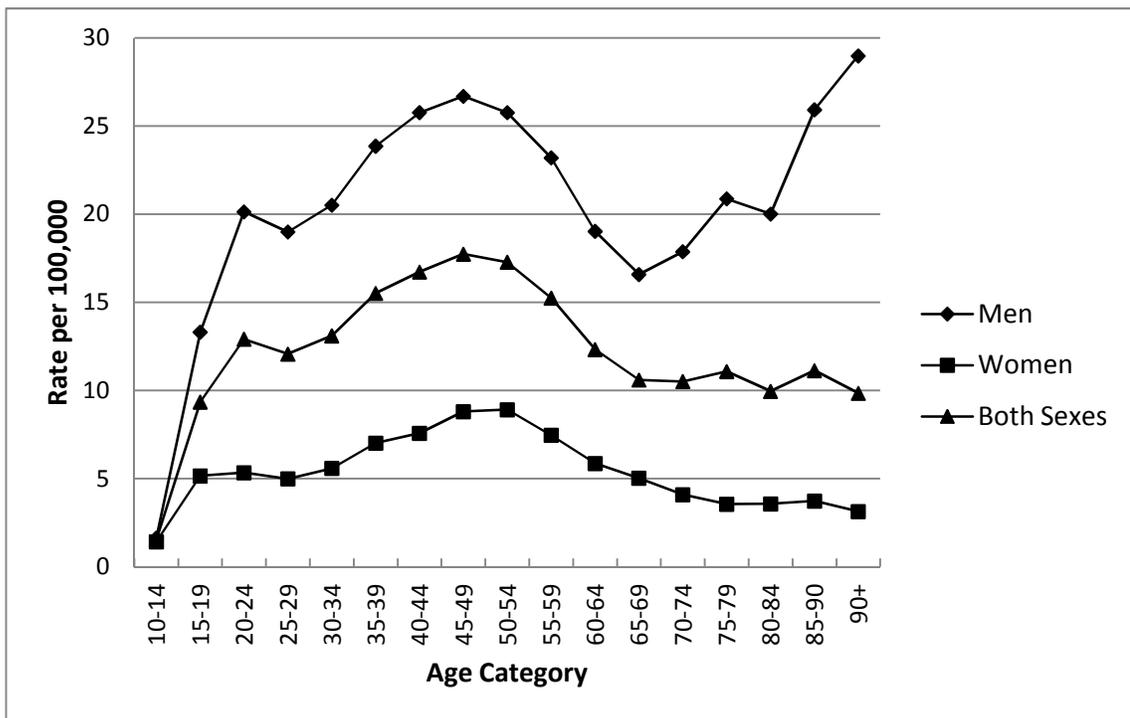


Figure 1. Canadian age specific suicide rate per 100,000 individuals (averaged over the years 2000 – 2009; rates produced using data from CANSIM)^{15, 16}

As compared to the total Canadian population, older men have higher suicide rates whereas older women have lower suicide rates (Table 1). During 2009, 488 older adults died by suicide in Canada and, of these, 398 (81.6%) were men.⁴ Although the reason for this sex discrepancy is not clear, sex differences are evident in both older and younger cohorts and have been observed consistently across time in Canada and throughout most of the world.¹⁷ Paradoxically, despite having lower rates of suicide, women are more likely than men to engage in suicide-related behaviours.⁶

Table 1. Suicide rate per 100,000 Canadians 65 and older and for the total Canadian population by sex for the years 2000-2009

Year	Canadians 65 and Older			Total Canadian Population		
	Both sexes	Men	Women	Both Sexes	Men	Women
2000	10.4	19.2	3.9	11.7	18.4	5.2
2001	10.1	17.9	4.2	11.9	18.6	5.2
2002	10.8	21.0	3.0	11.6	18.4	5.0
2003	10.9	19.8	4.1	11.9	18.5	5.4
2004	10.3	17.8	4.6	11.3	17.3	5.4
2005	10.9	19.3	4.5	11.6	17.9	5.4
2006	11.2	19.1	5.0	10.8	16.7	5.0
2007	10.2	17.9	4.2	11.0	16.7	5.3
2008	10.7	19.7	3.6	11.1	16.8	5.5
2009	10.4	19.2	3.4	11.5	17.9	5.3

Note: Data reproduced from Statistics Canada.^{15, 16}

1.3.3 Risk Factors for Suicide among Older Adults

Presence of suicide ideation and history of suicide-related behaviour are among the strongest predictors of death by suicide.¹¹ In one study investigating suicide among older adults, it was found that 78% of those who died by suicide reported thoughts of suicide to family and friends in the year preceding their death and that 38% reported such thoughts to a clinician.¹⁸ In another study of adult psychiatric outpatients, Brown and colleagues¹⁹ found that individuals who reported suicide ideation (defined as a score equal to or greater than 3 on the Scale for Suicide Ideation) were approximately seven times more likely to die by suicide over a 20-year follow-up, as compared to those who did not report suicide ideation. With respect to suicidal behaviour, it is estimated that the odds of death by suicide are 10.8 to 41.9 times greater among those who have a history of suicidal behaviour as compared to those who have not engaged in such behaviour. Nevertheless, for the majority of older adults who die by suicide, their first attempt is fatal.⁷

Rates of suicide are greatly elevated among older adults who have a mental disorder, particularly if it is a mood disorder. Psychological autopsy studies have revealed that approximately 85% of those who die by suicide would have been diagnosed with at least one mental disorder had they been assessed by a mental health professional,⁸ including 65% with either major (54%) or minor depression (11%).²⁰ Mood disorders are also associated with suicide ideation and suicide-related behaviours.¹¹ Still, many individuals

who are diagnosed with a mental disorder do not engage in suicide-related behaviours or report having thoughts of suicide. Moreover, it is estimated that 10% - 14% of older adults who die by suicide do not have a mental disorder.⁶ Thus, although mood and other mental disorders are significant indicators of risk, information regarding mental health diagnosis alone is insufficient to determine risk for suicide. Diagnosis of a personality disorder, particularly borderline personality disorder, has also been demonstrated to be a risk factor for suicide.²¹⁻²³ However, there is some evidence that personality disorders are less prevalent among older adults who die by suicide, as compared to younger individuals who die by suicide.²⁴

A growing body of literature suggests that certain personality characteristics are associated with vulnerability for suicide. The term Personality describes “an individual’s characteristic pattern of thinking, feeling, and acting” (pg 578).² In a recent systematic review, Brezo and colleagues⁹ found that suicide ideation, suicidal behaviour, and death by suicide have all been reported to be negatively associated with Extraversion and positively associated with Neuroticism, Hopelessness, Trait Anxiety, and Impulsivity. Additionally, Perfectionism and altruism have been shown to be associated with suicide ideation. After reviewing all of the available literature, Brezo and colleagues concluded that Neuroticism and Extraversion have particular promise as suicide risk indicators, demonstrating consistent association with both suicide ideation and death by suicide.⁹ It should be noted that few of the studies reviewed by Brezo and colleagues focused on older adult populations and that many of the studies excluded older individuals.

We next turn to a description of current personality theories and a discussion of theoretical and empirical associations between suicide ideation and contemporary personality constructs.

1.4 Theoretical Associations between Personality Characteristics and Suicide Ideation

Moving beyond the unconscious motivations suggested by Freud's Psychoanalytic theory, Gordon Allport was the first researcher to describe personality in terms of traits, or characteristic patterns of behaviour, representing a major shift in the way personality was conceptualized.² However, a trait approach to personality assessment requires that researchers identify which traits adequately capture variations in human personality. An example of one of the early attempts to develop a trait-based personality inventory is the Eysenck Personality Questionnaire, in which personality variation is reduced to two primary factors: Extroversion-Introversion and Emotional Stability-Neuroticism. By positioning each of these factors on a Cartesian grid, personality can be described by an individual's location on the resulting quadrants.²⁵ Another example of an early theory of personality is the Interpersonal Circumplex model, in which interpersonal interactions are described in terms of the two axes of Love and Dominance.²⁵ According to this model, most interaction styles can be located by moving in a circular order around these two factors. Although the trait dimensions identified in earlier research, such as the Extroversion-Introversion and Emotional Stability-Neuroticism factors, represent

important aspects of personality, contemporary research has evolved to focus on a broader range of dimensions in order to describe a fuller range of personality.²

1.4.1 The Five-Factor Model of Personality

From amongst the various models of personality, the Five-Factor Model of personality gained wide recognition among personality researchers during the 1990s.²⁶ The Five-Factor Model was derived from a lexical approach in which personality descriptors are identified using naturally occurring language.²⁵ Identified terms were then factor analyzed in an effort to reveal a comprehensive yet succinct set of personality domains that describe the full range of human personality.²⁶ According to the Five-Factor Model, individual differences in personality can be comprehensively characterized by the following five domains: Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness. Although the traits, or facets, that combine to create each domain could be conceptualized in several ways, the Five-Factor Model may be most recognizably associated with the longer (240-item: NEO-PI-R) and shorter (60-item: NEO-FFI) versions of the NEO measure. The facets that define each of the NEO-PI domains are presented in Table 2 and the following discussion uses this classification to describe the domains of the Five-Factor Model.

Table 2. Facets of the Five Factor Model of personality

Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness
• Anxiety	• Warmth	• Fantasy	• Trust	• Compliance
• Angry Hostility	• Gregariousness	• Aesthetics	• Straightforwardness	• Order
• Depression	• Assertiveness	• Feelings	• Altruism	• Dutifulness
• Impulsiveness	• Activity	• Actions	• Compliance	• Self-Discipline
• Vulnerability	• Positive Emotion	• Ideas	• Modesty	• Deliberation
• Self-Consciousness	• Excitement-Seeking	• Values	• Tender-Mindedness	• Achievement-Striving

Note: This table presents the facets of the Five-Factor Model according to the NEO-PI-R²⁷

Neuroticism. The Neuroticism domain contrasts emotional stability (or adjustment) and emotional instability (or maladjustment).²⁵ Those who score high on Neuroticism are prone to experience negative emotions (such as sadness, fear, and guilt), have irrational ideas, have difficulty controlling impulses, and be less able to cope with stress. Relative to high-scorers, those who score low on Neuroticism are more likely to be calm and even-tempered.²⁷ Although the Neuroticism domain is not in itself an indicator of psychopathology, individuals high in trait Neuroticism tend to be more susceptible to psychological distress.²⁷ Accordingly, elevated scores on measures of Neuroticism have consistently demonstrated significant associations with suicide ideation, suicide-related behaviours, and death by suicide.^{5, 9}

Extraversion. The Extraversion domain reflects an individual's preference for social interaction and activity.²⁵ High scorers can be described as sociable, affectionate, energetic, and optimistic and as tending to enjoy excitement and stimulation. Individuals who are low on this dimension (i.e., more introverted) can be described as reserved, quiet, and independent. Although individuals who are more introverted are

often thought of as being shy and socially anxious, they do not necessarily have difficulty interacting with others but rather may simply prefer being alone.²⁷ Nevertheless, individuals who are more introverted may be at greater risk for psychological distress, including suicide ideation, due to reduced social interaction and potentially lower perceived social support.^{5, 28} Additionally, introverted individuals who are experiencing a crisis may be less likely to communicate thoughts of suicide to others, possibly increasing the risk for death by suicide.²⁹

Openness to Experience. The Openness to Experience domain refers to an individual's receptiveness to new ideas, approaches, and experiences.²⁵ Individuals who score high on this domain have an interest in experience for its own sake and are imaginative, creative, and liberal. Conversely, those who are more closed (i.e., low scorers) tend to prefer things that are familiar, concrete, and practical. Individuals who are more closed have also been described as behaviourally, affectively, and cognitively constricted and as tending not to experience emotions as strongly as those who are more open.²⁷ Affective constriction represents one possible process by which Openness may lead to increased risk for suicide, as individuals who are affectively constricted may have difficulty processing and regulating emotions. Duberstein has hypothesized that individuals who are more closed are vulnerable to feelings of meaninglessness because they derive meaning in life from behaviours, which tend to be time limited.³⁰ However, although Duberstein has reported that individuals who are more closed and suffering from depression are more likely to die by suicide, they are also less likely to report having

thoughts of suicide.²⁹ One explanation that has been offered to explain this discrepancy is that individuals who are low on Openness may be at increased risk for suicide, at least in part, because they are less likely to report having thoughts of suicide to others, decreasing the likelihood of intervention.³¹ Conversely, individuals who are more open may be more open to experiencing thoughts of suicide and to the expression of those thoughts.

Agreeableness. The Agreeableness domain contrasts agreeable and disagreeable (or antagonistic) interpersonal tendencies.²⁵ Individuals who are more agreeable have an altruistic, selfless concern for others and are trusting, generous, and cooperative. Conversely, antagonistic individuals are skeptical of others' intentions, ruthlessly competitive, critical, and egocentric.²⁷ Although the Agreeableness domain has not received much focus in the suicide literature, there is some evidence that altruism is negatively associated with suicide ideation.⁹ Additionally, low Agreeableness is associated with interpersonal difficulty and decreased perceived social support,³² which may increase risk for suicide. Finally, some evidence suggests that Agreeableness plays an important role in regulating negative emotions, such as anger and aggression, and that this regulation may be particularly important for individuals who are prone to experience distress.³²

Conscientiousness. The Conscientiousness domain reflects individual differences in organization and achievement.²⁵ Those who score high on this domain strive to achieve excellence through order, dutifulness, and self-discipline and can be described as hardworking, ambitious, compulsive, and persevering. By contrast, those who are low on this domain are not as focused on achieving their goals, complete tasks in a more aimless, negligent, and disorganized manner, and tend to be impulsive, disinhibited, and hedonistic.²⁷ These characteristics may place individuals who are low in conscientiousness at greater risk for suicide ideation and suicide. Impulsivity and disinhibition may increase the frequency and/or intensity of thoughts of suicide as well as lower the threshold required for an individual to engage in suicide-related behaviours.^{9, 33} Some researchers suggest that impulsivity may be a particularly important marker of risk in those who do not appear to be suffering from depression.³³ However, at the same time, some research suggests that high Conscientiousness may increase the likelihood of death following suicide-related behaviours, perhaps due to a greater degree of planning and resolve that would be characteristic of individuals who are high in Conscientiousness.^{34, 35}

1.4.2 The Six-Factor Model of Personality: Are Five Factors enough?

Despite wide adoption of the Five-Factor Model, some personality researchers have questioned the comprehensiveness of this model and have argued that current evidence favours a six- (rather than five-) factor structure. Although the five-factor solution

produced in English language research has been replicated across many other languages and cultures,³⁶ this factor structure has failed to emerge in several studies of other languages, including Italian, Greek, and Filipino, suggesting that five-factors may not be sufficient to represent a universal model of personality.²⁶ Moreover, it has been argued that several important personality constructs are excluded from the five-factor solution, including conventionality, manipulateness, integrity, risk taking, and egotism. In contrast, not only has a common set of six-factors consistently emerged in studies of multiple languages, including those listed above, but many of the traits that are beyond the space of the Five-Factor Model are accommodated within a six-factor solution.³⁷

The most prominent difference between the five- and six-factor models of personality is the addition of the Honesty/Humility domain.³⁸ Individuals who score high on Honesty/Humility can be described as sincere, honest, loyal, modest, and fair-minded, whereas those who score low on this domain tend to be deceitful, pretentious, greedy, and boastful. Low levels of Honesty/Humility are associated with power-seeking and status-driven risk taking as well as criminal and other unethical behaviours.³⁸ Although research has not yet investigated associations between this domain and suicide ideation, a negative correlation seems intuitive given the potential impact of low Honesty/Humility on interpersonal relationships and the psychological pain that is often associated with interpersonal problems. Other notable differences between the five- and six-factor models include the transposition of the anger (which shifts from Neuroticism to Agreeableness) and sentimentality (which shifts from Agreeableness to Neuroticism) facets and the addition of an unconventionality facet to the Openness to

Experience domain. By contrast, comparable Extraversion and Conscientiousness domains have emerged in both five- and six-factor solutions.²⁶ Despite the noted differences, comparison of brief inventories assessing the five- (NEO-FFI) and six-factor models (HEXACO-60) demonstrate considerable overlap between the two, with correlations between corresponding domains ranging from 0.40 – 0.71 in community samples and 0.53 – 0.80 in college samples.³⁹

1.4.3 Perfectionism

Although higher order personality domains within the five- and six-factor models are theorized to represent the full range of personality, perfectionism may represent a personality trait that requires additional consideration because of its role in theories of suicide^{40, 41} and because of the strength of evidence linking perfectionism and suicidality.^{41, 42} Perfectionists are individuals who set unrealistically high standards, place an irrational amount of importance on achievement, and pursue their goals rigidly and compulsively.⁴³ Perfectionists also tend to engage in self-defeating thoughts and behaviours, such as ruminating over past or potential experiences of failure and disregarding experiences of success. Perfectionism is positively associated with a number of mental disorders, including mood and anxiety disorders, personality disorders, and eating disorders.^{42, 44}

Hewitt and Flett⁴⁴ have conceptualized perfectionism as a multidimensional construct consisting of three components: Self-Oriented Perfectionism (the setting of perfectionistic standards for oneself), Other-Oriented Perfectionism (the setting of perfectionistic standards for others), and Socially Prescribed Perfectionism (the perception that significant others expect perfection from oneself).⁴⁵ Hewitt and Flett have theorized that both Self-Oriented and Socially Prescribed Perfectionism are associated with suicidality.⁴⁶ Whereas research examining the association between suicide ideation and the self-oriented dimension has been somewhat conflicting, a consistent association between suicide ideation and Socially Prescribed Perfectionism has been demonstrated in numerous studies investigating both psychiatric and community samples and in studies adjusting for depression symptom severity, suggesting that this association does not simply reflect the relation between depression and perfectionism.⁴¹

Perfectionism has been implicated in a number of models of suicide. For example, Baumeister⁴⁰ proposed a model in which suicide is described as an attempt to escape aversive self-awareness. According to this model, internally attributed failure to achieve excessive standards and expectations, whether internally or externally imposed, leads to painful self-awareness. In an effort to thwart these negative emotions, Baumeister posits that individuals dull the perception of painful experiences and emotions through cognitive deconstruction, a process that involves the rejection of meaning and a shift towards rigid, concrete, and narrowly focused cognitions. The irrationality and

disinhibition that is associated with this state of cognitive deconstruction creates an environment in which suicide can be seen as a rational alternative to life. Within this model, the chain of events that lead to suicide-related behaviours are initiated by a discrepancy between one's standards and perceived reality, thereby implicating perfectionism as a key risk factor for death by suicide.

More recently, Hewitt and Flett⁴¹ have proposed a model referred to as the social disconnection model, which theorizes that the association between Socially Prescribed Perfectionism and suicide is mediated by objective and subjective social disconnection. According to Hewitt and Flett,⁴¹ socially prescribed perfectionists generate actual or perceived social disconnection through interpersonal hostility (anger, irritability, and resentment) and sensitivity (excessive neediness and fear of evaluation). The behaviours and cognitions associated with these characteristics make it difficult for such individuals to develop or maintain social relationships and can ultimately result in a sense of alienation and social hopelessness (i.e., a sense of hopelessness regarding future relationships) that confers vulnerability for suicide.⁴¹

We next consider the existing research base examining associations between personality and suicide among older adults by providing a narrative review of published literature identified through a systematic search strategy.

Chapter II: Systematic Literature Review

2.1 Systematic Review Methodology

A systematic literature review was conducted in order to identify published studies investigating associations between personality characteristics and suicide ideation, suicide-related behaviours, and/or death by suicide in older adults. The following databases were included in the search: Medline, PsychInfo, Web of Science, EMBASE, and CINAHL. Each database was searched from inception through February 2012. The search strategy (Table 3) was developed with the assistance of a research librarian using the Medline database and adapted for use in other search engines (i.e., inclusion of keywords and limits were dependent upon availability within each search engine).

Table 3. Search strategy

1. suicide/ OR suicidal ideation/ OR suicide, attempted/ OR (suicid*).mp.
 2. risk factors/ OR risk/ OR (risk OR predict*).mp.
 3. personality/ OR (extraver* OR neurotic* OR openness OR agreeable* OR conscientious* OR "personality characteristic*" OR "personality trait*" OR "personality dimension*" OR "personality domain*").mp.
 4. aged/ OR ("older adult" OR aging OR senior OR elderly OR geriatric* OR gerontolog* OR "life course" OR "late life").mp.
 5. 1 AND 2 AND 3 (limitations: age 65+).
 6. 1 AND 2 AND 3 AND 4.
 7. 5 OR 6 (limitations: English language, journal article).
-

Eligibility criteria for inclusion were established a priori and included the following:

1) The association between a personality variable (defined as any variable that was assessed using a validated measure of personality) and suicide ideation, suicide-related behaviours, or death by suicide was investigated and reported, 2) More than 85% of the sample (or a subgroup analysis) was 50 years of age or older, and 3) The article was published in an English language journal. Review articles that were identified during the search were read (including reference lists to identify other studies that may meet inclusion criteria) but not included. Studies investigating personality disorders rather than personality traits were excluded from this review because the review was focused on community-residing older adults, a population that is unlikely to be diagnosed with a personality disorder,⁴⁷ although studies that examined clinical populations were not excluded. No other methodological criterion was considered reason for exclusion.

2.2 Systematic Review Results

Results from the multi-stage review process are depicted in Figure 2. A total of 16 articles met inclusion criteria (see Appendix A); however, of these articles, only 11 represented unique samples, with the remainder presenting secondary analyses. All studies were included, regardless of sample overlap. Although one study did investigate suicide ideation in a community sample,⁴⁸ the majority of studies were limited to psychiatric populations, including outpatient (n = 3 studies), inpatient (n = 2 studies), and mixed (inpatient and outpatient; n = 3 studies) samples. One study did not include

a clear description of the sample included.⁴⁹ The most common personality measures used were the NEO-PI-R (n = 6 studies) and the NEO-FFI (n = 2 studies). Measures used to assess suicide ideation were more varied and included both continuous scales, such as the Geriatric Suicide Ideation Scale (GSIS), and single suicide-related items taken from measures designed to assess depression symptom severity.

Four studies reported unadjusted associations between measures of suicide ideation and higher order personality domains (Table 4). In all four studies, Neuroticism was reported to be significantly positively associated with suicide ideation severity.^{31, 48, 50, 51} Findings regarding the other four domains were less consistent: whereas two of the three studies investigating psychiatric populations did not identify significant associations between suicide ideation and the other four domains,^{50, 51} Heisel and colleagues³¹ reported that Openness to Experience was positively correlated with suicide ideation. In the only identified study investigating personality correlates of community-residing older adults, Segal and colleagues⁴⁸ found that Extraversion, Agreeableness, and Conscientiousness were all negatively associated with suicide ideation.

Figure 2. Systematic review article selection process

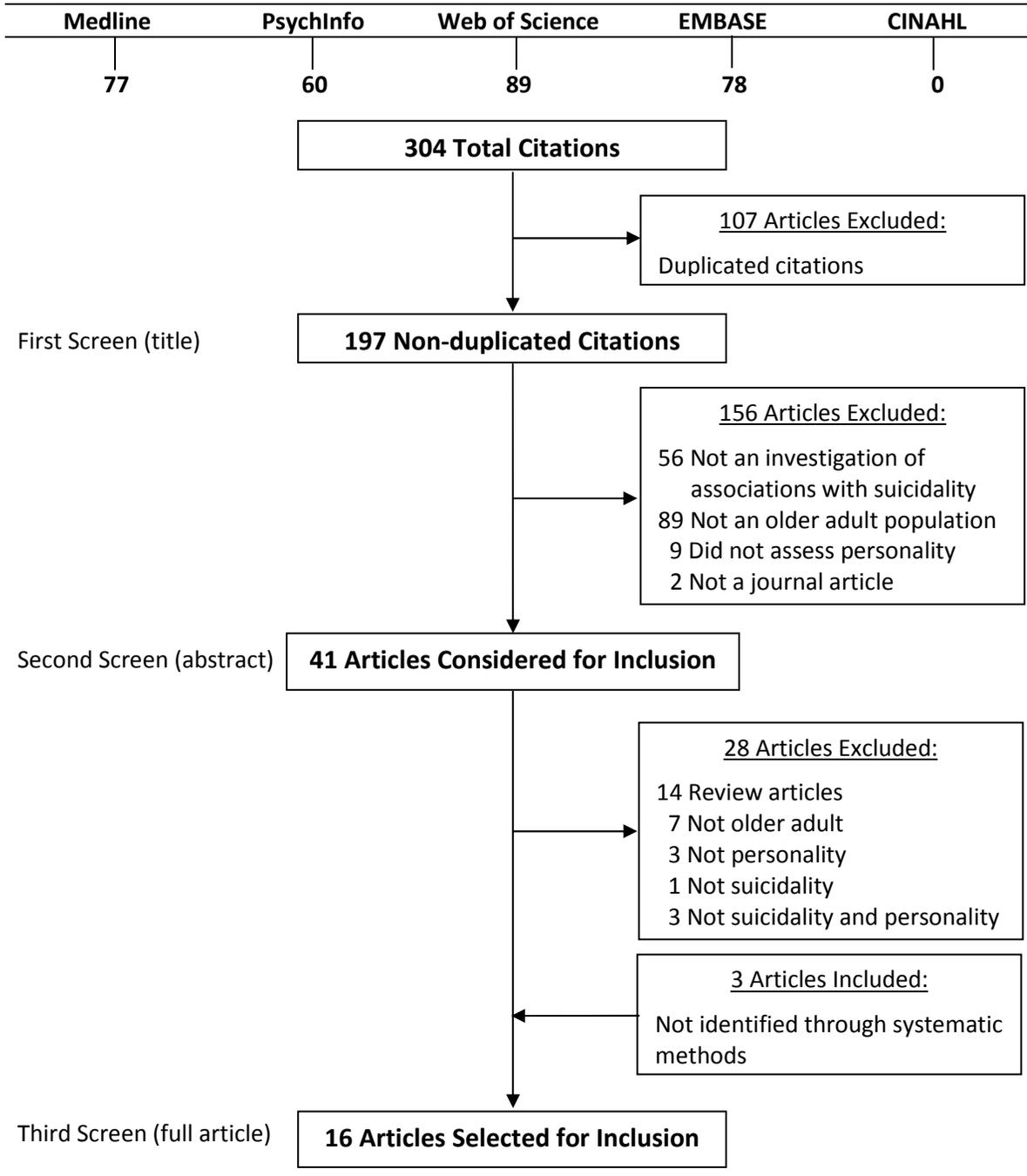


Table 4. Results from studies assessing the association between suicide ideation and higher order personality domains

Study	n	Analysis	Covariates	N	E	O	A	C
Duberstein ⁵⁰	81	Correlation	n/a	+				
Heisel ³¹	134	Correlation	n/a	+		+		
Hirsch ⁵¹	1801	Correlation	n/a	+				
Segal ⁴⁸	109	Correlation	n/a	+	-		-	-
Duberstein ⁵⁰	81	Linear regression	Age and sex					
Hirsch ⁵¹	1801	Linear regression	Age, sex, depression, anxiety, education, income, comorbidity, and happiness	+				
Segal ⁴⁸	109	Linear regression	None	+				
Heisel ³¹	134	Logistic regression	Age, sex, medical comorbidity, and hopelessness				+	
Duberstein ⁵⁰	81	Logistic regression	Age and sex				+	-

Note: Suicide ideation severity and suicide ideation status were the dependent variables for all linear and logistic regression analyses, respectively; All of the studies used a version of the NEO to assess personality; Hirsch and colleagues only included the Neuroticism domain in their analyses; N = Neuroticism, E = Extraversion, O = Openness to Experience, A = Agreeableness, C = Conscientiousness.

The same four studies^{31, 48, 50, 51} also presented results from multivariable analyses, with largely inconsistent findings: two of the studies reported positive associations between Neuroticism and suicide ideation severity,^{48, 51} two reported positive associations between Openness to Experience and suicide ideator status (i.e., presence or absence of suicide ideation),^{31, 50} and one reported a negative association between Agreeableness and suicide ideator status⁵⁰ (Table 4). One noteworthy finding is that whereas Segal and colleagues⁴⁸ found significant correlations between suicide ideation and four of the five

NEO-PI-R domains in bivariate analyses, only Neuroticism was significantly associated with suicide ideation in a linear regression analysis that included each of the five personality domains. Conversely, controlling for age and sex, Duberstein and colleagues⁵⁰ did not find any significant associations between the big five domains and suicide ideation severity. Still, in a study of 1,801 depressed primary care patients, Hirsch and colleagues⁵¹ found a significant association between Neuroticism and suicide ideation severity after controlling for a wide range of covariates, including depression symptom severity (it should be noted that Hirsch and colleagues only included the Neuroticism domain in their analyses). Taken together, results from these four studies demonstrate a consistent relationship between Neuroticism and suicide ideation in unadjusted and linear regression analyses. By contrast, significant associations between suicide ideation and the other personality domains failed to emerge in most of the studies.

A number of studies investigated personality differences between those who had died by suicide, engaged in suicide-related behaviours, or had no history of suicidality. In a psychological autopsy study, Duberstein and colleagues⁵² found that individuals who had died by suicide were reported to have higher Neuroticism scores and lower Openness to Experience scores, as compared to non-psychiatric, age and sex-matched living controls. In a study of similar design conducted in China, Tsoh and colleagues³⁴ also found that those who had died by suicide had higher proxy-rated Neuroticism scores than community controls; however, those who had died by suicide were reported

to be significantly lower in Extraversion, Openness, and Conscientiousness, as compared to non-psychiatric community-residing older adults.

Tsoh and colleagues³⁴ also provided a comparison between those who had died by suicide and those who had engaged in suicide-related behaviours. Comparing these two groups, the authors reported that individuals who had died by suicide were significantly lower in Neuroticism and Openness to Experience and significantly higher in Agreeableness and Conscientiousness. The study by Useda and colleagues³⁵ provides some additional support for these findings, reporting that individuals who had died by suicide were lower in Neuroticism and higher in Conscientiousness, as compared to inpatients who were admitted to psychiatric care following suicide-related behaviour. There is also some evidence that those who have engaged in suicide-related behaviour are significantly lower in Extraversion,^{34, 50} Agreeableness, and Conscientiousness, and significantly higher in Neuroticism,³⁴ as compared to those with no such histories. Conversely, in a study of selected NEO-PI facet scales, Seidlitz and colleagues⁵³ found that lower anxiety (a Neuroticism facet) was associated with having a history of suicide-related behaviour, as compared to those with no such histories. Taken together, there appears to be moderately strong evidence that individuals who have either died by suicide or engaged in suicide-related behaviour have significantly higher Neuroticism scores and significantly lower Extraversion scores, as compared to controls. There is also some converging evidence that death by suicide and suicide-related behaviour is associated with lower Conscientiousness and Openness to Experience.

Three studies investigated associations between suicide ideation and specific personality traits or facets. Using canonical correlation to explore the role of impulsivity (which is associated with low Conscientiousness) on suicidality, Neufeld and colleagues³³ found that impulsivity is a significant predictor of suicide ideation in older adults and that this trait may be an important marker of risk in individuals who do not display pronounced depression or hopelessness. In a sample of 538 depressed geriatric patients being treated in a depression day hospital, Heisel and colleagues⁵⁴ reported that 3.7% of patients were diagnosed as having a narcissistic personality disorder or narcissistic personality traits. Using logistic regression, the authors found that those with narcissistic personality traits were more likely to report suicide ideation than those without narcissistic personality traits, controlling for age, sex, and depression symptom severity. Useda and colleagues⁵⁵ investigated associations between selected NEO-PI facets and suicide ideation severity among psychiatric inpatients and reported significant positive correlations with one Neuroticism (depression) and one Agreeableness (modesty) facet and a negative correlation with two of the Extraversion facets (warmth and positive emotions). Finally, in a study that recruited individuals 65 years of age or older from a commercially purchased mailing list, O’Riley and Fiske⁴⁹ investigated the association between suicide ideation severity and Autonomy, defined as a cognitive style that reflects “excessive, perfectionistic value placed on achievement, control, and being separate from others” (pg 394).⁴⁹ The authors reported that suicide ideation severity was significantly associated with Need for Control, a subscale of the Autonomy measure that reflects inflexibility. However, suicide ideation was not

significantly correlated with either the total Autonomy scale or the other two subscales, Perfectionism and Defensive Separation.

2.3 Limitations of Previous Research

Taken together, the available research base examining associations between personality characteristics and suicide ideation among older adults is limited in several ways. With one exception,⁴⁸ all previous research has focused on psychiatric populations or on individuals who have died by suicide. Although it is important to explore suicide risk and resiliency factors within populations at increased risk, studies restricted to such populations will exclude a large percentage of those who may be at-risk for suicide;¹⁰ or, as stated by Rose, “a large number of people at a small risk may give rise to more cases of disease than the small number who are at a high risk” (pg 431).⁵⁶ Given the low base rate of suicide and the resulting difficulty in predicting death by suicide, strategies aimed at reducing risk among those at moderate risk may be substantially more effective than those targeting high risk individuals.¹⁰ Moreover, suicide ideation may be associated with different levels and/or patterns of personality characteristics within community-residing as compared to psychiatric patient samples. There is some evidence to support this notion as the only study that investigated associations between personality and suicide ideation in a community sample was also the only study demonstrating significant unadjusted correlations between suicide ideation severity and Extraversion, Agreeableness, and Conscientiousness.⁴⁸

The regression analyses that have been reported in the literature included few control variables. For example, Segal and colleagues⁴⁸ did not adjust for any covariates in their analyses whereas Duberstein and colleagues⁵⁰ adjusted for age and sex. Only one study⁵¹ investigating associations between higher order personality domains and suicide ideation controlled for depression symptom severity and one study controlled for hopelessness.³¹ It is important to control for depression severity because it potentially confounds the association between suicide ideation and personality characteristics (particularly neuroticism) and because the presence of depression could have an impact on self-reported personality assessments.⁵⁷ Unfortunately, the authors of the study that included depression symptom severity as a covariate only included one personality domain (Neuroticism) in their analyses.⁵¹ Similarly, it may be important to control for age and sex in multivariable models examining associations with suicide ideation because older age and male sex are both associated with self-reported personality characteristics²⁷ and increased risk for death by suicide.⁶ Although several of the models reported in the literature are adjusted for age and sex, these variables were not included in the one study examining a community-residing sample of older adults.⁴⁸

Another potential limitation of previous literature is that researchers have relied exclusively on measures derived from the Five-Factor Model to assess personality. Although the NEO measures are among the most commonly used personality measures, it is important to establish associations between personality variables and suicide ideation using different measures of personality because of theoretical and practical

differences between various measures, particularly those derived from other models of personality. Whereas consistent findings across different personality inventories would increase confidence in the reliability of identified associations, conflicting findings may offer valuable insight. For example, in the case of conflicting results, differences in how a domain is conceptualized may provide additional information regarding the nature of the association and offer direction for further research. Finally, our review of the literature only identified one study that examined the association between suicide ideation and a measure of perfectionism⁴⁹ and none of the studies investigated the role of personality characteristics in predicting future suicide ideation severity, which is necessary to ensure that identified associations are actually useful in terms of predicting future risk for suicide.

2.4 Objectives

The purpose of this thesis is to enhance our understanding of late-life suicide by testing cross-sectional and longitudinal models that investigate the role of personality in predicting suicide ideation severity among older adults. Specifically, the objectives of this study are to:

- 1) Investigate cross-sectional associations between higher order personality domains (assessed using both five- and six-factor measures of personality) and suicide ideation severity, controlling for age, sex, and depression symptom severity.

- 2) Investigate the cross-sectional association between perfectionism and suicide ideation severity, controlling for age, sex, and depression symptom severity as well as higher order personality domains.
- 3) Investigate the prospective association between higher order personality domains and future suicide ideation severity using data collected longitudinally (at a 6-to-12 month follow-up), controlling for age, sex, and depression symptom severity.

2.4.1 Hypotheses

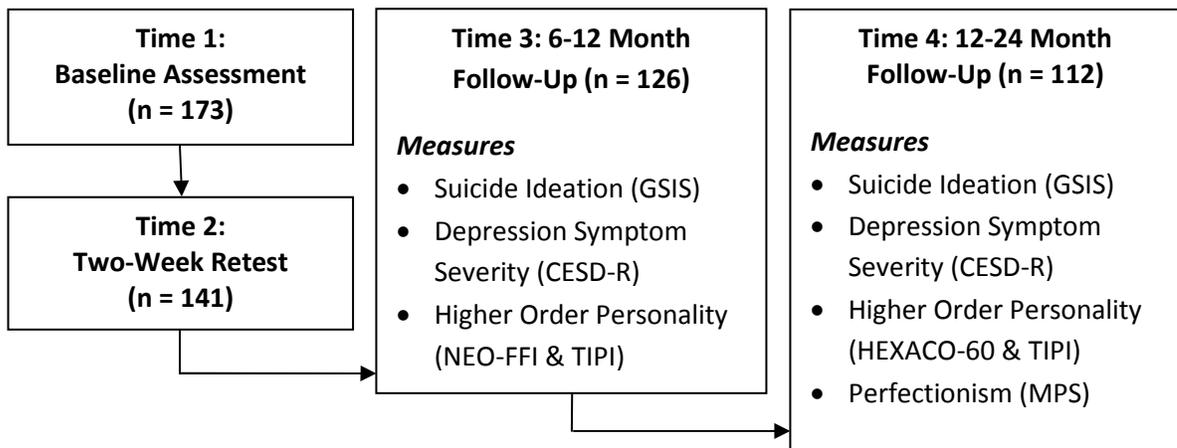
We hypothesized that Neuroticism and Introversion (i.e., low Extraversion) would each be significantly positively associated with suicide ideation among community-residing older adults after adjusting for age, sex, and depression symptom severity, consistent with previous findings. We also hypothesized that the Socially Prescribed Perfectionism subscale would be significantly positively associated with suicide ideation, adjusting for the same covariates, and that this subscale would add additional explanatory value beyond the factor-based measures of personality. Finally, it was hypothesized that Neuroticism and Introversion would each significantly predict future suicide ideation severity. This study will provide valuable information regarding risk indices for suicide ideation and will have practical implications for outreach initiatives as well as for treatment planning, delivery, and decision-making for clinicians working with community-residing older adults at risk for suicide.

Chapter III: Methods

3.1 Study Design

Community-residing adults 65 years or older were recruited to participate in a larger longitudinal cohort study investigating risk and resiliency factors associated with the onset and/or exacerbation of suicide ideation. This project involved assessment of diverse sets of psychological risk and resiliency factors at four time points: baseline, 2-week retest, 6-12 month follow-up, and 12-24 month follow-up. Demographic information (including sex, marital status, living status, birthplace, number of children/grandchildren, education, and occupational status) was collected during the baseline interview and personality measures were administered during the last two study waves. Consequently, only data from the last two study waves will be analyzed in the present study. A flow diagram depicting the study design and the flow of participants through the study is presented in Figure 3. Funding for this project was provided to the principal investigator (MJH) by the Ontario Mental Health Foundation, the Lawson Health Research Institute, the Canadian Institutes for Health Research (New Investigator Award), and the Ontario Ministry of Research and Innovation (Early Researcher Award).

Figure 3. Study design and participant flow through the study



Note: GSIS = Geriatric Suicide Ideation Scale; CESD-R = Center for Epidemiologic Studies Depression Scale Revised; NEO-FFI = NEO Five-Factor Inventory; TIPI = Ten Item Personality Inventory; HEXACO-60 = Honesty/Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience; MPS = Multidimensional Perfectionism Scale.

3.2 Participants

A total of 126 individuals participated in the third phase of this study. The mean age of the sample at time three was 74.22 (SD 5.8; range 65 – 95) years and included 92 women (73.0%). Participants were recruited from community centres and seniors' health and wellness fairs in London, Ontario, and by advertisements in local newspapers and flyers posted in community locations. Given the aims of the larger study to assess the onset and/or exacerbation of suicide ideation in a community sample, we deliberately did not recruit participants from medical or mental health services. Eligible participants were at least 65 years old, able to read and understand English, and reasonably cognitively intact (defined as a score of 21 or greater on the Mini Mental State Examination⁵⁸). Participants were reimbursed for their time (\$25 for each

completed study wave) and for travel and parking expenses (maximum of \$10 per interview).

3.3 Procedure

Participants were interviewed in person and study measures were administered verbally by the Principal Investigator (PI) and/or a trained research assistant. Before proceeding with the interview, participants read a study letter of information and were asked to provide informed consent to participate. Participants were encouraged to ask any questions that they had about the study at any time during the interview. Participants were also given the opportunity to take breaks during the interview or to complete the interview in multiple sittings over a one-to-two week period. Participants were referred to mental health care services if they appeared to be in distress or were judged to be in crisis by the PI or trained research assistant. In cases of potential crisis, the PI (a clinical psychologist) was available to meet with the participant and could accompany him/her to a local hospital Emergency Department if necessary (this was not required during the study). Although it was made clear that participation in the study was voluntary, participants were encouraged to complete all phases of the study and some participants received telephone reminders preceding their scheduled interview. This study received ethics approval from the Health Sciences Research Ethics Board at The University of Western Ontario.

3.4 Materials

3.4.1 Suicide Ideation

Suicide ideation was assessed with the Geriatric Suicide Ideation Scale (GSIS),⁵⁹ a 31-item measure of suicide ideation designed for use with older adults. This multidimensional measure assesses Suicide Ideation (e.g., “I want to end my life”), Death Ideation (e.g., “I long for the peaceful slumber of death”), Loss of Personal and Social Worth (e.g., “I generally feel pretty worthless”), and Perceived Meaning in Life (e.g., “I feel that my life is meaningful”; reverse-scored). GSIS items are rated on a 5-point Likert format scale (1 = strongly disagree, 5 = strongly agree) and yield total scores ranging from 31 to 155, with higher scores indicating greater intensity of suicide ideation. Acceptable internal consistency has been demonstrated for GSIS total scores (Cronbach’s $\alpha = 0.90$) and the four subscales (Cronbach’s $\alpha = 0.74 - 0.86$).⁵⁹ In the present study, Cronbach’s $\alpha = .91$ and $.94$ for GSIS total scores at time 3 and 4, respectively.

3.4.2 Personality

Three measures were used to assess higher order personality domains: the NEO Five-Factor Inventory (NEO-FFI), the Ten Item Personality Inventory (TIPI), and the HEXACO-60.

The NEO-FFI²⁷ is a brief 60-item measure of the Five Factor Model of personality, assessing Neuroticism (e.g., “Sometimes I feel completely worthless”), Extraversion (e.g., “I like to have a lot of people around me”), Openness to Experience (e.g., “I have a lot of intellectual curiosity”), Agreeableness (e.g., “I try to be courteous to everyone I meet”), and Conscientiousness (e.g., “I work hard to accomplish my goals”). The measure consists of a series of statements describing personality traits and characteristics which are rated on a 5-point Likert format (1 = strongly disagree, 5 = strongly agree). Total scores are calculated separately for each domain and range from 12 to 60. Cronbach’s alpha coefficients range from 0.68 – 0.86 across the five domains, indicating acceptable internal consistency.²⁷ In the present study, Cronbach’s $\alpha = .52$ for the Openness to Experience domain and ranged from .73 - .88 for each of the remaining domains.

The Ten Item Personality Inventory (TIPI)⁶⁰ is a very brief measure of the Five Factor Model of personality and consists of 10 adjective pairings, two for each of the following domains: Emotional Stability (i.e., the inverse of Neuroticism; e.g., “Anxious, Easily upset”), Extraversion (e.g., “Extraverted, Enthusiastic”), Openness to Experience (e.g., “Open to new experiences, Complex”), Agreeableness (e.g., “Sympathetic, Warm”), and Conscientiousness (e.g., “Dependable, Self-disciplined”). Participants rate how well each word-pair describes themselves on a 7-point Likert format (1 = strongly disagree, 7 = strongly agree). Total scores for each domain range from 2 to 14, with higher scores indicating stronger endorsement of that domain (some of the items are reverse-coded).

Although the TIPI has demonstrated low internal consistency, this is to be expected given the brief nature of the measure.⁶¹ In the present study, Cronbach's alphas ranged from .20 - .44 for the Agreeableness, Conscientiousness, and Openness to Experience domains and from .51 - .63 for the Emotional Stability and Extraversion domains, across times 3 and 4.

The 60-item HEXACO³⁹ is designed to assess the following six personality domains: Honesty-Humility (e.g., "I would never accept a bribe, even if it were very large"), Emotionality (e.g., "I sometimes can't help worrying about little things"), Extraversion (e.g., "The first thing that I always do in a new place is to make friends"), Agreeableness (e.g., "I tend to be lenient in judging other people"), Conscientiousness (e.g., "I often push myself very hard when trying to achieve a goal"), and Openness to Experience (e.g., "I like people who have unconventional views"). Each domain consists of 10-items representing four facets (i.e., narrow personality traits that combine to form the broader domain). Items on the HEXACO-60 are rated on a 5-point Likert format (1 = strongly disagree, 5 = strongly agree) and yield total scores ranging from 1 to 5 for each domain, with higher scores indicating greater intensity of that domain. The HEXACO-60 has demonstrated acceptable internal consistency when used with community-residing adults (Cronbach's $\alpha = 0.73 - 0.80$ across the six domains).³⁹ Normative data for the HEXACO-60 has not been published for older adult populations. In the present study, Cronbach's alphas ranged from .61 - .76 across the six domains. Although facet level scores can be computed for the HEXACO-60, facet level scores are

not considered to be reliable because each facet is composed of only two-to-three items.³⁹

Perfectionism was assessed with the Multidimensional Perfectionism Scale (MPS),⁶² a 45-item measure designed to assess perfectionism in three domains: Self-Oriented perfectionism (perfectionistic standards for oneself; e.g., “I strive to be as perfect as I can be”), Other-Oriented Perfectionism (perfectionistic standards for others; e.g., “I have high expectations for the people who are important to me”), and Socially Prescribed Perfectionism (perfectionistic standards perceived to be prescribed by significant others; e.g., “The better I do, the better I am expected to do”). Participants rate how well each statement describes themselves on a seven-point Likert format (1 = disagree strongly, 7 = agree strongly). Total scores are calculated separately for each subscale and range from 15 to 105, with higher scores indicating more extreme perfectionism. Acceptable internal consistency has been reported for each of the three MPS subscales (Cronbach’s $\alpha = 0.82$ to 0.99).⁶² In the present study, Cronbach’s alphas ranged from .74 - .86 across the three subscales.

3.4.3 Depression Symptom Severity

The Center for Epidemiologic Studies Depression Scale Revised (CESD-R)⁶³ is a 20-item measure assessing the duration of depression symptoms experienced during the past week or two, reflecting the nine symptoms of major depressive disorder as defined by

the American Psychiatric Association Diagnostic and Statistical Manual of Mental Disorders-fourth edition (DSM-IV): dysphoria, anhedonia, appetite, sleep, concentration, worthlessness, fatigue, agitation, and suicide ideation. Items are rated on a 4-point Likert format that reflects the duration of symptoms (0 = less than one day, 3 = five-to-seven days/most of the time for the past 2 weeks), with total scores ranging from 0 to 60. The CESD-R has demonstrated acceptable internal consistency (Cronbach's $\alpha = 0.93$).⁶⁴ In the present study, Cronbach's $\alpha = .85$ and $.89$ at time 3 and 4, respectively.

3.5 Statistical Analysis

Data were only included for participants who completed the personality measures administered at both follow-up waves of the study. This decision was made to enhance comparability of study findings from each study phase. ANOVA and chi-square analyses (for continuous and categorical variables, respectively) were used to assess differences between participants who completed the study and those who were lost to follow-up. Paired t-tests were used to identify changes in participant responses on continuously-scored measures that were administered at both follow-up interviews.

Bivariate correlations were used to explore unadjusted associations between suicide ideation severity and each of the personality measures. Multiple linear regression analyses were computed to investigate associations between each personality variable

and suicide ideation after controlling for age, sex, and depression symptom severity. Separate models were tested for the NEO-FFI, HEXACO-60, and MPS. Blocks of variables were entered simultaneously into the model. The first block included age, sex, and depression symptom severity whereas the second block included the personality variables. R^2 change statistics and F change significance tests were calculated to determine if inclusion of the personality variables significantly contributed to the model. The MPS was also entered into a third block following the HEXACO-60 to determine if perfectionism provides additional explanatory value, beyond the higher order domains, also determined by an F change significance test.

A prospective model was also investigated in which scores on the NEO-FFI (time 3) were used to predict suicide ideation severity at the time 4 follow-up, controlling for age, sex, and depression symptom severity. The MPS (time 4) was added to a third block following the NEO-FFI.

Associations between the TIPI and the GSIS were investigated but were not considered part of the primary analyses because the TIPI is not as comprehensive or reliable as the NEO-FFI or the HEXACO-60. Instead, the TIPI was primarily used to compare reported personality at time 3 and time 4, as this was the only personality index that was included at both time points. Thus, the TIPI was not included in any of the reported regression analyses, although correlations between the TIPI and the GSIS at times 3 and 4 are reported.

Additional analyses were performed to determine whether controlling for depression symptom severity had an impact on study findings. These analyses were performed by repeating the regression models described above, controlling for age and sex alone. Findings from analyses controlling for and not controlling for depression symptom severity were then compared to determine whether adjusting for this covariate had an impact on study conclusions (i.e., changed which variables significantly contributed to the regression models). We also conducted analyses in which age and sex were not included as covariates. Multicollinearity was investigated in all of the multivariable models using Tolerance and Variance Inflation Factor statistics. All statistical analyses used a two-tailed, 0.05 alpha level and were performed with SPSS version 20 (Chicago IL).

Chapter IV: Results

4.1 Description of Participants and Correlational Analyses

Of the 126 individuals who participated in the third study wave, 107 returned for the fourth. One participant did not complete any of the personality measures during the final interview and was also considered lost to follow-up, resulting in a final sample of 106 participants who completed the study. Participants completed the fourth interview within a mean of 235.54 days (SD 56.76; range = 168 – 435) of the third. As compared to those who completed the study, the 20 participants who were lost to follow-up reported significantly more suicide ideation on the GSIS ($F_{(1, 124)} = 6.80, p = 0.01$) but did not differ in terms of age, sex, marital status, depression symptom severity, or any of the NEO-FFI or TIPI personality domains.

At the time of the third interview, the 106 study participants had a mean age of 74.22 years (SD 5.8; range 65 – 95) and had completed a mean of 15.16 years (SD = 2.99) of education. Participants had a mean of 2.96 children (SD = 1.42; range 0 – 7) and 5.68 grandchildren (SD = 4.26; range 0 – 25). Additional participant demographics are presented in Table 5. Paired sample t-tests were conducted to identify changes in participant responses to measures administered at both the third and fourth study waves (Table 6). At the fourth interview, participants reported significantly higher mean scores on the GSIS: At time three, mean total GSIS scores averaged 41.27 (SD 9.61;

range 31-76), whereas time four mean total GSIS scores averaged 42.99 (SD 10.61; range 31-82). Although this comparison revealed a significant difference between GSIS scores at times three and four, these differences were small and do not likely reflect clinically relevant changes in suicide ideation severity. Participants also had significantly higher scores on the TIPI Emotional Stability domain during the last interview.

Mean scores for the NEO-FFI and the HEXACO-60 personality measures are presented in Table 7. As compared to the published normative sample for the NEO-FFI (an adult, American sample),²⁷ mean scores for participants in this study represented the 17th, 78th, 59th, 71st, and 62nd percentiles for the Neuroticism, Extraversion, Openness to Experience, Agreeableness, and Conscientiousness domains, respectively. Although percentile scores are not available for the HEXACO-60, mean scores for an adult, American, community sample have been published.³⁹ As compared to these values, mean scores for participants in this study were moderately elevated for each of the HEXACO-60 domains except Emotionality, which was moderately lower: none of these differences exceeded one standard deviation from the published values. Participants in the current study also reported somewhat lower scores on the CESD-R and on each of the GSIS subscales, as compared to published mean scores for community-residing samples;^{59, 64} however, these too were within one standard deviation of published scores. Overall, these comparisons suggest that most of the participants in this study were relatively well-adjusted and mentally healthy individuals.

Table 5. Participant demographics (n = 106)

Variable	Frequency (%)
Mean Age (SD)	74.22 (5.8)
Sex (Women)	78 (73.6%)
Lives Alone (Yes)	47 (44.1%)
Has Children (Yes)	96 (90.6%)
Has Grandchildren (Yes)	90 (84.9%)
<i>Occupational Status</i>	
Full-time work	1 (0.9%)
Part-time work	7 (6.6%)
Retired	96 (90.6%)
Volunteer or student	2 (1.8%)
<i>Marital Status</i>	
Married, living with spouse	52 (49.1%)
Widowed	31 (29.2%)
Separated or divorced	21 (19.8%)
Single, never married	2 (1.9%)
<i>Birthplace</i>	
North America	66 (62.3%)
United Kingdom	23 (21.7%)
Europe (other than United Kingdom)	14 (13.2%)
Other (S. America/Asia/Africa)	3 (2.8%)
<i>Highest Level of Education Achieved</i>	
Did not complete High School	8 (7.5%)
High School	32 (30.2%)
University or College	49 (46.2%)
Graduate Program (post-university or college)	16 (15.1%)

Table 6. Paired t-tests comparing participant responses on study measures at times 3 and 4 (n = 106)

Measure	Time 3 Mean (SD)	Time 4 Mean (SD)	t₍₁₀₅₎	p
Suicide Ideation (GSIS totals)	41.27 (9.61)	42.99 (10.61)	2.13	.036
Suicide Ideation	11.48 (2.75)	12.05 (3.35)	1.92	.058
Death Ideation	6.60 (2.31)	6.68 (2.13)	0.34	.732
Loss of Personal and Self-Worth	10.27 (2.99)	10.60 (3.44)	1.32	.189
Meaning in Life (reverse-coded)	11.78 (3.39)	12.53 (3.58)	2.68	.009
Depression Symptom Severity (CESD-R)	2.87 (4.73)	3.64 (6.20)	1.33	.188
Emotional Stability (TIPI)	2.03 (0.20)	2.48 (0.24)	2.40	.018
Extraversion (TIPI)	3.00 (0.29)	2.94 (0.29)	0.74	.462
Openness to Experience (TIPI)	2.03 (0.20)	2.09 (0.20)	0.18	.858
Agreeableness (TIPI)	2.00 (0.19)	2.14 (0.21)	1.58	.118
Conscientiousness (TIPI)	1.97 (0.19)	1.87 (0.18)	0.31	.760

Note: GSIS = Geriatric Suicide Ideation Scale; CESD-R = Center for Epidemiologic Studies Depression Scale Revised; TIPI = Ten Item Personality Inventory.

Total scores on the GSIS demonstrated significant bivariate correlations with each of the NEO-FFI domains except for Openness to Experience, both cross-sectionally and longitudinally (Tables 7 and 9, respectively). GSIS totals were also significantly associated with the Extraversion, Conscientiousness, and Openness to Experience domains of the HEXACO-60 and with the MPS Socially Prescribed Perfectionism subscale (Table 7). Each of the GSIS subscales was significantly correlated with the NEO-FFI measure of Neuroticism, both the NEO-FFI and HEXACO-60 measures of Extraversion, and the MPS Socially Prescribed Perfectionism subscale. With the exception of the NEO-FFI Conscientiousness domain (which was significantly correlated with the GSIS Suicide Ideation subscale) and the HEXACO-60 Agreeableness domain (which was not

significantly correlated with any of the GSIS subscales) the remaining NEO-FFI and HEXACO-60 domains were significantly correlated with either one or both of the GSIS Loss of Social and Personal Worth and Perceived Meaning in Life subscales but not with the GSIS Suicide Ideation or Death Ideation subscales. With the exception of a significant correlation between the MPS Other Oriented Perfectionism subscale and the GSIS Suicide Ideation subscale, no other significant correlation was found between the MPS and the GSIS subscales. A bivariate correlation matrix that includes the NEO-FFI, the HEXACO-60, and the MPS is presented in Table 8.

Each of the TIPI domains were significantly cross-sectionally associated with GSIS totals, except for Agreeableness at time 3 (Table 9). Only Emotional Stability (i.e., low neuroticism) and Extraversion (assessed at time 3) were significantly longitudinally correlated with time 4 GSIS totals. Correlations between the personality measures and the TIPI and between personality and depression symptom severity (CESD-R) are presented in Appendices B and C, respectively.

Table 7. Means (and standard deviations) for personality measures and cross-sectional bivariate correlations between these measures and GSIS total and subscale scores (n = 106)

Personality Variable	Mean (SD)	GSIS Total Score	GSIS Suicide Ideation	GSIS Death Ideation	GSIS Loss of Personal & Social Worth	GSIS Perceived Meaning in Life
<i>Personality (NEO-FFI)</i>						
Neuroticism	11.99 (5.99)	0.51**	0.40**	0.27**	0.57**	0.42**
Extraversion	32.34 (5.33)	- 0.42**	- 0.29**	- 0.24**	- 0.43**	- 0.41**
Openness to Experience	28.20 (4.38)	- 0.14	0.00	- 0.09	- 0.23*	0.13
Agreeableness	34.76 (4.77)	- 0.22*	- 0.14	- 0.06	- 0.20*	- 0.29**
Conscientiousness	36.47 (4.91)	- 0.33**	- 0.23*	- 0.16	- 0.28**	- 0.39**
<i>Personality (HEXACO-60)</i>						
Honesty/Humility	3.92 (0.47)	- 0.12	- 0.06	0.03	- 0.08	- 0.23*
Emotionality	2.94 (0.50)	0.13	0.07	0.11	0.19*	0.05
Extraversion	3.84 (0.44)	- 0.42**	- 0.26**	- 0.21*	- 0.45**	- 0.44**
Agreeableness	3.52 (0.52)	- 0.14	- 0.14	- 0.06	- 0.15	- 0.10
Conscientiousness	3.83 (0.40)	- 0.25**	- 0.18	- 0.17	- 0.21*	- 0.27**
Openness to Experience	3.73 (0.51)	- 0.23*	- 0.11	- 0.17	- 0.17	- 0.31**
<i>Perfectionism (MPS)</i>						
Self Oriented	64.71 (14.39)	0.03	0.11	- 0.01	0.02	- 0.06
Other Oriented	55.46 (10.52)	0.16	0.20*	0.15	0.12	0.08
Socially Prescribed	47.91 (10.87)	0.39**	0.35**	0.25*	0.38**	0.30**

* $p < 0.05$; ** $p < 0.01$. Notes: GSIS = Geriatric Suicide Ideation Scale; NEO-FFI = NEO Five-Factor Inventory; HEXACO-60 = Honesty/Humility, Emotionality, Extraversion, Agreeableness, Contentiousness, and Openness to Experience; MPS = Multidimensional Perfectionism Scale.

Table 8. Bivariate correlation matrix including the NEO-FFI, HEXACO-60, MPS, and NPI (n = 106)

	1	2	3	4	5	6	7	8	9	10	11	12	13
<i>NEO-FFI (time 3)</i>													
1. Neuroticism	-												
2. Extraversion	-.356**	-											
3. Openness	-.146	.279**	-										
4. Agreeableness	-.340**	.277**	.066	-									
5. Conscientiousness	-.386**	.286**	.058	.328**	-								
<i>HEXACO-60 (time 4)</i>													
6. Honesty/Humility	-.182	-.050	.055	.360**	.311**	-							
7. Emotional Stability	.392**	.004	-.060	.034	-.079	-.112	-						
8. Extraversion	-.318**	.664**	.356**	.096	.230*	-.080	-.007	-					
9. Agreeableness	-.188	.110	.139	.556**	.112	.313**	-.095	.034	-				
10. Conscientiousness	-.244*	.138	.146	.217*	.694**	.197*	-.097	.283**	.087	-			
11. Openness to Experience	-.110	.317**	.664**	.106	.110	.056	-.063	.393**	.027	.219*	-		
<i>MPS (time 4)</i>													
12. Self-oriented Perfectionism	.154	.180	-.010	.008	.215*	-.143	.127	.210*	-.109	.342**	.092	-	
13. Other-oriented Perfectionism	.193*	.036	-.070	-.289**	-.096	-.332**	.146	.086	-.518**	-.135	-.003	.424**	-
14. Socially Prescribed Perfectionism	.431**	-.183	-.271**	-.354**	-.211*	-.356**	.132	-.209*	-.460**	-.134	-.151	.394**	.552**

* $p < 0.05$; ** $p < 0.01$. Notes: NEO-FFI = NEO Five-Factor Inventory; HEXACO = Honesty/Humility, Emotionality, Extraversion, Agreeableness, Contentiousness, and Openness to Experience; MPS = Multidimensional Perfectionism Scale.

Table 9. Bivariate correlations between the Ten Item Personality Inventory (TIPI) and suicide ideation severity (GSIS totals) at times 3 and 4.

Personality Variable	Time 3 GSIS Totals	Time 4 GSIS Totals
<i>NEO-FFI (time 3)</i>		
Neuroticism	0.51**	0.37**
Extraversion	- 0.42**	- 0.45**
Openness	- 0.14	- 0.16
Agreeableness	- 0.22*	- 0.26**
Conscientiousness	- 0.33**	- 0.23*
<i>TIPI (time 3)</i>		
Emotional Stability	- 0.35**	- 0.36**
Extraversion	- 0.27**	- 0.29**
Openness	- 0.25*	- 0.16
Agreeableness	- 0.17	- 0.17
Conscientiousness	- 0.28**	- 0.16
<i>TIPI (time 4)</i>		
Emotional Stability	-	- 0.32**
Extraversion	-	- 0.27**
Openness	-	- 0.27**
Agreeableness	-	- 0.30**
Conscientiousness	-	- 0.33**

* $p < 0.05$; ** $p < 0.01$. Notes: GSIS = Geriatric Suicide Ideation Scale.

4.2 Cross-sectional Regression Analyses

We next conducted a linear regression analysis predicting total GSIS scores with the NEO-FFI using cross-sectional data collected at time 3. The regression analysis demonstrated that age, sex, and depression symptom severity explained 18.7% ($F_{(3,102)} = 7.85, p = .000$) of the variance in total GSIS scores. Inclusion of the NEO-FFI personality domains explained an additional 19.7% ($F_{(5,97)} \text{ change} = 6.21, p = .000$) of the variance in

GSIS totals, with Neuroticism and Extraversion both reaching statistical significance (Table 10).

Table 10. Linear regression analysis predicting suicide ideation (GSIS totals) with NEO-FFI personality domains, controlling for participant age, sex, and depression symptom severity (time 3; n = 106)

Variable	β	(95% CI)	Standard Error	t	p
<i>Block 1</i>					
Constant	15.62	(-6.35, 37.58)	11.07	1.41	.162
Age	0.34	(0.05, 0.64)	0.15	2.33	.022
Sex	- 2.62	(-6.46, 1.22)	1.94	- 1.35	.179
Depression (CESD-R)	0.72	(0.36, 1.08)	0.18	3.97	.000
<i>Block 2</i>					
Constant	26.25	(-7.97, 60.47)	17.24	1.52	.131
Age	0.31	(0.03, 0.58)	0.14	2.17	.033
Sex	- 2.45	(-6.10, 1.20)	1.84	- 1.33	.186
Depression (CESD-R)	0.15	(-0.25, 0.55)	0.20	0.74	.464
Neuroticism	0.63	(0.27, 0.99)	0.18	3.51	.001
Extraversion	- 0.40	(-0.73, -0.06)	0.17	- 2.35	.021
Openness to Experience	- 0.03	(-0.35, 0.42)	0.19	0.17	.868
Agreeableness	- 0.08	(-0.28, 0.44)	0.18	0.42	.677
Conscientiousness	- 0.12	(-0.48, 0.23)	0.18	- 0.69	.492

Note: $R^2 = .19$, $F_{(3,102)} = 7.85$, $p = .000$ (Block 1); $R^2 = .38$, $F_{(8,97)} = 7.57$, $p = .000$ (Block 2); GSIS = Geriatric Suicide Ideation Scale; CESD-R = Center for Epidemiologic Studies Depression Scale Revised.

We followed this analysis with a linear regression analysis predicting total GSIS scores with the HEXACO-60 using cross-sectional data collected at time 4. In this analysis, age, sex, and depression symptom severity explained 21.7% ($F_{(3,102)} = 9.43$, $p = .000$) of the variance in GSIS scores. Inclusion of the HEXACO-60 personality domains significantly improved the prediction of suicide ideation severity, explaining an additional 11.5%

($F_{(6,96)}$ change = 2.75, $p = .017$) of the variance in GSIS totals, although only Extraversion significantly contributed to the model (Table 11, Block 2). In a separate analysis, inclusion of the MPS also significantly improved the prediction of GSIS scores, controlling for age, sex, and depression symptom severity (R^2 change = 0.112; $F_{(3,99)}$ change = 5.48, $p = .002$): only one of the MPS subscales, Socially Prescribed Perfectionism, significantly contributed to the model (Table 12). Notably, inclusion of the MPS continued to explain unique variance in GSIS scores after accounting for the six HEXACO-60 personality domains in addition to the study covariates (R^2 change = 0.058; $F_{(3,93)}$ change = 2.95, $p = .037$; Table 11, Block 3).

Table 11. Linear regression analysis predicting suicide ideation (GSIS totals) with the HEXACO-60 personality domains and socially prescribed perfectionism, controlling for participant age, sex, and depression symptom severity (time 4; n = 106)

Variable	β	(95% CI)	Standard Error	<i>t</i>	<i>p</i>
<i>Block 1</i>					
Constant	16.61	(-7.42, 40.64)	12.12	1.37	.173
Sex	- 0.97	(-5.18, 3.24)	2.12	- 0.46	.648
Age	0.33	(0.01, 0.65)	0.16	2.03	.045
Depression (CESD-R)	0.68	(0.37, 0.98)	0.15	4.42	.000
<i>Block 2</i>					
Constant	75.57	(30.83, 120.30)	22.54	3.35	.001
Sex	0.31	(-4.15, 4.76)	2.24	0.14	.892
Age	0.18	(-0.15, 0.50)	0.16	1.07	.286
Depression (CESD-R)	0.58	(0.25, 0.91)	0.17	3.49	.001
Honesty/Humility	- 2.26	(-6.46, 1.95)	2.12	- 1.07	.290
Emotionality	0.17	(-3.86, 4.20)	2.03	0.08	.933
Extraversion	- 6.44	(-11.23, -1.65)	2.41	- 2.67	.009
Agreeableness	- 0.30	(-3.91, 3.32)	1.82	- 0.16	.871
Conscientiousness	- 1.37	(-6.23, 3.49)	2.45	- 0.56	.578
Openness to Experience	- 2.32	(-6.16, 1.52)	1.93	- 1.20	.233
<i>Block 3</i>					
Constant	48.38	(-0.84, 97.60)	24.79	1.95	.054
Sex	0.43	(-3.94, 4.79)	2.20	0.19	.847
Age	0.14	(-0.18, 0.46)	0.16	0.88	.382
Depression (CESD-R)	0.58	(0.26, 0.90)	0.16	3.57	.001
Honesty/Humility	- 0.77	(-4.99, 3.44)	2.12	- 0.36	.716
Emotionality	- 0.21	(-4.16, 3.74)	1.99	- 0.11	.916
Extraversion	- 4.80	(-9.76, 0.16)	2.50	- 1.92	.058
Agreeableness	1.63	(-2.50, 5.77)	2.08	0.78	.435
Conscientiousness	- 1.53	(-6.79, 3.73)	2.65	- 0.58	.565
Openness to Experience	- 2.01	(-5.75, 1.72)	1.88	- 1.07	.288
Self-Oriented Perfectionism	- 0.02	(-0.18, 0.15)	0.08	- 0.20	.845
Other-Oriented Perfectionism	- 0.04	(-0.28, 0.19)	0.12	- 0.36	.719
Socially Prescribed Perfectionism	0.31	(0.09, 0.53)	0.11	2.75	.007

Note: $R^2 = .22$, $F_{(3,102)} = 9.43$, $p = .000$ (Block 1); $R^2 = .33$, $F_{(9,96)} = 5.30$, $p = .000$ (Block 2); $R^2 = .39$, $F_{(12,93)} = 4.95$, $p = .000$ (Block 3); GSIS = Geriatric Suicide Ideation Scale; CESD-R = Center for Epidemiologic Studies Depression Scale Revised.

Table 12. Linear regression analysis predicting suicide ideation (GSIS totals) with the Multidimensional Perfectionism Scale, controlling for participant age, sex, and depression symptom severity (time 4; n = 106)

Variable	β	(95% CI)	Standard Error	<i>t</i>	<i>P</i>
Constant	15.62	(-9.38, 40.62)	12.60	1.24	.218
Sex	- 0.38	(-4.38, 3.63)	2.02	- 0.19	.853
Age	0.23	(-0.08, 0.54)	0.16	1.50	.136
Depression (CESD-R)	0.63	(0.33, 0.92)	0.15	4.26	.000
Self-Oriented Perfectionism	- 0.07	(-0.21, 0.07)	0.07	- 1.05	.297
Other Oriented Perfectionism	- 0.12	(-0.33, 0.09)	0.11	- 1.13	.261
Socially Prescribed Perfectionism	0.40	(0.20, 0.60)	0.10	4.00	.000

Note: $R^2 = .33$, $F_{(9,96)} = 5.30$, $p = .000$ (see Table 10 for Block 1); GSIS = Geriatric Suicide Ideation Scale; CESD-R = Center for Epidemiologic Studies Depression Scale Revised.

4.3 Longitudinal Analyses

A longitudinal multiple regression analysis was conducted predicting suicide ideation (GSIS totals) at time 4 with personality domains (NEO-FFI) assessed at time 3 (Table 13). The control variables, including age, sex, and depression symptom severity, explained 21.7% of the variance in time 4 GSIS scores ($F_{(3,102)} = 9.43$, $p = .000$). Inclusion of the NEO-FFI significantly improved the predictive model (R^2 change = 0.132; $F_{(5,97)}$ change = 3.93, $p = .003$), with only the Extraversion domain significantly contributing to the model. Perfectionism (assessed at time 4) was included in a third block to determine if perfectionism explains unique variance in suicide ideation severity beyond the personality domains of the NEO-FFI. Although inclusion of the MPS did not significantly improve the model, the F change test just narrowly missed reaching statistical significance (R^2 change = 0.051; $F_{(3,94)}$ change = 2.68, $p = .051$; Table 13, Block 3) and the

Socially Prescribed Perfectionism subscale contributed significantly to the model ($p = 0.008$).

The potential impact of controlling for depression symptom severity was examined by excluding this variable in a series of models otherwise identical to those presented above. The pattern of significant correlates of suicide ideation did not change as a result of removing depressive symptom severity. For completeness, models were also investigated in which age and sex were not included. Again, this change did not alter which variables were significantly associated with GSIS totals. Specifically, in both sets of additional analyses, the Extraversion Domain was significantly associated with GSIS totals whether assessed with the NEO-FFI at time 3 or the HEXACO-60 at time 4, the Neuroticism domain was significantly associated with GSIS totals only when assessed with the NEO-FFI at time 3, and the Socially Prescribed Perfectionism Subscale was significantly associated with GSIS totals at time 4 (data not shown).

Table 11. Linear regression analysis predicting suicide ideation (GSIS totals) at time 4 with the NEO-FFI personality domains (time 3), controlling for participant age, sex, depression symptom severity (n = 106)

Variable	β	(95% CI)	Standard Error	t	p
<i>Block 1</i>					
Constant	16.61	(-7.42, 40.64)	12.12	1.37	.173
Sex	-.97	(-5.18, 3.24)	2.12	-.46	.648
Age	.33	(0.01, 0.65)	.16	2.03	.045
Depression (CESD-R)	.68	(0.37, 0.98)	.15	4.42	.000
<i>Block 2</i>					
Constant	41.01	(2.28, 79.75)	19.52	2.10	.038
Sex	-.11	(-4.31, 4.09)	2.12	-.05	.960
Age	.29	(-0.03, 0.61)	.16	1.78	.078
Depression (CESD-R)	.44	(0.12, 0.76)	.16	2.73	.007
Neuroticism	.25	(-0.11, 0.62)	.19	1.37	.175
Extraversion	-.58	(-0.96, -0.20)	.19	-3.00	.003
Openness to Experience	-.06	(-0.49, 0.37)	.22	-.29	.776
Agreeableness	-.15	(-0.56, 0.26)	.21	-.72	.474
Conscientiousness	.04	(-0.37, 0.44)	.21	.18	.855
<i>Block 3</i>					
Constant	28.89	(-10.52, 68.30)	19.85	1.46	.149
Sex	.64	(-3.53, 4.81)	2.10	.31	.761
Age	.24	(-0.08, 0.56)	.16	1.50	.136
Depression (CESD-R)	.47	(0.15, 0.79)	.16	2.95	.004
Neuroticism	.08	(-0.31, 0.46)	.20	.38	.702
Extraversion	-.59	(-0.98, -0.20)	.20	-3.01	.003
Openness to Experience	.08	(-0.35, 0.51)	.22	.35	.727
Agreeableness	-.04	(-0.45, 0.38)	.21	-.17	.867
Conscientiousness	.05	(-0.36, 0.47)	.21	.25	.806
Self-Oriented Perfectionism	-.03	(-0.17, 0.12)	.07	-.35	.728
Other-Oriented Perfectionism	-.06	(-0.27, 0.15)	.11	-.60	.553
Socially Prescribed Perfectionism	.30	(0.08, 0.53)	.11	2.72	.008

Note: $R^2 = .22$, $F_{(3,102)} = 9.43$, $p = .000$ (Block 1); $R^2 = .35$, $F_{(8,97)} = 6.50$, $p = .000$ (Block 2); $R^2 = .40$, $F_{(11,94)} = 5.70$, $p = .000$ (Block 3). GSIS = Geriatric Suicide Ideation Scale; CESD-R = Center for Epidemiologic Studies Depression Scale Revised.

Chapter V: Discussion

5.1 Summary of Results

In the present study we sought to investigate cross-sectional and longitudinal associations between suicide ideation severity and measures of personality among community-residing older adults. The majority of participants in this study were relatively emotionally and psychologically healthy, obtaining low mean scores on measures of suicide ideation and depression and mean scores that reflect adaptive personality characteristics on each of the personality inventories. Within this population, Introversion (i.e. low Extraversion) appears to be a particularly robust predictor of suicide ideation severity, with significant associations emerging in unadjusted and adjusted (age, sex, and depression symptom severity) analyses, in cross-sectional and longitudinal analyses, and whether assessed with the NEO-FFI or the HEXACO-60. Socially Prescribed Perfectionism also appears to have a strong association with suicide ideation, even controlling for the higher order personality domains (in addition to age, sex, and depression symptom severity). In contrast, results were not as consistent as expected with respect to Neuroticism. Neuroticism was significantly associated with suicide ideation when assessed with the NEO-PI-R but not when assessed with the HEXACO-60.

5.2 Introversion

Although the association between suicide ideation and Introversion has a strong theoretical and empirical basis in the suicide literature,⁹ this relation is not well-supported in previous studies investigating older adult populations. In fact, only one previous study⁴⁸ was identified that has demonstrated a significant correlation between suicide ideation severity and Introversion among older adults. Interestingly, this is also the only study that used the GSIS to assess suicide ideation and that included a community-residing sample. Thus, it appears that Introversion may play a particularly important role within community populations in terms of identifying those at risk for suicide. One possible explanation for this finding is that Introversion may have a stronger association with suicide ideation when combined with lower levels of Neuroticism, depression, and/or suicide ideation severity. In the current study, participants obtained low mean scores on measures of each of these variables, even as compared to previously published values for community-residing samples. Whereas Neuroticism and Depression typically explain a substantial proportion of variance in suicide ideation, particularly when assessed in psychiatric samples, the lower range of Neuroticism and Depression scores for community-residing individuals may explain the stronger association. In other words, the association between suicide ideation and Introversion may be reduced in the presence of high levels of Neuroticism. Although the sample differences described above may explain why Introversion appears to be

more strongly associated with suicide ideation in community as compared to psychiatric populations, further research is needed to confirm this interpretation.

Results from this study demonstrate that individuals who are introverted are more likely to experience an onset and/or exacerbation of suicide ideation over time, even after adjusting for the impact of depression symptom severity. The finding that Introversion predicts future suicide ideation suggests that characteristics associated with Introversion may be potential targets for intervention. Although the characteristics that define an individual as introverted are thought to be quite stable,²⁵ some behavioural and cognitive features associated with introversion, such as contact with small social networks and decreased perceived social support,²⁸ may represent modifiable risk factors for suicide among these individuals. Thus, interventions aimed at altering some of the interpersonal aspects associated with Introversion may be effective in reducing risk among introverted older adults.

It is worth noting that some authors have argued that a personality styles approach, in which constellations of traits are considered simultaneously, may be a more effective method of risk assessment than the evaluation of individual traits alone. For example, Fang and colleagues⁶⁵ investigated the combined effects of Neuroticism and Extraversion in a study comparing individuals who had died by suicide to age and sex matched controls. Individuals who had died by suicide were more likely to be characterized by high Neuroticism and low Extraversion, as compared to controls. The

authors also reported that Neuroticism appeared to play a greater role than Extraversion in impacting suicide risk and that low Extraversion may not confer risk for suicide unless combined with high Neuroticism. Although the current study investigated associations between personality and suicide ideation rather than death by suicide, our findings do not fully agree with the conclusions reached by Fang and colleagues⁶⁵ in that Extraversion appears to have a unique impact on suicide risk among community residing-older adults.

5.3 Neuroticism

One of the most consistent findings from previous research investigating personality and late-life suicide risk is the strong correlation between Neuroticism and suicide ideation.⁹ In the present study, Neuroticism, as measured by the NEO-FFI, was significantly associated with suicide ideation, after adjusting for age, sex, and depression symptom severity. This finding suggests that the relationship between Neuroticism and suicide ideation does not simply reflect the conceptual overlap between Neuroticism and depression. However, Neuroticism was not associated with suicide ideation in adjusted or unadjusted (i.e., even when not controlling for age, sex, or depression symptom severity) analyses when it was measured with the HEXACO-60 (i.e. Emotionality). This inconsistency is likely explained at least in part by differences between the five- and six-factor conceptualizations of Neuroticism and/or by differences between the NEO-FFI and the HEXACO-60. From this perspective, observed differences

are likely related to either the removal of the anger facet or the addition of the sentimentality facet. Although the brief personality measures are not as reliable at the facet level as they are at the domain level, preliminary exploration of facet level correlations suggests that the HEXACO-60 sentimentality facet is significantly negatively associated with suicide ideation severity ($r = -.20$), the opposite direction of each of the other Neuroticism facets. In other words, it seems that the overall association between the HEXACO-60 Neuroticism domain and suicide ideation was likely reduced by the inclusion of the sentimentality facet.

Conceptual differences between the Five- and Six-Factor Models of personality do not appear to entirely account for the inconsistency in associations between Neuroticism and suicide ideation. When the NEO-FFI domains were included in a model to predict future suicide ideation, Neuroticism did not significantly contribute to the model (regardless of whether or not the model was adjusted for baseline suicide ideation severity). Although it is not appropriate to directly compare results from cross-sectional and longitudinal models, these findings suggest that the relation between Neuroticism and suicide ideation may not be as robust as was previously thought. In interpreting these results, it should be noted that mean scores on the TIPI Emotional Stability domain increased significantly from the time three to time four follow-up (i.e., Neuroticism decreased significantly). Thus, changes in participant Neuroticism cannot be negated as a possible explanation for the lack of a significant association at time four. Nevertheless, when considered together, the results of this study call into question the

utility of Neuroticism in terms of predicting future risk for suicide, at least among relatively healthy older adults at the lower end of the continuum of suicide ideation severity.

5.4 Perfectionism and Conscientiousness

Although many researchers have argued that perfectionism is an important risk factor for suicide,^{41, 42} measures of perfectionism are rarely included in studies examining relations between suicide ideation and personality characteristics. Only a single study was identified in our literature search that investigated this association among older adults.⁴⁹ In contrast to the study by O’Riley and Fiske,⁴⁹ which reported a non-significant association between suicide ideation severity and a four-item Perfectionism subscale derived from a measure of Autonomy, results from the present study demonstrated a significant association between suicide ideation severity and Socially Prescribed Perfectionism in unadjusted and adjusted analyses, controlling for age, sex, and depression symptom severity. Moreover, Socially Prescribed Perfectionism predicted suicide ideation after adjusting for higher order personality domains in addition to the other covariates. Thus, it seems that Socially Prescribed Perfectionism represents a construct that predicts suicide ideation beyond the broad trait dimensions represented within the Five- and Six-Factor Models of personality. In light of this finding, it seems that Perfectionism, and Socially Prescribed Perfectionism in particular, may not be adequately captured within the NEO-FFI or the HEXACO-60.

The finding that suicide ideation severity is associated with Socially Prescribed Perfectionism, but not with Self- or Other-Oriented Perfection, is largely in accordance with previous research, which has consistently revealed strong associations among Socially Prescribed Perfectionism, psychopathology, and maladjustment.^{41, 45} With respect to suicide ideation specifically, Socially Prescribed Perfectionism has been found to distinguish between suicide ideators and non-ideators and between those who have or have not engaged in suicide-related behaviours, within both clinical and general population samples.⁶⁶ However, the majority of research published on this topic has investigated college-age samples, with little research examining the association between Perfectionism and suicide ideation within older adults.⁶⁶

Results from the present study are consistent with Baumeister's⁴⁰ model of suicide as an escape from the self in that it demonstrates the importance of perfectionism. Whereas Baumeister did not specify whether internally or externally imposed expectations conferred risk for suicide, our results may add some clarity and precision to the model, as only the Socially Prescribed Perfectionism subscale was significantly associated with suicide ideation in either adjusted or unadjusted analyses. Within the context of Baumeister's model, these findings suggest that failure to achieve the perceived expectations and demands believed to be imposed by others may lead to painful self-awareness, cognitive deconstruction, and ultimately death by suicide. Our results also provide some preliminary support for the social disconnection model proposed by

Hewitt and Flett⁴¹ in that our findings highlight the importance of interpersonal risk factors for suicide. In fact, given the accumulating evidence that limited social connectedness is associated with suicide ideation among older adults,⁶⁷ it seems plausible that the social disconnection model may also help explain the association between suicide ideation and Introversion. Although further research is needed to investigate this adaptation of Hewitt and Flett's model, it seems that the social disconnection model may be applicable as a broader model of interpersonal vulnerability for suicide.

Conscientiousness (which some authors have suggested resembles a more positive or adaptive form of perfectionism)⁴³ was significantly negatively correlated with suicide ideation severity when assessed with both the NEO-PI-R and the HEXACO-60. Although this association was not maintained in our multivariable models, some additional exploratory analyses did show that the NEO-FFI Conscientiousness domain explained unique variance in suicide ideation severity after controlling for age, sex, and depression severity, but not when the other personality domains were included as covariates. This finding suggests that there is overlap in the variance in suicide ideation severity explained by Conscientiousness and the other four domains.

The above discussion highlights the maladaptive aspects of perfectionism (i.e., rigid, unrelenting standards of perfection) and, by contrast, the possibly beneficial effects of healthy achievement striving. It is noteworthy that whereas Conscientiousness was

negatively, albeit non-significantly, correlated with Socially Prescribed and Other-Oriented Perfectionism, Conscientiousness was significantly positively correlated with Self-Oriented Perfectionism. It has been suggested that the MPS Self-Oriented Perfectionism subscale contains both adaptive and maladaptive components and that the combination of situational stressors and other personality characteristics determine whether or not Self-Oriented Perfectionism is associated with positive or negative outcomes.⁶⁶ Another way to consider this is that both Self-Oriented Perfectionists and healthy-striving, non-perfectionists can score high on this subscale. Given the positive correlation between Conscientiousness and Self-Oriented Perfectionism observed within this sample, it appears that Self-Oriented Perfectionism may reflect the adaptive components of Conscientiousness rather than the maladaptive components typically associated with Perfectionism, at least among community-residing older adults.

5.5 Openness to Experience and Agreeableness

The Openness to Experience and Agreeableness domains were both demonstrated to have some association with suicide ideation but the results were inconsistent: the Agreeableness domain was significantly correlated with suicide ideation when it was assessed with the NEO-FFI but not with the HEXACO-60, whereas the opposite was true for the Openness domain. Although neither of these domains contributed significantly in the regression analyses that were presented, additional exploratory analyses revealed that the HEXACO-60 Openness domain was significantly associated with suicide ideation

after controlling for age, sex, and depression symptom severity but not when the Extraversion domain was also included as a covariate.

The primary difference between the five- and six- factor conceptualizations of Openness to Experience is that unconventionality is a prominent component within the Six-Factor model. An investigation at the facet level revealed a negative correlation between GSIS total scores and the HEXACO-60 Unconventionality facet that approached the nominal level of significance ($p = 0.051$). Interestingly, this association seems to be largely driven by the GSIS Meaning in life subscale (which was significantly correlated with the Unconventionality facet), suggesting that older adults who are more traditional also tend to report having less meaning in life. One possible explanation for this is that older adults who are traditional may be less able to adapt to new roles and circumstances during late-life, such as retirement, health complications, and loss of loved ones. Further research is needed to confirm these findings, particularly given the facet level reliability limitations of the HEXACO-60. Also, the internal consistency of the NEO-FFI Openness domain was rather poor in the current study (Cronbach's alpha = 0.52), which may account for the lack of significant association between this domain and severity of suicide ideation in the current study. Nevertheless, in contrast to previous findings suggesting that Openness to Experience plays an important role in risk for suicide,^{29, 29,}³⁰ results from this study do not support the association between Openness to Experience and suicide ideation after adjusting for other higher order domains, at least not within community-residing older adults.

5.6 Honesty/Humility

Although Ashton and Lee³⁸ have presented compelling arguments regarding the harmful personal and societal costs associated with low Honesty/Humility, results from this study suggest that the Honesty/Humility domain is not associated with suicide ideation, at least among healthy older adults. The only exception to this is that the Fairness facet, which represents moral integrity, was significantly negatively correlated with suicide ideation severity ($r = -.27, p < .01$). Individuals who score low on this facet are described as being willing to cheat, steal, and take advantage of others for personal gain.⁶⁸ As this is the first study investigating the association between Honesty/Humility and suicide ideation, further research is needed to confirm this finding, preferably using the longer version of the HEXACO, which is more reliable at the facet level. An additional consideration is that the harmful effects of Honesty/Humility may only be apparent in individuals with low levels of this domain: Participants in the present study tended to score high on the Honesty/Humility domain.

5.7 Clinical Implications

Results from this study indicate that individuals who are characterized by the personality traits associated with Introversion (reserved, quiet, and socially withdrawn), Socially Prescribed Perfectionism (rigid, compulsive, believe that others expect perfection), and/or Neuroticism (sad, fearful, and irrational) report more severe suicide

ideation. Healthcare professionals who work with older adults should be aware that individuals who display these characteristics may be more likely to contemplate suicide, particularly when combined with other risk factors, such as depression and hopelessness.

The fact that Introversion was found to predict the exacerbation of suicide ideation suggests that interventions designed specifically to engage introverted individuals may be warranted. Although Introversion may confer risk for late-life suicide through several processes, this association may be explained in part by the limited social engagement, reduced social network, and decreased perceived social support that tends to characterize introverts. If so, interventions aimed at increasing interpersonal interaction and perceived social support may reduce the risk of suicide in those who are introverted. Because individuals who are introverted may be less comfortable in large groups, group interventions may be less effective than individual interventions that promote a strong relationship with a single counselor. In fact, group interventions may induce anxiety and reduce adherence rates. Another consideration is that individuals who are introverted may be more difficult to engage in therapy because of their preference to be alone and because they may be less likely to contact health care professionals for help. Considering this, interventions that take place in the home, either through home visits or telecommunication, may be most effective.

Many individuals who are introverted do not suffer from the interpersonal difficulties noted above. In fact, many introverts relate well with others: they simply also enjoy spending time alone.⁶⁹ Thus, whereas interpersonal issues, such as lack of perceived social support, may explain part of the association between Introversion and suicide ideation in older adults, intrapersonal challenges likely also play a role. For example, introverted older adults who lack rich internal lives may be particularly at risk for suicide, regardless of their level of perceived social support. Consequently, in addition to interventions aimed at increasing social engagement and support, it may be beneficial to explore interventions designed to help introverted individuals cultivate meaning in life and draw resilience from intrapersonal sources, such as hobbies and personal reflection.

5.8 Limitations

One of the limitations of this study is that personality was assessed using brief versions of the NEO and HEXACO measures. The full versions of these measures may have increased the reliability and clarity of the study's findings and would have allowed a more complete investigation at the facet level. Another potential limitation is that the comparability of findings between the NEO-FFI and HEXACO-60 may have been compromised by the fact that these measures were not administered at the same time point. Error variance, test-administrator variance, and actual changes in participant characteristics over time may all explain in part the discrepancies observed between

these two measures. Similarly, because the MPS was only assessed during the second interview, we were not able to investigate whether perfectionism explained unique variance in suicide ideation beyond the NEO-FFI higher order domains, as was done with the HEXACO-60.

Another limitation of this study pertains to the relatively short duration of elapsed time between administration of the NEO-FFI and the follow-up assessment of suicide ideation, which may have limited our assessment of the predictive ability of the NEO-FFI. Furthermore, although our results demonstrated a significant association between Introversion and future suicide ideation, it may not be appropriate to extrapolate these findings to longer periods of time.

Finally, because the participants in this study represent a relatively healthy, volunteer sample of older adults, results may not be generalizable to less healthy and/or medical samples of older adults. Some of the participants endorsing more severe suicide ideation did not complete the time 4 assessment, further restricting possible associations between personality factors and suicide ideation. Similarly, because participants represented the lower end of the suicide ideation severity continuum, it is not clear if the relationships that were identified in this study would be maintained at more severe levels of suicide ideation. In other words, the results from this study may only describe associations between personality and suicide ideation at relatively low overall levels of severity.

5.9 Future Directions

Further research is needed to replicate and expand upon the findings from the present study. In particular, concerns regarding generalizability would be mitigated by sampling a larger number of older adults and by including participants from a variety of living-settings (such as assisted-living, long-term care, and hospital facilities) in addition to those residing in the community. Such research is important to demonstrate that the relationships identified in the current study are not just observed in samples of individuals with low suicide ideation severity but also among those at greater risk for death by suicide. Future research should also investigate longitudinal prediction of suicide-related behaviour and/or death by suicide among older adults. Inclusion of a longer follow-up period would also be useful to further establish the ability of personality characteristics to predict future suicide ideation.

Future research would also benefit from including larger personality inventories (rather than brief versions) so that associations between personality characteristics and suicide ideation can be more fully explored at the facet level, which would add greater precision in the identification of risk factors. Exploration of specific personality characteristics in addition to higher order domains may also be warranted given the findings of this study regarding perfectionism. For example, some evidence suggests that the personality characteristics associated with narcissism may confer vulnerability for suicidality;⁵⁴ however, further research is needed to determine if trait narcissism is associated with

suicide ideation above and beyond the impact of the higher order personality domains. Future studies may also benefit from exploring more complex models that consider potential moderators and mediators of the association between personality and suicide ideation severity, such as stress and hopelessness. There is also some suggestion that Neuroticism may modify the association between Introversion and suicide ideation.⁶⁵ Although no evidence of such an effect was observed in the current study, it is conceivable that interactions only occur at higher levels of Neuroticism than was reported by participants in this study. This potential interaction effect should be explored in further research that includes participants with more suicide ideation.

Finally, research is needed that investigates the effectiveness of interventions that target individuals with certain personality characteristics. Such interventions would likely represent modified versions of existing therapeutic approaches but would be adapted to reflect the individual's personality.

5.10 Conclusions

In this sample of relatively healthy older adults, increased suicide ideation was significantly associated with greater Introversion, Neuroticism, and Socially Prescribed Perfectionism, controlling for age, sex, and depression symptom severity. Introversion and Socially Prescribed Perfectionism appear to have particularly robust associations with suicide ideation. One of the unique contributions of this study to the existing

literature examining the association between personality characteristics and suicide ideation is that we included longitudinal assessment of suicide ideation. Results of our longitudinal analyses suggest that assessment of Introversion, in addition to other risk factors, may be effective in predicting the onset and/or exacerbation of suicide ideation. Accordingly, behaviours associated with Introversion, such as social withdrawal, may represent appropriate targets for intervention in older adults identified as being at risk for suicide. Another unique contribution of this study is that higher order personality domains were assessed using more than one measure. Results concerning Neuroticism were inconsistent across measures and demonstrate the importance of considering alternative models of personality when investigating associations between personality traits and suicide ideation. Results also highlight the merits of investigating associations between suicide ideation and personality characteristics that are not fully captured within general inventories of personality, such as perfectionism.

Overall, the results from this study demonstrate that personality variables confer vulnerability for suicide ideation. Specifically, the presence of characteristics associated with Introversion, Socially Prescribed Perfectionism, and/or Neuroticism appear to be indicators of increased suicide risk among community-residing older adults and should be considered when assessing suicide risk and planning interventions within this population.

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Appendix A

Table 12. Description of studies included in the systematic review

Author (Year), Country	N	Study Design	Mean Age (SD), Range	Population	Measures	Conclusion
Duberstein ⁵² Duberstein ³⁰ US	23	Psychological autopsy	64.8 (9.1)	Individuals 50 years of age or older who died by suicide (study also included age and sex matched controls).	NEO-PI (Proxy completed)	Individuals who died by suicide had significantly greater scores on Neuroticism (differing significantly on the Depression and Self-Consciousness facets) and significantly lower scores on Openness (differing on the Action and Aesthetics facets), as compared to matched controls.
Duberstein ⁵⁰ US	81	Cross-sectional	61.3 (9.6), 50-87	Depressed inpatients 50 years of age or older (55% admitted following a suicide attempt).	NEO-PI-R, SSI, Spectrum of Suicidal Behaviour Scale, and SCID (DSM-III-R)	Neuroticism was significantly correlated with suicide ideation severity in unadjusted analyses (but not in analyses adjusted for age and sex). Participants who had engaged in suicide-related behaviour reported significantly less Extraversion as compared to those who had not. Low Openness and high Agreeableness predicted absence of suicide ideation, controlling for age and sex.
Duberstein ⁷⁰ US	77	Cross-sectional	60.8 (9.5), 50-87	Depressed inpatients 50 years of age or older (42% admitted following a suicide attempt).	NEO-PI-R, BHS, HAM-D, and SCID (DSM-III-R)	In unadjusted analyses, Neuroticism and Extraversion were significantly correlated with hopelessness. Controlling for age and sex, Extraversion (-) significantly predicted hopelessness; however, Extraversion did not reach significance when additionally controlling for depression severity.

Harwood ⁷¹ UK	100	Psychological autopsy & case-control	72.2	Individuals 60 years of age or older who died by suicide (study also included 54 age and sex matched deceased controls for those who had informant completed interviews).	PAS (ICD-10) and the Psychiatric Illness Questionnaire (completed by proxy respondents)	Of those who died by suicide, 16% and 28% were determined to have a personality disorder or personality trait accentuation, respectively: anankastic, anxious and dependent personality traits were the most frequently observed. Those who died by suicide were significantly more likely to have a personality disorder or personality trait attenuation, as compared to age and sex matched deceased controls.
Harwood ⁷² UK	23	Psychological autopsy	73.3, 62-88	Individuals 60 years of age or older with no evidence of a psychiatric disorder who died by suicide.	PAS (ICD-10) and semi-structured interview	Of the 23 individuals who died by suicide, 1 (4%) had a personality disorder (dissocial) and 10 (43.5%) had a personality trait accentuation (anankastic and paranoid traits were the most common).
Heisel ³¹ US	134	Cross-sectional	61.5 (10.5)	Depressed psychiatric patients 50 years of age or older.	NEO-PI-R, SSI, BHS, and the Cumulative Illness Rating Scale	In unadjusted analyses, Openness (+) and neuroticism (+) were significantly correlated with suicide ideation. Controlling for age, sex, comorbidity, and hopelessness, only Openness was significantly associated with suicide ideator status.
Heisel ⁵⁴ CAN	538	Cross-sectional	76.1 (6.2), 65-94	Depressed psychogeriatric day-patients 65 years of age or older.	SCID (DSM-III or IV), Geriatric Depression Scale, and the HAM-D	Suicide ideation severity (assessed with a single item) was significantly associated with presence of narcissistic personality disorder and/or traits, controlling for age, sex, and depression severity.

Hirsch ⁵¹ US	1,801	Cross-sectional	71.18 (7.47)	Depressed primary care patients 60 years of age or older.	NEO-PI-R, SCID (DSM-IV), Hopkins Symptoms Checklist, and the Rand 12-item short form	Suicide ideation was significantly correlated with neuroticism (+). Neuroticism was also significantly associated with suicide ideation after controlling for age, sex, education, income, cognitive ability, anxiety, depression, presence of chronic medical problems, and happiness.
Neufeld ³³ CAN	117	Cross-sectional	68.47 (9.02), 50-92	Individuals 50 years of age or older with pronounced depression, suicide ideation, or history of suicide-related behaviours.	GSIS, Barratt Impulsiveness Scale, CESD-R, and the BHS	Suicide ideation was significantly associated with impulsivity. The authors also found some evidence that impulsivity may be a particularly important marker of risk in those who do not appear to be suffering from depression.
O'Riley & Fiske ⁴⁹ US	88	Cross-sectional	Not reported	Individuals 65 years of age or older recruited using a commercially purchased mailing list.	Suicidal Behavior Questionnaire-14, Personal Style Inventory-Revised (PSI-II; Autonomy Scale only)	Suicide ideation severity was significantly positively correlated with the Need for Control subscale of the PSI-II but not the Perfectionism or the Defensive Separation subscales. Similarly, in a linear regression analysis, only the Need for Control subscale was significantly associated with suicide ideation.
Segal ⁴⁸ CAN	109	Cross-sectional	71.4 (8.2), 60-95	Community-residing individuals 60 years of age or older.	NEO-FFI, GSIS, Coolidge Axis II Inventory, and the Reasons for Living Inventory	Suicide ideation was significantly correlated with Neuroticism (+), Extraversion (-), Agreeableness (-), and Conscientiousness (-). In multiple regression, the five NEO-FFI domains explained 38% of the variance in GSIS totals; Neuroticism was the only significant predictor.

Seidlitz ⁵³ US	85	Cross-sectional	61.0	Depressed inpatients 50 years of age or older, 47 of whom had a history of suicide-related behaviours.	NEO-PI-R, SCID (DSM-III-R), HAM-D, Suicidal Intent Scale, and the Lethality Rating Scale	Controlling for age and sex, individuals who had engaged in suicide-related behaviours had significantly lower scores on two Extraversion facets (warmth and positive emotions), as compared to those with no such suicide-related histories. Controlling for age, sex, and a total of 7 facets, those who had engaged in suicide-related behaviours had significantly lower scores on the Neuroticism Anxiety facet.
Tsoh ³⁴ Hong Kong	133	Cross-sectional	76.4 (7.1)	Individuals 65 years of age or older, 67 of whom had died by suicide and 66 who had been referred to psychiatry following suicide-related behaviours (study also included 91 community controls).	NEO-FFI, Suicidal Intent Scale, and the SCID (DSM-III-R)	As compared to community controls, those who died by suicide significantly differed in terms of Neuroticism (+), Extraversion (-), Openness (-), and Conscientiousness (-), while those who had engaged in suicide-related behaviours significantly differed in terms of Neuroticism (+), Extraversion (-), Agreeableness (-), and Conscientiousness (-). As compared to those who had died by suicide, those who had engaged in suicide-related behaviour significantly differed in terms Neuroticism (+), Openness (+), Agreeableness (-), and Conscientiousness (-)
Ueda ⁵⁵ US	110	Cross-sectional	60.3	Depressed inpatients 50 years of age and older, 67 of whom had a history of suicide-related behaviours.	NEO-PI-R, SSI, SCID (DSM-III-R), HAM-D	Suicide ideation was significantly correlated with facets of Neuroticism (+ depression), Extraversion (- warmth and positive emotions), and Agreeableness (+ modesty). Controlling for age, sex, depression symptomatology, and psychiatric comorbidity, suicide ideation was significantly associated with the two Extraversion facets (warmth and modesty).

Ueda ³⁵ US	103	Cross-sectional & psychological autopsy	63.2	Individuals 50 years of age or older, 60 of whom were psychiatric inpatients following suicide-related behaviours and 43 who had died by suicide.	NEO-PI-R , and the SCID (DSM III-R or IV-TR)	As compared to those who had engaged in suicide-related behaviour, individuals who had died by suicide significantly differed in terms of Neuroticism (-) and Conscientiousness (+).
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Note: younger (< 50 years) and control group participants were not included as part of the sample size; SCID = Structured Clinical Interview for the DSM, NEO-PI-R = NEO Personality Inventory-Revised, NEO-FFI = NEO Five-Factor Inventory, GSIS = Geriatric Suicide Ideation Scale, SSI = Scale for Suicide Ideation, BHS = Beck Hopelessness Scale, CESD-R = Revised Center for Epidemiologic Studies Depression Scale, HAM-D = Hamilton Rating Scale for Depression, PAS = Psychiatric Assessment Schedule.

Appendix B

Table 13. Bivariate correlation matrix including the TIPI (times 3 and 4), NEO-FFI, and the HEXACO-60 (n = 106)

Variable	TIPI (time 3)					TIPI (time 4)				
	ES	E	O	A	C	ES	E	O	A	C
<i>NEO-FFI (time 3)</i>										
Neuroticism	-.538**	-.145	-.304**	-.301**	-.199*	-.479**	-.117	-.083	-.330**	-.202*
Extraversion	.312**	.577**	.364**	.306**	.101	.209*	.540**	.246*	.346**	.125
Openness	.114	.308**	.457**	.119	-.053	.083	.300**	.351**	.127	.082
Agreeableness	.334**	.057	.095	.531**	.159	.411**	.064	.152	.572**	.195*
Conscientiousness	.188	.147	.163	.344**	.563**	.164	-.007	.087	.218*	.448**
<i>HEXACO-60 (time 4)</i>										
Honesty Humility	.076	.038	.054	.206*	.187	.182	.026	.103	.199*	.243*
Emotionality	-.217*	.175	-.144	.010	-.004	-.303**	.082	-.088	-.136	-.097
Extraversion	.288**	.686**	.351**	.129	.180	.213*	.628**	.351**	.187	.262**
Agreeableness	.234*	-.015	.057	.386**	.070	.449**	-.017	.133	.573**	.168
Conscientiousness	.195*	.173	.223*	.165	.418**	.212*	.042	.211*	.192*	.395**
Openness	.131	.291**	.431**	.046	-.016	.038	.316**	.375**	.079	.011
<i>TIPI (time 3)</i>										
Emotional Stability (ES)	-	.171	.197*	.293**	.212*	.531**	.131	-.005	.362**	.188
Extraversion (E)	.171	-	.322**	.086	.226*	.152	.808**	.272**	.087	.165
Openness (O)	.197*	.322**	-	.153	.141	.068	.231*	.447**	.163	.141
Agreeableness (A)	.293**	.086	.153	-	.257**	.248*	.064	.041	.601**	.188
Conscientiousness (C)	.212*	.226*	.141	.257**	-	.101	.101	-.081	.145	.510**
<i>TIPI (time 4)</i>										
Emotional Stability (ES)	.531**	.152	.068	.248*	.101	-	.234*	.278**	.599**	.343**
Extraversion (E)	.131	.808**	.231*	.064	.101	.234*	-	.298**	.143	.157
Openness (O)	-.005	.272**	.447**	.041	-.081	.278**	.298**	-	.257**	.267**
Agreeableness (A)	.362**	.087	.163	.601**	.145	.599**	.143	.257**	-	.313**
Conscientiousness (C)	.188	.165	.141	.188	.510**	.343**	.157	.267**	.313**	-

* $p < 0.05$, ** $p < 0.01$. Notes: TIPI = Ten Item Personality Inventory; NEO-FFI = NEO Five-Factor Inventory.

Appendix C

Table 14. Bivariate correlations between personality measures (NEO-FFI, HEXACO-60, and MPS) and depression symptom severity (CESD-R)

Personality Variable	Time 3 Depression	Time 4 Depression
<i>NEO-FFI (time 3)</i>		
Neuroticism	.562 ^{**}	.397 ^{**}
Extraversion	-.236 [*]	-.278 ^{**}
Openness	.098	.028
Agreeableness	-.161	-.216 [*]
Conscientiousness	-.218 [*]	-.204 [*]
<i>HEXACO-60 (time 4)</i>		
Honesty/Humility	-.014	-.031
Emotionality	.236 [*]	.285 ^{**}
Extraversion	-.230 [*]	-.244 [*]
Agreeableness	-.083	-.210 [*]
Conscientiousness	-.120	-.164
Openness	.022	.038
<i>MPS (time 4)</i>		
Self-Oriented Perfectionism	.021	.064
Other-Oriented Perfectionism	.005	.211 [*]
Socially Prescribed Perfectionism	.123	.178

* $p < 0.05$; ** $p < 0.01$. Notes: NEO-FFI = NEO Five-Factor Inventory; MPS = Multidimensional Perfectionism Scale; CESD-R = Center for Epidemiological Studies Depression Scale Revised.

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Foley N, **McClure JA**, Meyer M, Salter K, Willems D, Teasell R. Alternative level of care following acute admission for stroke: what are we waiting for? Stroke Collaborative, Toronto, Ontario, October 17, 2011.

McClure JA, Salter K, Kruger H, Foley H, Teasell R. Adherence to Canadian best practice recommendations for stroke care: Vascular cognitive impairment screening practices in an Ontario inpatient stroke rehabilitation facility. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Salter K, **McClure JA**, Kruger H, Foley N, Teasell R. Adherence to Canadian best practice recommendations for stroke care: Assessment and management of post-stroke depression in an Ontario inpatient stroke rehabilitation facility. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Salter K, **McClure JA**, Kruger H, Foley N, Teasell R. Adherence to Canadian best practice recommendations for stroke care: Attitudes, beliefs and barriers to the identification and management of post-stroke depression in current practice. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Foley N, Teasell R, Salter K, Meyer M, **McClure JA**, Willems D. Alternate level of care days associated with acute admission for stroke: What are we waiting for? 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Foley N, Salter K, Pereira S, **McClure JA**, Meyer M, Miller T, Sequeira K, Murie-Fernandez M, Teasell R. Does treatment with botulinum toxin improve upper extremity function following stroke? A systematic review and meta-analysis. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Meyer M, Pereira S, **McClure JA**, Foley N, Salter K, Willems D, Hall R, Asllani E, Fang J, Speechley M, Teasell R. Assessing the accessibility of inpatient rehabilitation in Ontario: A method for regional comparison. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Meyer M, Pereira S, **McClure JA**, Foley N, Salter K, Willems D, Hall R, Asllani E, Fang J, Speechley M, Teasell R. An economic model for stroke rehabilitation in Ontario using patient data to inform investment recommendations. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Pereira S, Meyer M, **McClure JA**, Salter K, Foley N, Lee D, Speechley M, Teasell R. Predicting discharge destination after post-stroke rehabilitation: A systematic review of multivariable models. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Pereira S, Foley N, **McClure JA**, Meyer M, Salter K, Brown J, Speechley M, Teasell R. Discharge destination of individuals with severe stroke undergoing rehabilitation: A predictive model. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Pereira S, Foley N, **McClure JA**, Meyer M, Salter K, Brown J, Speechley M, Teasell R. Availability of a caregiver is associated with greater FIM gains for severe stroke patients during stroke rehabilitation. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Teasell R, Foley N, Salter K, Meyer M, Pereira S, **McClure JA**, Britt E. The Stroke Rehabilitation Evidence Based Review: Research Knowledge Applied to Clinical Practice – The I's Have It. 2nd Canadian Stroke Congress, Ottawa, Ontario, October 2-4, 2011.

Macaluso S, Teasell RW, **McClure JA**, Walton D, Pretty P, Salter K, Meyer M, Sequeira K, Death B. Developing an evidence-based approach to whiplash-associated disorder (WAD). Annual Meeting of the Canadian Association of Physical Medicine and Rehabilitation, Victoria, British Columbia, June 8-11th 2011 (3rd place poster award winner).

McClure JA, Salter K, Foley N, Kruger H, Teasell R. Adherence to Canadian Best Practice Recommendations for Stroke Care: Vascular cognitive impairment screening practices in an Ontario inpatient stroke rehabilitation facility. Lawson Research Day, London, Ontario, March 22, 2011.

Meyer M, Pereira S, **McClure JA**, Lee D, Teasell R. Predicting functional independence after post-stroke rehabilitation: A systematic review of multivariable models. Lawson Research Day, London, Ontario, March 22, 2011.

McClure JA, Salter K, Foley N, Kruger H, Teasell R. Adherence to Canadian Best Practice Recommendations for Stroke Care: Vascular cognitive impairment screening practices in an Ontario inpatient stroke rehabilitation facility. Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 7, 2011.

Salter K, **McClure JA**, Kruger H, Foley N, Teasell R. Adherence to Canadian Best Practice Recommendations for Stroke Care: Assessment and management of post-stroke depression in an Ontario inpatient stroke rehabilitation facility. Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 7, 2011 (People's choice award for best podium presentation).

Foley N, **McClure JA**, Meyer M, Britt E, Salter K, Teasell R. How much therapy do patients receive during inpatient stroke rehabilitation and does it matter? Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 7, 2011.

Foley N, Willems D, Salter K, Meyer M, **McClure JA**, Teasell R. Application of a standardized assessment method to evaluate candidacy for inpatient rehabilitation following acute stroke: Results from 8 Ontario hospitals. Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 7, 2011.

Pereira S, Brown J, Foley N, **McClure JA**, Meyer M, Salter K, Speechley M, Teasell R. Discharge destination of individuals with severe stroke undergoing rehabilitation: A predictive model. Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 7, 2011.

McClure JA, Salter K, Foley N, Kruger H, Teasell R. Adherence to Canadian Best Practice Recommendations for Stroke Care: Vascular cognitive impairment screening practices in an Ontario inpatient stroke rehabilitation facility. ARGC/FHS Research Day, London, Ontario, February 4, 2011.

Pereira S, Brown J, Foley N, **McClure JA**, Meyer M, Salter K, Speechley M, Teasell R. Discharge destination of individuals with severe stroke undergoing rehabilitation: A predictive model. ARGC/FHS Research Day, London, Ontario, February 4, 2011.

Salter K, **McClure JA**, Foley N, Teasell R. Performance-based assessment in high-functioning individuals post stroke: Validity and sensitivity to change of the 2-minute walk test. American Congress of Rehabilitation Medicine - American Society of Neurorehabilitation Joint Educational Conference, Montreal, Quebec, October 21-23, 2010.

McClure JA, Meyer M, Salter K, Kruger H, Foley N, Teasell R. Prolonged length of stay in patients admitted to stroke rehabilitation with high levels of functional independence. 1st Canadian Stroke Congress, Quebec City, Quebec, June 7-8, 2010.

McClure JA, Salter K, Zettler L, Teasell R. A profile analysis exploring the impact of comorbidity on functional recovery post-stroke. 1st Canadian Stroke Congress, Quebec City, Quebec, June 7-8, 2010.

Foley N, Meyer M, **McClure JA**, Salter K, Britt E, Teasell R. A survey of scheduled therapy time for assessment and treatment of patients admitted for inpatient stroke rehabilitation. 1st Canadian Stroke Congress, Quebec City, Quebec, June 7-8, 2010.

Foley N, Meyer M, Salter K, Bayley M, Hall R, Liu Y, Willems D, **McClure JA**, Teasell R. Stroke rehabilitation in Ontario (2006-2008): a comparison of facilitation that provided stroke-specialized and non-specialized services. 1st Canadian Stroke Congress, Quebec City, Quebec, June 7-8, 2010.

Teasell R, Foley N, Salter K, Meyer, M, **McClure, JA**. The impact of the Stroke Rehabilitation Evidence Based Review. 1st Canadian Stroke Congress, Quebec City, Quebec, June 7-8, 2010.

Salter K, **McClure JA**, Teasell R. Community integration following TBI and the ICF: An examination of the Community Integration Questionnaire and the Reintegration to Normal Living Index. 8th World Congress of Brain Injury, Washington D.C., March 10-14, 2010.

McClure JA, Meyer M, Salter K, Kruger H, Foley N, Teasell R. Prolonged length of stay in patients admitted to stroke rehabilitation with high levels of functional independence. West GTA Stroke Network Symposium, Mississauga, Ontario, February 11, 2010.

McClure JA, Salter K, Zettler L, Teasell R. A profile analysis exploring the impact of comorbidity on functional recovery post-stroke. West GTA Stroke Network Symposium, Mississauga, Ontario, February 11, 2010.

McClure JA, Salter K, Zettler L, Teasell R. A profile analysis exploring the impact of comorbidity on functional recovery post-stroke. ARGC/FHS Research Day, London, Ontario, February 5, 2010.

McClure JA, Meyer M, Salter K, Kruger H, Foley N, Teasell R. Prolonged length of stay in patients admitted to stroke rehabilitation with high levels of functional independence. 9th Stroke Symposium and 31st Annual Meeting of the Inter-Urban Stroke Academic Association, Toronto, Ontario, January 28-29, 2010.

Foley N, Meyer M, **McClure JA**, Salter K, Teasell R. A survey of scheduled therapy time for assessment and treatment of patients admitted for inpatient stroke rehabilitation. 9th Stroke Symposium and 31st Annual Meeting of the Inter-Urban Stroke Academic Association, Toronto, Ontario, January 28-29, 2010.

Foley N, Meyer M, Salter K, Bayley M, Hall R, Liu Y, Willems D, **McClure JA**, Teasell R. Stroke rehabilitation in Ontario (2006-2008): A comparison of process indicators between facilities that provided stroke-specialized and non-specialized services. 9th Stroke Symposium and 31st Annual Meeting of the Inter-Urban Stroke Academic Association, Toronto, Ontario, January 28-29, 2010.

Teasell R, Foley N, Salter K, Meyer M, **McClure JA**. Stroke rehabilitation. World Congress of Neurology, Bangkok, Thailand, October 25-26, 2009.

McClure JA, Salter K, Zettler L, Teasell R. A profile analysis exploring the impact of comorbidity on functional recovery post-stroke. Canadian Stroke Network Annual General Meeting, Ottawa, Ontario, October 13-15, 2009.

Meyer M, Aubut J, **McClure JA**, Marshall S, Cullen N, Bayley M, Teasell R for the ERABI team. Models of Care for the Management of Acquired Brain Injury. 57th Annual Meeting of Canadian Association of Physical Medicine and Rehabilitation, Banff, Alberta, May 27-30, 2009.

Meyer M, **McClure JA**, Pan C, Murie-Fernandez M, Foley N, Salter K, Teasell R. Economic review of stroke rehabilitation in Ontario: Improving efficiency to optimize outcomes. 57th Annual Meeting of Canadian Association of Physical Medicine and Rehabilitation, Banff, Alberta, May 27-30, 2009 (awarded best review poster category and best overall poster).

Meyer M, Pan C, **McClure JA**, Foley N, Salter K, Mehta S, McHale H, Hall R, Lee D, Murie-Fernandez M, Teasell R. An economic review of stroke rehabilitation in Ontario: Improving efficiency to optimize outcomes. Showcase Health Policy Initiative at Western, London, Ontario, May 7, 2009.

Meyer M, Aubut J, **McClure JA**, Marshall S, Cullen N, Bayley M, Teasell R. Models of care for the management of acquired brain injury. Showcase Health Policy Initiative at Western, London, Ontario, May 7, 2009.

McClure JA, Salter K, Zettler L, Teasell R. A profile analysis exploring the impact of comorbidity on functional recovery post-stroke. 30th Annual Meeting of InterUrban Stroke Academic Association, London, Ontario, April 24, 2009.

Meyer M, Teasell R, Foley N, Salter K, **McClure JA**, Pan C, Mehta S. Economic review of stroke rehabilitation in Ontario: Improving efficiency to optimize outcomes. 30th Annual Meeting of InterUrban Stroke Academic Association, London, Ontario, April 24, 2009 (3rd place poster award winner).

McClure JA, Salter K, Zettler L, Teasell R. A profile analysis exploring the impact of comorbidity on functional recovery post-stroke. Lawson Research Day, London, Ontario, March 24, 2009.

Pan C, Meyer M, Foley N, **McClure JA**, Teasell R. An economic model of early supported discharge (ESD) for the rehabilitation of mild stroke patients. Lawson Research Day, London, Ontario, March 24, 2009.

McClure JA, Teasell R, Meyer M, Marshall S, Cullen N, Bayley M, Aubut J, Foley N, Salter K for the ERABI and EBRSR teams. A systematic review of cognitive therapy in stroke and acquired brain injury rehabilitation. Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 9, 2009.

Meyer M, Teasell R, Aubut J, Marshall S, Cullen N, Bayley M, **McClure JA** for the ERABI team. Models of Care for the Management of Acquired Brain Injury. Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 9, 2009.

Meyer M, Aubut J, **McClure JA**, Marshall S, Cullen N, Bayley M, Teasell R, Foley N, Salter K. Prevention and treatment of seizure disorders in stroke and acquired brain injuries: A systematic review. Greater Toronto Area Best Practices Day in Rehabilitation, Toronto, Ontario, March 9, 2009.

McClure JA, Teasell R, Meyer M, Marshall S, Cullen N, Bayley M, Aubut J, Foley N, Salter K for the ERABI and SREBR Research Groups. A systematic review of cognitive therapy in stroke and acquired brain injury rehabilitation. ARGC/FHS Research Day, London, Ontario, February 6, 2009.

Meyer M, Teasell R, Aubut J, Marshall S, Cullen N, Bayley M, **McClure JA** for the ERABI team. Models of Care for the Management of Acquired Brain Injury. ARGC/FHS Research Day, London, Ontario, February 6, 2009.