The Association Between Social Support Availability and Memory: A Cross-Sectional Analysis of the Canadian Longitudinal Study on Aging

by

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Author's Declaration

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

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Abstract

Population aging leads to a rise in the prevalence of age-related cognitive decline. While some declines in the memory domain of cognitive function are expected as people age, deterioration beyond a certain point may reduce functional ability and independence, and increase the risk of dementia. Therefore, it is critical to gain a better understanding of the protective and risk factors for memory function to promote better health throughout the aging process.

Social support is a modifiable psychosocial factor that has been shown to be positively associated with the maintenance of cognitive function. However, little evidence on this topic has been gathered from large-scale, population-based studies that include middle- and older-aged adults, leading to a gap in the understanding of the nature of this association.

The objective of this study was to investigate the relationship between social support availability (SSA) and memory function using data from the Comprehensive Cohort of the Canadian Longitudinal Study on Aging (CLSA). This thesis used multiple linear regression to explore the association between SSA (measured using the 19-item Medical Outcomes Study-Social Support Survey) and memory (measured using the immediate and delayed recall Rey Auditory Verbal Learning Test), controlling for covariates including sociodemographic factors, health-related factors, depressive symptoms, and health behaviours.

Results show that overall, there is a significant positive association between SSA (overall and subtypes) and memory function, both before and after adjusting for covariates. For sex-stratified analyses, stronger associations were typically observed for males compared to females for both immediate and delayed recall. Mixed findings were observed for age group-stratified results, with the strength of association for each age group varying substantially by SSA subtype and trial of the REY test.

This research addresses gaps in the literature, building on existing evidence that there is a link between SSA and memory function. Findings help to improve the understanding of the relationship between SSA and memory, and suggests that there are subgroups of the population that may benefit optimally from SSA, thereby supporting the development of social support initiatives to promote healthy cognitive function in Canadians.

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List of Abbreviations

AD	Alzheimer disease
ADL	Activity of Daily Living
ADRD	Alzheimer Disease and Related Disorders
APOE	Apolipoprotein E
BMA	British Medical Association
CES-D10	Center for Epidemiological Studies Short Depression Scale
CIHR	Canadian Institutes for Health Information
CLSA	Canadian Longitudinal Study on Aging
DCS	Data Collection Site
FSA	Forward Sortation Area
IADL	Instrumental Activity of Daily Living
MCI	Mild Cognitive Impairment
MOS-SSS	Medical Outcomes Study-Social Support Survey
NuAge	Quebec Longitudinal Study on Nutrition and Aging
ORE	Office of Research Ethics
RDD	Random Digit Dialing
REY	Rey Auditory Verbal Learning Test
SD	Standard Deviation
SES	Socioeconomic Status
SSA	Social Support Availability
WHO	World Health Organization

1.0. Introduction and Thesis Overview

Canada is currently experiencing a demographic shift; for the first time in history, there are more Canadians over the age of 65 years than under 15 years.[1] The primary reason for this demographic transition is a decrease in fertility rates and an increase in life expectancy.[2] Accompanying the rapidly aging population is an increased prevalence of age-related conditions, including cognitive impairment. Nearly half a million older Canadians are presently living with cognitive impairment, and this figure is expected to increase by approximately 76,000 cases annually.[3] Moreover, over 400,000 Canadians over the age of 65 years are currently living with dementia, and this number is predicted to increase to 937,000 by 2031.[3] Reports indicate approximately 25,000 new cases of dementia are diagnosed in Canada annually.[4] Cognitive impairment has been linked to numerous negative outcomes, including depression,[5] social withdrawal,[6] difficulties with activities of daily living (ADLs) or instrumental activities of daily living (IADLs),[7] and increased risk of future institutionalization and mortality.[8]

Cognitive decline in domains such as memory, executive function, and processing speed commonly occurs with normal aging, even in the absence of neurodegenerative diseases,[9] through changes in age-associated neural networks of the brain.[10] The hippocampus (the area of the brain responsible for learning and memory storage) is particularly vulnerable to the effects of aging, leading to memory decline and related difficulties in social and functional areas (e.g., decreased participation in social activities or increased restrictions in ADLs).[8,9,11] The investigation of modifiable risk and protective factors for cognitive function is necessary to develop interventions to maintain memory function, prevent memory loss, and offset the development of dementia or other adverse outcomes (e.g., functional decline, loss of independence).[12,13]

Social support is a modifiable psychosocial factor that has been shown to be positively associated with the maintenance of various domains of cognitive function, including memory function.[14–25] Several theories exist to explain the association between social support and memory function: high levels of social support may facilitate better physical health,[26] improve cognitive reserve,[8] improve vascular health,[27] or buffer stress,[28] all of which promote better memory.[8] However, little evidence on this topic has been gathered from large-scale population-based studies in samples that include both middle-aged and older adults, especially in the Canadian context, leading to a gap in the understanding of the nature of this association. The association is important to evaluate on a national scale for two reasons: (1) to increase the applicability of results to the whole population and (2) to reduce the potential impact of selection biases that can emerge from studying persons recruited from narrow sampling frames (e.g., clinics, workplaces, single cities). Therefore, this thesis aims to investigate the relationship between functional social support availability (SSA) and memory using data from the Comprehensive Cohort of the Canadian Longitudinal Study on Aging (CLSA).

The CLSA is a population-level, prospective cohort study following 51,338 middle-aged and older-aged adults for a minimum of 20 years. The sample is divided into two groups: a Comprehensive Cohort (n = 30,097) and a Tracking Cohort (n = 21,241). Participants in the Comprehensive Cohort are providing data through in-home interviews and visits to one of 11 data collection sites (DCS) across Canada every three years. Within the CLSA, SSA is measured using the Medical Outcomes Study-Social Support Survey (MOS-SSS),[29] a 19-item, self-administered questionnaire with Likert-scale responses ranging from 1 (low) to 5 (high). The MOS-SSS assesses overall SSA and four subtypes: affectionate support, emotional/informational support, positive interactions, and tangible support.

The CLSA measures memory using the Rey Auditory Verbal Learning Test (REY),[30] which requires participants to listen to a list of 15 words and recall as many of the words as possible, both immediately after hearing the list (immediate recall; REY I) and five minutes later (delayed recall; REY II).[31] In this thesis, the association between SSA and memory was explored using multiple linear regression, controlling for covariates including sociodemographic factors, health-related factors, depressive symptoms, and health behaviours, while incorporating the CLSA's weight and strata variables to account for the complex sampling design. Scores for both the immediate and delayed recall administrations of the REY were regressed separately on each SSA subscale and SSA overall (10 base models in total). As the Canadian and global populations continue to age, the exploration of modifiable protective and risk factors for cognitive function, including SSA, is essential for promoting healthy aging.

2.0. Background and Literature Review

2.1. Healthy Aging

The World Health Organization (WHO) defines healthy aging "as the process of developing and maintaining the functional ability that enables wellbeing in older age".[32] The healthy aging process is affected by several factors, including the built environment, social attitudes/values/policies, health systems and social relationships.[32] Researchers explore these factors to better understand the risks for unhealthy aging and to devise policies and programs to promote healthy aging.

2.2. Cognitive Function

Cognition is widely defined as the mental processes permitting individuals to perform ADLs and IADLs, and can include attention, short- and long-term memory, reasoning, and planning.[33] The Diagnostic and Statistical Manual of Mental Disorders (5th ed.) identifies six domains of cognitive function: (1) language, (2) learning and memory, (3) social cognition, (4) complex attention, (5) executive function and (6) perceptual-motor function.[33] When combined, these aspects of cognitive function are typically referred to as global cognition.[13]

Cognition plays a key role in the healthy aging process. Healthy cognition is critical for preserving functional abilities, wellbeing and independence throughout the lifespan.[13] Conversely, the negative effects of poor cognition on the ability of older adults to participate in daily activities is well established.[34] Cognitive function exists on a continuum from normal to severely impaired, with the latter often reflective of the presence of dementia.[35]

Age-related changes in the neural networks of the brain may produce declines in various cognitive domains, including memory, executive function, and processing speed.[10] These changes in cognitive function can be part of the normal aging process and do not necessarily indicate a health problem; however, beyond a certain point, declines in cognitive function may exceed the accepted bounds of normality and become cognitive impairment.[13]

According to the Public Health Agency of Canada, nearly half a million older adults are presently living with cognitive impairment, and this figure is expected to rise annually by approximately 76,000 cases.[3] Cognitive impairment is widely defined as problems with memory, acquisition of information, concentration or decision-making.[36] There are several manifestations of cognitive impairment, beginning with mild cognitive impairment (MCI), which is now known as 'mild neurocognitive disorder'. MCI was first defined over two decades ago[35] and is often referred to as the symptomatic pre-dementia phase of Alzheimer disease (AD). Persons with MCI experience gradually progressive cognitive declines that are not severe enough to interfere with daily activities.[37,38] Annually, approximately 14% of persons with MCI progress to dementia, compared with 1-2% of the general population.[39] Prevalence estimates for MCI are highly uncertain due to diagnostic difficulties, although one estimate reports the global prevalence of MCI ranges from 5.0-36.6 percent.[40] Moreover, the prevalence of MCI varies greatly by age: a recent meta-analysis demonstrated that the prevalence of MCI in persons aged 60-64 was only 6.7%, compared to 25.2% among persons aged 80-84 years.[41]

More serious cognitive impairments are typically classified as dementia ('major neurocognitive impairment'), an umbrella term typically referring to cognitive impairment severe enough to interfere with ADLs, and includes diagnoses such as AD, vascular dementia, Lewy body dementia, and frontotemporal dementia.[4] Dementia is characterized by a range of

symptoms affecting the brain, with memory loss as the most common and notable symptom.[4] Although numerous types of dementia exist, any type can cause cognitive, functional, emotional, behavioural, and physical impairments.[4] According to the WHO, dementia is the third largest contributor to years lived with disability, after terminal cancer and spinal cord injury.[42] Dementia is the most prevalent set of neurodegenerative disorders in Canada,[43] and it substantially impacts the health and well-being of the Canadian population.[44] The most common form of dementia is AD, which is characterized by the presence of amyloid plaques and neurofibrillary tangles in the brain.[37,45] Dementia may also result from non-neurodegenerative conditions such as vascular dementia.

It is important to note that most research on cognitive function and aging focuses on dementia, the most extreme form of cognitive impairment. Although the exploration of the effects of social support on dementia is beyond the scope of this thesis, it can be inferred that at least some of the research on risk and protective factors for dementia also applies to cognitive function in general, as dementia is preceded by declines in cognitive function. There is a need for further research exploring the risk and protective factors for cognitive function on its own, separate from the factors that affect dementia risk, especially because the maintenance of cognitive function can maximize opportunities to delay the onset or progression of dementia. Furthermore, it has been suggested that research on subclinical levels of cognitive impairment (both in midlife and older age) is relevant and important in all populations (young or old; cognitively impaired or not), as everyone can benefit from improved cognitive function.[46] Thus, the literature review presented in this thesis includes information on dementia, as literature on cognitive function and aging is limited.

2.2.1. The Memory Domain of Cognitive Function

While the proper functioning of all cognitive domains is crucial for healthy aging, the memory domain is particularly important because even in the absence of dementia, age-related memory declines pose daily challenges for older adults. Such challenges may include difficulty adhering to medication prescription schedules or impaired driving, among others.[7] The hippocampus is particularly vulnerable to the effects of aging due to its central role in learning and memory consolidation.[9] Memory impairments are marked by atrophy, aberrant connectivity, inflammation and reduced plasticity in the hippocampus.[47] Memory declines often occur in conjunction with other illnesses (such as cardiovascular disease), and the presence of these comorbidities can increase one's risk of developing more severe forms of cognitive impairment.[35] Furthermore, declines in memory function resulting from dementia can raise one's risk of future institutionalization and mortality.[8]

Inhibited memory function is commonly the first observable sign of cognitive impairment or dementia.[34,48] Subjective memory complaints often precede a formal diagnosis of cognitive impairment, and the severity of memory decline can predict the conversion from MCI to AD.[49] Thus, researchers stress the importance of monitoring memory deficits in non-impaired older adults to more accurately predict the onset of cognitive impairment.[49]

Memory deficiencies are quite noticeable by older adults who experience them, as well as by their families, friends, and aquaintences.[34] Indeed, one of the most common fears reported by older adults is developing a memory impairment.[50] Changes in memory function in individuals with MCI have been shown to result in negative emotional experiences, social withdrawal and workplace challenges.[6] Additionally, older adults with memory issues may be judged negatively

by others; for example, they may be viewed as selfish for forgetting important events like birthdays.[51] As such, memory decline can have a high emotional impact on older adults, resulting in increased social isolation and reduced social support.[34,51]

Memory function is assessed by neuropsychological tests in clinical or research settings. These tests are needed because objective biomarkers or pathophysiological indicators of memory function do not exist. Memory tests typically focus on the acquisition and recall of information, as these tasks appear most sensitive to detecting memory declines or early signs of cognitive impairment.[35] A common method of operationalizing these tasks is to present subjects with a list of stimuli and ask them to recall said list after a short interval. Psychometric research has shown this approach to most accurately assess levels of memory function.[35] Some commonly used memory tests include the Boston Naming Test,[52] the Hopkins Verbal Learning Test,[53] the Rey Auditory Verbal Learning Test (REY),[30] the Wechsler Adult Intelligence Scale Revised,[54] and the Wechsler Memory Scale.[55]

2.2.2. Factors Affecting Cognitive Function

2.2.2.1. Non-Modifiable Factors

There are several non-modifiable factors affecting cognitive function/impairment, including age, sex, and genetics. Age is the most well-known risk factor for cognitive decline, with numerous studies observing a positive association between age and the incidence or prevalence of cognitive dysfunction.[56–58] Age is also associated with declines in several cognitive domains, particularly those requiring quick processing or decision making, such as memory, executive function, attention and processing speed.[59] Age-related cognitive decline is correlated with numerous structural changes in the brain, including loss of neural synapses, neuronal

network disruption, and atrophy.[59] Research has also demonstrated that the risk of dementia (especially AD) increases exponentially in older individuals.[57,58]

Additionally, sex plays an important role in the risk of any form of cognitive impairment, with females generally at a higher risk compared to males, especially at older ages.[56,58] For example, a pooled analysis of four studies found the incidence of AD to significantly differ by sex in individuals over the age of 85.[57] This difference was greatest for those aged 90 years or older, where the rate of AD was 81.7% for women and 24.0% for men.[57] The explanation behind the increased risk of dementia-related cognitive impairment in women is unknown, but researchers speculate that it may be due to survival differences (i.e., women have longer life expectancies than men), a higher prevalence of apolipoprotein (APOE) ε4 allele in women compared to men, or early death for men who are susceptible to dementia (e.g., men with hypertension have a high risk of dementia).[56,57,60] However, the risk of dementia in women is speculated to be modulated by estrogen, which may have neuroprotective effects.[57,60]

2.2.2.2. Modifiable Factors

No medical treatment is available to halt or reverse chronic age-related memory decline. Therefore, research seeks to elicit 'modifiable' lifestyle factors that can be changed through individual initiative or health promotion. The hope is that individuals will modify their lifestyles accordingly and enjoy the downstream benefits of preserved memory.[12,13] Modifiable lifestyle factors include structural (e.g., education) and personal factors (e.g., behaviours [diet, physical activity], marital status, or psychosocial factors like social support).[61]

2.2.2.2.1. Structural Factors

Education is a well-known risk factor for cognitive impairment, whereby individuals who have lower levels of education have a higher risk of developing dementia (and vice versa).[56] However, educational levels may also be reflective of other factors such as socioeconomic status (SES).[56] SES has also been shown to predict later-life cognitive function, with research demonstrating that individuals with low SES have poorer performance on cognitive measures, compared to those with high SES.[62] Limited evidence suggests rural living is associated with a higher risk of cognitive decline,[63] although other research has not found such an association, potentially due to confounders such as education and general health status.[64]

2.2.2.2.2. Personal Factors

Health behaviours such as smoking and alcohol consumption may increase one's risk of developing cognitive impairment through cardiovascular mechanisms.[56,65] Additionally, studies have shown that individuals who are unmarried, or who live alone, perform more poorly on cognitive measures, including global cognitive function and processing speed.[19] Furthermore, the effect of marital status has different impacts for men and women.[66] For example, one study demonstrated that spousal support is the primary source of social support for men, contrary to women, who rely more on their friends and relatives for emotional support.[67] The influence of marital status on cognition may operate through a 'prompting' mechanism whereby individuals who are married are more likely to engage in health-promoting behaviours in recognition of a sense of responsibility to the family unit.[68]

Strong epidemiological evidence supports the effect of psychosocial factors, such as stress, depression, or social factors (e.g., engagement in social activity) on the pathogenesis and

development of dementia.[69,70] Psychosocial factors play a critical role in influencing the age of onset of cognitive impairment and the rate of cognitive decline, and can include a combination of physiological and psychological factors.[71] Associations have been observed between positive psychosocial factors (e.g., high levels of social support), the preservation of cognition with age, and enhanced resilience to disease; conversely, negative psychosocial factors (e.g., depression) are associated with decreased cognition over the lifespan.[72,73] For example, research has shown that depression is associated with cognitive decline, and that late-life depression is a strong risk factor for dementia onset.[66] Longitudinal research on depression and cognition has found that, among patients with coronary artery disease, those with depressive symptoms demonstrated the greatest cognitive declines compared to those without symptoms.[5] The association between depressive symptoms and cognitive decline was stronger in persons with the APOE-ε4 allele.[5] Overall, interventions targeting these psychosocial factors may present an opportunity to improve the cognitive function of Canadians.

Personal factors may present a better opportunity to modify cognitive function compared to structural factors, which often require societal-level interventions. For example, quitting smoking is a personal factor that many individuals can achieve on their own. Yet, increasing SES so that fewer people in the population are living in the low-SES bracket requires government intervention. Personal and structural factors are intertwined (e.g., someone with low SES may be more likely to smoke), and a mix of both sets of factors is likely to affect cognitive function in any one individual.

2.3. Social Support

2.3.1. Definition and Concepts

The generic term 'social support' is divided into two concepts, structural social support and functional social support, both of which play crucial roles in successful aging, physical and mental health, and mortality.[74] Structural social support involves social participation and social networks. Social participation refers to the type and frequency of activities that individuals join outside the home (e.g., work, volunteering, attending cultural events).[75] Social networks are defined as the number of direct ties with other individuals, and the frequency of interacting with these individuals.[28]

Functional social support is the extent to which one believes they can count on their direct social ties for help and support in times of need.[28] 'Help and support' can take the form of emotional or practical assistance. Emotional assistance includes someone to talk to in times of crisis (e.g., 'a shoulder to lean on') and practical assistance includes someone to help with important tasks (e.g., grocery shopping, lifts to doctor's appointments). Functional social support is sometimes called 'perceived' social support or social support availability (SSA). To avoid overlapping terminology, functional or perceived social support will be referred to as SSA from this point forward in the thesis.

The distinction between structural and functional support lies in the *quantity* (structural) versus the *quality* (functional) of personal relationships. The structural versus functional distinction is important to acknowledge because both aspects of social support may affect different cognitive domains.[13] For example, a systematic review illustrated that structural social support is not associated with attention and processing speed, but it is positively related with

global cognitive function and episodic memory.[13] Furthermore, research has shown that the quality of social support (functional), rather than the quantity (structural), has the greatest and most consistent effect on cognitive health outcomes.[19,76] Additionally, perceived levels of social support are the most important aspect of social support in determining well-being in older adults.[77]

There are numerous subtypes of functional social support, including emotional, tangible, appraisal, and informational support.[16] While differentiating between these subtypes can be challenging, general definitions do exist. Emotional support is defined as "[the amount of] love and caring, sympathy and understanding and/or esteem or value available from others,"[78] and typically refers to support provided by a loved one, although it can sometimes include support from less intimate relationships.[28] Tangible support, also called instrumental support, refers to assistance with activities such as grocery shopping, driving to appointments, answering the phone, cooking, cleaning, or paying bills.[28] Appraisal support is assistance with decision-making, and the provision of feedback (e.g., if you have accomplished a goal).[28] Finally, informational support is defined as the receipt of advice or information from others.[28] Well-rounded social support exists if each subtype is available when needed.[16] For example, an older adult may require emotional support during a time of bereavement, and tangible support when dealing with snow removal, but they may not need both types of support simultaneously.[16] Since functional social support is multidimensional and complex, all four subtypes will be studied in this thesis.[74]

Several studies have noted the relationship between SSA and health. A meta-analysis of 148 studies noted that individuals with stronger SSA had a 50% increased likelihood of overall survival. SSA's effect on survival was commensurate with the effect of smoking cessation on survival, and greater than the effects of increasing physical activity or lowering BMI.[79] SSA has

also been linked to better mental and physical health.[80,81] However, the association between SSA and cognitive function is less well established,[82] though it is gaining traction as an area for study and intervention.[19] Section 2.4. below outlines the current evidence for an association between SSA and cognitive function.

2.3.2. Modifying Factors for Social Support Availability

Several factors play a key role in determining one's access to and use of social supports. Two key factors are age and sex, as discussed in the following two sections.

2.3.2.1. Age

Throughout the aging process, opportunities for social engagement may become limited for several reasons, including illness or disability, a loss of social ties due to death of loved ones, relocation, a perceived lack of social opportunities, or avoidance of social opportunities (perhaps due to fear of rejection or embarrassment).[75] Although opportunities for structural social support may decline with age (e.g., decreased social participation or smaller social networks), this is not necessarily the case for functional social support. Notably, research has illustrated that some types of social support (e.g., emotional or tangible support) may remain stable or even increase with age.[67] Furthermore, the few social relationships that remain for older adults may be of high quality and be characterized by tighter bonds.[67] This notion is supported by research on community-dwelling older adults, which found that while the size of social networks (a measure of structural support) decreased with age, the number of close relationships did not differ across age groups,[83] indicating that SSA may be preserved with age.

The effects of SSA may differ for older adults compared to the rest of the population. For example, emotional support has been shown to have a greater effect on cognitive function in older adults (over the age of 65) relative to middle-aged adults (aged 55-65 years).[77] Furthermore, research has illustrated that levels of emotional support tend to remain constant over time, whereas levels of tangible support tend to increase with age.[67]

2.3.2.2. Sex

Sex plays a large and important role in the availability and use of social support, as well as in the type of social support. Over the lifespan, women give and receive greater amounts of social support and tend to extract the greatest benefits from social interactions.[67] This is possibly because social relationships may not decline extensively with age in women, although some decline has been observed for men,[67] especially regarding relationships outside of immediate family members.[84] Although the size or frequency of social contacts may decline for men over time, SSA does not necessarily change. Some research has observed that while women experience the most benefit from structural social support, functional support is particularly beneficial for men.[67] Although the reason behind this finding is unclear, some research suggests that it is related to marital status, as women may receive less functional support from their spouse, forcing them to rely on external social ties.[67] Moreover, married women tend to have fewer external social ties, and less emotional and tangible support compared to married men.[82] The effect of marital status on social support appears to be greatest in men; for example, men who are unmarried (i.e., separated, divorced, or single) have smaller social networks compared to those who are married, which may limit opportunities for strong SSA.[85]

2.3.2.3. Other Modifying Factors for Social Support Availability

Other factors affect SSA, either directly or as an interconnected system, although these factors have not been studied as extensively as age and sex. Education, income and SES tend to be strongly related to SSA and to each other.[86] For example, men with low education have a higher likelihood of low income and low SES.[87] Moreover, men with low incomes are more likely to have lower social support from their neighbours,[86] and low income may increase the amount of negative social interactions over time.[67]

A mental health factor that may be associated with SSA is depression. Low levels of SSA are associated with depressive symptoms, and the strength of this association increases with age.[88] The mechanism of this association appears to operate through the hypothalamic pituitary adrenal (HPA) axis.[17] The HPA axis can be activated by depression, and causes increased levels of stress hormones, resulting in damage to the hippocampus and memory decline.[89]

2.4. Social Support and Memory Function

Literature exploring the relationship between SSA and memory function is somewhat limited; thus, the present literature review will be divided into two sections: (1) structural social support and memory function, and (2) functional social support (SSA) and memory function.

I employed the help of a medical librarian and used systematic review methods to design and conduct the literature search. The syntax used to execute the literature search is shown in Table A1 in Appendix A. I screened citations retrieved from the search at both the title and abstract and full-text levels, and extracted relevant data into tables. The extracted data included author, title, location of article retrieval, data source and study design, study population, measure(s) of exposure, measure(s) of outcome, key findings, and covariates (see Table A2 in

Appendix A for the covariates). Regression coefficients, correlation coefficients, or odds ratios (with 95% confidence intervals when reported by the original articles) are listed with the key findings.

2.4.1. Structural Social Support and Memory Function

Observational research has illustrated the positive association between structural social support factors (described variously in the literature as social integration, social engagement, social activity, and social networks) and subtypes of memory function (i.e., episodic memory, semantic memory, and working memory).[8,69,90–93] Importantly, longitudinal research examining data from the Rush Memory and Aging Project noted that individuals with larger social networks had higher semantic and working memory function relative to those with smaller social networks (regression coefficient [β] = .015, 95% confidence interval [CI] = 0.007-0.02 for semantic memory; β = .015, 95% CI = 0.005-0.02 for working memory).[91] Moreover, one cross-sectional study found significant positive associations between social network size and frequency of contact as exposures, and global cognition as the outcome (β = 0.048 and β = 0.049, respectively).[93] However, one longitudinal study of community dwelling adults over the age of 65 years (n = 755 at baseline) did not observe an association between structural social factors and memory function.[69]

These observational findings are supported by twin studies and animal models. Research drawing upon 119 monozygotic twins found associations between social activity and memory (β = .24), but not with any other cognitive domains (i.e., perceptual speed, verbal ability, and executive function).[94] In addition, research utilizing mouse models found evidence for the temporal relationship between social ties and memory, as evidenced through reduced

neuroinflammation in the hippocampus of mice that lived in group housing compared to those living in isolation (although this may operate through stress mechanisms).[95]

2.4.2. Social Support Availability and Memory Function

Sixteen studies were identified that specifically examined the association between SSA and various subtypes of memory function, including episodic, semantic and working memory.[14–24,76,96] For a summary of the findings of each article discussed in this section, see Table A2 in Appendix A. Altogether, the literature reports associations between higher levels of overall SSA and slower memory decline. Cross-sectional and longitudinal research has shown positive associations between overall SSA and both episodic memory[18,20,97] and working memory.[18,76] Importantly, one recent cross-sectional study using the same memory and social support measures as the present thesis (the REY[30] and the MOS-SSS[29], respectively) found significant associations between overall SSA and immediate memory, even when adjusting for demographic and sampling characteristics (β = 0.07, 95% CI = 0.01-0.13).[46] Furthermore, cross-sectional research examining overall SSA and subjective memory complaints in older adults showed that individuals with lower SSA from friends reported poorer subjective memory function (β = -0.06, 95% CI = -0.05-[-0.07]),[22] and those with high SSA reported less subjective memory complaints compared to those with low SSA (odds ratio: 1.55; 95% confidence interval [CI]:1.19–2.01).[23] On the other hand, some longitudinal research in adults over the age of 65 years has not shown associations between overall SSA and global memory function,[19] episodic memory,[76] semantic memory[76] or working memory.[18]

A recent study employing the CLSA data in the Tracking Cohort found the strongest associations for immediate recall with overall SSA (β = 0.07, 95% CI = 0.04-0.10) and

emotional/informational support (β = 0.06, 95% CI = 0.03-0.09).[98] For delayed recall, the strongest associations involved overall SSA (β = 0.06, 95% CI = 0.02-0.09), emotional/informational support (β = 0.05, 95% CI = 0.02-0.08) and affectionate support (β = 0.05, 95% CI = 0.02-0.07).[98] Refer to Section 4.0. for more information on the different CLSA cohorts, the REY[30] and the MOS-SSS.[29]

Turning to SSA subtypes, cross-sectional research of a convenience sample of young, middle-aged, and older adults (n = 2,613) examined subtypes of SSA and observed positive associations between emotional support and overall memory function (β = 0.11),[96] as well as informational support and overall memory function (β = 0.07), but did not observe an association between tangible support and general memory function.[96] An additional cross-sectional study of 452 adults over the age of 55 years found a link between emotional support and working memory (β = 0.10), but not between tangible support and working or episodic memory.[24] A longitudinal study of community-dwelling older adults recruited via convenience sampling (n = 417 at baseline) found links between greater satisfaction with emotional support and less decline in episodic memory performance (β = -0.02).[15] Additional longitudinal research of 213 older adults recruited from two hospitals observed a positive (though weak) correlation between tangible support and working memory (r = 0.18).[17]

While the reasons underlying these inconsistent findings are unclear, it has been proposed that the equivocal results may be due to varying study samples,[16] or that certain cognitive domains are more highly sensitive to positive psychosocial factors than others.[24] With respect to varying study samples, research by Sims and colleagues[16] noted an inverse relationship between memory and tangible support (β = -0.17, 95% CI = -0.29-[-0.05]) for individuals living with chronic illness. The authors hypothesized that individuals with a chronic illness may perceive

social support as a stressor because they are unable to reciprocate the support they receive.[16] Additionally, the effect of SSA on memory function may vary by race. For example, cross-sectional research consisting of a convenience sample of 548 ethnically diverse older adults found a positive association between social support and working memory in Caucasians, no association among African Americans, and an inverse association between emotional support and working memory in Hispanic older adults.[21]

An additional explanation is that SSA is more strongly connected to some cognitive abilities than to others. As a case in point, a study of 838 older adults found a positive association between perceived levels of social support and working memory, perceptual speed, and visuospatial ability, but not episodic or semantic memory. The investigators concluded that problem-solving abilities and processing efficiency were more strongly related to levels of SSA than information storage.[76]

Another potential explanation for the inconsistent findings in the literature is variability in the definition and measurement of social support.[90] For example, all studies in the literature on SSA and memory used different measures of social support, except for two studies by the same investigators,[21,24] and two additional studies that employed the same measures of SSA and memory function as in the present thesis.[46,98] Importantly, the latter two studies observed positive associations between SSA and memory.[46,98] Moreover, in most published research, social support was assessed as one aspect of some broader concept of social engagement.

Disparities in the assessment of memory and subtypes of memory were also seen in the published research, with every study in the literature review using different measurements of memory function. However, there was some overlap between studies, as some researchers elected to use large memory test batteries that contained common sets of memory tests.

Equivocal results from the16 studies of SSA and memory suggest the need for further research to identify specific aspects of social functioning (such as SSA and its subtypes) that may be important for preserving memory.

Some of the 16 studies also noted that the findings were modified by age[15,20,22,23] or sex,[14] although one study concluded that age did not modify the association between social support and memory[98]; another study observed that neither age nor sex modified the association.[96] The remaining studies did not assess age or sex as potential effect modifiers.

Overall, this literature review on the link between SSA and memory function identified several weaknesses in previous research on the topic; namely, the vast majority of studies recruited older adults over the age of 60 years, neglecting middle-aged adults. Including middle-aged individuals is important in aging studies to better understand the relationship between SSA and memory in middle age, and how factors in mid-life can impact cognitive function over the life course. Moreover, most participants were recruited using methods such as convenience sampling (suggesting the possibility of selection bias), and participants were typically recruited from only one location (i.e., hospital clinic, nursing home or city). Evaluating this association on a large scale is important to increase the applicability of results to more than a limited number of population subgroups (e.g., seniors only).

2.4.3. Mechanisms Explaining Links between Social Support Availability and Memory

Researchers have proposed numerous theories to explain the mechanism behind the association between SSA and memory function, including that high SSA facilitates better physical health[26], improves cognitive reserve[99], aids in buffering stress[8] and improves vascular health.[27] The optimal explanation for understanding the association between SSA and memory

function is likely an amalgamation of these various mechanisms. Each mechanism will be explained in detail below.

It is important to note that most of the research into these mechanisms involves structural social support instead of SSA. As previously discussed, SSA (i.e., functional support) is a more accurate and consistent measure of social support compared to structural support.[19,76,97] However, the impact of structural support on health is likely mediated by SSA, as elements such as emotional and tangible SSA operate through the existence of social networks. Some research findings also suggest that the effect of structural characteristics (e.g., size of social networks) on health outcomes is attributed to the resources available through these networks, including SSA.[97]

2.4.3.1. Physical Health

SSA has been proposed to improve cognition through its effects on physical health. Notably, a review by Uchino et al. concluded that social support improves the health of cardiovascular, endocrine, and immune systems.[26] Social relationships may boost health-seeking and health-promoting behaviours (e.g., physical activity), which ultimately result in improved cognitive health.[90] One study found that social activity was an important determinant of physical activity levels; individuals had increased likelihoods of participating in physical activities when a social component was present.[68] This study also reported that physical activity may be a mediator in the relationship between social activity and cognitive function, wherein individuals who engage in more social activity also participate in more physical activity, which ultimately protects against cognitive decline.[68]

2.4.3.2. Cognitive Reserve

The cognitive reserve hypothesis was first introduced to explain why persons with higher levels of physical and mental activity in early life had a reduced risk of developing dementia in later life.[99] The hypothesis posits that specific aspects of the life experience (such as occupation, years of education, and engagement in stimulating activities) improve the cognitive reserve of an individual, so they are better able to compensate for any neuropathological changes in later life.[100] Individuals with higher cognitive reserve are able to draw on other areas of the brain to compensate for impairment-related pathophysiology, thereby preserving cognitive function[27] or transitioning from MCI back to normal cognition.[101]

Cognitive reserve offers an explanation for why some individuals present with AD pathology yet are asymptomatic. In support of this theory, a study by Bennett and colleagues found that social networks can help to moderate AD pathology and maintain memory function.[91] Specifically, social stimulation increases the synaptic density of the neocortical association cortex in the brain.[102] Therefore, SSA may maintain or improve cognition throughout the lifespan as a means of promoting cognitive reserve.[8]

2.4.3.3. Stress-Buffering Hypothesis

The stress-buffering hypothesis postulates that stronger social ties may act as a buffer against neuropathological changes by altering effects on HPA axis activation in the central nervous system, thereby affecting neural functioning.[28] Thus, individuals with better social networks/more SSA may be protected from the hypothalamic activation. This hypothesis implies that SSA facilitates the use of effective coping strategies to reduce the impact of stressful experiences.[103] In other words, fewer meaningful social interactions may result in negative

emotions associated with higher stress.[103] In support of this hypothesis, research has noted significant associations between working memory deficits and stress (measured via salivary cortisol) in young male students, illustrating that stress disrupts memory processing.[104] The effects of stress hormones appear to be amplified with age, and can cause a loss of hippocampal neurons, which may result in memory declines.[105] Research has also shown that social relationships may buffer against the negative effects of stress, resulting in improved health outcomes.[79] For example, one study demonstrated that individuals with stronger social relationships have a 50% increased likelihood of survival, even after adjusting for age, sex, initial health status, and cause of death.[79]

2.4.3.4. Vascular Hypothesis

The vascular hypothesis proposes that cognitive dysfunction is caused by problems arising in brain microvasculature.[106] Some researchers have extended this concept to explain the association between SSA and cognitive function, whereby social stimulation may benefit the cardiovascular system of the body (e.g., through decreased atherosclerosis), subsequently reducing the risk of cognitive decline,[27] although this potentially operates through the physical activity and stress-buffering mechanisms. Furthermore, numerous studies have outlined the effect of vascular risk factors on subsequent development of cognitive impairment.[27] For example, a study by Vemuri and colleagues demonstrated that vascular pathology was a major independent predictor of cognitive decline in later life.[107]

2.4.4. Reverse Causality/Reciprocity

A reverse causality theory has also been proposed, by which cognitive impairment is speculated to narrow one's social environment,[34] perhaps due to difficulties in participating or

maintaining relationships.[90] More specifically, the memory domain of cognition has been linked to feelings of shame and embarrassment that may lead to social withdrawal.[51] One longitudinal study demonstrated that individuals with poorer memory performance had fewer social relationships, which led to less available social support systems.[108] Longitudinal research has also shown a cyclical relationship between cognitive function and SSA, wherein individuals who have low engagement in social activities (thus receive lower levels of social support) have lower cognitive function, which leads to even lower participation in social activities, causing further cognitive decline.[109,110]

The reciprocal nature of the relationship between social support and memory function has led to challenges with using cross-sectional studies to assess the association between the two variables.[11] To resolve the issue of temporality, one longitudinal study examining social engagement and episodic memory illustrated that social engagement is a significant predictor of episodic memory performance over time; interestingly, no association was observed when examining the effect of memory on social engagement.[92] Similarly, a recent study using six waves of data from the English Longitudinal Study on Aging found that the link between social isolation and memory decline was driven by social isolation affecting memory function, not the reverse.[111] Other recent longitudinal research has found similar results.[97]

2.5. Theoretical Framework Explaining How Social Support Impacts Health and Cognition

Each of the previously discussed mechanisms likely functions in tandem through a broader framework.[13] A theoretical framework proposed by Berkman et al. in 2000[28] hypothesizes that "upstream factors" (i.e., cultural, socioeconomic, and political factors related to social change) heavily influence social network structure and characteristics, ultimately affecting

"downstream factors" including social support, access to resources, social influence, social engagement, and person-to-person contact. All of these factors facilitate the effect of social conditions on health through behavioural, psychological, and physiological pathways. A similar framework was proposed by Seeman and Crimmins in 2001,[112] although they differentiated between the biological pathways and the intermediate mechanisms (i.e., psychological and behavioural characteristics) that facilitate the effect of social relationships on physical and mental health outcomes, including mortality.

This thesis proposes that SSA is a psychosocial factor impacting cognitive health outcomes through various possible mechanisms (described in Section 2.4.). Berkman's framework is utilized in this thesis through its description of micro downstream factors, which ultimately lead to positive or negative health outcomes. Specifically, SSA falls under the rubric of social support, which according to the framework, includes tangible and financial, informational, appraisal, and emotional support. Berkman also emphasizes that it is the effect of perceived support on health outcomes that is most important to consider.[28] Although the framework does not explicitly mention cognition, Berkman considers health outcomes to include both physical and mental health; therefore, encompassing cognition as well.

2.6. Conclusion

This literature review shows limited evidence for a positive association between SSA and memory function, although the totality of findings is equivocal. The association is complex and can be affected by numerous factors, most notably age and sex. While the exact underlying mechanisms of the association are unknown, the framework by Berkman and colleagues[28] may provide a useful means of contextualizing the association between SSA and memory.

3.0. Study Rationale and Research Questions

3.1. Study Rationale

The present study aimed to investigate the association between SSA and memory in middle-aged and older-aged adults using baseline data from the Comprehensive Cohort of the CLSA. As shown in the literature review, previous research on this topic is limited (i.e., only 16 studies were retrieved from the literature search) and the results were equivocal. Furthermore, little evidence on this topic has been gathered from large-scale population-based studies in samples that include both middle-aged and older adults, and very few studies have explored this topic in a Canadian context. Overall, the lack of strong evidence for or against an association between SSA and memory warrants further exploration of the topic. Although the association between SSA and memory function has previously been explored in the Tracking Cohort of the CLSA,[98] it is important to also examine this association in the Comprehensive Cohort because the two samples differ in their recruitment methods and geographical restrictions, as well as in the administration of the REY[30] and the MOS-SSS.[29] Therefore, the results of this study can be used to further explore the relationship between SSA and memory, as well as confirm the results from the Tracking Cohort.[98]

3.2. Research Questions

1. Is there a cross-sectional association between SSA and memory function in community-dwelling men and women aged 45 to 85 years?
2. Does the association between SSA and memory function in Question 1 change after adjusting for covariates (including sociodemographic factors, health-related factors, depressive symptoms, and health behaviours)?
3. Does age or sex modify the association between SSA and memory function, after adjusting for covariates?

4.0. Methods

4.1. Data Source: The Canadian Longitudinal Study on Aging

4.1.1. Background and Study Design

The CLSA is a national, population-based, prospective cohort study that aims to explore how biological, medical, psychological, social, economic and lifestyle factors maintain health and protect against the onset of disease or disability over the life course from middle- to old-age.[113] The CLSA is currently following 51,338 men and women who were aged 45-85 years at baseline.[113] Participants are being followed at three-year intervals for a planned minimum of 20 years. Data collection occurs in French and English. Most alphanumeric (questionnaire) data are available for baseline ($Time_0$) and the first three-year follow-up period ($Time_1$); REY I and II data for $Time_1$ were only released in April 2020. Therefore, the analyses undertaken for this thesis included only the baseline data.

4.1.2. Sampling Frame and Eligibility Criteria

The CLSA consists of a Tracking Cohort (n = 21,241) and a Comprehensive Cohort (n = 30,097). In this thesis, data was drawn from the Comprehensive Cohort only. As such, the information below pertains only to the Comprehensive Cohort. Details about the Tracking Cohort are available elsewhere.[113]

Participants in the Comprehensive Cohort were selected from three sampling frames: provincial health registries, random digit dialing (RDD), and the Québec Longitudinal Study on Nutrition and Aging (NuAge).[114] The provincial health registries were the primary source of recruitment, and eligible participants were randomly selected from registry lists based on the set

of inclusion criteria described below. Provincial Ministries of Health mailed an information package to persons whom they selected from the lists, and interested persons were asked to contact the CLSA for more information. When required, RDD (limited to landline phone numbers) was employed to supplement the recruitment efforts from provincial health registries. A national polling firm telephoned landlines and, when connected with someone who fit the CLSA's eligibility criteria, explained the study and asked for permission to pass the person's contact information to the CLSA, who would later phone back. The final enrolees into the Comprehensive Cohort were recruited from NuAge. Participants in NuAge who agreed to share their contact information with the CLSA subsequently received an information package in the mail, with an invitation to call the CLSA for more information. Interested persons from any of the three sampling frames were formally recruited into the study once they made contact with the CLSA and agreed to participate.[115]

The CLSA required these three sampling frames to recruit enough participants into predetermined strata based on province, age group (45-54, 55-64, 65-74, and 75-85 years), and sex. The overall response rate for the Comprehensive Cohort was 10%. The response rate in the CLSA was similar to previous large-scale and population-based studies such as the UK Biobank (10%)[116] and the 45 and Up Study (17.9%).[117] For a table of provincial participant response rates, see Table C1 in Appendix C. Additional information on recruitment methods and sampling is available in the CLSA's technical documentation.[115]

The CLSA included persons who could speak French or English, and who were between the ages of 45 and 85 years at recruitment. This age range was selected to include individuals who were part of the baby boom cohort, as well as those who were completing major life transitions (such as transitions into retirement or death).[113] Individuals were excluded if they

resided in the three territories, lived on a federal First Nations reserve or other First Nations settlement, were full-time members of the Canadian Armed Forces, or lived in an institution, including long-term care facilities. Individuals residing in seniors' residences that provided only minimal care were eligible for the study. Individuals with cognitive impairment, as determined by the normative opinion of the interviewers at the initial contact with the CLSA, were excluded from the baseline sample. The presence of other chronic illnesses did not warrant exclusion from the study.

4.1.3. Comprehensive Cohort

Approximately 3,000-6,000 participants were recruited from within 25-50 kilometers of each of 11 data collection sites (DCS) spread across seven of the ten provinces: British Columbia (Burnaby, Surrey, Victoria), Alberta (Calgary), Manitoba (Winnipeg), Ontario (Hamilton, Ottawa), Québec (Montréal, Sherbrooke), Nova Scotia (Halifax) and Newfoundland and Labrador (St. John's). The remaining three provinces (Prince Edward Island, New Brunswick, and Saskatchewan) were excluded due to small population sizes and/or large rural areas within potential DCS catchment areas. The Comprehensive Cohort is not considered a nationally representative sample due to inclusion of participants who only reside close to the DCS, but it is still national in scope.[118]

Participants in the Comprehensive Cohort engage in a 90-minute in-home interview and a separate DCS visit once every three years to provide basic demographic, social, physical/clinical, psychological, economic, and health service utilization information to the study. During the in-home visit, data collection focuses around basic demographic, medical and health information. At the DCS visit, participants complete cognitive assessments, vision tests, a hearing test, a range

of clinical tests (e.g., electrocardiography, spirometry, bone density scans), and a series of physical performance tests (e.g., timed-up-and-go, chair rise). Participants are also asked to provide optional blood and urine samples.

4.1.4. Analytical Samples for the Thesis

Data from the Comprehensive Cohort were used for this thesis. The data were divided into two analytical samples, one each for the immediate and delayed recall administrations of the REY (explained in Sections 4.2.1 and 4.2.2), to reduce the amount of missing data in each sample (as some participants may have completed REY I and not REY II, or vice versa). For both samples, I initially excluded participants who did not complete the administration of the REY at the DCS, as some participants received alternative modes of administration for personal reasons. Next, I excluded participants with incomplete data on SSA and/or the REY. Finally, I excluded participants with missing data on any of the covariates, which are described in Section 4.2.4. below. The analytical sample sizes were 24,945 for the immediate recall administration of the REY and 24,719 for the delayed recall administration. For diagrams depicting how the analytical samples were obtained from the full sample, see Figures D1 and D2 in Appendix D.

4.2. Measures

4.2.1. Cognitive Assessments in the CLSA

All participants in the Comprehensive Cohort completed a baseline neurocognitive assessment that included two administrations of the REY test: the first administration was known as ‘immediate recall’ (REY I) and the second as ‘5-minute delayed recall’ (REY II). Immediate and delayed recall were scored separately and treated as distinct tests in this thesis.[10,98,119]

4.2.2. Outcome Variable: Rey Auditory Verbal Learning Test I and II

The original REY is a 15-item tool designed to assess verbal learning and memory function.[30] The REY has well-established sensitivity (especially to early cognitive impairment) and reliability,[31] and research has shown that individuals with MCI or dementia perform significantly lower on the test compared to cognitively normal older adults.[35,120] The CLSA investigators selected the REY because it is used extensively in longitudinal and population-based research, is effective for use in all age groups, and is available in English and French.[31] In this thesis, the REY was kept as a continuous variable based on advice from a cognition expert and member of the CLSA's Psychology Working Group (Megan O'Connell, personal communication) due to issues that can arise with dichotomization (e.g., a loss of power and uncertainty about the optimal cutpoint).[121] Moreover, the use of data-derived cutpoints can lead to numerous biases, including an overestimation of between-group differences.[121]

4.2.2.1. Administration

The REY was administered as follows. For immediate recall, participants listened to a list of 15 recorded words (see Appendix E, Table E1) and had to immediately recall (in any order) as many of the words as possible, within a 90-second time limit. For delayed recall, five minutes after hearing the list of words, participants were asked to recall as many of the words as possible, again in any order yet without hearing the list again, within a 60-second time limit. Responses for both administrations were audio-recorded to permit centralized scoring by trained CLSA personel.[118]

4.2.2.2. Scoring

For each administration, participants received a point for every correctly recalled word. Participants also received a point for any approved variant word, defined as a word sounding similar to one of the 15 words on the recording, such as "collar" instead of "colour". For delayed recall, participants would have to recall the same variant word as in the first administration, to receive the point. Participants could receive a maximum score of 15 points on each administration.

Raw test scores were converted into *z*-scores ($\mu = 0$; $\sigma = 1$), with the conversions being done separately for English and French speakers to account for language-based differences in participants' test performance.[31] Based on expert recommendation (Holly Tuokko, personal communication), participants were excluded from the analytical samples if they switched back and forth between languages during the test due to issues with scoring (e.g., if a participant responded with a French word, it may be scored as incorrect compared to the French translation of the English response) (Megan O'Connell, personal communication). Scores on REY I and II in the CLSA were similar to scores reported in other studies (for a comprehensive comparison, see Tuokko et al., p.7[118]).

4.2.3. Exposure: Medical Outcomes Study-Social Support Survey

In the CLSA, SSA was measured using the Medical Outcomes Study-Social Support Survey (MOS-SSS),[29] a 19-item, self-administered questionnaire with Likert-scale responses ranging from 1 (low) to 5 (high). Participants are asked "How often is each of the following kinds of support available to you if you need it?" Possible responses included (1) none of the time, (2) a little of the time, (3) some of the time, (4) most of the time, or (5) all of the time. The

reliability and construct validity of the survey have been well established in both English- and French-speaking populations.[74]

4.2.3.1. Medical Outcomes Study-Social Support Survey Subscales

The MOS-SSS assesses functional social support using four subscales of SSA: tangible social support, affectionate support, positive interactions, and emotional/informational support. Eighteen of the 19 items on the scale are assigned to one of the subscales. Tangible social support includes questions regarding the availability of someone to help if the participant is confined to bed, someone to transport them to appointments, or someone to aid in meal preparation or other daily chores. Affectionate support includes questions about the availability of someone to demonstrate love, provide feelings of love/desirability, and someone to hug. Positive interactions includes questions regarding the availability of someone with whom to spend time, participate in relaxing activities with, or partake in other enjoyable activities with. Emotional and informational support includes questions regarding the availability of someone to listen and give advice during challenging times; someone to provide information, confide in and talk with; or someone who understands the participant's problems.[74] While these subtypes are slightly different from the subtypes previously described in the literature (Section 2.3.1.) they essentially capture the same concepts. For an overview of the items in the MOS-SSS, as well as the subscales under which these items are grouped, see Appendix F, Table F1.

4.2.3.2. Scoring

Each question on the MOS-SSS received a score from 1-5, based on the response to the Likert scale. Since the questions were grouped by subscale, I calculated an average score per participant on each subscale.[122] Likewise, an overall SSA score was computed by calculating the

average of the scores on all 19 items in the survey. Higher scores for each subscale and for overall SSA indicated greater levels of SSA.

4.2.4. Covariates

Several variables were extracted from the CLSA dataset to serve as covariates in the regression analyses described in Section 4.3.2. below. These covariates included sex, age group, and province, in accordance with the CLSA's recommendation to account for the CLSA's complex survey design.[123] Additional covariates were selected based on the literature review described earlier. Table G1 in Appendix G lists these covariates and the published articles that motivated their selection into the thesis. A further set of covariates was selected in accordance with Berkman et al.'s theoretical framework[28]: urban versus rural living status, depressive symptoms, household income, smoking status and alcohol use. The entire covariate set was categorized into four groups: (1) sociodemographic information, (2) health-related factors, (3) depressive symptoms, and (4) health behaviours. These groups are described in the following four sections. Refer to Figure B1 in Appendix B for a conceptual diagram of the relationship between the exposure, outcome, and covariates.

4.2.4.1. Sociodemographic Information

Sex (male, female) was assessed by asking participants whether they are male or female. Males were considered as the reference category, and sex was treated *a priori* as an effect modifier.

Age (in years) was calculated at the time of the baseline in-home interview, as well as at the baseline visit to the DCS. The CLSA sampling strategy divides age into four groups: 45-54

years (treated as the reference category), 55-64 years, 65-74 years, ≥75 years. These groups were included in the regression models. Participants' ages ranged from 45-87 years at baseline. Age group was treated *a priori* as an effect modifier.

Province of residence was determined during initial recruitment: British Columbia, Alberta, Manitoba, Ontario (treated as the reference category), Québec, Newfoundland and Labrador, and Nova Scotia.

Level of education was assessed via a four-level measure of highest degree obtained by the participant: less than high school (treated as the reference category), high school completed, some post-secondary, post-secondary degree/diploma completed.

Total annual household income in Canadian dollars was assessed using a five-level measure: less than $20,000 (treated as the reference category); $20,000 or more, but less than $50,000; $50,000 or more, but less than $100,000; $100,000 or more, but less than $150,000; and $150,000 or more.

Marital status was assessed using a five-level measure: single, never married or never lived with a partner; married or living with a partner in a common-law relationship (treated as the reference category); widowed; divorced; or separated.

Urban/rural living status was determined by participants' forward sortation area (FSA), i.e., the first three digits of their postal code. The variable was dichotomized based on the middle value of the FSA (0 = rural; ≥ 1 = urban). Urban living was treated as the reference category. Further details about defining rural or urban areas based on FSA are available elsewhere.[124]

4.2.4.2. Health-Related Factors

Self-rated health was assessed by a five-category response to the question "In general, would you say your health is excellent, very good, good, fair or poor?". Participant responses were then rated on a scale from poor to excellent. "Poor" was treated as the reference category.

Number of chronic conditions consisted of 11 self-reported medical conditions that were selected based on existing literature, noting their association with cognitive function (Megan O'Connell, personal communication). These conditions included high blood pressure/hypertension; diabetes/borderline diabetes/high blood sugar; cancer; under-active thyroid gland/hypothyroidism/myxedema; chronic obstructive pulmonary disease/emphysema/chronic bronchitis; kidney disease/failure; cardiac chronic conditions (i.e., heart disease/congestive heart failure; myocardial infarction/heart attack/acute myocardial infarction; angina/chest pain due to heart disease), stroke-related conditions, peripheral vascular disease; and asthma. For each condition, participants were asked whether they had ever been diagnosed with that condition. For example, diabetes was assessed with the question "Has a doctor ever told you that you have diabetes, borderline diabetes or that your blood sugar is high?", with possible responses of "yes" or "no". This variable was treated as a four-level categorical measure based on the number of chronic conditions present: 0, 1, 2-3 or ≥ 4. No chronic conditions (0) was treated as the reference category.

4.2.4.3. Depressive Symptoms

Depressive symptoms were measured via the self-reported Center for Epidemiological Studies Short Depression Scale (CES-D10).[125] The CES-D10 measures depressive symptoms throughout the past week and has been shown to have high reliability and validity in the general

population[126] and in older adults.[127] There are ten items in total, with four possible responses for each item, scaled from 0-3, for a maximum possible score of 30. The CES-D10 was treated as a dichotomous measure using established cut-offs (i.e., scores < 10 versus scores ≥ 10).[125,128] No depressive symptoms were treated as the reference category.

4.2.4.4. Health Behaviours

Smoking status was determined by the creation of a derived variable to classify participants as current, former or never smokers based on the skip pattern of a questionnaire administered on smoking and tobacco use.[129] Participants were classified as current smokers if they answered "yes" to the question "Have you smoked at least 100 cigarettes in your life?" and answered "daily" or "occasionally" to the question "At the present time, do you smoke cigarettes daily, occasionally, or not at all?". Participants who answered "yes" to the first question but "not at all" to the second question were classified as former smokers. Participants who answered "no" to the first question and "not at all" to the second question were classified as never smokers. "Never smoker" was treated as the reference category.

Alcohol use was assessed using a CLSA-derived variable, where individuals were classified as not users, occasional users, or regular users of alcohol. Those who reported never consuming alcohol or not consuming alcohol in the last 12 months were classified as not users. Those who answered "yes" to consuming alcohol less than once a month were classified as occasional users. Those who answered "yes" to consuming alcohol almost every day, 4-5 times a week, 2-3 times a week, once a week, 2-3 times a month, once a month, for the last 12 months were classified as regular users. "Not user" was treated as the reference category.

4.3. Data Analyses

4.3.1. Descriptive Analyses

To gain a better understanding of the analytical samples' characteristics, I performed descriptive analyses using trimmed weights, which were calculated by the CLSA and based on individual participants' stratum-specific inclusion probabilities.[115] Frequency tables (n/%) were generated for categorical variables. For unweighted continuous variables that were normally distributed, means and standard deviations (SD) were calculated; means and standard errors of the mean were computed for weighted continuous variables. For non-normally distributed continuous variables, medians, and $25^{th}/75^{th}$ percentiles were calculated. Descriptive analyses for the weighted sample were stratified by effect modifiers sex and age group.

4.3.2. Regression Analyses

Multiple linear regression was used to model the relationship between SSA and memory function, with SSA considered as the exposure and memory function as the outcome. Scores for both the immediate and delayed recall administrations of the REY were regressed separately on each SSA subscale and SSA overall, resulting in ten different base regression models. The SURVEYREG procedure in SAS was used to undertake the regression analyses given the CLSA's complex survey design. The CLSA's geographical strata variable and the analytical weight variable were employed in all regression analyses.

To account for the potential effects of the covariates, the following steps were undertaken. First, the base model was run with the exposure and outcome variables, as well as with sex, age group and province, according to CLSA recommendations (Model 1).[123] Second,

the covariates were sequentially entered into the model in four themed chunks: sociodemographic (Model 2), health-related (Model 3), depressive symptoms (Model 4) and health behaviours (Model 5). Each subsequent model included the variables from the previous models.

The regression coefficient for SSA in each of Models 2-5 was compared to the regression coefficient for SSA in Model 1. A model was considered 'important' if the regression coefficient for SSA in this model changed by ±10% compared to the same coefficient in Model 1. Once the important models were identified, the optimal model was chosen from this set as the model with the highest R^2. Currently, model fit statistics such as the Akaike Information Criterion and the Bayesian Information Criterion are unavailable in SURVEYREG. Therefore, R^2 served as the criterion to choose the optimal model. In the event the R^2 values were virtually the same across the 'important' models, the regression coefficient with the largest percent change compared to Model 1 was selected as the optimal model. One optimal model was chosen for each SSA subscale, and SSA overall, for both REY I and REY II.

Once the optimal model was selected, I examined the regression diagnostics for this model. Since the SURVEYREG procedure did not provide the full panel of diagnostic information that one can find in SAS's REG procedure, I obtained residuals and predicted SSA scores, and used the SGPLOT procedure to generate a residual plot (x-axis: predicted REY score; y-axis: residuals). Residual plots showing random scatter of the points were taken as evidence of good model fit. Further, I generated a plot with predicted values of the outcome on the x-axis and observed values of the outcome on the y-axis. Better-fitting models on this second plot had R^2 of the regression line closer to 1.0 (if the association was positive) or -1.0 (if the association was negative).

Each optimal model was stratified by age group and sex to assess effect modification. This approach yielded four stratified models for age group and two stratified models for sex. An overall description of the analytical plan is described in Table 1. All statistical analyses were implemented using SAS v9.4 (The SAS Institute, Cary, NC) and the significance level was set at $\alpha = 0.05$. Graphs were produced with the 'ggplot2' package in R v3.6.3 (The R Foundation for Statistical Computing, Vienna, Austria).

4.3.3. Missing Data Analyses

Mann-Whitney-Wilcoxon tests were conducted to explore if there was a statistically significant difference between participants with and without missing data on the exposure and outcome variables, and covariates. Test comparisons were conducted for (1) those with and without missing data on REY I, comparing SSA scores between both groups; (2) those with and without missing data on REY II, comparing SSA scores between both groups; (3) those with and without missing data on SSA (overall and subtypes), comparing REY I scores between both groups; (4) those with and without missing data on SSA (overall and subtypes), comparing REY II scores between both groups; (5) those with and without missing data on any covariate, comparing REY I scores between both groups; and (6) those with and without missing data on any covariate, comparing REY II scores between both groups.

Table 1. Analytical plan for assessing the association between overall social support availability and memory: statistical methods and variables[a]

Model	Statistical Method	Variables
Overall SSA: Base Model	Multiple Linear Regression	*Exposure Variable:* Memory function *Outcome Variable*: Overall SSA *Covariates:* Sex, age group, province
Overall SSA: Covariates	Multiple Linear Regression	*Exposure Variable:* Memory function *Outcome Variable*: Overall SSA *Covariate chunks*[b]*:* Sociodemographic: Sex, age group, province, education, household income, marital status, urban/rural living status Health-related: Self-rated health, chronic conditions Depressive Symptoms: depressive symptoms Health behaviours: Smoking status, alcohol use

[a] Table 1 illustrates the set of models that assessed the association between overall SSA and memory function. The set of models was repeated with each of the four subtypes of SSA as exposure variables: affectionate, emotional/informational support, positive interactions, and tangible support. As well, the set of models was repeated for the immediate and delayed recall versions of the REY memory function test.

[b] Each subsequent covariate chunk included all the variables from the previous chunks
SSA = social support availability

4.4. Ethics

The CLSA received research ethics approval from the 11 universities hosting the DCS. Written, informed consent was obtained from all participants prior to data collection, and all participants are identified by a number code to ensure confidentiality. Further information regarding the ethics of the CLSA, including data collection and storage, are available elsewhere.[130]

This thesis is part of a broader project entitled "Profiles of Socially and Cognitively Vulnerable Canadians: A Cross-sectional Analysis of the Canadian Longitudinal Study on Aging (CLSA)," which received ethics approval from the University of Waterloo in December 2015 (ORE#21398). In November 2015, the research team applied for CLSA data access, which was approved in December 2015. Baseline data for the Tracking Cohort were received in April 2016, followed by baseline data from the Comprehensive Cohort in February 2017 (Tracking v3.1, Comprehensive v2.0). All variables related to cognitive function were updated in June 2017 (Comprehensive v3.1) followed by an update for SSA in the Comprehensive data in January 2018 (Comprehensive v3.2). In September 2018, the CES-D10 data were updated (Comprehensive v4.0). In October 2018, I received clearance to access data from the CLSA and was added to the University of Waterloo's ethics approval as a student investigator. All data files were stored on a password-protected shared drive at the University of Waterloo.

5.0. Results

5.1. Descriptive Analyses for the Full Sample

Descriptive statistics for the sociodemographic factors, health-related factors, depressive symptoms, and health behaviour factors are presented in Table 2 for both the unweighted and weighted full samples, as well as the two analytical samples (one analytical sample for REY I and one for REY II; only weighted data for these samples is shown). In the unweighted full sample, about half the participants were male and half were female, approximately 58% of participants were aged 45-64, and 62% of participants resided in British Colombia, Ontario, or Quebec. Over three-quarters (approximately 78%) of the participants graduated from post-secondary school, 71% of participants reported a total annual household income of $50,000 or more, 69% were married or living with a partner in a common-law relationship, and 91% resided in an urban area. In terms of health and health behaviours, 91% of participants rated their health as good, very good, or excellent, 64% reported one chronic condition or less, 84% did not have severe levels of depressive symptoms, 48% never smoked and three-quarters were regular alcohol users. For the weighted full sample, some of these statistics are slightly different; for example, nearly three-quarters (71.73%) of participants were aged 45-64 and approximately 75% of participants resided in British Colombia, Ontario, or Quebec. The percent distributions of the categories for each covariate are relatively similar for the two weighted analytical samples compared to the weighted full sample.

Table 2. Descriptive statistics for covariates in the unweighted and weighted samples, and analytical samples (for REY I and II)

	Unweighted Sample n=30,097		**Weighted Sample** n=3,746,316		**REY I Analytical Sample** n=3,183,496*		**REY II Analytical Sample** n=3,156,121*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Sex								
Female	15,320	50.90	1,886,733	50.36	1,570,700	49.34	1,556,594	49.32
Male	14,777	49.10	1,859,583	49.64	1,612,796	50.66	1,599,527	50.68
Age Group								
45-54 years	7,595	25.24	1,572,256	41.97	1,390,417	43.68	1,381,539	43.77
55-64 years	9,856	32.75	1,114,799	29.76	960,855	30.18	952,603	30.18
64-74 years	7,362	24.46	642,993	17.16	524,960	16.49	519,752	16.47
≥ 75 years	5,284	17.56	416,268	11.11	307,263	9.65	302,227	9.58
Province								
Alberta	2,957	9.82	449,805	12.01	353,525	11.10	350,873	11.12
British Columbia	6,254	20.78	1,116,157	29.79	975,231	30.63	967,757	30.66
Manitoba	3,113	10.34	308,654	8.24	255,024	8.01	253,533	8.03
Newfoundland and Labrador	2,214	3.36	80,983	2.16	70,421	2.21	70,011	2.22
Nova Scotia	3,078	10.23	130,223	3.48	108,878	3.42	108,206	3.43
Ontario	6,418	21.32	488,770	13.05	421,535	13.24	416271	13.19
Quebec	6,063	20.14	1,171,724	31.28	998,882	31.38	989,471	31.35

Table 2, continued. Descriptive statistics for covariates in the unweighted and weighted samples, and analytical samples (for REY I and II)

	Unweighted Sample n=30,097		**Weighted Sample** n=3,746,316		**REY I Analytical Sample** n=3,183,496*		**REY II Analytical Sample** n=3,156,121*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Highest Level of Education								
Less than secondary school	1,643	5.47	181,519	4.85	143,168	4.50	140,451	4.45
Secondary school only	2,839	9.45	335,075	8.96	276,153	8.67	272,558	8.64
Some post-secondary education	2,238	7.45	250,936	6.71	210,141	6.60	208,489	6.61
Post-secondary graduation	23,327	77.64	2,973,337	79.48	2,554,033	80.23	2,534,624	80.31
Total Annual Household Income[a]								
< $20,000	1,566	5.56	165,767	4.69	132,129	4.15	129,623	4.11
$20,000 - $49,999	6,360	22.59	662,799	18.74	568,706	17.86	562,320	17.82
$50,000-$99,999	9,907	35.19	1,177,394	33.29	1,063,663	33.41	1,054,587	33.41
$100,000-$149,999	5,524	19.62	784,321	22.18	724,179	22.75	718,405	22.76
≥$150,000	4,799	17.04	746,275	21.10	694,820	21.83	691,187	21.90

Table 2, continued. Descriptive statistics for covariates in the unweighted and weighted samples, and analytical samples (for REY I and II)

	Unweighted Sample n=30,097		**Weighted Sample** n=3,746,316		**REY I Analytical Sample** n=3,183,496*		**REY II Analytical Sample** n=3,156,121*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Marital Status								
Single, never married or never lived with a partner	2,654	8.82	313,323	8.37	252,461	7.93	250,200	7.93
Married or living with a partner in a common-law relationship	20,651	68.63	2,841,504	75.87	2,461,863	77.33	2,421,329	77.35
Widowed	2,809	9.34	205,527	5.49	151,426	4.76	149,946	4.75
Divorced	3,185	10.59	300,681	8.03	245,627	7.72	243,325	7.71
Separated	790	2.63	84,256	2.25	71,118	2.27	71,322	2.26
Urban/Rural Living Status								
Rural Living	2,764	9.19	349,616	9.34	306,891	9.64	302,097	9.57
Urban Living	27,321	90.81	3,395,126	90.66	2,876,605	90.36	2,854,024	90.43

Table 2, continued. Descriptive statistics for covariates in the unweighted and weighted samples, and analytical samples (for REY I and II)

	Unweighted Sample n=30,097		Weighted Sample n=3,746,316		REY I Analytical Sample n=3,183,496*		REY II Analytical Sample n=3,156,121*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Self-Rated Health								
Excellent	5,995	19.93	762,413	20.36	674,705	21.29	669,256	21.20
Very good	12,420	41.30	1,534,110	40.97	1,308,385	41.10	1,297,887	41.12
Good	8,877	29.52	1,116,653	29.82	943,129	29.62	935,076	29.63
Fair	2,315	7.70	279,473	7.46	217,759	6.84	214,744	6.80
Poor	467	1.55	51,697	1.38	39,519	1.24	39,158	1.24
Number of Chronic Conditions								
0	9,387	32.52	1,365,167	37.77	1,223,531	38.43	1,215,835	38.52
1	9,021	31.25	1,147,103	31.74	1,008,641	31.68	998,473	31.64
2-3	8,634	29.91	930,087	25.73	807,459	25.36	799,664	25.34
≥4	1,823	6.32	172,038	4.76	143,866	4.52	142,150	4.50
Depressive Symptoms[b]								
No	25,165	84.07	3,148,187	84.39	2,718,003	85.38	2,694,831	85.38
Yes	4,768	15.93	582,124	15.61	465,493	14.62	461,291	14.62

Table 2, continued. Descriptive statistics for covariates in the unweighted and weighted samples, and analytical samples (for REY I and II)

	Unweighted Sample n=30,097		Weighted Sample n=3,746,316		REY I Analytical Sample n=3,183,496*		REY II Analytical Sample n=3,156,121*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Smoking Status								
Never smoker	14,265	47.52	1,857,824	49.70	1,561,700	49.06	1,549,365	49.10
Former smoker	13,186	43.93	1,542,454	41.26	1,340,168	42.10	1,340,168	42.06
Current smoker	2,567	8.55	337,841	9.04	281,628	8.85	279,157	8.84
Alcohol Use								
Regular user	22,239	75.72	2,840,042	77.51	2,502,101	78.60	2,483,063	78.67
Occasional User	3,705	12.61	418,003	11.41	347,482	10.91	343,869	10.90
Not User	3,427	11.67	405,986	11.08	333,913	10.49	329,190	10.43

*Weighted

[a] Canadian dollars

[b] Measured using the CES-D10. Scores < 10 are categorized as “no”, > 10 are categorized as “yes”

For the exposure variables, median SSA scores (overall and subtypes) for the full unweighted ranged from 4.33-4.66, and 4.34-4.69 for the full weighted sample. Among SSA subtypes, affectionate support had the highest median for both unweighted and weighted samples, with medians of 4.66 and 4.69, respectively. More details on medians and $25^{th}/75^{th}$ percentiles for the exposure variables are presented in Table 3. Moreover, Figures 1-5 depict the distributions for SSA (overall and subtypes) for the weighted full sample; these figures show that the exposure data exhibits left skewness, indicating that most participants had high levels of SSA. Figure 2 illustrates that the greatest amount of skewness appears to be for affectionate support, with nearly half of participants rating their levels of affectionate support at five, the highest possible rating.

For the outcome variables, the raw score was higher for REY I compared to REY II in both the unweighted and weighted full samples (Table 4). For example, in the unweighted sample, the mean raw score on the REY I was 5.85, compared to 4.04 for REY II, a difference of nearly two points. Furthermore, the z-scores on both REY tests were fairly normally distributed, although the distribution of scores for REY I appears to better fit the normal curve compared to REY II. Refer to Figures 6 and 7 for histograms on distribution for the full weighted sample.

Table 3. Exposure (social support availability) descriptive data for the unweighted and weighted samples[a]

	Unweighted Sample n=30,097		**Weighted Sample** n=3,746,316	
Exposure	**Median**	**25th/75th percentiles**	**Median**	**25th/75th percentiles**
Overall social support availability	4.42	3.89/4.84	4.42	3.91/4.83
Affectionate support	4.66	4.00/5.00	4.69	4.02/4.84
Emotional/informational support	4.38	3.88/4.88	4.34	3.79/4.85
Positive interactions	4.33	4.00/5.00	4.34	3.75/4.78
Tangible support	4.50	3.75/5.00	4.37	3.77/4.80

[a] Medians and 25th/75th percentile are reported as data are non-normally distributed (data exhibits left skewness)

Table 4. Outcome (REY I and II) descriptive data for the unweighted and weighted samples

	Unweighted Sample n=30,097		**Weighted Sample** n=3,746,316	
Outcome	**Mean**	**Standard Deviation**	**Mean**	**Standard Error of the Mean**
Z-Scores				
REY I *z*-score	0	1	0.12	0.01
REY II *z*-score	0	1	0.13	0.01
Raw Scores				
REY I raw score	5.85	1.91	6.04	0.01
REY II raw score	4.04	2.16	4.30	0.02

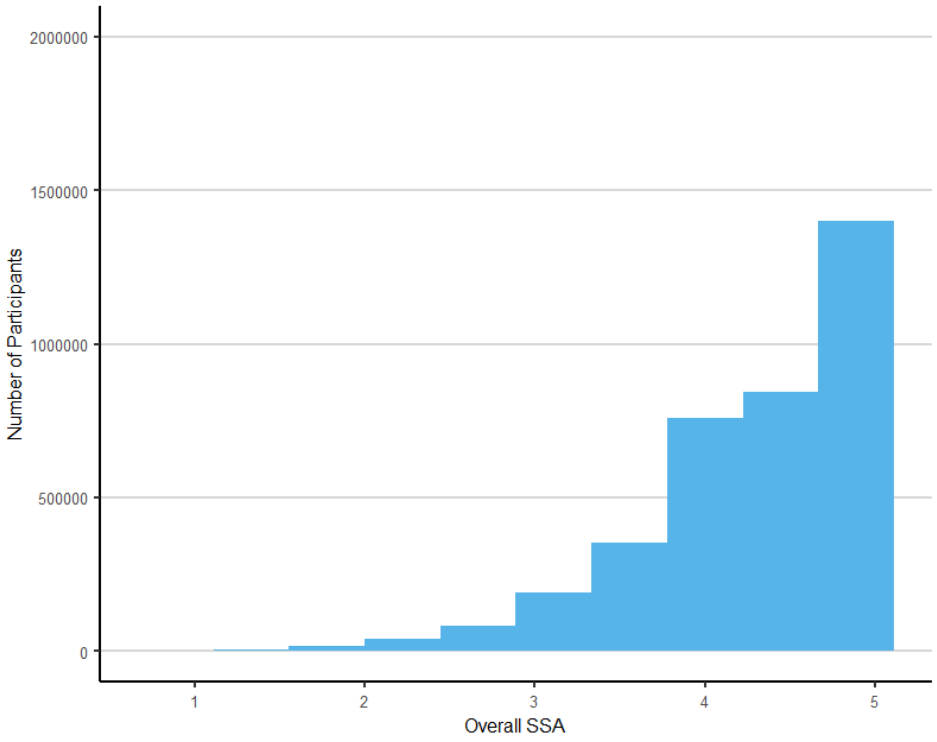

Figure 1. Histogram for exposure (overall social support availability) distribution for the full sample

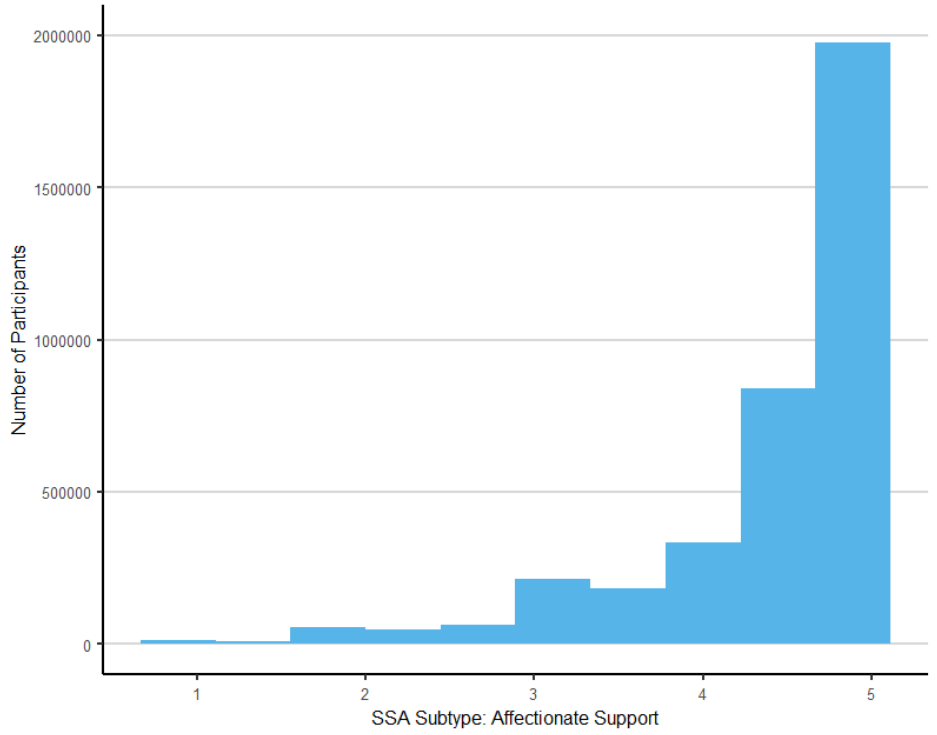

Figure 2. Histogram for exposure (affectionate support) distribution for the full sample

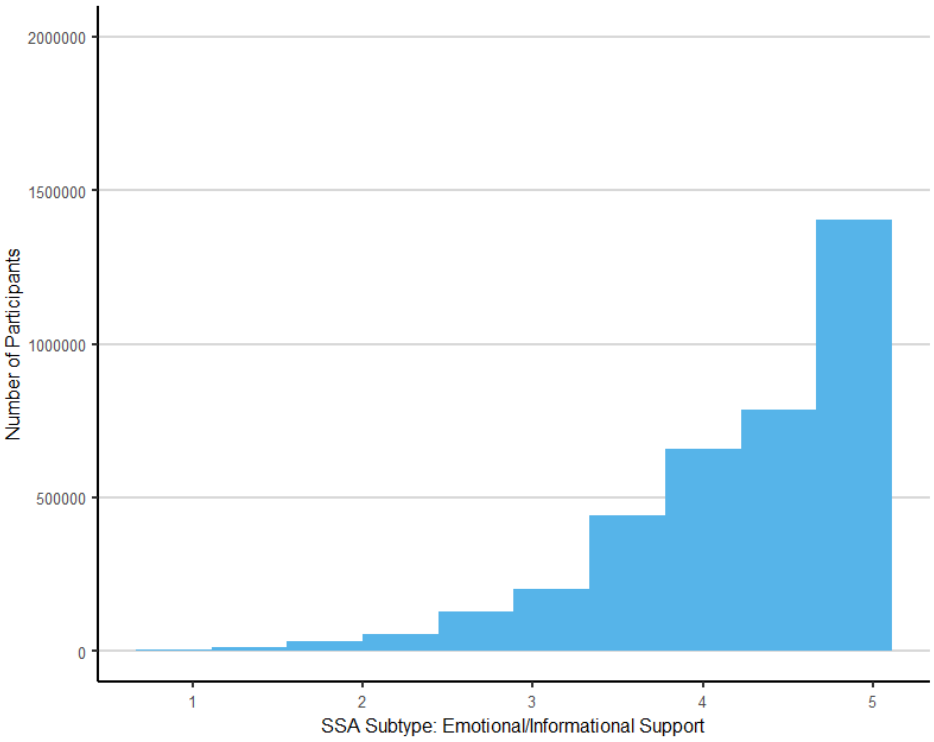

Figure 3. Histogram for exposure (emotional/informational support) distribution for the full sample

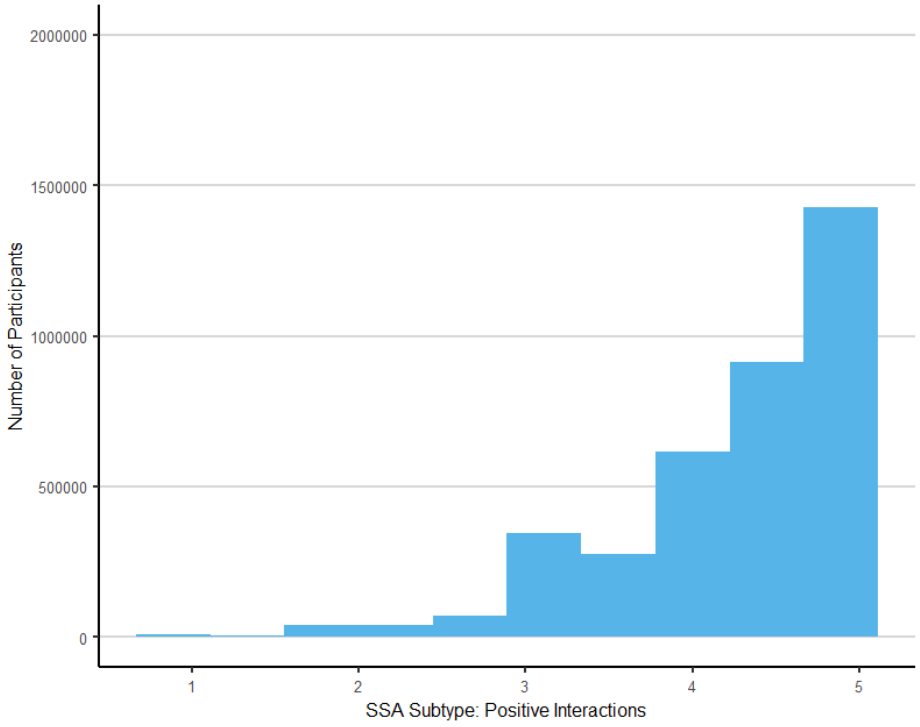

Figure 4. Histogram for exposure (positive interactions) distribution for the full sample

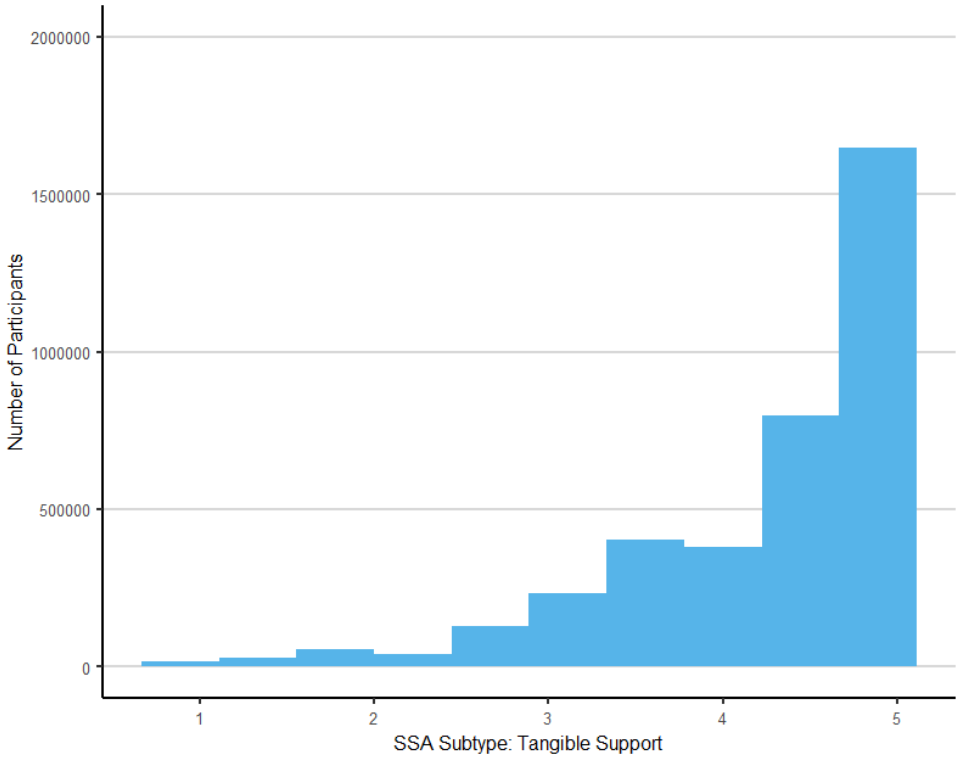

Figure 5. Histogram for exposure (tangible support) distribution for the full sample

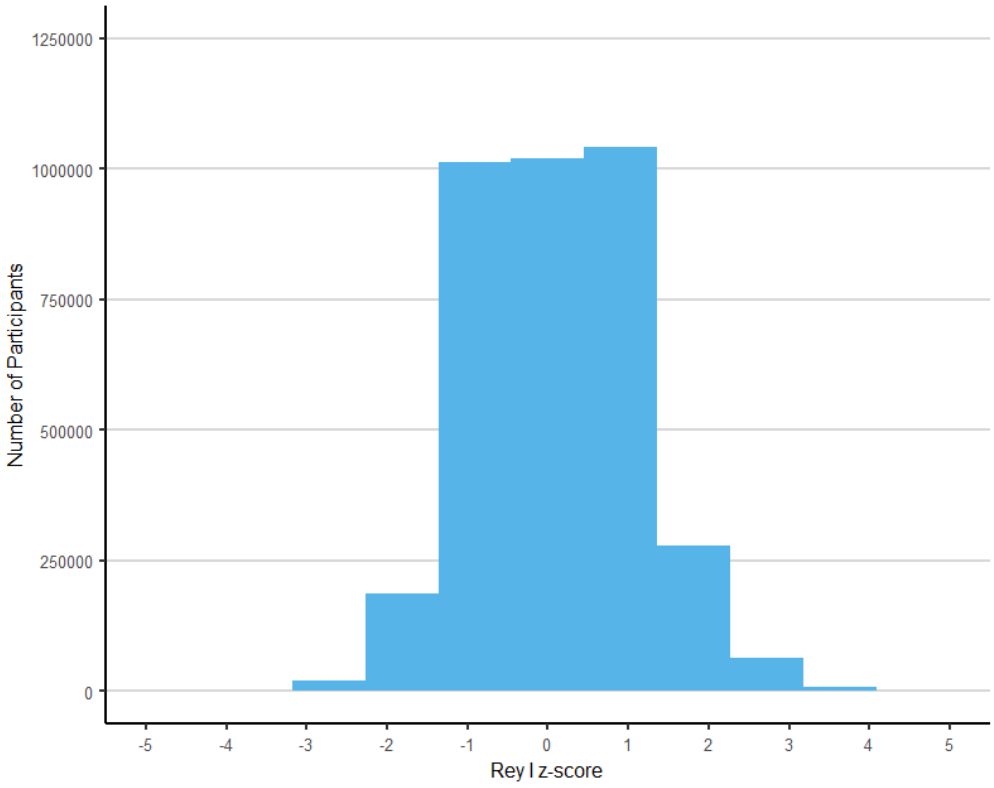

Figure 6. Histogram for outcome (REY I) distribution for the full sample

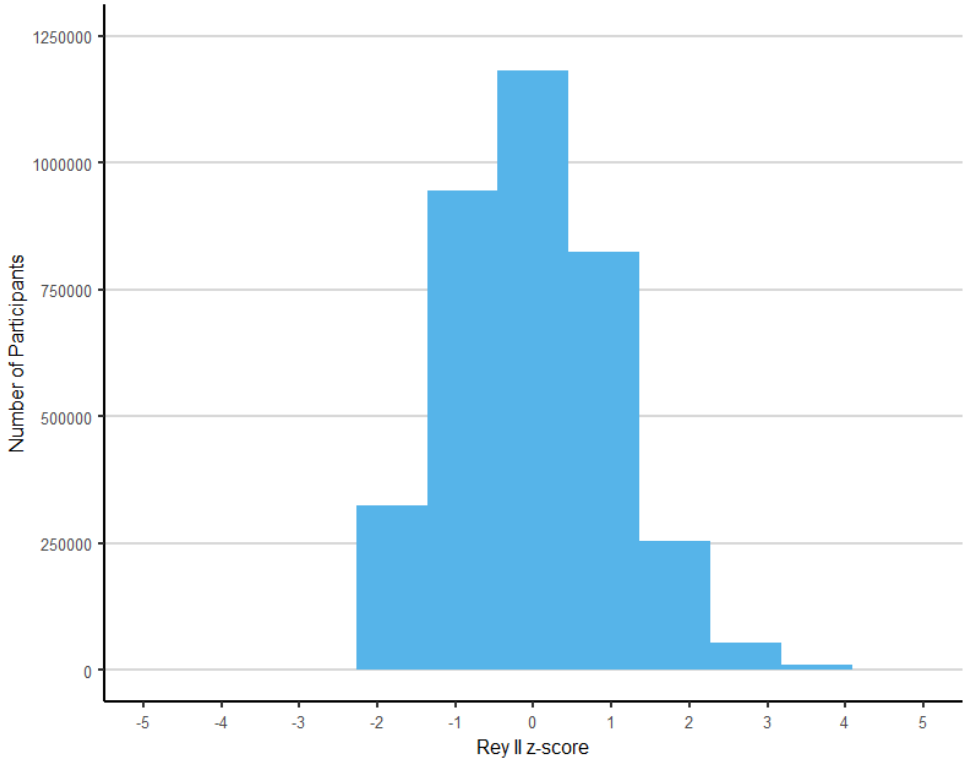

Figure 7. Histogram for outcome (REY II) distribution for the full sample

5.2. Descriptive Analyses Stratified by Sex

Descriptive statistics for sex-stratified sociodemographic factors, health-related factors, depressive symptoms, and health behaviour factors are presented in Table 5. The percent distributions between females and males were relatively similar for many covariates, including age group, province, highest level of education, urban/rural living status, self-rated health, and number of chronic conditions. For the remaining covariates, there were some variations observed between males and females. Males had a higher total annual household income compared to females, with approximately 49% of males reporting an income of $100,000 or more, compared to 38% of females. A higher proportion of males were married: approximately 82% of males reported being married or living in a common-law relationship, compared to 70% of females; while the proportion of females reporting being widowed or divorced was almost twice as large as males (13% of females versus 7% of males). More males also reported a higher frequency of severe depressive symptoms (87%) compared to females (82%) ($p < 0.001$), and a slightly greater proportion of males were current or former smokers (52%) versus females (48%). Likewise, a higher percentage of males (82%) reported regularly using alcohol, compared to females (73%).

Table 5. Descriptive statistics for covariates by sex

	Males n=1,859,583*		Females n=1,886,733*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Age Group				
45-54 years	820,960	44.15	751,296	39.82
55-64 years	552,299	29.70	562,500	29.81
64-74 years	294,808	15.85	348,185	18.45
≥ 75 years	191,516	10.30	224,752	11.91
Province				0.00
Alberta	246,640	13.26	203,165	10.77
British Columbia	545,859	29.35	570,298	30.23
Manitoba	157,394	8.46	151,259	8.02
Newfoundland and Labrador	36,815	1.98	44,168	2.34
Nova Scotia	58,086	3.12	72,137	3.82
Ontario	242,989	13.07	245,781	13.03
Quebec	571,799	30.75	599,925	31.80
Highest Level of Education				
Less than secondary school	76,561	4.12	104,959	5.57
Secondary school only	143,042	7.70	192,033	10.19
Some post-secondary education	119,557	6.44	131,378	6.97
Post-secondary graduation	1,517,774	81.74	1,455,563	77.26

Table 5, continued. Descriptive statistics for covariates by sex

	Males n=1,859,583*		Females n=1,886,733*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Total Annual Household Income[a]				
< $20,000	62,018	3.47	103,749	5.93
$20,000 - $49,999	272,116	15.23	390,683	22.32
$50,000-$99,999	579,740	32.45	597,654	34.15
$100,000-$149,999	434,961	24.35	349,360	19.96
≥$150,000	437,567	24.49	308,708	17.64
Marital Status				
Single, never married or never lived with a partner	152,836	8.22	160,487	8.51
Married or living with a partner in a common-law relationship	1,526,594	82.11	1,314,910	69.72
Widowed	46,683	2.51	158,845	8.42
Divorced	95,494	5.14	205,186	10.88
Separated	37,697	2.03	46,560	2.47
Urban/Rural Living Status				
Rural living	161,124	8.67	188,492	10.00
Urban living	1,698,232	91.33	1,696,894	90.00
Self-Rated Health				
Excellent	363,174	19.54	399,239	21.17
Very good	749,948	40.35	784,162	41.58
Good	578,365	31.12	538,288	28.54
Fair	140,458	7.56	139,015	7.37
Poor	26,467	1.42	25,230	1.34

Table 5, continued. Descriptive statistics for covariates by sex

	Males n=1,859,583*		Females n=1,886,733*	
Characteristic	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Number of Chronic Conditions				
0	724,286	40.34	640,881	35.24
1	556,359	30.98	590,744	32.48
2-3	440,710	24.54	489,378	26.91
≥4	74,318	4.14	97,720	5.37
Depressive Symptoms[b]				
No	1,614,193	87.16	1,533,994	81.67
Yes	237,896	12.84	344228	18.33
Smoking Status				
Never smoker	881,818	47.52	976,006	51.85
Former smoker	801,627	43.20	740,827	39.35
Current smoker	172,144	9.28	165,697	8.80
Alcohol Use				
Regular user	1,497,434	81.91	1,342,608	73.13
Occasional user	149,381	8.17	268,622	14.63
Not user	181,396	9.92	224,591	12.23

*Weighted

[a] Canadian dollars

[b] Measured using the CES-D10. Scores < 10 are categorized as "no", > 10 are categorized as "yes"

For the exposure variables in the full sample stratified by sex (Table 6), males typically had slightly higher median SSA scores compared to females, with ranges from 4.30-4.69 (males) and 4.30-4.68 (females). Affectionate support also had the highest median scores among SSA subtypes for both males (median = 4.69) and females (median = 4.68). Furthermore, sex-stratified histograms (Figures 8-12) show the percentage distribution varied between males and females. Similar to the weighted full sample, the sex-stratified results all exhibited left skewness; however, the distributions were slightly more left skewed for males compared to females, particularly for tangible support.

For the outcome variables, females had slightly higher means for both REY I and II *z*-scores and raw scores. Consistent with the weighted full sample, the raw scores for REY I were higher than the scores for REY II; a trend observed in both males and females (Table 7). Furthermore, the histograms for REY I and II *z*-scores for females appear to better fit the normal curve than the histograms for males, which exhibit slight right skewness (see Figures 13 and 14).

Table 6. Exposure (social support availability) descriptive data by sex

	Males n=1,859,583*		Females n=1,886,733*	
Exposure	**Median**	**25th/75th percentiles**	**Median**	**25th/75th percentiles**
Overall social support availability	4.44	3.91/4.84	4.41	3.92/4.81
Affectionate support	4.69	4.02/4.84	4.68	4.01/4.84
Emotional/informational support	4.30	3.73/4.84	4.37	3.87/4.87
Positive interactions	4.39	3.76/4.79	4.30	3.74/4.77
Tangible support	4.50	4.00/5.00	4.27	3.62/4.77

*Weighted

[a] Medians and 25th/75th percentile are reported as data are non-normally distributed (data exhibits left skewness)

Table 7. Outcome (REY I and II) descriptive data by sex

	Males n=1,859,583*		Females n=1,886,733*	
Outcome	**Mean**	**Standard Error of the Mean**	**Mean**	**Standard Error of the Mean**
Z-Scores				
REY I *z*-score	-0.07	0.01	0.31	0.01
REY II *z*-score	-0.08	0.01	0.34	0.01
Raw Scores				
REY I raw score	5.67	0.02	6.40	0.02
REY II raw score	3.85	0.02	4.75	0.02

*Weighted

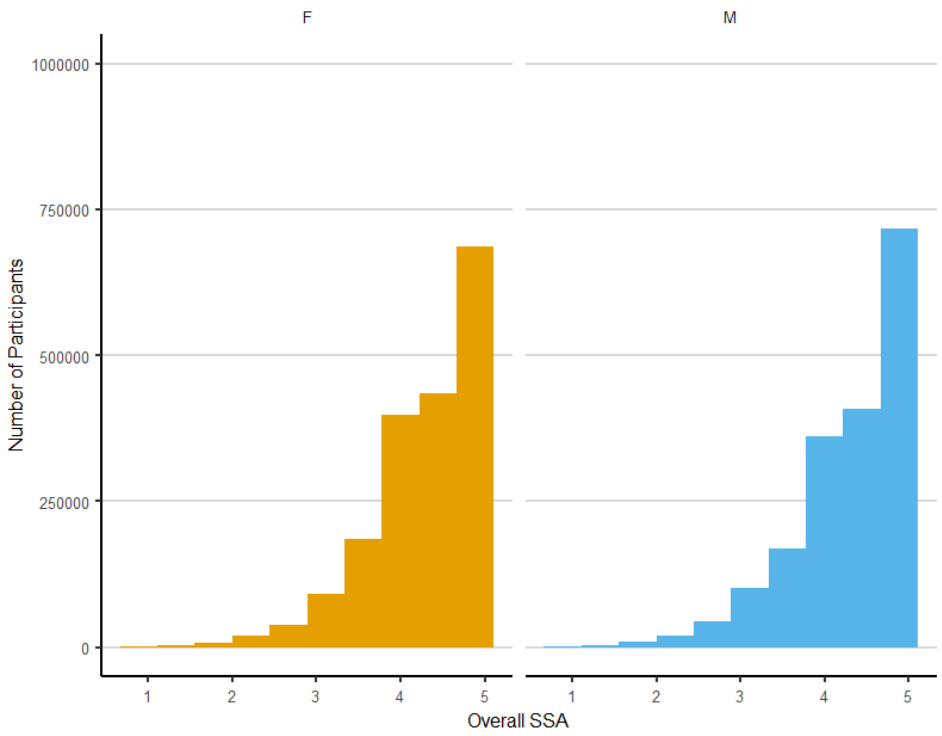

Figure 8. Histogram for exposure (overall social support availability) distribution by sex. M = Males; F = Females

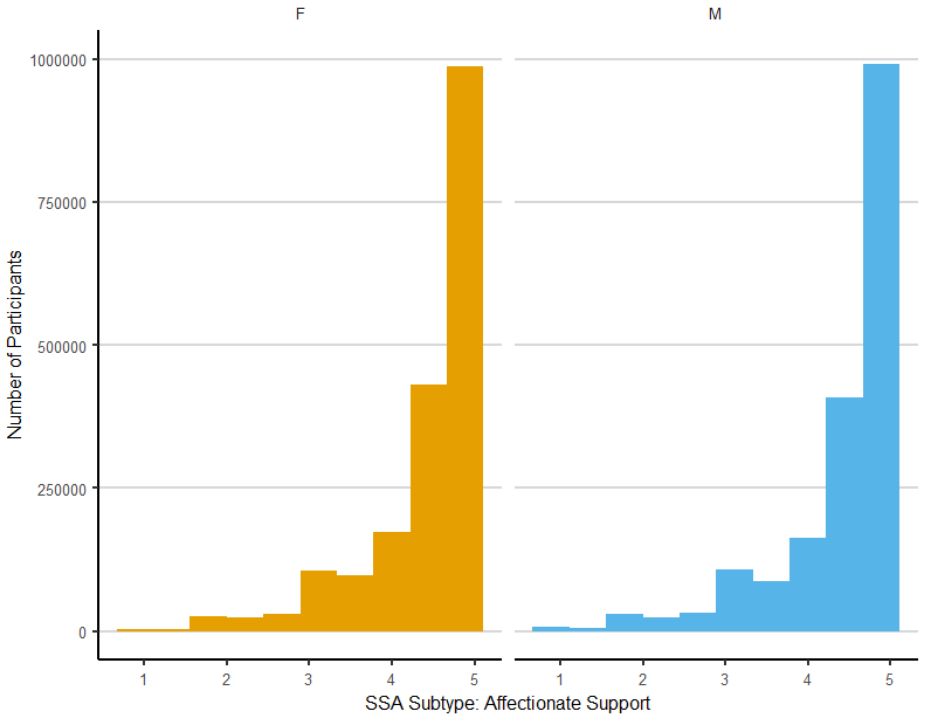

Figure 9. Histogram for exposure (affectionate support) distribution by sex. M = Males; F = Females

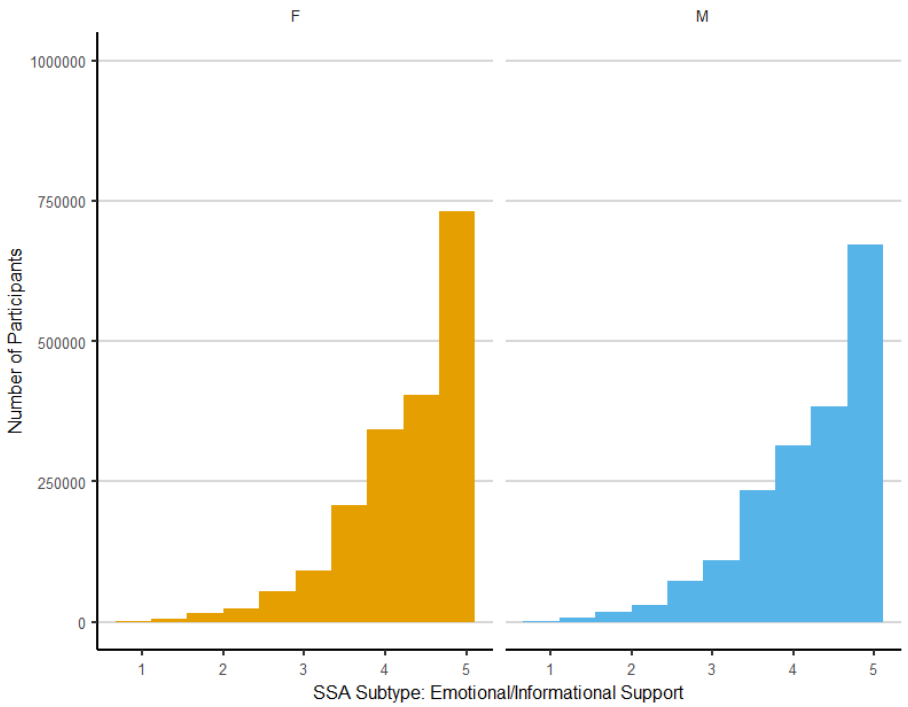

Figure 10. Histogram for exposure (emotional/informational support) distribution by sex. M = Males; F = Females

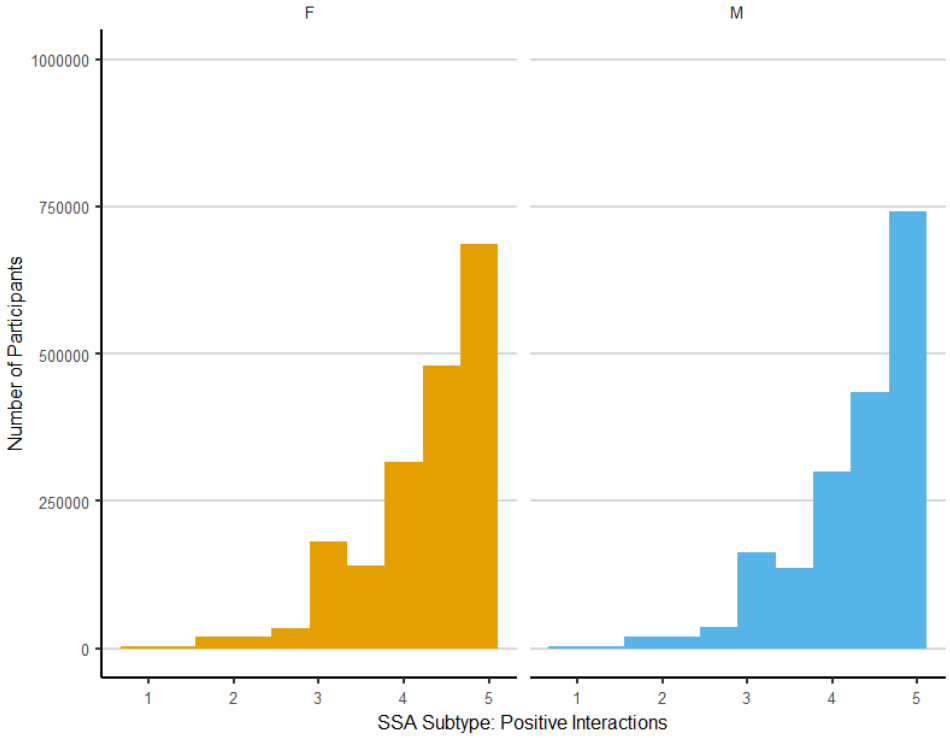

Figure 11. Histogram for exposure (positive interactions) distribution by sex. M = Males; F = Females

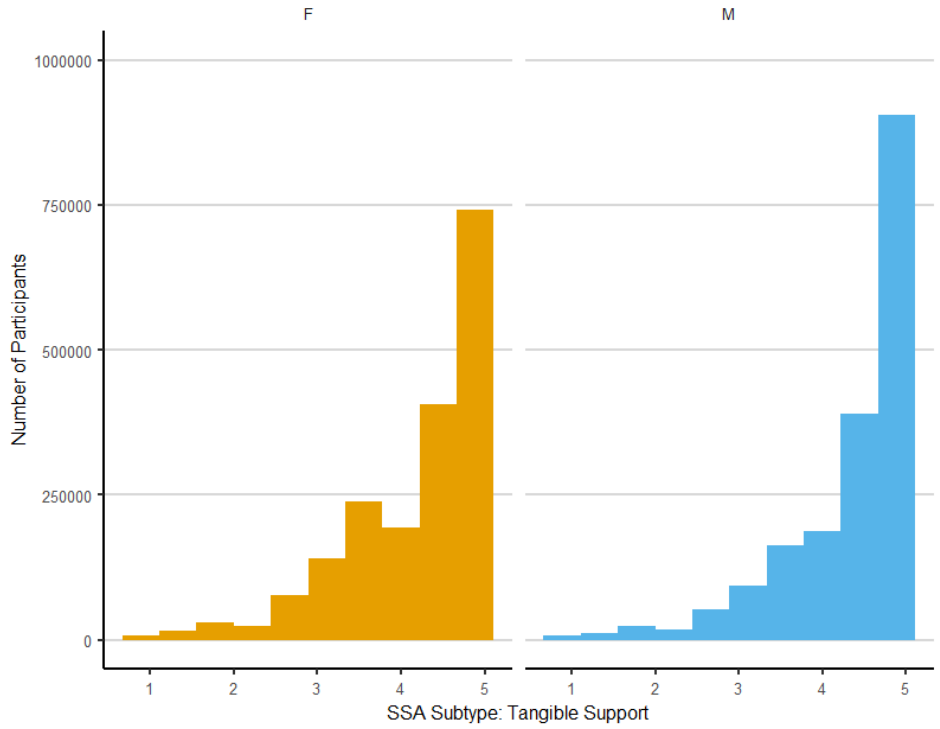

Figure 12. Histogram for exposure (tangible support) distribution by sex. M = Males; F = Females

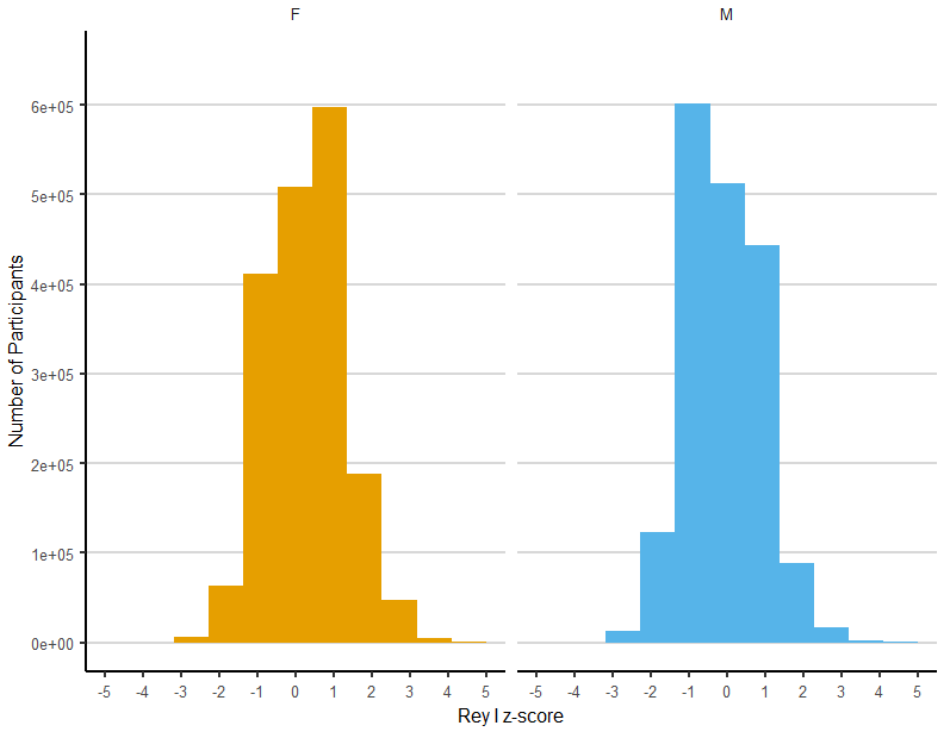

Figure 13. Histogram for outcome (REY I) distribution by sex. M = Males; F = Females

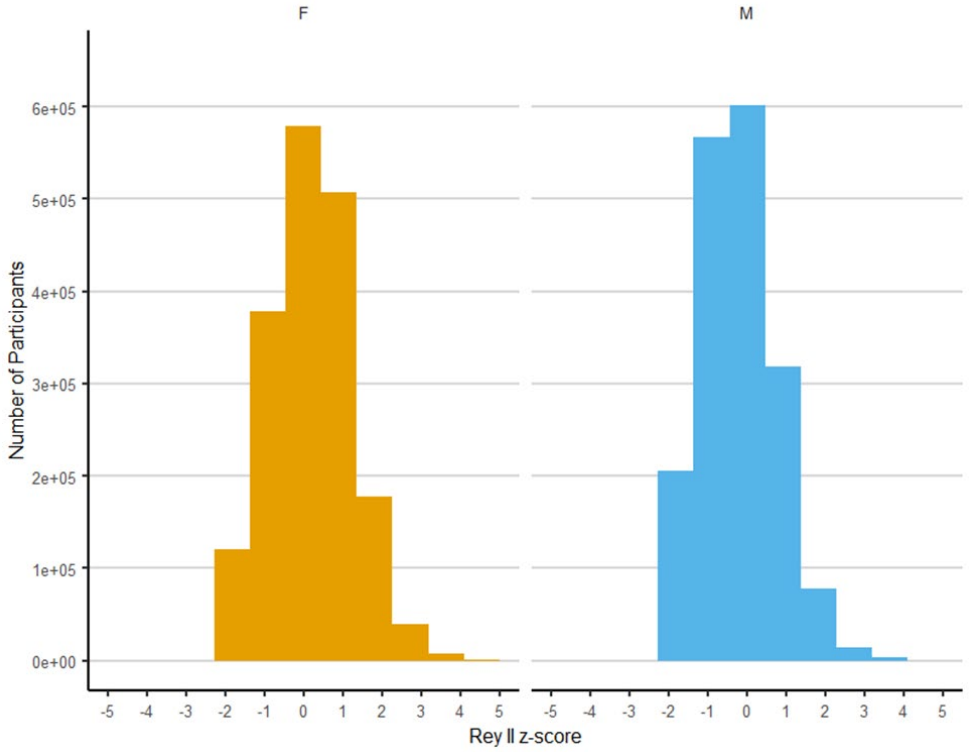

Figure 14. Histogram for outcome (REY II) distribution by sex. M = Males; F = Females

5.3. Descriptive Analyses Stratified by Age Group

Descriptive statistics for age group-stratified sociodemographic factors, health-related factors, depressive symptoms, and health behaviour factors are presented in Table 8. The percent distributions across age groups (45-54 years, 55-64 years, 65-74 years, and ≥75 years) were relatively similar for five covariates, namely sex, province, self-rated health, depressive symptoms, and alcohol use. Younger age groups had higher levels of education compared to the older age groups; for example, 91% of those aged 45-54 years obtained more than secondary school education, compared to 74% of those aged 75 years or more. Total annual household income generally decreased with age: 59% of those aged 45-54 made at least $100,000 annually, versus 42% of those aged 55-64, 22% of those aged 65-74, and only 16% of those 75 years or older. The highest proportion of participants in the youngest age group were married (81%), compared to only 60% of those in the oldest age group, while the greatest proportion of those in the oldest age group were widowed (25% of participants ≥75 years were widowed, versus less than 1% of those between 45-54 years).

The proportion of participants living in a rural residence slightly decreased with age: 9% of those aged 45-54 years reported living in a rural residence, compared to less than 7% of those who were ≥ 75 years. The proportion of persons reporting two or more chronic conditions increased with age, with 17% of those in the 45-54 age group reporting two or more chronic conditions, compared to 31%, 44%, and 60% of those in the 55-64 years, 65-74 years, and ≥75 years age groups, respectively. Finally, a higher proportion of persons in the oldest age groups were former smokers (50% of those ≥ 75 years versus 33% of those 45-54 years).

Table 8. Descriptive statistics for covariates by age group

Characteristic	45-54 Years n=1,572,256*		55-64 Years n=1,114,799*		65-74 Years n=642,993*		≥75 Years n=416,268*	
	Frequency (n)	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Sex								
Female	751,296	47.78	562,500	50.46	348,185	54.15	224,752	53.99
Male	820,960	52.22	552,299	49.54	294,808	45.85	191,516	46.01
Province								
Alberta	222,548	14.15	133,546	11.98	60,128	9.35	33,583	8.07
British Columbia	471,488	29.99	340,279	30.52	183,318	28.51	121,072	29.09
Manitoba	126,473	8.04	91,385	8.20	51,378	7.99	39,417	9.47
Newfoundland and Labrador	34,793	2.21	23,810	2.14	14,759	2.30	7,621	1.83
Nova Scotia	55,462	3.53	38,720	3.47	22,202	3.45	13,839	3.32
Ontario	196,359	12.49	146,065	13.10	98,057	15.25	48,289	11.60
Quebec	465,133	29.58	340,995	30.59	213,150	33.15	152,446	36.62

Table 8, continued. Descriptive statistics for covariates by age group

Characteristic	45-54 Years n=1,572,256*		55-64 Years n=1,114,799*		65-74 Years n=642,993*		≥75 Years n=416,268*	
	Frequency (n)	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Highest Level of Education								
Less than secondary school	34,742	2.21	38,410	3.45	48,815	7.61	59,552	14.37
Secondary school only	113,437	7.22	103,894	9.33	68,114	10.62	49,630	11.98
Some post-secondary education	83,850	5.34	85,020	7.64	49,267	7.68	32,798	7.91
Post-secondary graduation	1,339,461	85.24	886,051	79.58	475,364	74.10	272,462	65.74
Total Annual Household Income[a]								
< $20,000	48,572	3.21	49,949	4.72	36,079	6.06	31,167	8.39
$20,000 - $49,999	146,224	9.68	182,977	17.28	186,265	31.30	147,333	39.67
$50,000-$99,999	422,161	27.94	379,681	35.85	240,406	40.40	135,145	36.39
$100,000-$149,999	424,662	28.11	233,004	22.00	86,327	14.51	40,329	10.86
≥$150,000	469,313	31.06	213,524	20.16	46,007	7.73	17,431	4.69

Table 8, continued. Descriptive statistics for covariates by age group

Characteristic	45-54 Years n=1,572,256*		55-64 Years n=1,114,799*		65-74 Years n=642,993*		≥75 Years n=416,268*	
	Frequency (n)	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Marital Status								
Single, never married or never lived with a partner	159,086	10.12	98,299	8.82	35,607	5.54	20,330	4.88
Married or living with a partner in a common-law relationship	1,267,487	80.64	858,595	77.05	466,204	72.51	249,218	59.88
Widowed	10,980	0.70	34,137	3.06	57,599	8.96	102,811	24.70
Divorced	90,480	5.76	100,291	9.00	72,999	11.35	36,910	8.87
Separated	43,703	2.78	23,012	2.07	10,583	1.65	6,958	1.67
Urban/Rural Living Status								
Rural living	147,156	9.36	112,850	10.13	62,514	9.73	27,096	6.51
Urban living	1,424,374	90.64	1,001,616	89.87	580,084	90.26	389,052	93.49

Table 8, continued Descriptive statistics for covariates by age group

Characteristic	45-54 Years n=1,572,256*		55-64 Years n=1,114,799*		65-74 Years n=642,993*		≥75 Years n=416,268*	
	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Self-Rated Health								
Excellent	320,860	20.41	233,326	20.94	140,952	21.95	67,276	16.17
Very good	656,367	41.75	458,122	41.12	257,117	40.03	162,504	39.07
Good	464,786	29.56	320,488	28.77	189,501	29.50	141,878	34.11
Fair	110,566	7.03	84,678	7.60	45,777	7.13	38,452	9.24
Poor	19,503	1.24	17,389	1.56	8,939	1.39	5,865	1.41
Number of Chronic Conditions								
0	781,183	50.91	388,161	35.95	144,758	23.58	51,065	13.22
1	491,571	32.03	354,271	32.81	196,415	31.99	104,846	27.15
2-3	238,259	15.53	293,357	27.17	221,821	36.13	176,651	45.74
≥4	23,543	1.53	43,855	4.06	51,013	8.31	53,626	13.89
Depressive Symptoms[b]								
No	1,317,976	84.00	936,974	84.36	548,546	85.85	344,690	83.74
Yes	251,023	16.00	173,776	15.64	90,376	14.15	66,950	16.26

Table 8, continued. Descriptive statistics for covariates by age group

Characteristic	45-54 Years n=1,572,256*		55-64 Years n=1,114,799*		65-74 Years n=642,993*		≥75 Years n=416,268*	
	Frequency (n)	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**	**Frequency (n)**	**Percent (%)**
Smoking Status								
Never smoker	874,886	55.71	505,980	45.51	284,624	44.39	192,335	46.38
Former smoker	522,391	33.27	493,925	44.42	319,256	49.79	206,882	49.89
Current smoker	173,027	11.02	111,974	10.07	37,344	5.82	15,495	3.74
Alcohol Use								
Regular user	1,215,557	78.99	852,194	78.04	481,511	76.54	290,780	71.98
Occasional user	167,672	10.90	121,698	11.14	73,455	11.68	55,177	13.66
Not user	155,684	10.12	118,155	10.82	74,139	11.78	58,008	14.36

*Weighted

[a] Canadian dollars

[b] Measured using the CES-D10. Scores < 10 are categorized as “no”, > 10 are categorized as “yes”

For the exposure variables stratified by age group (Table 9), those in the youngest age group (45-54 years) had the highest SSA scores (medians ranging from 4.37-4.71). SSA scores typically decreased with age, with those in the ≥75 years group having the lowest median scores, ranging from 4.11-4.53. Similar to the sex-stratified results, the SSA subtype with the highest median score among all age groups was affectionate support. Furthermore, age group-stratified histograms (Figures 15-19) show the distribution across age groups, which again exhibited left skewness, although the youngest age group (45-54 years) exhibited the most skewness.

For the outcome variables, scores on REY I and II decreased with age, with *z*-scores becoming negative in the two oldest age groups (Table 10). Likewise, regarding the outcome descriptive data for the full sample and the sex-stratified sample, REY I scores were higher than REY II scores. Furthermore, Figures 20 and 21 show histograms of the distribution for REY I and REY II across age groups. The histograms are fairly normally distributed for all age groups except ≥75 years, which shows substantial right skewness.

Table 9. Exposure (social support availability) descriptive data by age group

	45-54 Years n=1,572,256*		**55-64 Years** n=1,114,799*		**65-74 Years** n=642,993*		**≥75 Years** n=416,268*	
Exposure	**Median**	**25th/75th percentiles**	**Median**	**25th/75th percentiles**	**Median**	**25th/75th percentiles**	**Median**	**25th/75th percentiles**
Overall social support availability	4.48	3.97/4.85	4.42	3.90/4.84	4.41	3.91/4.81	4.24	3.71/4.69
Affectionate support	4.71	4.14/4.85	4.68	3.96/4.84	4.67	3.98/4.84	4.53	3.82/4.81
Emotional/informational support	4.41	3.89/4.88	4.35	3.80/4.87	4.30	3.75/4.81	4.11	3.54/4.68
Positive interactions	4.40	3.79/4.79	4.34	3.74/4.78	4.36	3.77/4.78	4.15	3.56/4.72
Tangible support	4.37	3.80/4.80	4.38	3.80/4.81	4.44	3.80/4.81	4.26	3.52/4.76

*Weighted

[a] Medians and 25th/75th percentile are reported as data are non-normally distributed (data exhibits left skewness)

Table 10. Outcome (REY I and II) descriptive data by age group

	45-54 Years n=1,572,256*		**55-64 Years** n=1,114,799*		**65-74 Years** n=642,993*		**≥75 Years** n=416,268*	
Outcome	**Mean**	**Standard Error of the Mean**	**Mean**	**Standard Error of the Mean**	**Mean**	**Standard Error of the Mean**	**Mean**	**Standard Error of the Mean**
Z-Scores								
REY I *z*-score	0.36	0.01	0.17	0.01	-0.11	0.01	-0.59	0.02
REY II *z*-score	0.39	0.01	0.16	0.01	-0.13	0.01	-0.57	0.01
Raw Scores								
REY I raw score	6.01	0.03	6.04	0.02	6.02	0.03	6.09	0.03
REY II raw score	4.25	0.03	4.32	0.03	4.30	0.03	4.34	0.04

*Weighted

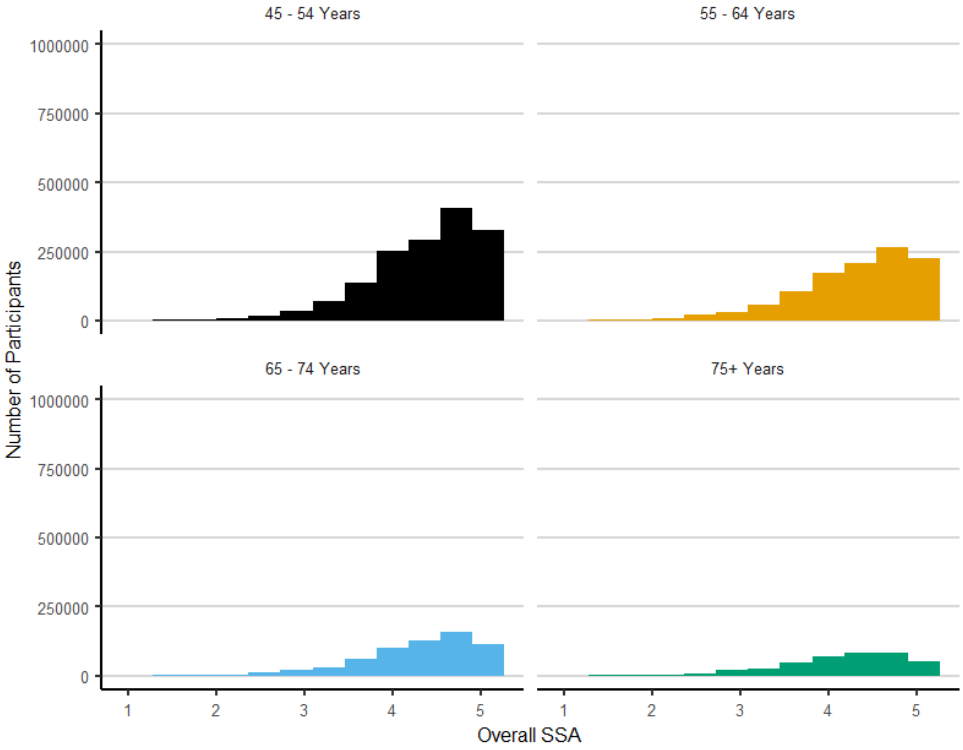

Figure 15. Histogram for exposure (overall social support availability) distribution by age group

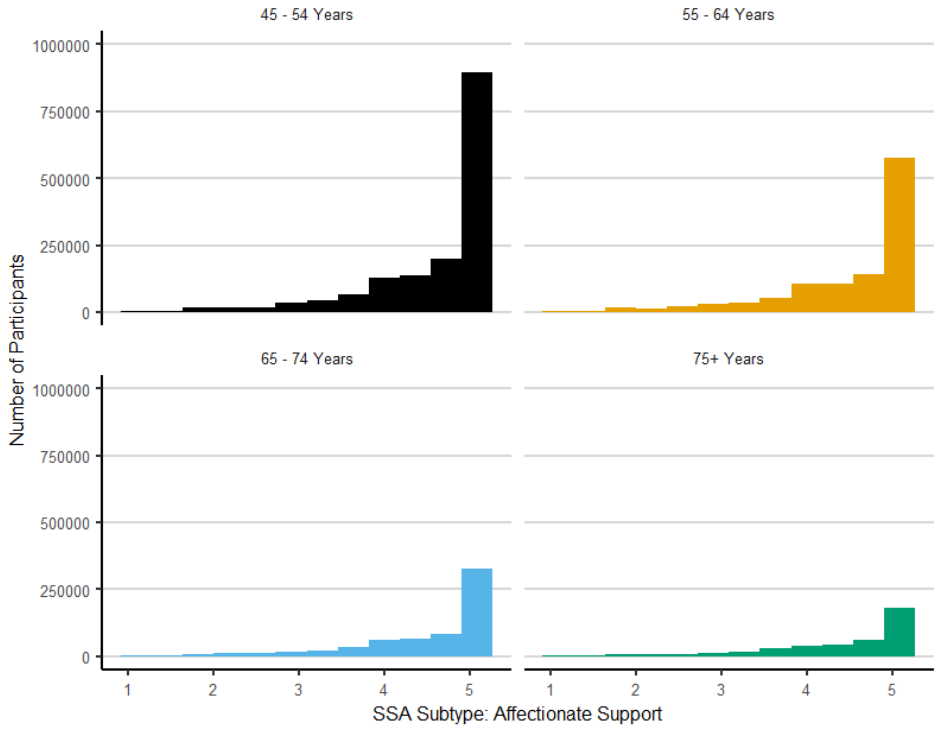

Figure 16. Histogram for exposure (affectionate support) distribution by age group

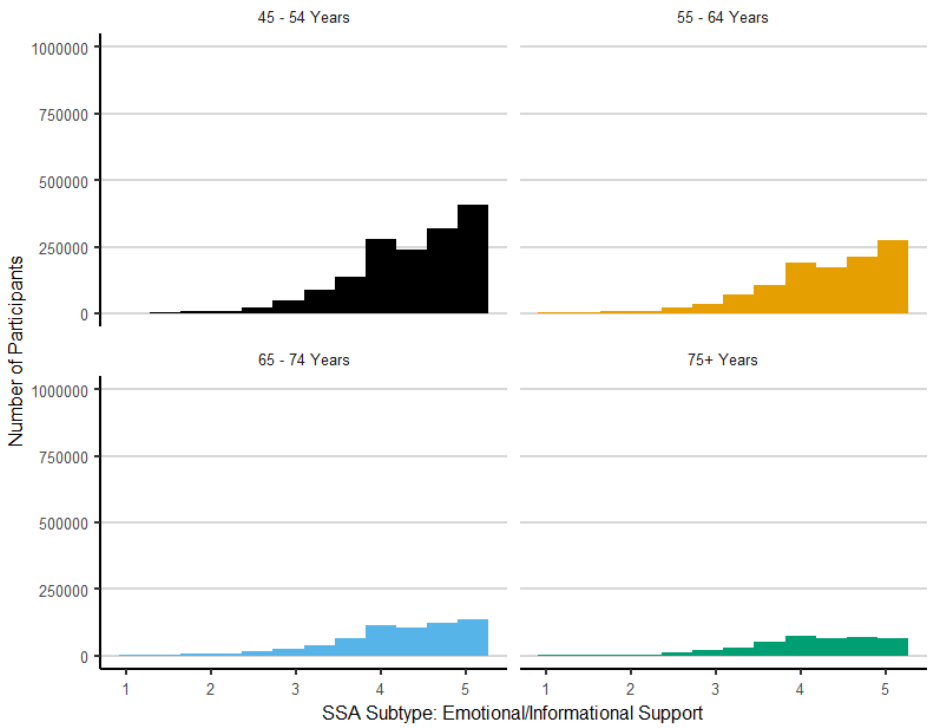

Figure 17. Histogram for exposure (emotional/informational support) distribution by age group

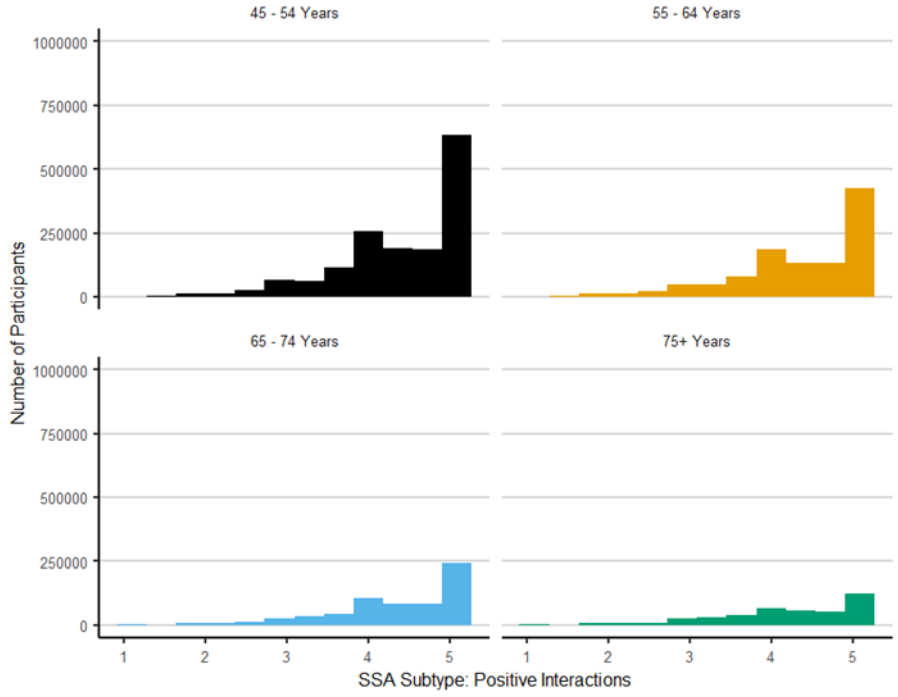

Figure 18. Histogram for exposure (positive interactions) distribution by age group

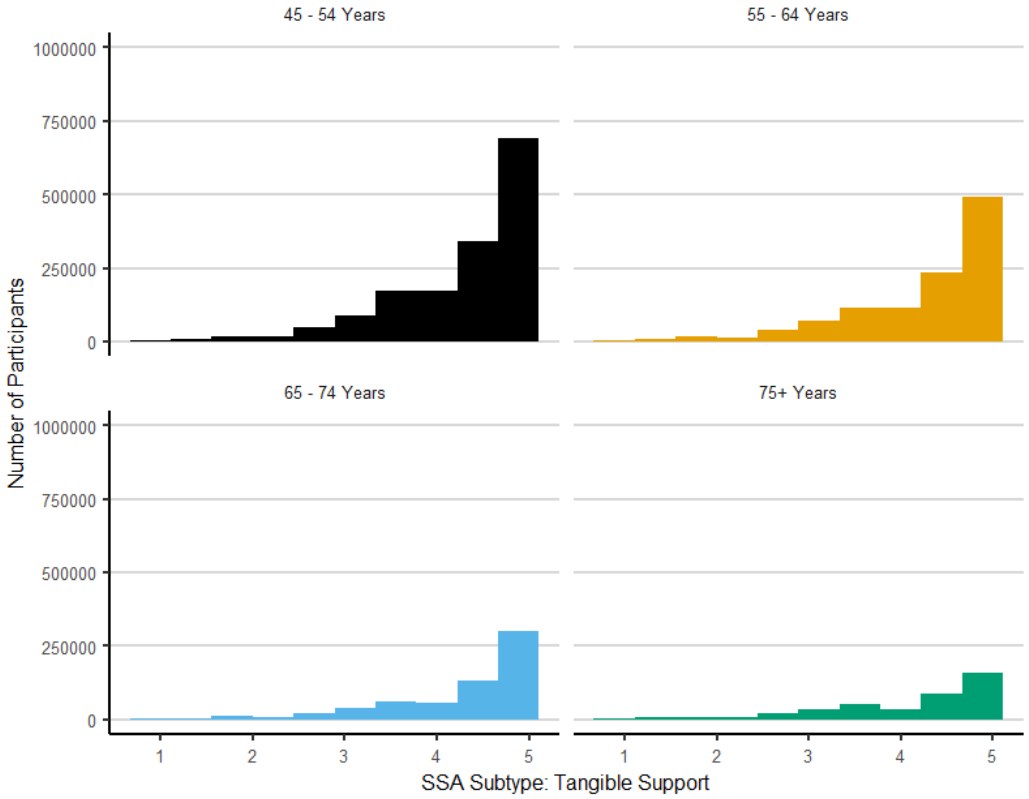

Figure 19. Histogram for exposure (tangible support) distribution by age group

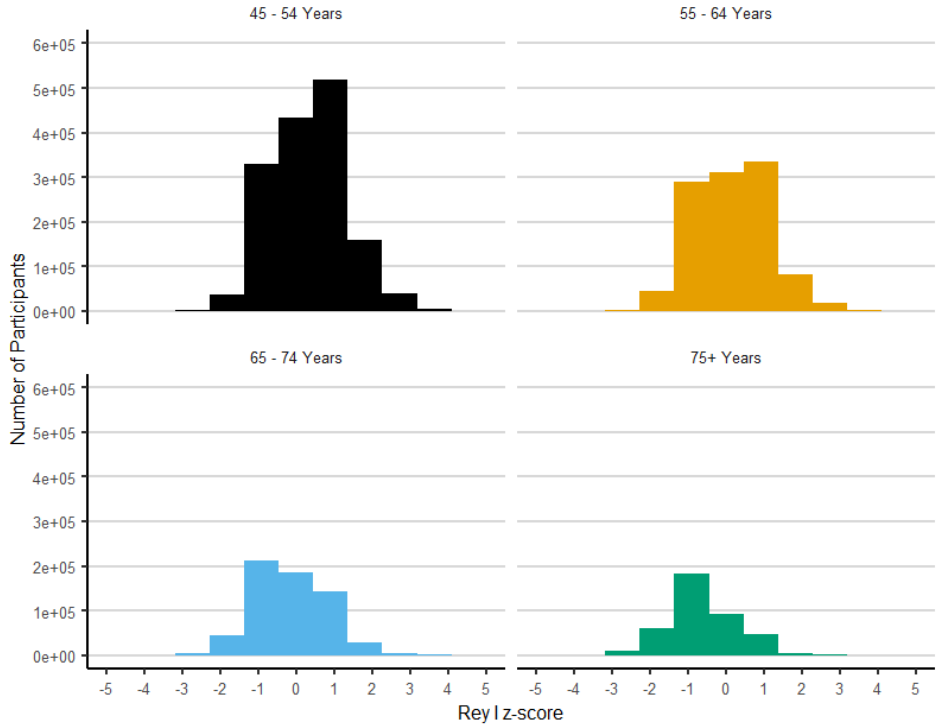

Figure 20. Histogram for outcome (REY I) distribution by age group

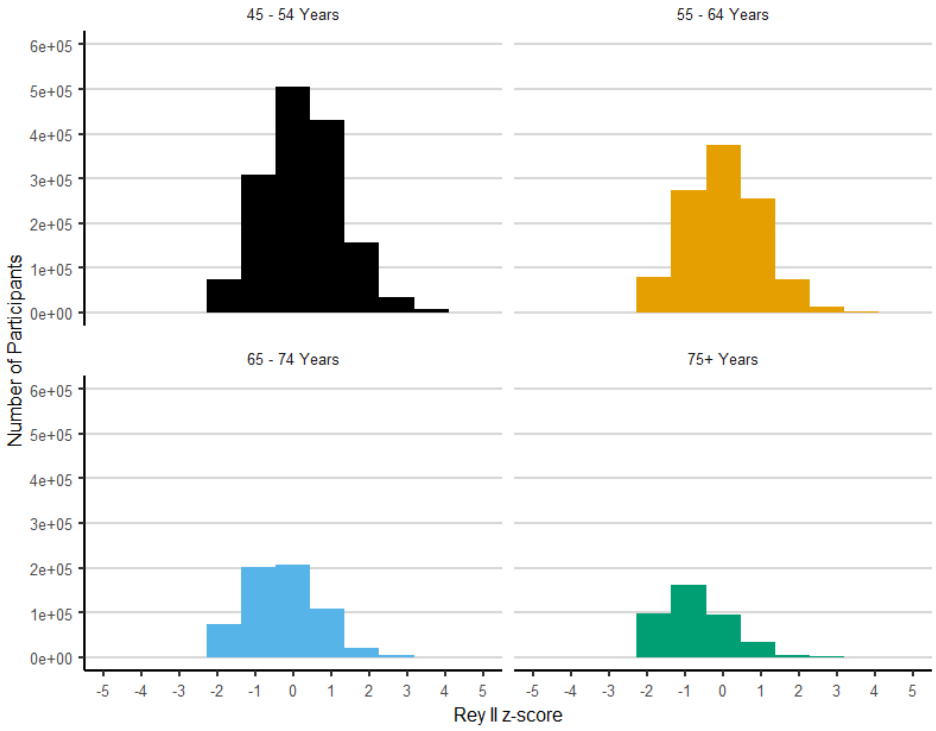

Figure 21. Histogram for outcome (REY II) distribution by age group

5.4. Multivariable Analyses

5.4.1. Research Question 1: Is there a cross-sectional association between social support availability and memory function in community-dwelling men and women aged 45 to 85 years?

In general, the base models showed significant, positive associations between SSA (overall and subtypes) and memory function. Overall, SSA had the strongest associations with both REY I and II. Regression coefficients also showed that the associations were stronger for SSA (overall and subtypes) and REY I compared to REY II. For example, overall SSA and REY I had a regression coefficient of 0.13 (95% CI = 0.11-0.15) compared to a regression coefficient of 0.10 (95% CI = 0.08-0.12) for overall SSA and REY II. Emotional/informational support was the SSA subtype with the strongest association for both REY tests. All base models were statistically significant. A summary of results for the base model associations between SSA and REY I and II is presented in Table 11.

Table 11. Summary of results for the relationship between social support availability and memory for base models [*,**]

Main Effect	Base Model (REY I)	Base Model (REY II)
Overall Social Support Availability	**0.13 (0.11-0.15)**	**0.10 (0.08-0.12)**
Affectionate Support	**0.10 (0.08-0.11)**	**0.08 (0.07-0.10)**
Emotional/Informational Support	**0.11 (0.09-0.13)**	**0.09 (0.07-0.11)**
Positive Interactions	**0.09 (0.07-0.10)**	**0.06 (0.05-0.08)**
Tangible Support	**0.09 (0.08-0.11)**	**0.07 (0.05-0.08)**

[*] β represents regression coefficient; CI is confidence interval.

[**] The complete models with all covariates are shown in Appendices J and K.

Statistically significant values ($p<0.05$) are **bolded**

5.4.2. Research Question 2: Does the association between social support availability and memory function in Question 1 change after adjusting for covariates (including sociodemographic, health-related factors, depressive symptoms, and health behaviour factors)?

A summary of results for the optimal models are presented in Table 12, and the complete models with all covariates are available in Appendix J. Overall, regression coefficients decreased as more covariate chunks (sociodemographic, health-related, depressive symptoms, and health behaviours) were added into the models, indicating that the coefficients for the optimal models were smaller than the base models. For example, for REY I and overall SSA, the base model was [β] = 0.13, 95% CI = 0.11-0.15, while the optimal model was [β] = 0.07, 95% CI = 0.05-0.09. Furthermore, the regression coefficients in all models maintained their significance with the inclusion of each covariate chunk, except for positive social interactions and REY II, which was

no longer statistically significant in Model 5 after the inclusion of the health behaviour covariates; although all models still demonstrated positive associations.

Turning to the optimal model results, similar to the base model, emotional/informational support had the strongest association with REY I, and emotional/informational support and affectionate support both had the strongest associations for REY II. As observed with the base models, the optimal models showed stronger associations for SSA (overall and subtypes) and REY I compared to REY II, except for affectionate support, which had the same coefficient and confidence interval for both models. All optimal models demonstrated positive and statistically significant associations.

Model 3, containing sociodemographic and health-related covariate chunks, was the most common optimal model across all regression analyses. Model 3 was the optimal model in five of the ten models (i.e., for overall SSA, emotional/informational and tangible support with REY I as the outcome; affectionate and emotional/informational support for REY II). This was followed by Model 4, which consisted of the same covariates as Model 3, with an additional depressive symptoms covariate. Model 4 was the optimal model in four of the analyses (i.e., for affectionate support and positive interactions for REY I; positive interactions and tangible support for REY II). Model 5 was the optimal model for the remaining model, overall SSA and REY II. Model 5 included the same covariates as Model 4, with an additional health behaviour covariate chunk.

Regression diagnostics for the optimal models contained evidence of heteroscedasticity, as shown by discernable patterns in the residual plots. Refer to Appendix H for the residual plots, and plots of observed versus predicted values, for the optimal models. Section 6.1.4. discusses possible explanations and solutions for the heteroscedasticity.

Table 12. Summary of results for the relationship between social support availability and memory for optimal models [*,**]

Main Effect	Optimal Model (REY I)	Optimal Model (REY II)
Overall Social Support Availability	**0.07**[a] **(0.05-0.09)**	**0.05**[c] **(0.03-0.07)**
Affectionate Support	**0.05**[b] **(0.03-0.07)**	**0.05**[a] **(0.03-0.07)**
Emotional/Informational Support	**0.06**[a] **(0.04-0.08)**	**0.05**[a] **(0.03-0.07)**
Positive Interactions	**0.03**[b] **(0.01-0.05)**	**0.02**[b] **(0.00-0.04)**
Tangible Support	**0.05**[a] **(0.04-0.07)**	**0.03**[b] **(0.02-0.05)**

[*] β represents regression coefficient; CI is confidence interval.

[**] The complete models with all covariates are shown in Appendices J and K.

[a] Model 3, containing sociodemographic and health-related covariates

[b] Model 4, containing sociodemographic, health-related, and depressive symptoms covariates

[c] Model 5, containing sociodemographic, health related, depressive symptoms, and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

5.4.3. Research Question 3: Does age or sex modify the association between social support availability and memory function in Question 1, after adjusting for covariates?

Results for sex and age-group stratified models are presented in Tables 13 and 14, and complete stratified models with all covariates are available in Appendix K. For males, overall SSA had the strongest association with REY I, followed by affectionate, emotional/informational, and tangible support, all of which had the same point estimates. For females, overall SSA also had the strongest association with REY I, followed by emotional/informational support. Turning to REY II, overall SSA and affectionate support had the strongest associations for males, whereas for females, the strongest association for REY II

was with emotional/informational support as the exposure variable. All the sex-stratified models were positive, and most were statistically significant, except for positive interactions and REY II (males and females), and tangible support and REY II (females). Overall, the sex-stratified analyses indicated that the association between SSA and memory was stronger for males than females in all models except positive interactions and REY I, where males and females had the same point estimate, but females had a slightly narrower confidence interval.

Table 13. Summary of results for the relationship between social support availability and memory for sex-stratified models[*,**]

Main Effect	**REY I**		**REY II**	
	Males β (95% CI)	**Females** β (95% CI)	**Males** β (95% CI)	**Females** β (95% CI)
Overall Social Support Availability	**0.09 (0.06-0.12)**	**0.06 (0.03-0.09)**	**0.07 (0.03-0.10)**	**0.03 (0.00-0.07)**
Affectionate Support	**0.07 (0.04-0.10)**	**0.03 (0.00-0.06)**	**0.07 (0.04-0.10)**	**0.03 (0.01-0.06)**
Emotional/Informational Support	**0.07 (0.05-0.10)**	**0.05 (0.02-0.08)**	**0.06 (0.04-0.09)**	**0.04 (0.01-0.07)**
Positive Interactions	**0.03 (0.00-0.06)**	**0.03 (0.01-0.06)**	0.02 (-0.01-0.05)	0.03 (-0.01-0.05)
Tangible Support	**0.07 (0.05-0.11)**	**0.04 (0.01-0.06)**	**0.05 (0.03-0.08)**	0.02 (-0.01-0.04)

[*] β represents regression coefficient; CI is confidence interval.

[**] The complete models with all covariates are shown in Appendices J and K.

Statistically significant values ($p<0.05$) are **bolded**

Turning to results stratified by age group, in participants aged 45-54 years, the strongest associations were found between overall SSA and affectionate support, with REY I, whereas affectionate support had the strongest association with REY II. For those aged 55-64 years, the strongest associations were between overall SSA and emotional/informational support, with REY I, and emotional/informational support and REY II. For the 65-74 years age group, overall

SSA and affectionate support had the highest point estimates for REY I and II, respectively. Finally, for those in the ≥75 age group, overall SSA had the strongest associations with REY I, and overall SSA and positive interactions both had the strongest associations for REY II.

For REY I age group-stratified results, the point estimates for overall SSA were relatively similar across age groups; however, the strength of the associations varied greatly by SSA subtype. For overall SSA, emotional/informational support, and tangible support, the regression coefficients by strata only differed by 0.02 or less. For the remaining two SSA subtypes (affectionate support and positive interactions), regression coefficients were highest for affectionate support in persons aged 45-54 and 65-74 years; for positive interactions, the strongest associations were seen in the 65-74 and the ≥75 years age groups. All REY I models demonstrated positive associations, and most were statistically significant, except for positive interactions in the 45-54 and 55-64 year age groups.

REY II age-group stratified results differed greatly from REY I, with wide variations across strata. Globally, the strongest associations were seen in the 45-54 and/or ≥75 years age groups; with both groups having the highest regression coefficients for overall SSA and tangible support. Moreover, only those in the 45-54 years age group had the strongest association for both affectionate support and emotional/informational support, while those in the ≥75 years age group had the strongest association for positive interactions. For REY II age group-stratified results, statistical significance varied greatly, although all models demonstrated a positive association.

Table 14a. Summary of results for the relationship between social support availability and REY I for age group-stratified models [*,**]

Main Effect	**45-54 Years** β* (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Overall Social Support Availability	**0.07 (0.03-0.11)**	**0.07 (0.04-0.11)**	**0.08 (0.04-0.12)**	**0.08 (0.04-0.12)**
Affectionate Support	**0.07 (0.03-0.10)**	**0.03 (0.00-0.06)**	**0.07 (0.03-0.10)**	**0.04 (0.00-0.08)**
Emotional/Informational Support	**0.05 (0.02-0.09)**	**0.07 (0.04-0.10)**	**0.07 (0.03-0.10)**	**0.05 (0.02-0.09)**
Positive Interactions	0.01 (-0.02-0.05)	0.03 (0.00-0.06)	**0.07 (0.03-0.11)**	**0.07 (0.03-0.11)**
Tangible Support	**0.06 (0.03-0.10)**	**0.04 (0.01-0.07)**	**0.05 (0.01-0.08)**	**0.06 (0.03-0.09)**

[*] β represents regression coefficient; CI is confidence interval.

[**] The complete models with all covariates are shown in Appendices J and K.

Statistically significant values ($p<0.05$) are **bolded**

Table 14b. Summary of results for the relationship between social support availability and REY II for age group-stratified models [*,**]

Main Effect	**45-54 Years** β* (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Overall Social Support Availability	**0.07 (0.02-0.11)**	0.03 (0.00-0.07)	0.03 (-0.01-0.07)	**0.07 (0.02-0.11)**
Affectionate Support	**0.08 (0.04-0.12)**	0.03 (0.00-0.06)	**0.05 (0.01-0.08)**	0.03 (-0.01-0.07)
Emotional/Informational Support	**0.06 (0.02-0.10)**	**0.05 (0.02-0.08)**	0.03 (0.00-0.06)	**0.05 (0.02-0.09)**
Positive Interactions	0.02 (-0.02-0.06)	0.01 (-0.02-0.04)	0.02 (-0.01-0.06)	**0.07 (0.02-0.10)**
Tangible Support	**0.05 (0.02-0.09)**	0.02 (-0.01-0.05)	0.01 (-0.02-0.05)	**0.05 (0.02-0.08)**

[*] β represents regression coefficient; CI is confidence interval.

[**] The complete models with all covariates are shown in Appendices J and K.

Statistically significant values ($p<0.05$) are **bolded**

5.7. Missing Data

Appendix I presents the results of the missing data analyses. In summary, participants with missing data on REY I or II tended to have lower SSA scores (overall and subscales), and participants with missing data on SSA (overall or subtypes) exhibited lower scores on REY I and II. Furthermore, differences in SSA scores (overall and subtypes), and REY I and II *z*-scores, existed for participants who did not have any missing covariate data, compared to participants who had missing data on one or more covariates. Section 6.1.5. discusses the implications of the missing data.

6.0. Discussion

6.1. Summary of Study Findings

This thesis investigated the association between SSA (overall and subtypes, including affectionate support, emotional/informational support, positive interactions, and tangible support) and memory function (immediate and delayed recall). Furthermore, this thesis assessed whether the associations were affected by sociodemographic, health-related and health behaviour covariates, and whether the associations were modified by sex or age group.

Overall, higher levels of SSA were positively associated with higher memory function on REY I and II, with slightly stronger associations typically observed in immediate recall compared to delayed recall. For both immediate and delayed recall, the strongest base-model associations were observed for overall SSA, followed by emotional/informational support. Moreover, all regression coefficients for SSA were positive and statistically significant in the base models, and significance generally remained following the inclusion of the sociodemographic, health-related, depressive symptoms, and health behaviour chunks. The sole exception was the regression coefficient for the association between the positive interactions subtype of SSA and delayed recall, which was not significant (yet remained positive) in Model 5 (i.e., the base model plus all covariate chunks). Furthermore, the magnitudes of the regression coefficients in the base models mainly decreased with the addition of covariate chunks. The most common optimal models were Model 3 (containing sociodemographic and health-related covariate chunks) and Model 4 (containing the same variables as Model 3, with the addition of a depressive symptoms covariate).

The optimal models were stratified by sex and age group. For sex-stratified results, regression coefficients were generally higher for males compared to females, although the differences in regression coefficients by sex were fairly small, ranging from 0.02-0.04. This indicates that the difference between sexes may not be clinically important. In males, overall SSA was most strongly associated with immediate recall, and overall SSA and affectionate support were most strongly associated with delayed recall. In females, overall SSA was most strongly associated with immediate recall, and emotional/informational support was most strongly associated with delayed recall. For results stratified by age group, the strengths of association varied by group and SSA subtype, although participants in the 45-54 years and/or ≥75 years age groups showed the strongest associations when delayed recall was the outcome.

6.1.1. Discussion of Unstratified Results

The positive association between SSA and memory function reflected published findings.[14–24,76,96] For example, a recent cross-sectional study by Oremus et al. (2020)[98] used data from the CLSA's Tracking Cohort (n = 21,241) and found a positive association between SSA and memory function, while adjusting for many of the same covariates as the present study, including sociodemographic factors (i.e., age group, sex, province, education, marital status, income, urban/rural living status), health-related factors (i.e., presence of comorbidities), depressive symptoms, and health behaviours (i.e., smoking status, alcohol consumption).[98] The study by Oremus et al. also reported regression coefficients that were generally higher for immediate recall compared to delayed recall,[98] in agreement with the findings in this thesis. These differences are possible because immediate and delayed recall measure distinct aspects of memory function.

Moreover, the thesis findings coincided with Zuelsdorff et al.'s (2019) cross-sectional study of middle- and older-aged adults (n = 1,052), which noted positive associations between overall SSA and memory function, measured with the same tests used in this thesis, and adjusted for a similar set of covariates.[46] These results are supported by an additional study by Oremus et al. (2019) examining the descriptive relationship between SSA and global cognition in the CLSA's Tracking Cohort, which found that the proportion of participants with low cognitive function was greater among those who also had low SSA.[131]

However, the findings in this thesis contrast with cross-sectional research of 1,091 older adults by Gow et al. (2013), who observed a positive association between social support and global cognition, but not memory function.[19] A possible explanation for the conflicting results is varying study samples; namely, participants in Gow et al.'s study were recruited from only one city and the mean age of the study sample was 70 years. Another possible explanation is that Gow et al. used an adapted version of the Social Support Questionnaire as their social support measurement, which assesses satisfaction with social support rather than the availability of social support. While satisfaction and availability of social support both measure normative aspects of social support, it is possible that the availability of social support is more closely related to memory function compared to satisfaction with support. I could find no previous published work that explored this possibility, although one study noted that perceived availability of support better discriminated between depressed and non-depressed older adults, compared to items regarding feelings of belongingness (intended to measure satisfaction with support).[132] This finding highlights the complexities that exist with measuring social support.

Moreover, the findings of this thesis differ from research by Zahodne and colleagues, who studied the effect of positive psychosocial factors on cognitive health outcomes. As

mentioned in the literature review (Section 2.4.2.), the study consisted of 548 ethnically diverse older adults, and found a positive association between social support and working memory function in Caucasians, but did not observe the same association in African Americans and Hispanics. Moreover, the investigators detected an inverse association between emotional support and working memory in Hispanics. The researchers believed the results occurred due to lower performance on cognitive tests by minority ethnic groups, possibly due to reverse causation or threshold effects.[21] The findings in the Caucasian group are consistent with the results of this thesis, although I did not measure ethnic identity. Previous research using the CLSA Tracking Cohort has noted that the CLSA is an ethnically diverse sample, consisting of at least 13 ethno-cultural groups; therefore, ethnic identity could be included as a covariate in future research.[133]

The thesis also found significant, positive associations between the four SSA subtypes and memory function, with the strongest associations in the base and unstratified optimal models observed for the emotional/informational subtype and memory function. These findings agreed with existing literature (detailed in the literature review, Section 2.4.2., and in Table A2, Appendix A), which reported positive associations between memory and emotional support,[15,24,96] informational support,[96] and tangible support.[17] For example, the study by Oremus et al. (2020) also observed the strongest associations between overall SSA and both REY tests, followed by emotional/informational support (and affectionate support for delayed recall).[98] Similarly, Pillemer and Holtzer's (2016) cross-sectional study of community-dwelling older adults (n = 355) found that overall SSA, followed by emotional/informational support and positive interactions (measured using the MOS-SSS[29]), had the strongest associations with

cognitive function (measured using a cognitive test battery which included immediate and delayed recall assessments of memory).[134]

Furthermore, findings from the current study are somewhat consistent with a cross-sectional study by La Fleur and Salthouse (2015), who used data from the Virginia Cognitive Aging Project (n = 2,613). The researchers observed that memory function was positively associated with *received* emotional and informational support, but not received tangible support.[96] A possible explanation for discrepancies between these results and the findings from this thesis, particularly for tangible support, is that La Fleur and Salthouse used the Social Networks Questionnaire to measure social support, which is a composite measure of both structural and functional aspects of social support.[96] By contrast, *perceived* support (SSA) was the index of social support used in this thesis. Received support is typically a measure of structural social support.[135] Moreover, previous research has demonstrated that perceived support is a more accurate predictor of adjustments to stressful events than received support, and the effect of received support on stress reduction likely operates through perceived support.[135] Research by Reinhardt, Borerner & Horowitz (2006) has observed that perceived support positively impacts well-being in older adults, whereas received support can have a negative effect.[136] The authors concluded that social support is "good to have but not to use", meaning the perception of available social support can be comforting, but constant use can result in feelings of dependence.[136]

The findings of this thesis on SSA subtypes provide support for the stress-buffering hypothesis (i.e., stronger social ties aid in coping with stressful experiences and reduce the harm of stress on the brain). This is because fewer meaningful social interactions may lead to negative emotions and higher stress.[103] Thus, individuals with high levels of emotional/informational

support may be able to develop more effective coping strategies for successfully managing life stressors. For example, La Fleur and Salthouse propose that positive types of support like emotional/informational support may promote healthy behaviours (and in turn, promote better cognitive function), whereas more physical types of support like tangible support could be less nurturing, thereby limiting the amount of control one has over her/his own decisions.[96] Other researchers have suggested that tangible support can lead to feelings of distress and low self-efficacy because it reflects impairments in performing ADLs or IADLs.[77]

The results of this thesis supported the stress-buffering hypothesis, which aligns with Rutter's (2019) findings demonstrating that low affectionate support, low emotional/informational support, and low positive interactions were significantly associated with low executive function in the Comprehensive Cohort of the CLSA, while adjusting for sociodemographic (age group, sex, province, education, income, urban/rural residence) and health-related factors (self-rated health, presence of chronic disease, clinical depression), as well as other covariates.[25] Rutter also concluded that her findings supported the stress-buffering hypothesis because they reflected positive connections with others, and such connections could reduce the negative effects of anxiety and stress on the brain.[25]

6.1.2. Discussion of Stratified Results by Sex

For males, all associations between SSA and performance on the REY were positive, and most were statistically significant, except for positive interactions and delayed recall. These findings indicate that males may benefit from SSA regardless of subtype, which appears to be a novel finding of the thesis, as I could not find any published research to support or contradict this observation. For women, point estimates were statistically significant in all models of SSA and

immediate recall, and overall SSA, affectionate support, and emotional/informational support and delayed recall. The findings for females support the stress-buffering hypothesis, as animal research has shown that when females are placed in a stressful environment, they tend to react by bonding with other females or with their young (known as the "tend and befriend hypothesis").[137] Therefore, it is biologically reasonable that women experience more benefits (i.e., reduced stress) from affectionate and emotional/informational support because these types of support reflect positive connections and bonding with others.

The findings of this thesis are substantiated by other cross-sectional and longitudinal research that has found differential effects of social support (structural or functional) on cognitive function between men and women.[14,67,111,138] Moreover, this thesis found stronger associations between SSA and memory function in males compared to females (although the difference between groups may not be clinically meaningful). This finding is similar to results from a prospective cohort study by Liao and Scholes (2017), who used data from the English Longitudinal Study on Aging (ELSA; n = 10,241 at baseline).[14] The investigators observed sex as a modifier of the association between SSA and memory function, and noted that men with more positive social support from their spouses or partners had slower memory decline; while the same association was not maintained over time with women.[14] However, as this thesis was limited to cross-sectional data, a direct comparison to Liao and Scholes' study cannot be undertaken because of a lack of temporality.

However, the finding of this thesis that the link between SSA and memory is stronger in males compared to females contrasts with cross-sectional research by Pillemer and Holzer (2016; detailed in Section 6.1.1.), which noted that sex moderated the association between emotional/informational support and cognitive function, with stronger associations observed in

females compared to males.[134] Moreover, longitudinal research by Read et al. (2020) from the ELSA (n = 6,123 women and 5,110 men) found that the link between social isolation (i.e., low frequency of social contacts) and memory (measured with immediate and delayed recall) was weaker in men compared to women.[111] Other cross-sectional research by La Fleur and Salthouse (detailed above) found that sex was not a moderator of the association between social support and cognitive function.[96]

A likely explanation for the discrepancies between this thesis' sex-stratified findings compared to previous studies is variability in the definition and measurement of social support. Previous research has shown that while women may benefit more from structural support, men may benefit more from functional support.[67] This may explain why in this thesis, where social support was measured functionally rather than structurally, men had stronger associations between SSA and memory function compared to women. By contrast, the study by Read et al.[111] used social isolation (a measure of structural social support) as their social index measurement, and, as previously discussed, La Fleur and Salthouse used a composite measure of structural and functional support.[96] Another likely explanation for the equivocal findings between the thesis's sex-stratified findings and published literature is different measurements of cognition; for example, in Pillemer and Holtzer's (2016) study, cognition was assessed globally rather than by looking at individual cognitive domains. It is important to examine individual domains of cognition because some cognitive domains may have higher sensitivities to psychosocial factors, than others, and these associations may vary by sex.[24,76]

Additionally, the inconsistent results may be due to varying study samples, particularly concerning the age of participants and education levels; for example, La Fleur and Salthouse's study had a wider age range (age 18-99 years) compared to the CLSA (aged 45-85 years), and

Pillemer and Holtzer's study[134] had a mean age of 77 years. Moreover, the study by Read et al.[111] was also slightly older (aged ≥50, with a mean of 65 years), and the sample was less formally educated compared to the CLSA (only 28% of the sample had post-secondary education, compared to 79% of CLSA participants). As women generally have a longer life expectancy than men, and the risk of cognitive impairment increases over the lifespan,[60] age may substantially impact sex-stratified findings.

In sum, the finding that the association between SSA and memory is stronger in males compared to females, contrasting with some previous research, highlights the fact that the nature of the association between SSA and memory is complex, and the effect of sex on this relationship requires further exploration.

6.1.3. Discussion of Stratified Results by Age Group

Age group-stratified analyses show varying strengths of associations by age group for each SSA subtype and overall SSA. These findings are in accordance with previous research, which has observed that the effect of social support on memory function is modified by age.[15,20,22,23] For immediate recall, there was no apparent trend observed for the link between SSA and memory function across the four age groups, although all associations were positive. For delayed recall, those in the youngest and/or oldest age groups consistently demonstrated the strongest associations.

The findings of this thesis for age-group stratified results differ from previous research, although most existing research examining social support and cognitive function modified by age has been conducted longitudinally, which may not permit direct comparisons with the results from this cross-sectional thesis. Most longitudinal research has demonstrated that the benefits of

SSA may differ in the oldest adults compared to other age groups (such as middle-aged adults). For example, a study by Ellwardt et al. (2013) of 2,255 participants aged 55-85 years at baseline, demonstrated that emotional support may have a greater effect on cognitive function in older adults (over the age of 65) relative to middle-aged adults (aged 55-65 years).[77] Other longitudinal research (n = 7,104 in the baseline sample) by Seeman et al. (2011) found age interaction effects with social strain and episodic memory, and noted that the older age groups exhibited the poorest performance.[20] The descriptive results from this thesis are in agreement with the latter finding, with those in the oldest age groups performing more poorly on immediate and delayed recall compared to the other age groups. Interestingly, previous cross-sectional research on the relationship between SSA and memory function in the Tracking Cohort of the CLSA (n = 21,241) noted that age group was not an effect modifier, but an independent predictor of memory function, negatively associated with both immediate and delayed recall.[98]

The age-group stratified results of this thesis may differ from previous research due to varying study samples (similarly to the sex-stratified findings). For example, the study sample in Ellwardt et al.'s research[77] had an older age range (55-85 years, versus 45-85 years in the CLSA) while, Seeman et al.'s study has a wider age range compared to the CLSA (aged 35-85 years).[20] Moreover, the study sample by Seeman et al. had less formal education (66.5% of the sample reported having a post-secondary education, versus 79% in the CLSA).[20]

An explanation for the varied strengths of association seen across the age groups in this thesis is that the availability, sources, and types of SSA, as well as the meaningfulness, relevance, or impact of social support may change over the lifespan. Previous research has shown that different sources of SSA provide different types of support (e.g., family tends to provide more tangible support, whereas friends provide more emotional support), and that the

composition of social networks tend to change over the lifespan (e.g., due to life transitions or death).[67] Therefore, it is reasonable to predict that the relative availability of types of social support may also fluctuate throughout the lifespan because of the ever-changing composition of social networks. Moreover, although the size of social networks and opportunities for social participation may decrease with age, SSA is often preserved due to stronger bonds that exist within remaining social relationships.[67] For example (as discussed in Section 2.3.2.1.), a study of 156 older adults found that the number of close relationships did not differ significantly across age groups, despite the fact that the size of social networks in the old age group was twice as large as those in the very old age group. Therefore, although persons in the older age groups may have less structural support, SSA may not necessarily decline, as reflected by the regression coefficients in this thesis.

6.1.4. Discussion of Heteroscedasticity

The regression diagnostic plots for the unstratified optimal models showed evidence of heteroscedasticity, which could have resulted from outliers. I confirmed the plausibility of all outliers with a cognition expert (Megan O'Connell, personal communication) and decided to retain all outlier observations in the regression analyses. The left skewness of the exposure data could also have accounted for heteroscedasticity, though this was an inherent trait of the collected data, as most CLSA participants reported high SSA levels. Lastly, residual confounding can cause heteroscedasticity, though the comprehensive nature of the available data in the CLSA permitted for the adjustment for a multitude of known confounders. Namely, this thesis controlled for a total of 13 covariates, representing the majority of the covariates identified in the literature search.

Three potential solutions were examined to address heteroscedasticity, but all were determined to be inadequate, as discussed below. First, multiple linear regression analyses were performed with the SURVEYREG procedure in SAS, which does not allow for bootstrapping, a method typically used to address heteroscedasticity. Second, I consulted with a statistician (Ashok Chaurasia, personal communication) who suggested utilizing a weighted least squares regression model that would correct for heteroscedasticity by attaching weights to observations based on their conditional expected variance; however, the SURVEYREG procedure did not allow for the use of more than one weight variable in the regression modelling process, and I was already using the CLSA's analytical weights in the modelling. The third option to deal with heteroscedasticity was data transformation, which can lead to difficulties in the interpretation of findings. For example, data transformation does not necessarily reflect the hypothesis of interest (i.e., the null hypothesis of the skewed data may be different than the null for the original, non-transformed data)[139]; thus, it was decided that transformation of data was not appropriate.

In the end, I decided that the most effective way to deal with heteroscedasticity was to acknowledge the limitations it would impose on the interpretation of findings. Specifically, heteroscedasticity might not bias the point estimated regression coefficients, but it could produce narrower confidence intervals and increase the possibility of type I errors, which occur when researchers wrongly reject a null hypothesis that is true.[140]

6.1.5. Discussion of Missing Data

Mann-Whitney-Wilcoxon tests (results shown in Appendix I) demonstrated statistically significant differences between those with and without missing data on REY I, II, MOS-SSS, or any covariate. However, it was not possible to determine if the observed data were missing at

random or missing not at random.[141] Multiple imputation is commonly used to address missing data; however, this method is complex and can often lead to biases, particularly if the data are missing not at random, because the available data are used to impute the missing values. Furthermore, multiple imputation requires researchers to specify an imputation dataset; no guidance exists with regard to what variables are related to the missingness.

Even if multiple imputation is undertaken, the imputed data are based on the complete data; therefore, selection bias and information bias are not eliminated. As such, multiple imputation was not performed in the present study; instead, I acknowledge that the missing data may have led to overestimates of the regression coefficients, as scores on the MOS-SSS and the REY were higher for people with no missing data, compared to those with missing data. Therefore, caution should be exercised before applying the findings of this research to persons whose characteristics differ from the those of the analytical samples. However, descriptive statistics (Table 2) show that the differences in distributions of sample characteristics between the full sample and the analytical samples are minimal, suggesting that the missing data did not have a sizeable impact on the results.

6.2. Strengths

This study has several strengths. Firstly, the CLSA is national in scope and can be considered representative of participants who reside near DCS, especially because participants were randomly sampled from the population. Secondly, despite the cross-sectional nature of the study, it recognizes the life-course approach to epidemiology. This is because of the wide age range of participants (45-85 years), which permitted the exploration of how the association between SSA and memory differed across age groups. Thirdly, the large-scale nature of the

CLSA also included the collection of vast amounts of health and demographic information, allowing for the control of numerous covariates. Additionally, the exposure and outcome variables in this study depicted a more accurate picture of the association of interest. This is because social support was assessed as functional social support (SSA), which some have suggested is a more accurate measure of social support than structural social support due to its large and consistent effect on health outcomes.[76,77] Indeed, functional social support is less common in the literature than structural social support,[142] so this thesis focused on an area of research that can benefit from more attention. Also, the inclusion of the four SSA subscales allowed for a more in-depth assessment of various aspects of SSA, and memory function was assessed twice (immediate and delayed recall) to account for multiple facets of memory.

6.3. Limitations

This study has some limitations. Firstly, volunteer bias may have affected recruitment into the CLSA, as participants were healthier or more educated, or had higher levels of social support compared to the average member of the population at large. Second, participants who were suspected of having cognitive impairment (as determined by the CLSA interviewer at the time of recruitment) were excluded from the study at baseline, which resulted in a sample whose level of cognitive functioning was most likely within the normal range for the population. Third, there were statistically significant differences seen in SSA for those with missing data on the memory tests versus those without missing data; therefore, results from this study should only be applied to persons with the same characteristics as those with no missing data. These three limitations may have resulted in an overestimation of the regression coefficients. Fourth, analyses for this study are restricted to the baseline data (cross-sectional), and temporality cannot be established. Thus, reverse causality bias is possible, as previously discussed in Section 2.4.4.

Cross-sectional data can also limit one's ability to distinguish the effects of age from cohort effects (i.e., whether differences between age groups are due to the aging process itself, or due to differences in the life events that each particular age group collectively experienced). Lastly, regression diagnostics demonstrated evidence of heteroscedasticity; therefore, narrowing confidence intervals and lowering *p*-values.

Moreover, there may be mediating factors, effect modifiers, or confounders that may have affected the relationship between SSA and memory that were not adjusted for in this thesis. Although this thesis included the majority of covariates that the literature search suggested would be important, there may be other relevant covariates (e.g., ethnicity, medication, physical activity). Additionally, there may be residual confounding resulting from the manner whereby covariates were measured (e.g., this thesis controlled for chronic conditions by measuring the number of conditions present, but it is possible that the type or severity of chronic condition also has an effect).

6.4. Implications and Future Directions

With the rapidly aging population in Canada and globally, investigation of protective factors for healthy cognitive function is critical to reduce the impact of an aging population for individuals and society alike. This research addresses several gaps in the literature, helping to develop a better understanding of the relationship between SSA and memory function. As previously discussed, little research on this topic has been gathered from large-scale population-based studies, especially in a Canadian context. This study also addresses the limitations seen in previous research, namely that most studies only included adults aged 60 years or older at recruitment, and participants were generally recruited from only one location using non-random

sampling. The CLSA includes both middle-aged and older-aged adults, randomly sampled from 11 primarily urban centres across the country.

The present study further adds to the body of literature on this topic by demonstrating that specific aspects of social functioning and social support, such as SSA and its subtypes, are differentially positively associated with memory function. This thesis underscores the need for developing functional social support initiatives to promote healthy memory function, and that these initiatives may benefit from targeting specific subtypes of SSA. Specifically, emotional/informational support was the subtype of SSA observed in this thesis to have the strongest associations with both immediate and delayed recall in the base and optimal models. Oremus and colleagues (2020) suggest that social support initiatives should aim to target this SSA subtype while emphasizing the importance of the quality of relationships, and can include initiatives such as buddy programs in seniors' centres, pet therapy, or psychological therapy for patients and marital partners or caregivers.[98] Importantly, subtypes of social support can go hand in hand. For example, a buddy program may primarily aim to improve emotional/informational support, but it can also provide tangible support, positive interactions or appraisal support.[143]

Furthermore, this thesis identifies subgroups of the population who may benefit more from particular types of SSA; for example, males may benefit from any kind of SSA, whereas females may benefit the most from affectionate support and emotional/informational support. Therefore, social support initiatives should aim to target specific types of SSA for particular subgroups (including different sexes or age groups), to optimize their development and delivery (and maximize their benefit). For example, women may benefit more from programs aiming to improve emotional support, such as psychological therapy or support groups (which are designed to improve coping for life stressors),[144] whereas men may benefit more from buddy programs

that may help to provide any type of social support. The timing of these interventions is crucial so that adequate social support is provided when it is most needed (e.g., during significant life changes such as retirement, caregiving, career transitions, or onset of illness/disease), optimizing the positive effect on health outcomes.[144]

The British Medical Association (BMA) emphasizes that the push for early diagnosis of dementia must go hand-in-hand with social support services.[145] Specifically, the BMA states that early diagnosis without adequate social support is pointless and will only increase distress for patients and their families.[145] While the effect of social supports on dementia is beyond the scope of this thesis, the associations between SSA and memory function suggest the utility of social support initiatives to aid in improving the cognitive function of Canadians. Importantly, improved social supports can benefit any person at any age, regardless of cognitive status.[46]

Although this study is limited to cross-sectional data, it establishes a foundation for future research on the topic. Normative cognitive test scores are currently under development, which can eventually be used for future work using the CLSA data. Furthermore, longitudinal data from the CLSA are becoming available, and with these data, more variance can be expected in the relationship between social support and memory function over time. The longitudinal data would also allow for temporality to be established, possibly confirming that SSA precedes memory declines in older adults, and would allow for separation of age effects versus cohort effects. Accompanying the availability of longitudinal data will be the eventual release of data for other variables that are not currently available, such as the presence of the APOE ε4 allele, which can be added as a covariate in future regression models.

6.5. Conclusion

As the population continues to age, the investigation of the effect of social support on cognitive function is crucial for providing guidance for public health initiatives, policies, and future research. This thesis builds on previous research by exploring the effect of SSA subtypes on memory function, while controlling for sociodemographic, health-related, depressive symptoms, and health behaviour confounders. Results demonstrated that SSA has a positive effect on memory function, and that various subgroups of the population (e.g., males versus females, or younger versus older age groups) may benefit more from receiving from particular subtypes of SSA. Future research should be conducted using the longitudinal CLSA data (when available) and should control for additional confounders.

References

1. Statistics Canada. Canada's population estimates: Age and sex, July 1, 2018 [Internet]. 2019 [cited 2019 Jan 27]. Available from: https://www150.statcan.gc.ca/n1/daily-quotidien/190125/dq190125a-eng.htm

2. Government of Canada SC. Recent changes in demographic trends in Canada [Internet]. 2015 [cited 2019 Jul 2]. Available from: https://www150.statcan.gc.ca/n1/pub/75-006-x/2015001/article/14240-eng.htm

3. Government of Canada. Dementia in Canada, including Alzheimer's Disease: Highlights from the Canadian Chronic Disease Surveillance System [Internet]. aem. 2017 [cited 2019 Jan 28]. Available from: https://www.canada.ca/en/public-health/services/publications/diseases-conditions/dementia-highlights-canadian-chronic-disease-surveillance.html

4. Alzheimer Society of Canada. Latest information and statistics [Internet]. Alzheimer Society Canada. 2018 [cited 2019 Feb 25]. Available from: https://alzheimer.ca/en/Home/Get-involved/Advocacy/Latest-info-stats

5. Freiheit EA, Hogan DB, Eliasziw M, Patten SB, Demchuk AM, Faris P, et al. A dynamic view of depressive symptoms and neurocognitive change among patients with coronary artery disease. Arch Gen Psychiatry. 2012 Mar;69(3):244–55.

6. Parikh PK, Troyer AK, Maione AM, Murphy KJ. The impact of memory change on daily life in normal aging and mild cognitive impairment. The Gerontologist. 2016;56(5):877–85.

7. Ross M, Schryer E. Outsourcing memory in response to an aging population. Perspect Psychol Sci. 2015 Nov 1;10(6):716–20.

8. Ertel KA, Glymour MM, Berkman LF. Effects of social integration on preserving memory function in a nationally representative US elderly population. Am J Public Health. 2008 Jul;98(7):1215–20.

9. Bettio LEB, Rajendran L, Gil-Mohapel J. The effects of aging in the hippocampus and cognitive decline. Neurosci Biobehav Rev. 2017 Aug;79:66–86.

10. Demnitz N, Hogan DB, Dawes H, Johansen-Berg H, Ebmeier KP, Poulin MJ, et al. Cognition and mobility show a global association in middle- and late-adulthood: Analyses from the Canadian Longitudinal Study on Aging. Gait Posture. 2018;64:238–43.

11. Dause TJ, Kirby ED. Aging gracefully: social engagement joins exercise and enrichment as a key lifestyle factor in resistance to age-related cognitive decline. Neural Regen Res. 2019 Jan;14(1):39–42.

12. Cattan M, White M, Bond J, Learmouth A. Preventing social isolation and loneliness among older people: a systematic review of health promotion interventions. Ageing Soc. 2005 Jan;25(1):41–67.

13. Kelly ME, Duff H, Kelly S, McHugh Power JE, Brennan S, Lawlor BA, et al. The impact of social activities, social networks, social support and social relationships on the cognitive functioning of healthy older adults: a systematic review. Syst Rev [Internet]. 2017 Dec 19;6. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5735742/

14. Liao J, Scholes S. Association of social support and cognitive aging modified by sex and relationship type: A prospective investigation in the English Longitudinal Study of Ageing. Am J Epidemiol. 2017 Oct 1;186(7):787–95.

15. Hughes TF, Andel R, Small BJ, Borenstein AR, Mortimer JA. The association between social resources and cognitive change in older adults: evidence from the Charlotte County Healthy Aging Study. J Gerontol B Psychol Sci Soc Sci. 2008 Jul;63(4):P241–4.

16. Sims RC, Hosey M, Levy S-A, Whitfield KE, Katzel LI, Waldstein SR. Distinct functions of social support and cognitive function among older adults. Exp Aging Res. 2014;40(1):40–59.

17. Dickinson WJ, Potter GG, Hybels CF, McQuoid DR, Steffens DC. Change in stress and social support as predictors of cognitive decline in older adults with and without depression. Int J Geriatr Psychiatry. 2011 Dec;26(12):1267–74.

18. Ge S, Wu B, Bailey DEJ, Dong X. Social support, social strain, and cognitive function among community-dwelling U.S. Chinese older adults. J Gerontol Ser -Biol Sci. 2017 Jul;1(suppl_1):S16–21.

19. Gow AJ, Corley J, Starr JM, Deary IJ. Which social network or support factors are associated with cognitive abilities in old age? Gerontology. 2013;59(5):454–63.

20. Seeman TE, Miller-Martinez DM, Stein Merkin S, Lachman ME, Tun PA, Karlamangla AS. Histories of social engagement and adult cognition: midlife in the U.S. study. J Gerontol B Psychol Sci Soc Sci. 2011 Jul;66 Suppl 1:i141-152.

21. Zahodne LB, Watson CW-M, Seehra S, Martinez MN. Positive psychosocial factors and cognition in ethnically diverse older adults. J Int Neuropsychol Soc. 2018;24(3):294–304.

22. Ha J-H, Pai M. Subjective memory problems and availability of emotional support. Res Aging. 2018;40(10):978–1007.

23. Kuiper JS, Oude Voshaar RC, Zuidema SU, Stolk RP, Zuidersma M, Smidt N. The relationship between social functioning and subjective memory complaints in older persons: a population-based longitudinal cohort study. J Geriatr Psychiatry. 2017 Oct;32(10):1059–71.

24. Zahodne LB, Nowinski CJ, Gershon RC, Manly JJ. Which psychosocial factors best predict cognitive performance in older adults? J Int Neuropsychol Soc JINS. 2014 May;20(5):487–95.

25. Rutter EC. The association between social support availability and executive function in the Canadian Longitudinal Study on Aging. 2019 Jun 20 [cited 2019 Jul 4]; Available from: https://uwspace.uwaterloo.ca/handle/10012/14772

26. Uchino BN, Cacioppo JT, Kiecolt-Glaser JK. The relationship between social support and physiological processes: a review with emphasis on underlying mechanisms and implications for health. Psychol Bull. 1996 May;119(3):488–531.

27. Fratiglioni L, Paillard-Borg S, Winblad B. An active and socially integrated lifestyle in late life might protect against dementia. Lancet Neurol. 2004 Jun;3(6):343–53.

28. Berkman LF, Glass T, Brissette I, Seeman TE. From social integration to health: Durkheim in the new millennium. Soc Sci Med 1982. 2000 Sep;51(6):843–57.

29. Sherbourne CD, Stewart AL. The MOS social support survey. Soc Sci Med 1982. 1991;32(6):705–14.

30. Rey A. L'examen clinique en psychologie. [The clinical examination in psychology.]. Paris: Presses Universitaries De France; 1958. 222 p.

31. Tuokko H, Griffith LE, Simard M, Taler V. Cognitive measures in the Canadian Longitudinal Study on Aging. Clin Neuropsychol. 2017;31(1):233–50.

32. World Health Organization. WHO | What is Healthy Ageing? [Internet]. WHO. [cited 2019 Jan 8]. Available from: http://www.who.int/ageing/healthy-ageing/en/

33. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders [Internet]. Fifth Edition. American Psychiatric Association; 2013 [cited 2019 Jun 18]. Available from: https://psychiatryonline.org/doi/book/10.1176/appi.books.9780890425596

34. Ayalon L, Shiovitz-Ezra S, Roziner I. A cross-lagged model of the reciprocal associations of loneliness and memory functioning. Psychol Aging. 2016;31(3):255–61.

35. Petersen RC, Smith GE, Waring SC, Ivnik RJ, Kokmen E, Tangelos EG. Aging, memory, and mild cognitive impairment. Int Psychogeriatr. 1997;9(S1):65–9.

36. Centers for Disease Control and Prevention. Cognitive Impairment: A Call for Action, Now! 2011 Feb;4.

37. Albert MS, DeKosky ST, Dickson D, Dubois B, Feldman HH, Fox NC, et al. The diagnosis of mild cognitive impairment due to Alzheimer's disease: recommendations from the National Institute on Aging-Alzheimer's Association workgroups on diagnostic guidelines for Alzheimer's disease. Alzheimers Dement J Alzheimers Assoc. 2011 May;7(3):270–9.

38. Joubert S, Brambati SM, Ansado J, Barbeau EJ, Felician O, Didic M, et al. The cognitive and neural expression of semantic memory impairment in mild cognitive impairment and early Alzheimer's disease. Neuropsychologia. 2010 Mar;48(4):978–88.

39. Petersen RC, Stevens JC, Ganguli M, Tangalos EG, Cummings JL, DeKosky ST. Practice parameter: early detection of dementia: mild cognitive impairment (an evidence-based review). Report of the Quality Standards Subcommittee of the American Academy of Neurology. Neurology. 2001 May 8;56(9):1133–42.

40. Sachdev PS, Lipnicki DM, Kochan NA, Crawford JD, Thalamuthu A, Andrews G, et al. The prevalence of mild cognitive impairment in diverse geographical and ethnocultural regions: The COSMIC Collaboration. PloS One. 2015;10(11):e0142388.

41. Petersen RC, Lopez O, Armstrong MJ, Getchius TSD, Ganguli M, Gloss D, et al. Practice guideline update summary: Mild cognitive impairment: Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology. Neurology. 2018 Jan 16;90(3):126–35.

42. The World Health Report 2003 [Internet]. [cited 2019 Feb 12]. Available from: https://www.who.int/whr/2003/en/whr03_en.pdf?ua=1

43. Statistics Canada. Census in Brief: A portrait of the population aged 85 and older in 2016 in Canada, Census year 2016 [Internet]. 2016 [cited 2018 Dec 4]. Available from: https://www12.statcan.gc.ca/census-recensement/2016/as-sa/98-200-x/2016004/98-200-x2016004-eng.cfm

44. Fiest KM, Roberts JI, Maxwell CJ, Hogan DB, Smith EE, Frolkis A, et al. The prevalence and incidence of dementia due to Alzheimer's disease: a systematic review and meta-analysis. Can J Neurol Sci. 2016 Apr;43(S1):S51–82.

45. Walter, J., Kaether, C., H. S, Haass, C. The cell biology of Alzheimer's disease: uncovering the secrets of secretases. Curr Opin Neurobiol. 2001 Oct;11(5):585–90.

46. Zuelsdorff ML, Koscik RL, Okonkwo OC, Peppard PE, Hermann BP, Sager MA, et al. Social support and verbal interaction are differentially associated with cognitive function in midlife and older age. Aging Neuropsychol Cogn. 2019;26(2):144–60.

47. Bartsch T, Wulff P. The hippocampus in aging and disease: From plasticity to vulnerability. Neuroscience. 2015 Nov 19;309:1–16.

48. Verlinden VJA, van der Geest JN, de Bruijn RFAG, Hofman A, Koudstaal PJ, Ikram MA. Trajectories of decline in cognition and daily functioning in preclinical dementia. Alzheimers Dement J Alzheimers Assoc. 2016 Feb;12(2):144–53.

49. Kirova A-M, Bays RB, Lagalwar S. Working memory and executive function decline across normal aging, mild cognitive impairment, and Alzheimer's disease. BioMed Res Int. 2015;2015:748212.

50. Rowell SF, Green JS, Teachman BA, Salthouse TA. Age does not matter: Memory complaints are related to negative affect throughout adulthood. Aging Ment Health. 2016;20(12):1255–63.

51. Ballard J. Forgetfulness and older adults: concept analysis. J Adv Nurs. 2010;66(6):1409–19.

52. Kaplan E, Goodglass H, Weintraub S, Goodglass H. Boston naming test. Philadelphia: Lea & Febiger; 1983.

53. Benedict RHB, Schretlen D, Groninger L, Brandt J. Hopkins Verbal Learning Test – Revised: Normative Data and Analysis of Inter-Form and Test-Retest Reliability. Clin Neuropsychol. 1998 Feb 1;12(1):43–55.

54. Wechsler D. The Wechsler Adult Intelligence Scale Revised. San Antonio: Psychological Corporation; 1981.

55. Wechsler D. The Wechsler Memory Scale. 3rd ed. San Antonio, TX: Psychological Corporation; 1997.

56. Launer LJ, Andersen K, Dewey ME, Letenneur L, Ott A, Amaducci LA, et al. Rates and risk factors for dementia and Alzheimer's disease: results from EURODEM pooled analyses. EURODEM Incidence Research Group and Work Groups. European Studies of Dementia. Neurology. 1999 Jan 1;52(1):78–84.

57. Andersen K, Launer LJ, Dewey ME, Letenneur L, Ott A, Copeland JRM, et al. Gender differences in the incidence of AD and vascular dementia: The EURODEM Studies. Neurology. 1999 Dec 1;53(9):1992–1992.

58. Fratiglioni L, Viitanen M, von Strauss E, Tontodonati V, Herlitz A, Winblad B. Very old women at highest risk of dementia and Alzheimer's disease: incidence data from the Kungsholmen Project, Stockholm. Neurology. 1997 Jan;48(1):132–8.

59. Murman DL. The impact of age on cognition. Semin Hear. 2015 Aug;36(3):111–21.

60. Snyder HM, Asthana S, Bain L, Brinton R, Craft S, Dubal DB, et al. Sex biology contributions to vulnerability to Alzheimer's disease: A think tank convened by the Women's Alzheimer's Research Initiative. Alzheimers Dement. 2016 Nov 1;12(11):1186–96.

61. Clare L, Wu Y-T, Teale JC, MacLeod C, Matthews F, Brayne C, et al. Potentially modifiable lifestyle factors, cognitive reserve, and cognitive function in later life: A cross-sectional study. PLoS Med [Internet]. 2017 Mar 21 [cited 2019 Jul 27];14(3). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5360216/

62. Gallacher JE, Elwood PC, Hopkinson C, Rabbitt PM, Stollery BT, Sweetnam PM, et al. Cognitive function in the Caerphilly study: associations with age social class, education and mood. Eur J Epidemiol. 1999 Feb;15(2):161–9.

63. Jia J, Wang F, Wei C, Zhou A, Jia X, Li F, et al. The prevalence of dementia in urban and rural areas of China. Alzheimers Dement J Alzheimers Assoc. 2014 Jan;10(1):1–9.

64. St John PD, Seary J, Menec VH, Tyas SL. Rural residence and risk of dementia. Can J Rural Med Shawville. 2016 Summer;21(3):73–9.

65. Tyas SL. Alcohol use and the risk of developing Alzheimer's disease. Alcohol Res Health J Natl Inst Alcohol Abuse Alcohol. 2001;25(4):299–306.

66. Shankar A, McMunn A, Banks J, Steptoe A. Loneliness, social isolation, and behavioral and biological health indicators in older adults. Health Psychol Off J Div Health Psychol Am Psychol Assoc. 2011 Jul;30(4):377–85.

67. Gurung RAR, Taylor SE, Seeman TE. Accounting for changes in social support among married older adults: insights from the MacArthur Studies of Successful Aging. Psychol Aging. 2003 Sep;18(3):487–96.

68. Hawkley LC, Thisted RA, Cacioppo JT. Loneliness predicts reduced physical activity: cross-sectional & longitudinal analyses. Health Psychol Off J Div Health Psychol Am Psychol Assoc. 2009 May;28(3):354–63.

69. Brown CL, Robitaille A, Zelinski EM, Dixon RA, Hofer SM, Piccinin AM. Cognitive activity mediates the association between social activity and cognitive performance: A longitudinal study. Psychol Aging. 2016;31(8):831–46.

70. Qiu C, Xu W, Fratiglioni L. Vascular and psychosocial factors in Alzheimer's disease: epidemiological evidence toward intervention. J Alzheimers Dis JAD. 2010;20(3):689–97.

71. Wight RG, Aneshensel CS, Seeman M, Seeman TE. Late life cognition among men: A life course perspective on psychosocial experience. Arch Gerontol Geriatr. 2003;37(2):173–93.

72. Andrew MK, Keefe JM. Social vulnerability from a social ecology perspective: a cohort study of older adults from the National Population Health Survey of Canada. BMC Geriatr. 2014;14:90–90.

73. Fuller-Iglesias HR, Antonucci T. Convoys of social support in Mexico: Examining socio-demographic variation. Int J Behav Dev. 2016;40(4):324–33.

74. Robitaille A, Orpana H, McIntosh CN. Psychometric properties, factorial structure, and measurement invariance of the English and French versions of the Medical Outcomes Study social support scale. Health Rep. 2011 Jun;22(2):33–40.

75. Goll JC, Charlesworth G, Scior K, Stott J. Barriers to social participation among lonely older adults: The influence of social fears and identity. PLoS ONE [Internet]. 2015 Feb 23 [cited 2019 Feb 25];10(2). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4338142/

76. Krueger KR, Wilson RS, Kamenetsky JM, Barnes LL, Bienias JL, Bennett DA. Social engagement and cognitive function in old age. Exp Aging Res. 2009;35(1):45–60.

77. Ellwardt L, Aartsen M, Deeg D, Steverink N. Does loneliness mediate the relation between social support and cognitive functioning in later life? Soc Sci Med 1982. 2013 Dec;98:116–24.

78. Thoits PA. Stress, coping, and social support processes: Where are we? What next? J Health Soc Behav. 1995;53–79.

79. Holt-Lunstad J, Smith TB, Layton JB. Social relationships and mortality risk: a meta-analytic review. PLoS Med. 2010 Jul 27;7(7):e1000316.

80. Cornwell EY, Waite LJ. Social disconnectedness, perceived isolation, and health among older adults. J Health Soc Behav. 2009 Mar;50(1):31–48.

81. Kumar S, Calvo R, Avendano M, Sivaramakrishnan K, Berkman LF. Social support, volunteering and health around the world: cross-national evidence from 139 countries. Soc Sci Med 1982. 2012 Mar;74(5):696–706.

82. Seeman TE, Lusignolo TM, Albert M, Berkman L. Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging. Health Psychol Off J Div Health Psychol Am Psychol Assoc. 2001 Jul;20(4):243–55.

83. Lang FR, Carstensen LL. Close emotional relationships in late life: further support for proactive aging in the social domain. Psychol Aging. 1994 Jun;9(2):315–24.

84. Field D. A cross-cultural perspective on continuity and change in social relations in old age: introduction to a special issue. Int J Aging Hum Dev. 1999;48(4):257–61.

85. McLaughlin D, Vagenas D, Pachana N, Begum N, Dobson A. Gender differences in social network size and satisfaction in adults in their 70s. J Health Psychol. 2010;15(5):671–9.

86. Chaix B, Isacsson S-O, Råstam L, Lindström M, Merlo J. Income change at retirement, neighbourhood-based social support, and ischaemic heart disease: results from the prospective cohort study “Men born in 1914.” Soc Sci Med 1982. 2007 Feb;64(4):818–29.

87. Wiles P. The correlation between education and earnings: The External-Test-not-Content hypothesis (ETNC). High Educ. 1974 Feb 1;3(1):43–58.

88. Blazer D, Burchett B, Service C, George LK. The association of age and depression among the elderly: an epidemiologic exploration. J Gerontol. 1991 Nov;46(6):M210-215.

89. Ownby RL, Crocco E, Acevedo A, John V, Loewenstein D. Depression and risk for Alzheimer disease. Arch Gen Psychiatry. 2006 May;63(5):530–8.

90. Giles LC, Anstey KJ, Walker RB, Luszcz MA. Social networks and memory over 15 Years of followup in a cohort of older Australians: Results from the Australian Longitudinal Study of Ageing [Internet]. Journal of Aging Research. 2012 [cited 2019 Feb 4]. Available from: https://www.hindawi.com/journals/jar/2012/856048/

91. Bennett DA, Schneider JA, Tang Y, Arnold SE, Wilson RS. The effect of social networks on the relation between Alzheimer's disease pathology and level of cognitive function in old people: a longitudinal cohort study. Lancet Neurol. 2006;5(5):406–12.

92. Mousavi-Nasab S -M. -Hossein, Kormi-Nouri R, Nilsson L. Examination of the bidirectional influences of leisure activity and memory in old people: A dissociative effect on episodic memory. Br J Psychol. 2014;105(3):382–98.

93. Li M, Dong X. Is social network a protective factor for cognitive impairment in US Chinese older adults? Findings from the PINE study. Gerontology. 2018;64(3):246–56.

94. Lee T, Lipnicki DM, Crawford JD, Henry JD, Trollor JN, Ames D, et al. Leisure activity, health, and medical correlates of neurocognitive performance among monozygotic twins: the Older Australian Twins Study. J Gerontol B Psychol Sci Soc Sci. 2014 Jul;69(4):514–22.

95. Smith BM, Yao X, Chen KS, Kirby ED. A larger social network enhances novel object location memory and reduces hippocampal microgliosis in aged mice. Front Aging Neurosci. 2018;10:142.

96. La Fleur CG, Salthouse TA. Which aspects of social support are associated with which cognitive abilities for which people? J Gerontol Ser B-Psychol Sci. 2017 Oct;72(6):1006–16.

97. Zahodne LB, Ajrouch KJ, Sharifian N, Antonucci TC. Social relations and age-related change in memory. Psychol Aging. 2019 Sep;34(6):751–65.

98. Oremus M, Tyas SL, Maxwell CJ, Konnert C, O'Connell ME, Law J. Social support availability is positively associated with memory in persons aged 45–85 years: A cross-sectional analysis of the Canadian Longitudinal Study on Aging. Arch Gerontol Geriatr. 2020 Jan 1;86:103962.

99. Ballesteros S, Kraft E, Santana S, Tziraki C. Maintaining older brain functionality: A targeted review. Neurosci Biobehav Rev. 2015 Aug;55:453–77.

100. Stern Y. What is cognitive reserve? Theory and research application of the reserve concept. J Int Neuropsychol Soc JINS. 2002 Mar;8(3):448–60.

101. Iraniparast M, Wu Y, Zeng L, Maxwell CJ, Kryscio RJ, St. John PD, et al. Cognitive resilience predicts reverse transitions from mild cognitive impairment to normal cognition: Findings from the Nun Study. Alzheimers Dement J Alzheimers Assoc. 2016;12(Supplement):P403–4.

102. Katzman R. Education and the prevalence of dementia and Alzheimer's disease. Neurology. 1993;43(1):13–20.

103. Cohen S. Social relationships and health. Am Psychol. 2004;59(8):676–84.

104. Luethi M, Meier B, Sandi C. Stress effects on working memory, explicit memory, and implicit memory for neutral and emotional stimuli in healthy men. Front Behav Neurosci [Internet]. 2008;2. Available from: http://journals.scholarsportal.info/details/16625153/v2inone/nfp_seowmeaesihm.xml

105. Sapolsky RM, Krey LC, McEwen BS. The neuroendocrinology of stress and aging: the glucocorticoid cascade hypothesis. Sci Aging Knowl Environ. 2002 Sep 25;2002(38):cp21.

106. Torre JC de la, Mussivan T. Can disturbed brain microcirculation cause Alzheimer's disease? Neurol Res. 1993 Jun 1;15(3):146–53.

107. Vemuri P, Lesnick TG, Przybelski SA, Knopman DS, Preboske GM, Kantarci K, et al. Vascular and amyloid pathologies are independent predictors of cognitive decline in normal elderly. Brain. 2015 Mar 1;138(3):761–71.

108. Cerhan JR, Wallace RB. Predictors of decline in social relationships in the rural elderly. J Epidemiol. 1993 Apr;137(8):870–80.

109. Bosma H, van Boxtel MPJ, Ponds RWHM, Jelicic M, Houx P, Metsemakers J, et al. Engaged lifestyle and cognitive function in middle and old-aged, non-demented persons: a reciprocal association? Z Für Gerontol Geriatr. 2002;35(6):575–81.

110. Small BJ, Dixon RA, McArdle J J, Grimm K J. Do changes in lifestyle engagement moderate cognitive decline in normal aging? Evidence from the Victoria Longitudinal Study. Neuropsychology. 2012;26(2):144–55.

111. Read S, Comas-Herrera A, Grundy E. Social isolation and memory decline in later-life. J Gerontol B Psychol Sci Soc Sci. 2020 Jan;75(2):367–76.

112. Seeman TE, Crimmins E. Social environment effects on health and aging: integrating epidemiologic and demographic approaches and perspectives. Ann N Y Acad Sci. 2001 Dec;954:88–117.

113. Raina PS, Wolfson C, Kirkland SA, Griffith LE, Oremus M, Patterson C, et al. The Canadian Longitudinal Study on Aging (CLSA)*. Can J Aging Rev Can Vieil. 2009 Sep;28(3):221–9.

114. Gaudreau P, Morais JA, Shatenstein B, Gray-Donald K, Khalil A, Dionne I, et al. Nutrition as a determinant of successful aging: description of the Quebec longitudinal study Nuage and results from cross-sectional pilot studies. Rejuvenation Res. 2007 Sep;10(3):377–86.

115. CLSA Technical Document: Sampling and Computation of Response Rates and Sample Weights for the Tracking (Telephone Interview) Participants and Comprehensive Participants [Internet]. [cited 2019 Jun 14]. Available from: https://www.clsa-elcv.ca/doc/1041

116. Collins R. UK Biobank Protocol. :112.

117. Cohort Profile: The 45 and Up Study. Int J Epidemiol. 2008 Oct 1;37(5):941–7.

118. Tuokko H, Griffith LE, Simard M, Taler V, O'Connell ME, Voll S, et al. The Canadian Longitudinal Study on Aging as a platform for exploring cognition in an aging population. Clin Neuropsychol. 2019 Jan 13;0(0):1–30.

119. Cross NE, Carrier J, Postuma RB, Gosselin N, Kakinami L, Thompson C, et al. Association between insomnia disorder and cognitive function in middle-aged and older adults: a cross-sectional analysis of the Canadian Longitudinal Study on Aging. Sleep. 2019 Aug 1;42(8).

120. Mitrushina M, Satz P, Van Gorp W. Some putative cognitive precursors in subjects hypothesized to be at-risk for dementia. Arch Clin Neuropsychol. 1989;4(4):323–33.

121. Royston P, Altman DG, Sauerbrei W. Dichotomizing continuous predictors in multiple regression: a bad idea. Stat Med. 2006 Jan 15;25(1):127–41.

122. Monica 1776 Main Street Santa, California 90401-3208. Social Support Survey instrument scoring instructions [Internet]. [cited 2019 Feb 28]. Available from: https://www.rand.org/health-care/surveys_tools/mos/social-support/scoring.html

123. Sampling and Computation of Response Rates and Sample Weights for the Tracking (Telephone Interview) Participants and Comprehensive Participants [Internet]. [cited 2019 Apr 11]. Available from: https://www.clsa-elcv.ca/doc/1041

124. Merchanda K, Puderer H. How Postal Codes Map to Geographic Areas [Internet]. Statistics Canada. [cited 2019 Jul 8]. Available from: https://www150.statcan.gc.ca/n1/pub/92f0138m/92f0138m2007001-eng.htm

125. Andresen EM, Malmgren JA, Carter WB, Patrick DL. Screening for depression in well older adults: evaluation of a short form of the CES-D (Center for Epidemiologic Studies Depression Scale). Am J Prev Med. 1994 Apr;10(2):77–84.

126. Radloff LS. The CES-D Scale: A self-report depression scale for research in the general population. Appl Psychol Meas. 1977 Jun 1;1(3):385–401.

127. Mohebbi M, Nguyen V, McNeil JJ, Woods RL, Nelson MR, Shah RC, et al. Psychometric properties of a short form of the Center for Epidemiologic Studies Depression (CES-D-10) scale for screening depressive symptoms in healthy community dwelling older adults. Gen Hosp Psychiatry. 2018 Apr;51:118–25.

128. Derived Variable - Depression [Internet]. [cited 2019 Jun 19]. Available from: https://www.clsa-elcv.ca/doc/2528

129. In-home questionnaire (Baseline-Comprehensive) [Internet]. [cited 2019 Jul 13]. Available from: https://clsa-elcv.ca/doc/1048

130. Canadian Longitudinal Study on Aging. Who ensures high ethical standards? [Internet]. [cited 2019 May 29]. Available from: https://www.clsa-elcv.ca/participants/privacy/who-ensures-high-ethical-standards

131. Oremus M, Konnert C, Law J, Maxwell CJ, O'Connell ME, Tyas SL. Social support and cognitive function in middle- and older-aged adults: descriptive analysis of CLSA tracking data. Eur J Public Health. 2019 Dec 1;29(6):1084–9.

132. James O, Davies ADM. Assessing social support and satisfaction in the elderly: Development of a brief assessment instrument, the index of social support. Int J Geriatr Psychiatry. 1987;2(4):227–33.

133. Shooshtari S, Menec V, Swift A, Tate R. Exploring ethno-cultural variations in how older Canadians define healthy aging: The Canadian Longitudinal Study on Aging (CLSA). J Aging Stud. 2020 Mar 1;52:100834.

134. Pillemer SC, Holtzer R. The differential relationship of dimensions of perceived social support with cognitive function among older adults. Aging Ment Health. 2016 Jul;20(7):727–35.

135. Wethington E, Kessler RC. Perceived Support, received Support, and adjustment to stressful life events. J Health Soc Behav. 1986;27(1):78–89.

136. Reinhardt JP, Boerner K, Horowitz A. Good to have but not to use: Differential impact of perceived and received support on well-being. J Soc Pers Relatsh. 2006 Feb 1;23(1):117–29.

137. Taylor SE, Klein LC, Lewis BP, Gruenewald TL, Gurung RA, Updegraff JA. Biobehavioral responses to stress in females: tend-and-befriend, not fight-or-flight. Psychol Rev. 2000 Jul;107(3):411–29.

138. Zunzunegui M-V, Alvarado BE, Del Ser T, Otero A. Social networks, social integration, and social engagement determine cognitive decline in community-dwelling Spanish older adults. J Gerontol Ser B. 2003 Mar 1;58(2):S93–100.

139. Feng C, Wang H, LU N, CHEN T, HE H, LU Y, et al. Log-transformation and its implications for data analysis. Shanghai Arch Psychiatry. 2014 Apr;26(2):105–9.

140. Caudill SB. Type I errors after preliminary tests for heteroscedasticity. J R Stat Soc Ser Stat. 1988;37(1):65–8.

141. Sterne JAC, White IR, Carlin JB, Spratt M, Royston P, Kenward MG, et al. Multiple imputation for missing data in epidemiological and clinical research: potential and pitfalls. BMJ [Internet]. 2009 Jun 29 [cited 2020 Apr 30];338. Available from: https://www.bmj.com/content/338/bmj.b2393

142. Rutter EC, Tyas SL, Maxwell CJ, Law J, O'Connell ME, Konnert CA, et al. Association between functional social support and cognitive function in middle-aged and older adults: a protocol for a systematic review. BMJ Open. 2020 Apr 6;10(4):e037301.

143. Peterson JL, Rintamaki LS, Brashers DE, Goldsmith DJ, Neidig JL. The forms and functions of peer social support for people living with HIV. J Assoc Nurses AIDS Care. 2012 Jul;23(4):294–305.

144. Rodriguez M, Cohen S. Social Support. In: Encyclopedia of Mental Health. New York, NY, US: Academic Press; 1998. p. 535–44.

145. Rimmer A. BMA meeting: Early dementia diagnosis is pointless without support services. BMJ [Internet]. 2016 Jun 27 [cited 2020 Mar 24];353. Available from: https://www.bmj.com/content/353/bmj.i3505

Appendices

Appendix A: Literature search syntax and key findings

Table A1. Syntax used in literature search across various databases

Syntax for Medline (Ovid)	Syntax for PubMed	Syntax for PsycInfo
((social support* or emotional support* or instrumental support* or appraisal support* or informational support* or tangible support* or social relationship* or affection or interpersonal relation*) and memory).mp. [mp=title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] and aged/	(((((((("social support"[MeSH Terms] OR (("emotions"[MeSH Terms] OR "emotions"[All Fields] OR "emotional"[All Fields]) AND support[All Fields])) OR (instrumental[All Fields] AND support[All Fields])) OR (appraisal[All Fields] AND support[All Fields])) OR (informational[All Fields] AND support[All Fields])) OR (tangible[All Fields] AND support[All Fields])) OR affection[All Fields]) OR "interpersonal relations"[MeSH Terms]) AND "memory"[MeSH Terms]) AND "aged"[MeSH Terms]	(Abstract: social support* OR Abstract: emotional support* OR Abstract: instrumental support* OR Abstract: appraisal support* OR Abstract: informational support* OR Abstract: tangible support* OR Abstract: social relationship* OR Abstract: affection OR Abstract: interpersonal relation*) AND Abstract: memory AND (Abstract: elderly OR Abstract: senior* OR Abstract: older adult*) AND Peer-Reviewed Journals only

Search performed December 2018. Updated October 2019, and April 2020.

Table A2. Summary table for research on the association between social support and memory

	Author(s)/Title/location of article retrieval	Data Source/Study Design	Study Population	Measures of Exposure (Social Support)	Measures of Outcome (Memory Function)	Key Findings Relevant to Social Support and Memory	Covariates
(1)	*Dickinson, Potter, Hybels, McQuoid & Steffens (2011)[17] Change in stress and social support as predictors of cognitive decline in older adults with and without depression	Patients with depression recruited from Duke University's psychiatric services and medical clinic in the National Institutes of Health-supported Neurocognitive Outcomes of Depression in the Elderly (NCODE), a prospective cohort study.	-Adults over the age of 60 - Recruited from hospital settings in one city	- Measured social support with the Duke Social Support Index (DSSI) – includes tangible support and subjective social support	- Memory assessed with logical memory subtest of the WMS-R (immediate and delayed)	- Observed an association between tangible social support and verbal working memory (r=0.18). - Researchers hypothesize that this potentially functions through stress mechanisms	Age, sex, depression, race, education

(2)	*Ge, Wu, Bailey & Dong (2017)[18] Social support, social strain and cognitive function among community-dwelling U.S. Chinese older adults	Data from the Population Study of Chinese Elderly in Chicago (PINE), a cross-sectional study design	- Adults over the age of 60 - Recruited from the community in one city	- Social support measured with the Health and Retirement Study Social Support Scale	- Episodic memory assessed with the East Boston Memory Test immediate and delayed recall (along with other measures of cognitive and executive function). Working memory was measured with digit span backwards test	- Overall social support was associated with higher levels of episodic memory ($\beta = 0.11$, SE = 0.03), working memory ($\beta = 0.18$, SE = 0.08) as well as global cognitive function ($\beta = 0.11$, SE = 0.02). - Individuals with higher levels of social support from friendships had higher episodic memory performance ($\beta = 0.04$, SE = 0.02). - There was no association between social support from friends and working memory.	Age, gender, education, marital status, personal annual income, length of residence in the community, living arrangement, acculturation, depression, medical conditions, physical function (ADLs and IADLs)
(3)	*Gow, Corley, Starr, Deary (2013)[19] Which social network or support factors are associated with cognitive abilities in old age?	Data from the Lothian Birth Cohort 1936 Study (LBC1936), a longitudinal study of aging	- Mean age of study sample is 70 years - Recruited from participants who had previously completed a test of mental abilities at age 11	- Social support assessed with the Social Support Questionnaire (Short Form)	- Memory measured with the Wechsler Adult Intelligence Scale III UK	- Social support was significantly associated with better cognitive performance ($\eta_p^2 = 0.13$) yet there was no significant association between social support and memory specifically. - The researchers could not propose a plausible explanation for this, especially because social support was associated with other cognitive domains. The researchers emphasized the importance of assessing individual cognitive domains as opposed to global cognitive function.	Age, sex, martial status, living situation, loneliness, depression

(4)	Ha and Pai (2018)[22] Subjective memory problems and availability of emotional support Retrieved from PubMed search	Data from one wave of the Health and Retirement Study	- Adults over the age of 51 - Recruitment methods not specified	- Emotional support measured via questions created by the authors based on measures from Schuster, Kessler & Aseltine (1990)	- Subjective memory measured via one question "how would you rate your memory at the present time [on a scale from 1-5]"	- Lower subjective memory was associated with lower social support from friends in older adults (β = -0.06, SE = 0.003) (the same findings were not found for younger adults). - No association was observed between subjective memory complaints and support from adult children or spousal support. - The authors propose that this is perhaps because older adults have a smaller network of friends	Gender, functional limitations (ADLs) Control variables: objective memory, age, race/ethnicity, depressive symptoms, marital status
(5)	*Hughes et al. (2008)[15] The association between social resources and cognitive change in older adults: evidence from the Charlotte County Healthy Aging Study	Analyzed data from the Charlotte County Health Aging Study (longitudinal)	- Adults over the age of 65 - Community recruitment via non-random sampling	- Social resources measured with 26 items derived from Lubben's (1988) Social Network Scale and social support measures from Krause and Borawski-Clark (1995). - Instrumental, informational, and emotional support were all assessed, as well as satisfaction with support	- Memory measured with the Hopkins Verbal Learning Tests for cued recall, free recall and recognition	- Association between higher levels of perceived positive social support and less decline in episodic memory performance over five years, and this effect was modified by age.	Age, gender, education, marital status, residency in charlotte county Florida in years, attrition, and personality (measured with the NEO Five-Factor Inventory)

(6)	Krueger et al. (2009)[76] Social engagement and cognitive function in old age Retrieved from Wilson et al. (2015), retrieved from Kelly et al. (2017), which was retrieved from a search on Medline	Participants from the Rush Memory and Aging Project, a prospective-cohort study	- Adults over the age of 65 - Recruited from subsidized housing facilities and retirement homes in one city	- Social support measured with the Multidimensional Scale of Perceived Social Support, assessed as one domain of social engagement	- Episodic memory assessed with seven measures Word List Memory, Recall, and Recognition and immediate and delayed recall of measured with the Logical Memory of the Wechsler Memory Scale–Revised and of the East Boston Story - Working memory was assessed with three measures Digit Span Forward and Digit Span Backward and digit ordering - Semantic memory assessed with three measures of the Boston Naming Test, Verbal Fluency, and a 15-item version of the National Adult Reading Test	- There was a significant positive association observed between social support and working memory ($\beta = 0.099$, SE = 0.045) but not episodic or semantic memory. - The researchers propose these findings suggest that social support is more related to problem-solving abilities and processing efficiency than to information storage	Depression, personality (NEO 5-Factor Inventory), participation in cognitively stimulating activities, physical activity, presence of chronic medical conditions (diabetes, hypertension, heart disease, cancer, thyroid disease, head injury), disability, age, sex education

(7)	Kuiper et al. (2017)[23] The relationship between social functioning and subjective memory complaints in older persons: a population-based longitudinal cohort study Retrieved from Medline search	Data from the LifeLines Cohort Study (a prospective cohort study in the Netherlands) examining data from three generations	- Adults over the age of 65 - Recruited from the population living in the northern region of the Netherlands	- Social support measured via perceived support from partner family, work and friends (on a scale from 1-5) - Social support measured as just one aspect of social functioning	- Subjective memory complaints assessed via a self-report questionnaire	- Individuals with high social support at baseline reported less subjective memory complaints during follow-up compared to those with low social support (OR: 1.55; 95% CI:1.19–2.01). - Age slightly increases the odds of subjective memory complaints (OR: 1.04; 95% CI:1.01-1.06).	Age, gender, education level, lifestyle characteristics (physical activity, alcohol use, smoking status), depression, presence of 4 cardiovascular conditions (arrhythmia myocardial infarction, heart failure, stroke)
(8)	La Fleur & Salthouse (2015)[96] Which aspects of social support are associated with which cognitive abilities for which people? Retrieved from Medline search	Cross-sectional data from the Virginia Cognitive Aging Project	- Included three age groups: 18-39 years, 40-59 years and 60-99 years - Recruited via convenience sampling	- The Social Network Questionnaire used to measure social support (11 aspects of social support)	- Memory assessed with logical memory, free recall task and paired associates task (measured as one of several aspects of cognition)	- An association was observed between emotional support and memory ($\beta = 0.11$) and informational support and memory ($\beta = 0.07$), but not tangible support and memory. - These relations were not moderated by age or sex.	Age, sex, education, self-reported health

(9)	Liao & Scholes (2017)[14] Association of social support and cognitive aging modified by sex and relationship type: a prospective investigation in the English Longitudinal Study of Ageing. Retrieved from Medline search	Analyzed data from the English Longitudinal Study on Aging	- Adults over the age of 50 - Community-based and national sample	- Social support measured with a questionnaire created by the researchers	- Memory measured via three tasks: time orientation, verbal learning and prospective memory	- Slower memory declines associated with high levels of positive social support in men (β = 0.006, 95% CI = 0.000-0.012). - Low baseline memory scores associated with high levels of negative social support in men (β = -0.002, 95% CI = -0.046-0.012). - For all participants, there was a longitudinal association between high levels of social support and slower memory declines (β = 0.004, 95% CI = 0.001-0.007).	Health factors, depression, age, sex, SES (measured via highest educational attainment and wealth quintiles), number of mobility limitations
(10)	Oremus, Tyas, Maxwell, Konnert, O'Connell & Law (2019)[98]	Baseline data from the Tracking Cohort of the Canadian Longitudinal Study on Aging	- Adults aged 45-85 at baseline - Random sample	- Social support availability (and emotional/informational, tangible, affectionate and positive interactions subtypes) measured with the Medical Outcomes Study – Social Support Survey	- Memory measured with the Rey Auditory Verbal Learning Test (REY)[30]	- The strongest associations with immediate recall were overall SSA (β = 0.07, 95% CI = 0.04-0.10) and emotional/informational support (β = 0.06, 95% CI = 0.03-0.09) - The strongest associations for delayed recall were overall SSA (β = 0.06, 95% CI = 0.02-0.09), emotional/informational support (β = 0.05, 95% CI = 0.02-0.08) and affectionate support (β = 0.05, 95% CI = 0.02-0.07)	Age group, sex, province of residence, education, marital status, home ownership, total annual household income, urban/rural residence, smoking, alcohol consumption, Basic and Instrumental Activities of Daily Living, comorbidity, depressive symptoms

(11)	*Seeman, Miller-Martinez, Stein Merkin, Lachman, Tun & Karlamangla (2011)[20] Histories of social engagement and adult cognition: midlife in the U.S. study	Data from the MIDUS study, a longitudinal study	- Adults age 35-85 years - National in scope but not nationally representative as data was gathered via voluntary surveys	- Social support measured as one aspect of social engagement - Social support measured with perceived support (how much spouse, other family, and friends are sources of understanding, caring, appreciation, and provide emotional, reliance, and esteem support)	- Episodic and working memory measured as one of 6 domains assessed in the Brief Test of Adult Cognition by Telephone (immediate and delayed recall for word lists)	- Episodic memory was independently positively associated with social support ($\beta = 0.037$). - Age interaction effects were observed with social strain and episodic memory, with the poorest performance seen in the older age groups	Age, gender education, race, health status (chronic conditions, number of ADL disabilities and depression), health behaviours (smoking status, physical activity)
(12)	Sims et al. (2014)[16] Distinct functions of social support and cognitive function among older adults Retrieved from Medline search	Data derived from a cross-sectional study of cardiovascular risk factors, cognitive function and neuroimaging	- Adults age 54-83 years - Convenience sample recruited from the community	- Social support measured with the Interpersonal Support Evaluation List, which assessed perceived social support in 4 areas: appraisal, self-esteem, belonging, and tangible social support. All 4 areas are described as the "availability of…"	- Memory assessed with the WMS-R for nonverbal memory, WAIS-R digit span forward and backward for working memory and LMI and II for verbal memory.	- An inverse relationship between nonverbal memory and tangible support ($\beta = -0.17$ SE = 0.06) and memory and self-esteem support ($\beta = -0.17$, SE = 4.83) for individuals living with chronic illness. - The only explanation the researchers could provide was that the relation between the two concepts vary as a function of the population of interest. - No other positive associations were observed between social support domains and memory function.	Depression, age, gender, education, blood pressure, BMI, cholesterol levels, fasting glucose levels

(13)	Zahodne, Ajrouch, Sharifian & Antonucci (2019)[97] Social relations and age-related change in memory Retrieved from PubMed search	Longitudinal analysis of data from the Health and Retirement Study	-Adults over the age of 50 - Recruitment method not specified	-Social relations assessed via a self-reported questionnaire -Questions captured the structural (i.e., marital status, social network size, contact frequency) and the functional aspects (i.e., social support) of social relations	-Episodic memory assessed using a variant of the Consortium to Establish a Registry for Alzheimer's Disease list learning task.	-social support was positively associated with initial episodic memory performance ($\beta = 0.04$; 95% CI = 0.02-0.05), although this association did not hold over time.	Age, gender, race and ethnicity, education, mental health, physical health, chronic conditions, self-rated health
(14)	*Zahodne, Nowinski, Gershon & Manly (2014)[24] Which psychosocial factors best predict cognitive performance in older adults?	Cross-sectional study of community-dwelling mid- and older-aged adults.	- Adults over the age of 55 - Convenience sample from the community, recruited via market research company	- Emotional and tangible social support were assessed with the NIH toolbox	- Memory assessed as one of several domains assessed in the Cognition module of NIH. -Both episodic and working memory were considered.	- Emotional support was associated with working memory ($\beta = 0.10$) but not episodic memory. - Tangible support was not associated with working or episodic memory. - No explanation for these associations were provided by the researchers, other than certain cognitive domains appear to be more sensitive to positive psychosocial factors than others.	Education, negative affect, illness burden (presence of hypertension, peripheral vascular disease, other heart problem, diabetes, thyroid problems, joint problems, and breathing problems)

(15)	Zahodne, Watson Seehra & Martinez (2018)[21] Positive psychosocial factors and cognition in ethnically diverse older adults Retrieved from Medline search	Cross-sectional data from the Washington Heights-Inwood Columbia Aging Project. Participants included white, Hispanic and black older adults	- Adults over the age of 65 - Community-based, recruited via market research company or Medicare records	- NIH toolbox used to measure several positive psychosocial factors, including emotional support and tangible support	- Cognitive function assessed with a neuropsychological battery (including episodic memory) and the NIH toolbox cognition module (including working memory [list sorting])	- Associations were observed between social support from friends and working memory function in Caucasians (β = 0.22, SE = 0.09) but not Hispanics - A negative association was observed between emotional support and working memory in Hispanics (β = -0.24, SE = 0.10). - The authors propose that the low performance on cognitive tests by this group may explain this finding. - No associations between emotional support and working memory were observed in blacks.	Age, sex, years of education, language of test administration, depressive symptoms, health status (i.e., presence of hypertension, diabetes, heart disease and stroke), income, acculturation and school quality

(16)	Zuelsdorff et al. (2019)[46] Retrieved from PubMed search	Data from one to two waves from the WRAP (Wisconsin Registry for Alzheimer's Prevention)	- Participants aged 40-65 at baseline -recruitment method not specified	-Social support measured with the Medical Outcomes Study – Social Support Survey	-Verbal learning and memory, and immediate memory were measured with the Rey Auditory Verbal Learning Test -Visual learning and memory measured with the Brief Visuospatial Memory Test Revised - Story recall measured with the Logical Memory immediate and delayed -Working memory measured with the Digit Span Forward, Digit Span Backward and Letter-Number Sequencing	-Higher social support was associated with immediate memory when adjusting for demographic and sampling characteristics ($\beta = 0.07$) -Significant interactions were seen with verbal learning and memory and verbal interactions.	Smoking status, alcohol consumption, caffeine consumption, BMI, partner status, APOE-ε4 status, parental history of Alzheimer's disease, age, gender, race, education, quality of interaction

*Retrieved from: Rutter (2019)[25]

Note: β is regression coefficient; η_p^2 is Spearman's rho; SE is standard error; CI is confidence interval. These statistics are reported in the table only when reported in the original research article.

Appendix B: Conceptual analytical diagram of the association between social support availability and memory function

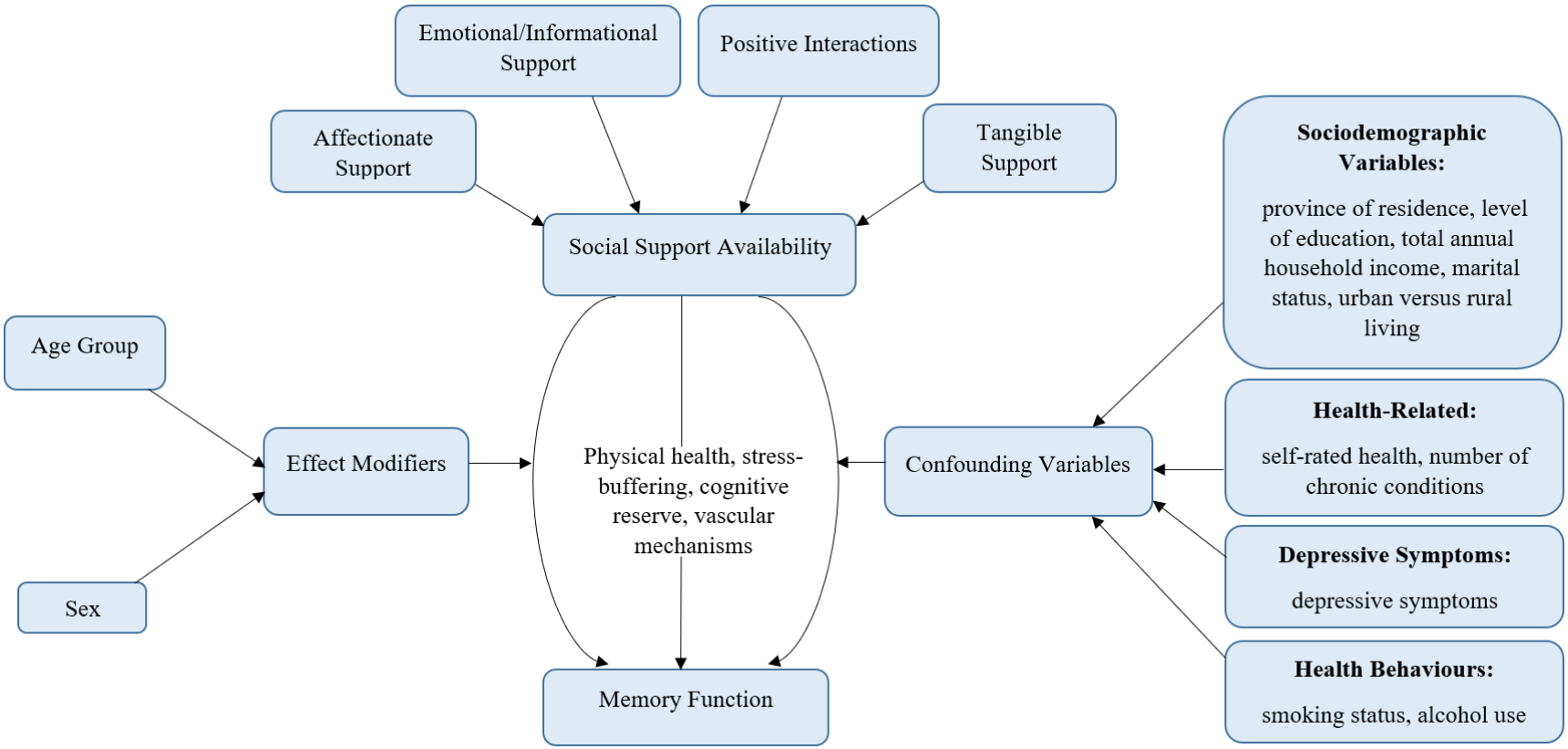

Figure B1. Conceptual diagram of the association between social support availability and memory with covariates

Appendix C: Provincial and overall response rates in the Canadian Longitudinal Study on Aging's Comprehensive Cohort

Table C1. Provincial and overall response rates for the Comprehensive Cohort[115]

	AB	BC	MB	NL	NS	ON	QC	Canada
RDD	0.11	0.10	0.13	0.19	0.16	0.10	0.12	0.11
RTS	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.02
TS	0.11	0.10	0.10	0.15	0.12	0.09	0.10	0.10
HR1	---	0.02	0.09	0.06	0.16	0.09	---	0.09
HR2	---	---	---	---	0.08	---	---	0.08
HR	---	0.02	0.09	0.06	0.14	0.09	---	0.09
Overall	**0.11**	**0.09**	**0.10**	**0.12**	**0.13**	**0.09**	**0.10**	**0.10**

RDD: Random Digit Dialing
RTS: Random (Telephone) Sampling from listed telephone numbers
TS: Telephone Sampling
HRI: Initial Health Registry mail-outs
HR2: Health Registry mail-outs targeting lower-educated areas
HR: Health Registry mail-outs (estimates based on number of eligible persons who were sent letters)

Appendix D: Flowchart of analytical samples for REY I and II

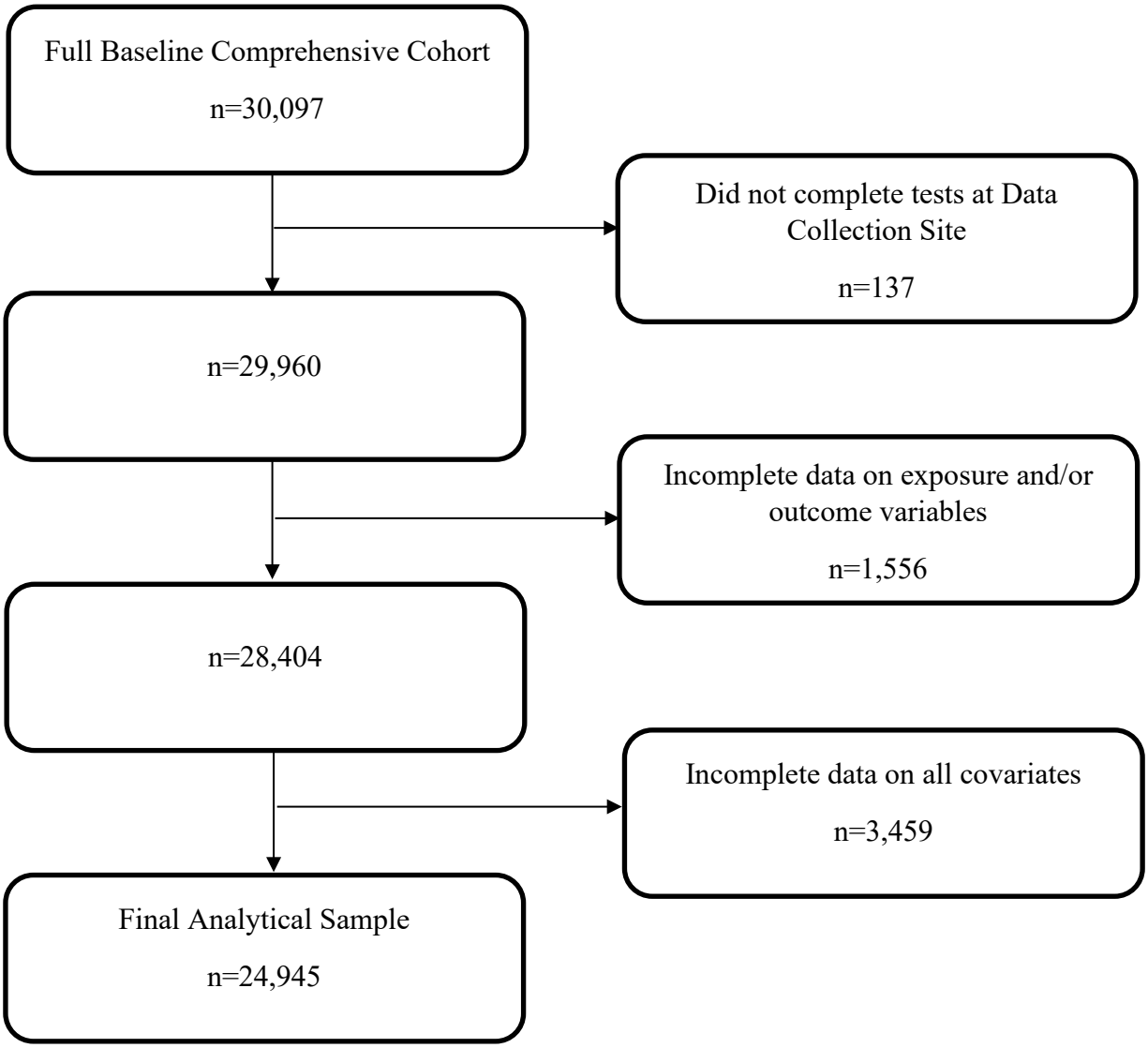

Figure D1. Flowchart of process for obtaining analytical sample for REY I from full sample

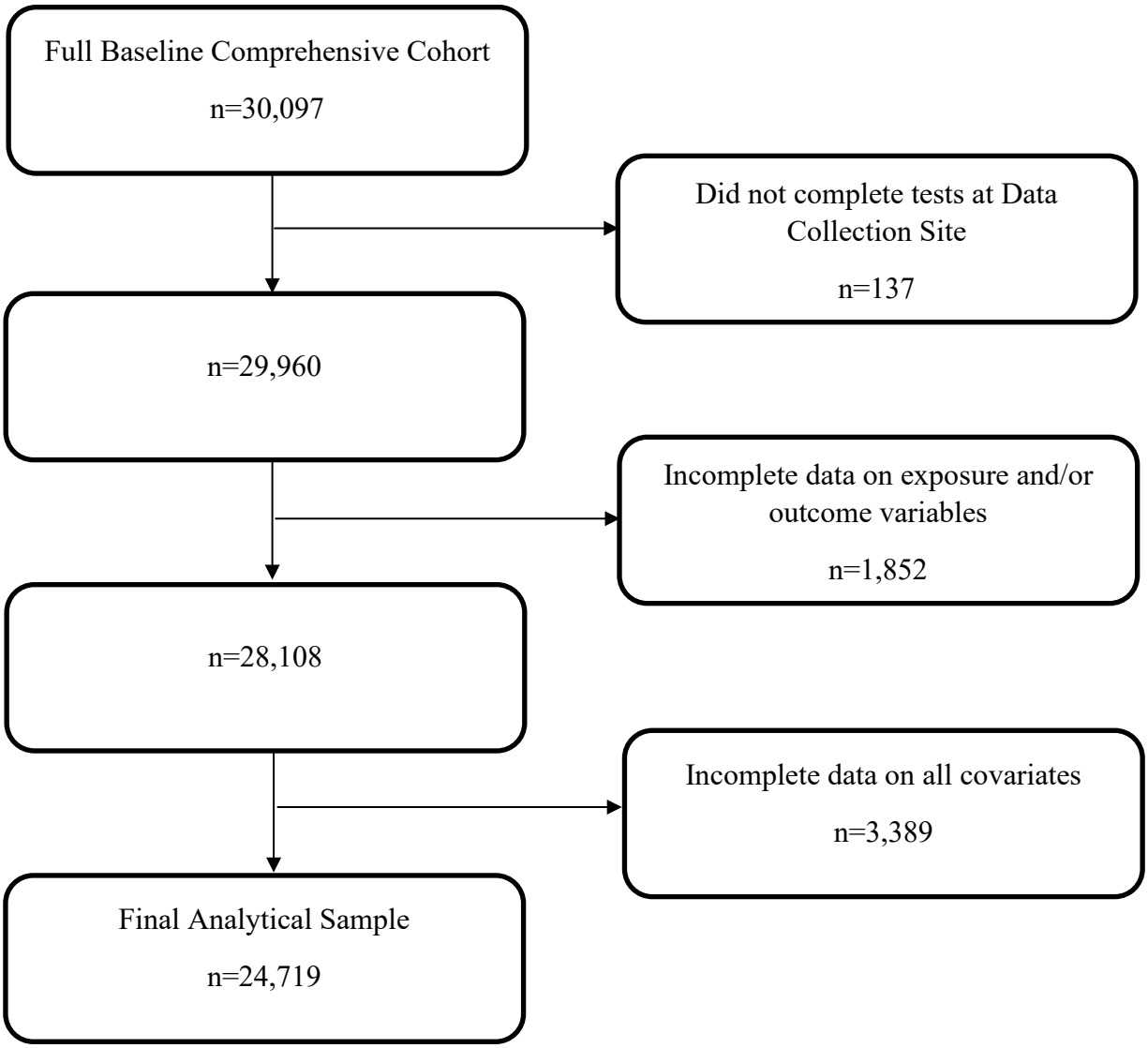

Figure D2. Flowchart of process for obtaining analytical sample for REY II from full sample

Appendix E: Rey Auditory Verbal Learning Test words

Table E1. List of REY items in order of presentation (adapted from Tuokko et al.[31])

English	**French**
Drum	Tambour
Curtain	Rideau
Bell	Cloche
Coffee	Café
School	École
Parent	Parent
Moon	Lune
Garden	Jardin
Hat	Chapeau
Farmer	Fermier
Nose	Nez
Turkey	Dinde
Color	Couleur
House	Maison
River	Rivière

Appendix F: Items on the Medical Outcomes Study-Social Support Survey

Table F1. Items on the Medical Outcomes Study-Social Support Survey (MOS-SSS)[29]

	Subtype of Support	**Item**[a,b]
Overall Social Support Availability	Emotional/Informational Support	Someone you can count on to listen to you when you need to talk
		Someone to give you information to help you understand a situation
		Someone to give you good advice about a crisis
		Someone to confide in or talk to about yourself or your problems
		Someone whose advice you really want
		Someone to share your most private worries and fears with
		Someone to turn to for suggestions about how to deal with a personal problem
		Someone who understands your problems
	Tangible Support	Someone to help you if you were confined to bed
		Someone to take you to the doctor if you needed it
		Someone to prepare your meals if you were unable to do it yourself
		Someone to help with daily chores if you were sick
	Affectionate Support	Someone who shows you love and affection
		Someone to love and make you feel wanted
		Someone who hugs you
	Positive Interaction	Someone to have a good time with
		Someone to get together with for relaxation
		Someone to do something enjoyable with
	Additional Item	Someone to do things with to help you get your mind off things

[a]Participants were asked: How often is each of the following kinds of support available to you if you need it?

[b]Possible responses include: (1) none of the time, (2) a little of the time, (3) some of the time, (4) most of the time, or (5) all of the time

Appendix G: Covariates found in the literature on social support and cognitive function

Table G1. Covariates found in previous literature on social support and cognitive function (i.e., global cognitive function or memory specifically).

Covariate	Author (Year)
Age or Age Group	Aartsen et al., (2002); Ayalon, Schiovitz-Ezra & Roziner (2016); Bennett, Schneider, Tang Arnold & Wilson (2006); Bosma et al., (2002); Dickinson, Potter, Hybels, McQuoid & Steffens (2011); Ertel, Glymour & Berkman (2008); Ge, Wu, Bailey & Dong (2017); Giles, Anstey, Walker & Luszcz (2012); Gow, Corley, Starr & Deary (2013); Ha & Pai (2018); Hughes, Andel, Small, Borenstein & Mortimer (2008); Krueger et al., (2009); Kuiper et al., (2016); LaFleur & Salthouse (2017); Liao & Scholes (2017); Oremus et al. (2020); Seeman et al., (2011); Seeman, Luisgnolo, Albert & Berkman (2001); Shankar, McMunn, Banks & Steptoe (2012); Sims et al., (2014); Small, Dixon, McArdle & Grimm (2012); Zahodne, Ajrouch, Sharifian & Antonucci (2019); Zahodne, Watson, Seehra & Martinez (2018); Zuelsdorff et al. (2019)
Gender or Sex	Aartsen et al., (2002); Ayalon et al., (2016); Bennett et al., (2006); Bosma et al. (2002); Dickinson et al., (2011); Ertel (2008); Ge et al., (2017); Giles et al., (2012); Gow et al., (2013); Ha & Pai (2018); Hughes et al. (2008); Krueger et al., (2009); Kuiper et al., (2016); LaFleur & Salthouse (2017); Liao & Scholes (2017); Oremus et al. (2020); Pillemer et al. (2019); Seeman et al., (2011); Shankar et al., (2012); Sims et al., (2014); Small et al., (2012); Zahodne et al., (2019); Zahodne et al., (2018); Zuelsdorff et al. (2019)
Education (level or years)	Aartsen et al., (2002); Ayalon et al., (2016); Bennett et al., (2006); Bosma et al., (2002); Dickinson et al., (2011); Ge et al., (2017); Giles et al., (2012); Gow et al., (2013); Hughes et al. (2008); Krueger et al., (2009); LaFleur & Salthouse (2017); Oremus et al. (2020); Pillemer et al. (2019); Seeman et al., (2001); Sims et al., (2014); Small et al., (2012); Zahodne, Nowinski, Gershon & Manly (2014); Zahodne et al., (2019); Zahodne et al., (2018); Zuelsdorff et al. (2019)
Depression (or depressive symptomology)*	Ayalon et al., (2016); Bennett et al., (2006); Dickinson et al., (2011); Ertel et al., (2008); Ge et al., (2017); Gilles et al., (2012); Gow et al., (2013); Ha & Pai (2018); Krueger et al., (2009); Kuiper et al., (2016); Liao & Scholes (2017); Oremus et al. (2020); Pillemer et al. (2019); Seeman et al., (2001) Seeman et al., (2011); Shankar et al., (2012); Sims et al., (2014)

*also considered in theoretical framework by Berkman et al.[28]

Table G1 continued. Covariates found in previous literature on social support and cognitive function (i.e., global cognitive function or memory specifically).

Martial status (or partner status)	Ge et al., (2016); Gilles et al., (2012); Gow et al., (2013); Ha & Pai (2018); Hughes et al. (2008); Oremus et al. (2020); Zuelsdorff et al. (2019)
Health Conditions (or comorbidity or number of health/medical/chronic conditions)	Ayalon et al., (2016); Ertel et al., (2008); Ge et al., (2016); Gilles et al., (2012); Krueger et al., (2009); Liao & Scholes (2017); Pillemer et al. (2019); Seeman et al., (2001); Seeman et al., (2011); Zahodne et al., (2019); Zahodne et al., (2014)
Household income (or income or household wealth)*	Ertel et al., (2008); Ge et al., (2016); Oremus et al. (2020); Seeman et al., (2001); Shankar et al., (2012); Zahodne et al., (2018)
Health or health status	Aartsen et al., (2002); LaFleur & Salthouse (2017); Small et al., (2012); Zahodne et al., (2019); Zahodne et al., (2018)
Smoking status*	Gilles et al., (2012); Kuiper et al., (2016); Oremus et al. (2020); Seeman et al., (2011); Shankar et al., (2012); Zuelsdorff et al. (2019)
Alcohol use*	Gilles et al., (2012); Kuiper et al., (2016); Oremus et al. (2020); Zuelsdorff et al. (2019)
Urban/rural living Status*	Oremus et al. (2020)

*also considered in theoretical framework by Berkman et al.[28]

Appendix H: Regression diagnostics

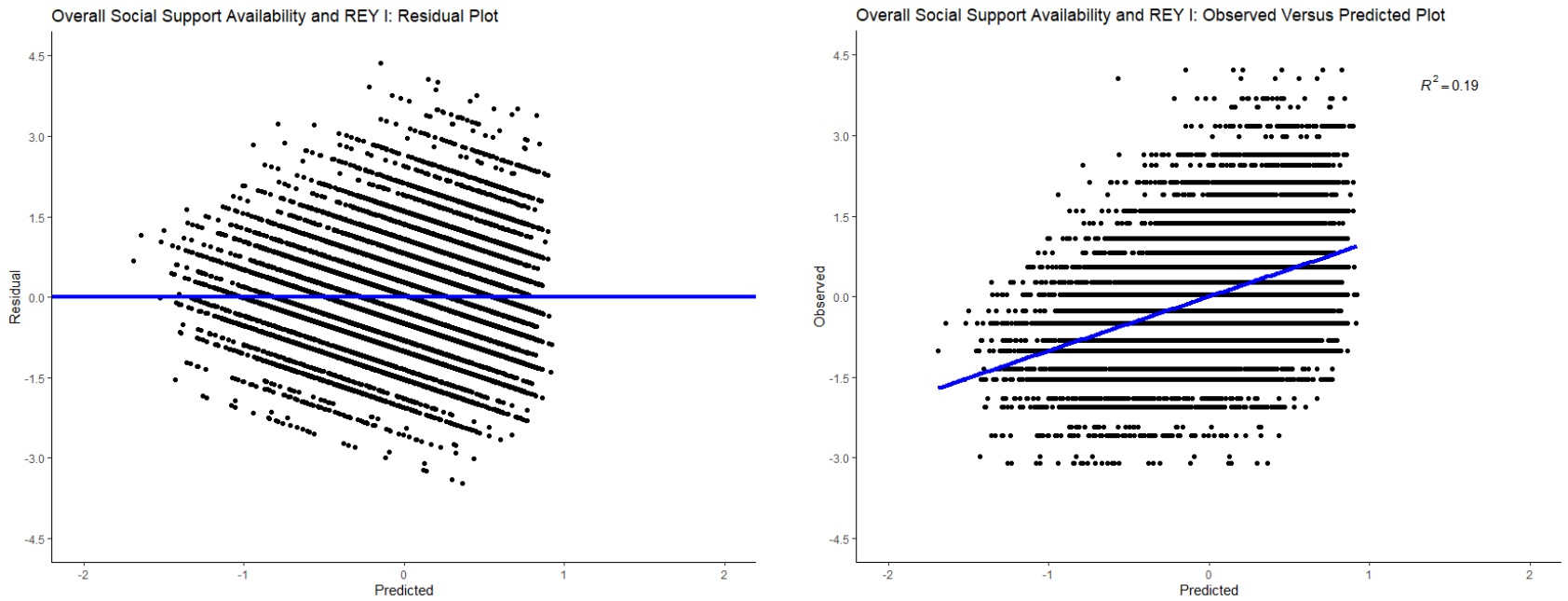

Figure H1. Overall social support availability and REY I: Residual and observed versus predicted plots

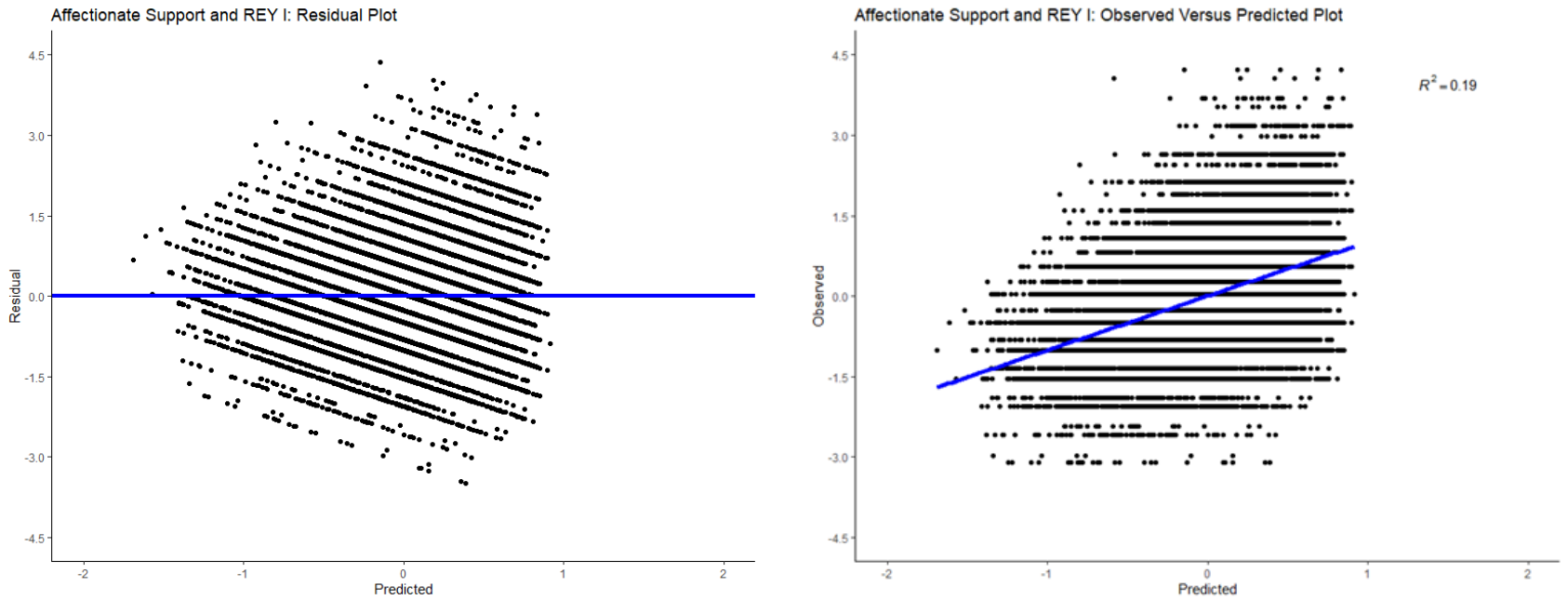

Figure H2. Affectionate support and REY I: Residual and observed versus predicted plots

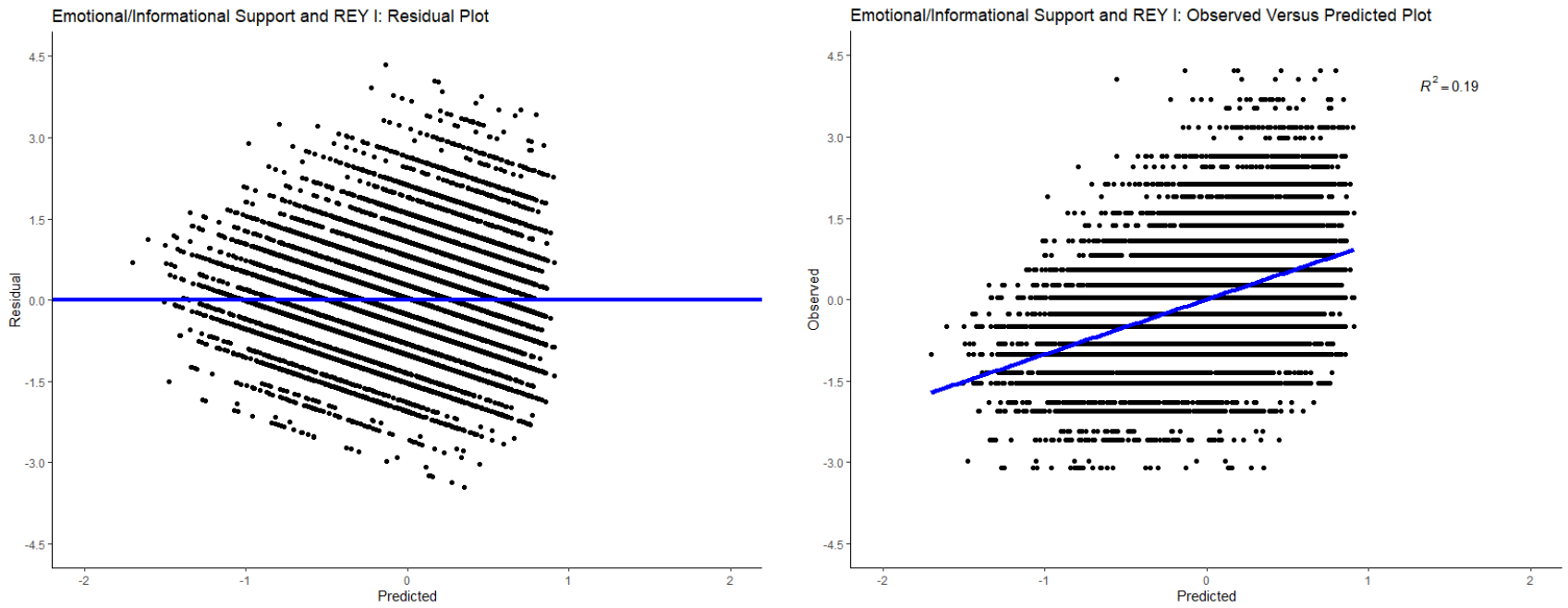

Figure H3. Emotional/informational support and REY I: Residual and observed versus predicted plots

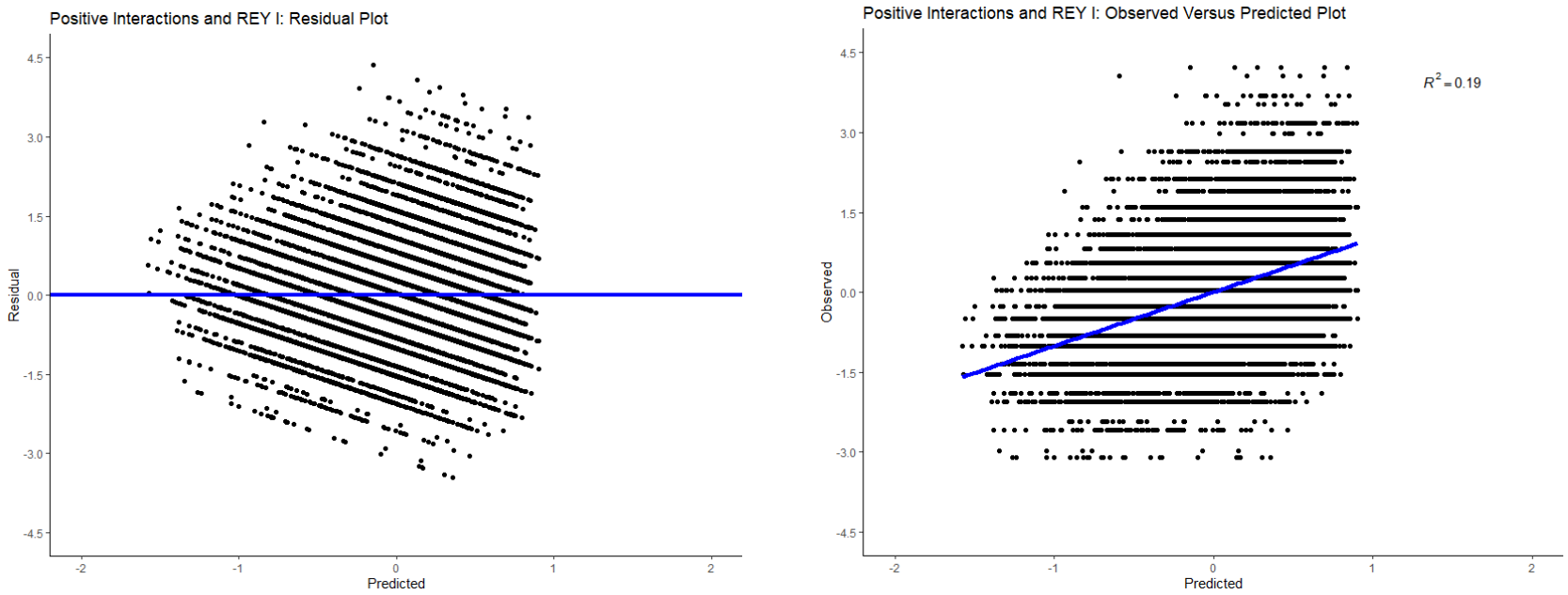

Figure H4. Positive interactions and REY I: Residual and observed versus predicted plots

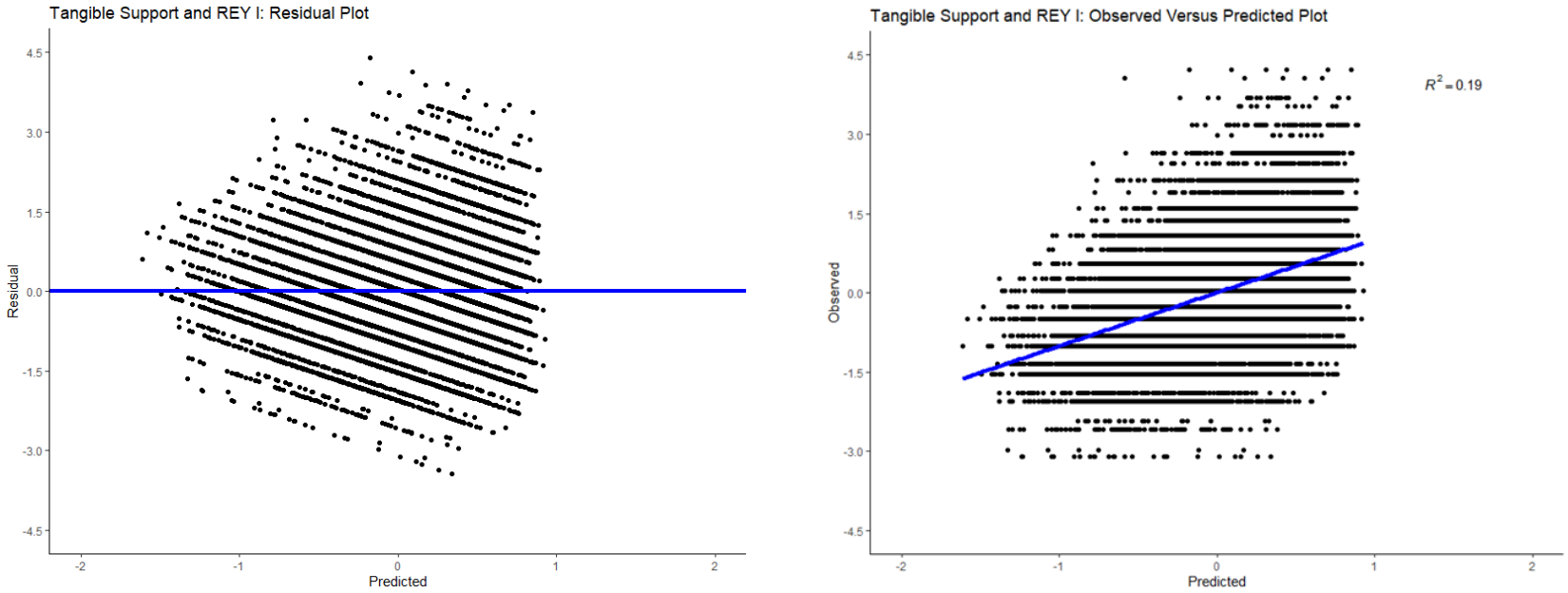

Figure H5. Tangible support and REY I: Residual and observed versus predicted plots

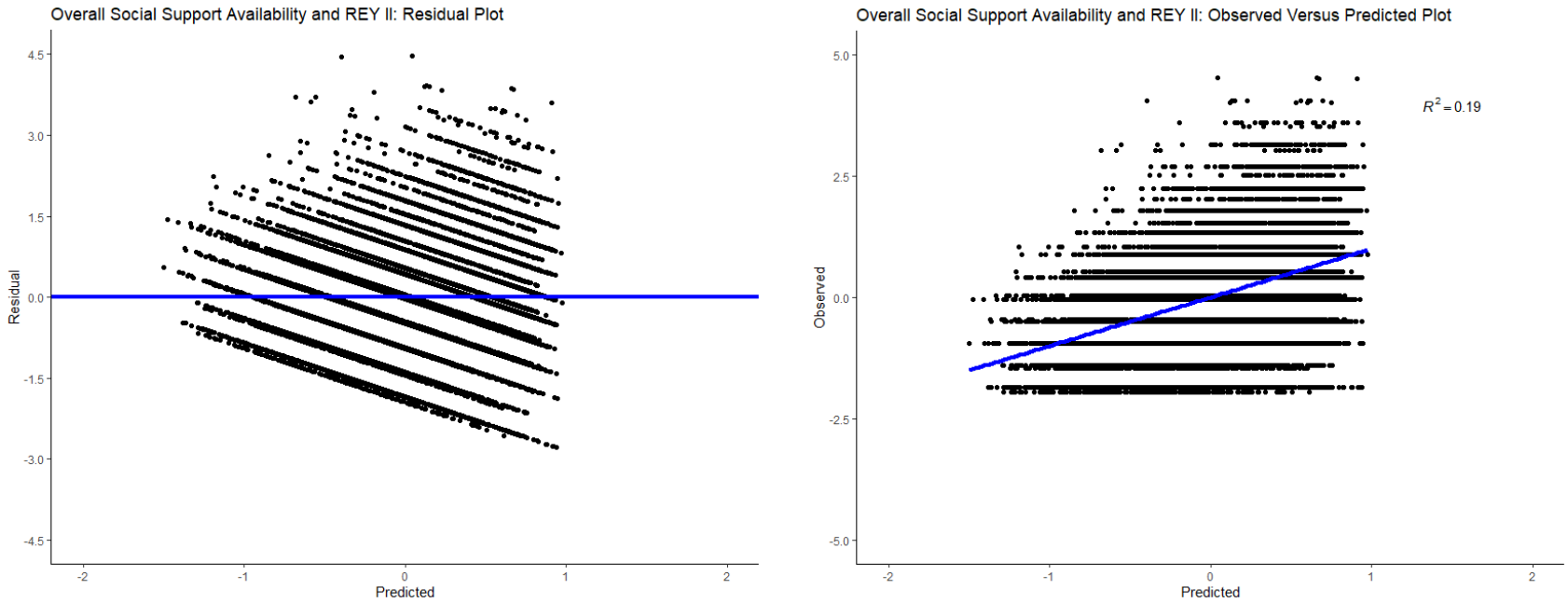

Figure H6. Overall social support availability and REY II: Residual and observed versus predicted plots

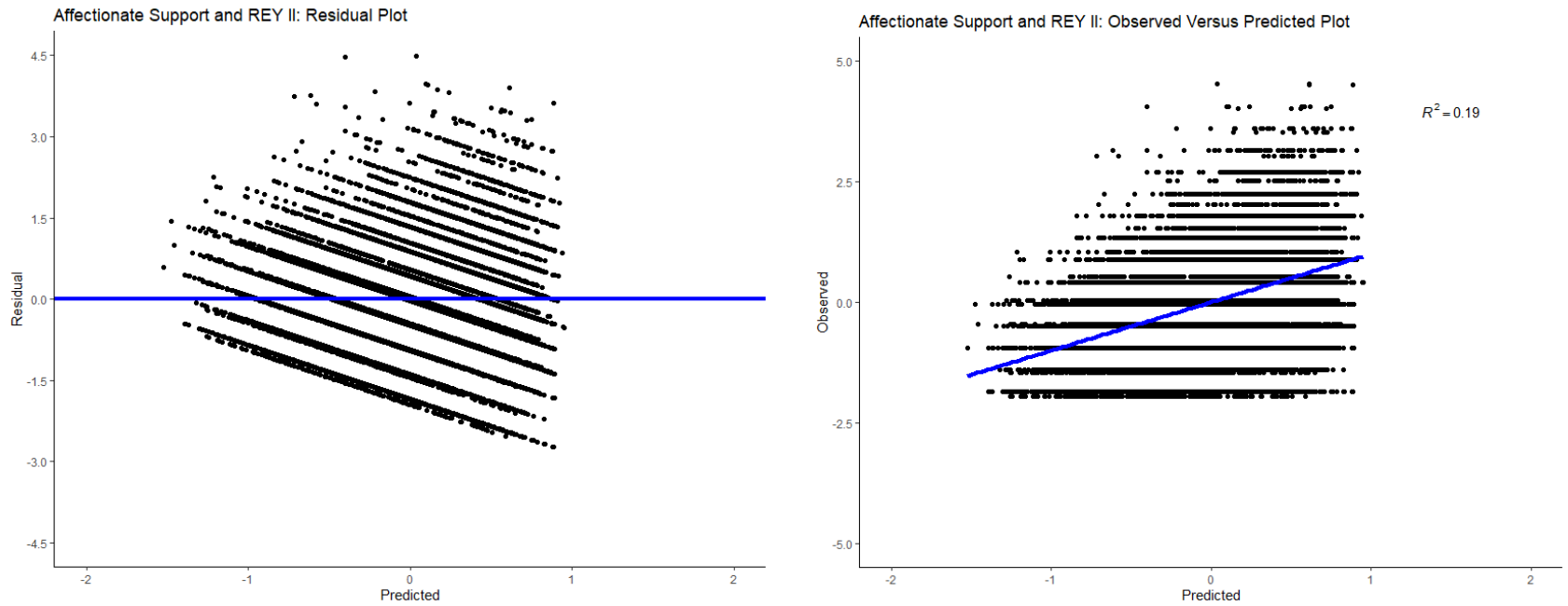

Figure H7. Affectionate support and REY II: Residual and observed versus predicted plots

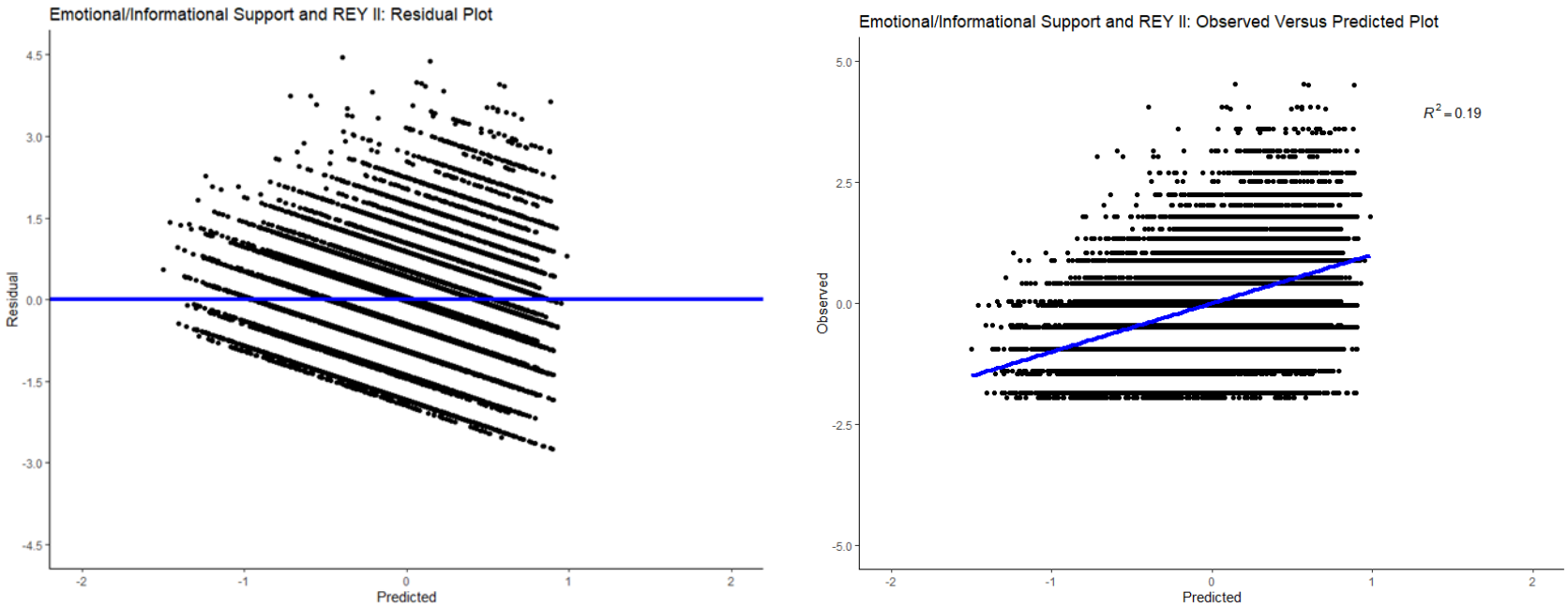

Figure H8. Emotional/informational support and REY II: Residual and observed versus predicted plots

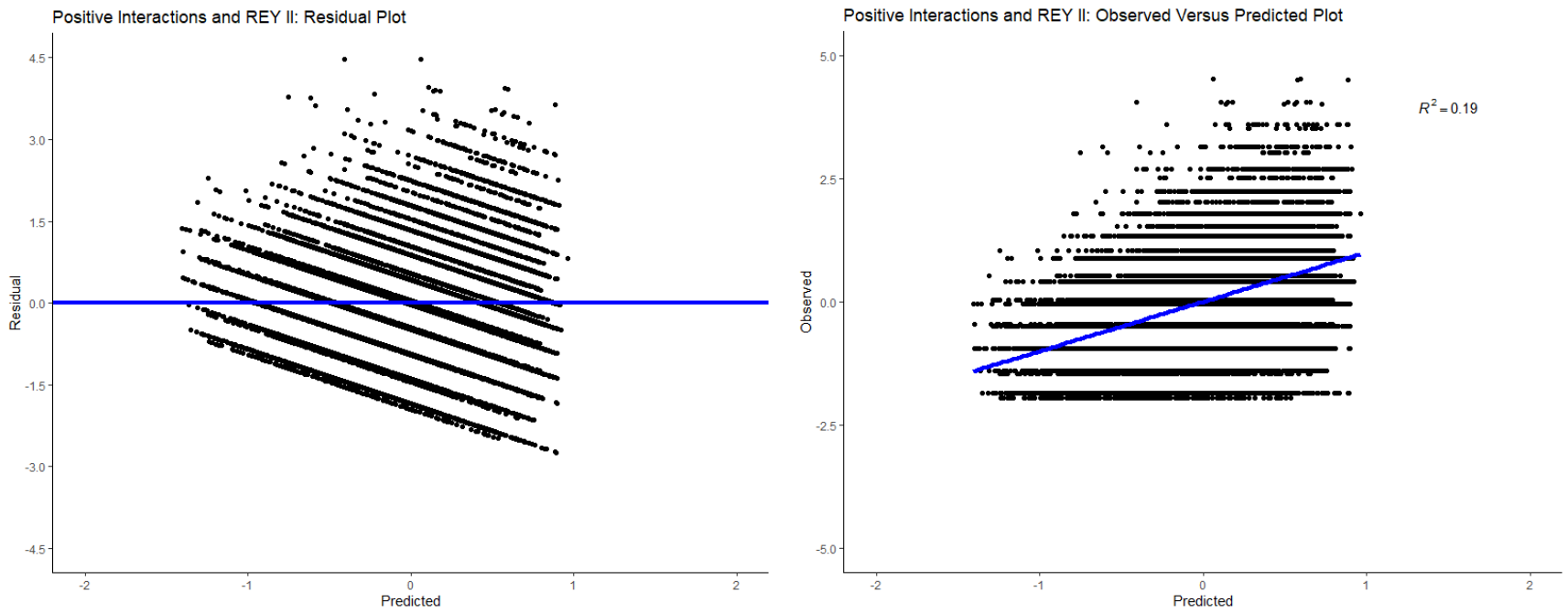

Figure H9. Positive interactions and REY II: Residual and observed versus predicted plots

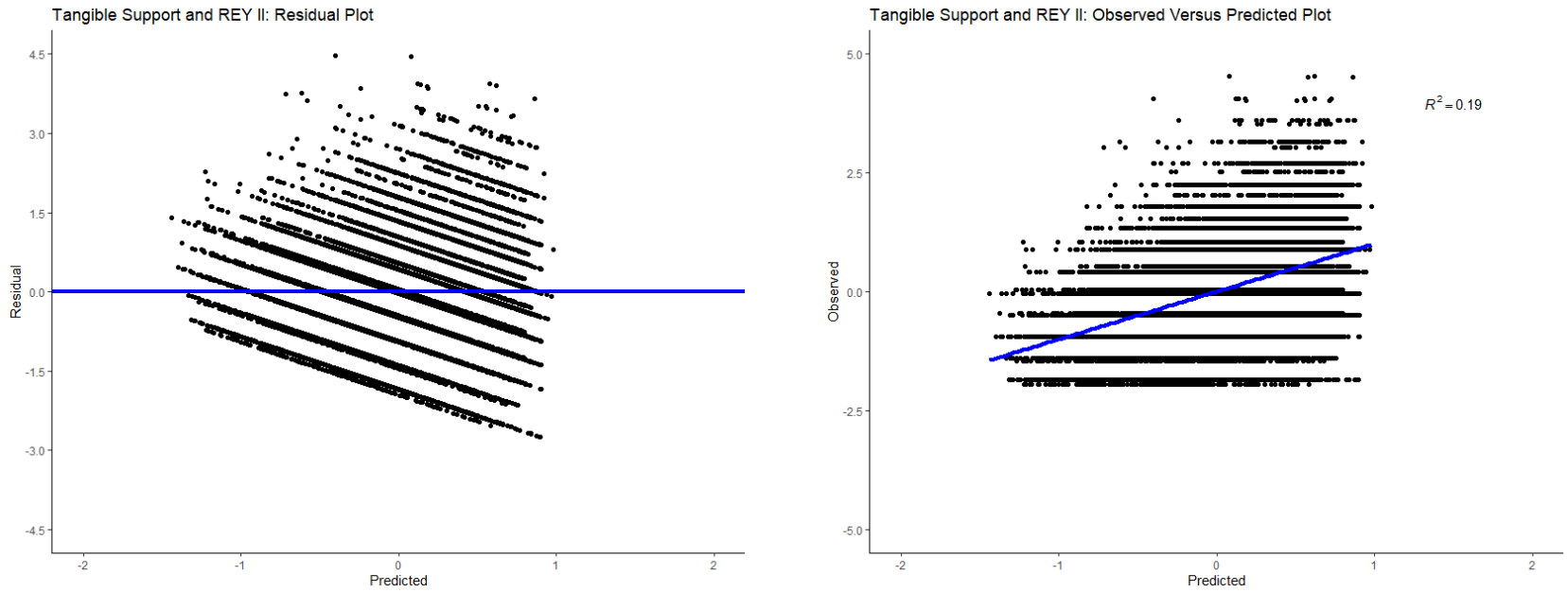

Figure H10. Tangible support and REY II: Residual and observed versus predicted plots

Appendix I: Missing data Mann-Whitney-Wilcoxon analyses

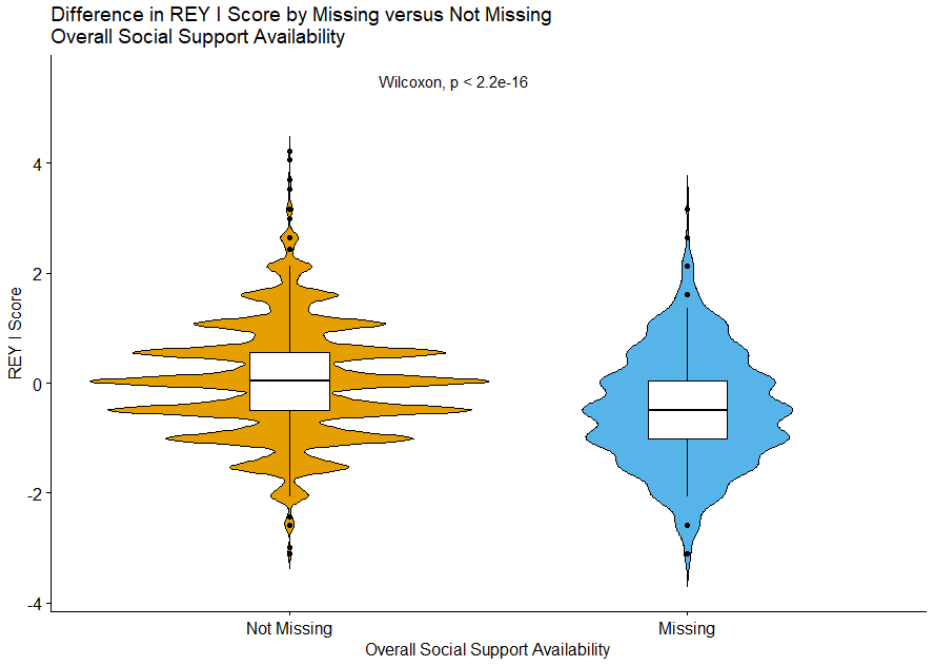

Figure I1. Distribution of Wilcoxon scores for REYI, comparing groups with no missing versus missing data on overall social support availability (OSI)

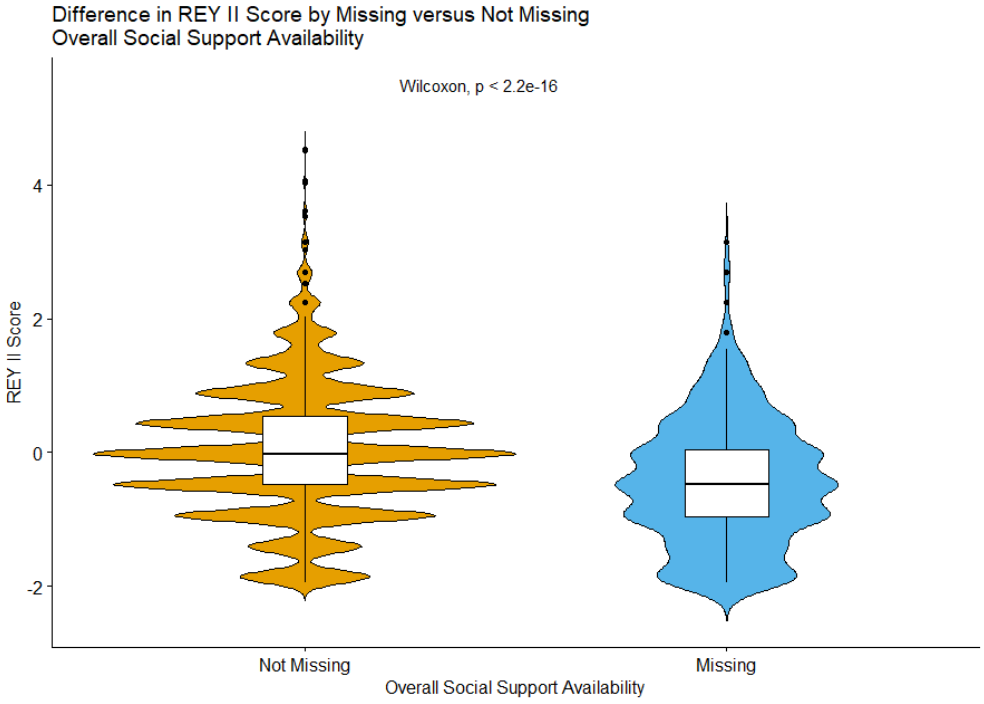

Figure I2. Distribution of Wilcoxon scores for REYII, comparing groups with no missing versus missing data on overall social support availability (OSI)

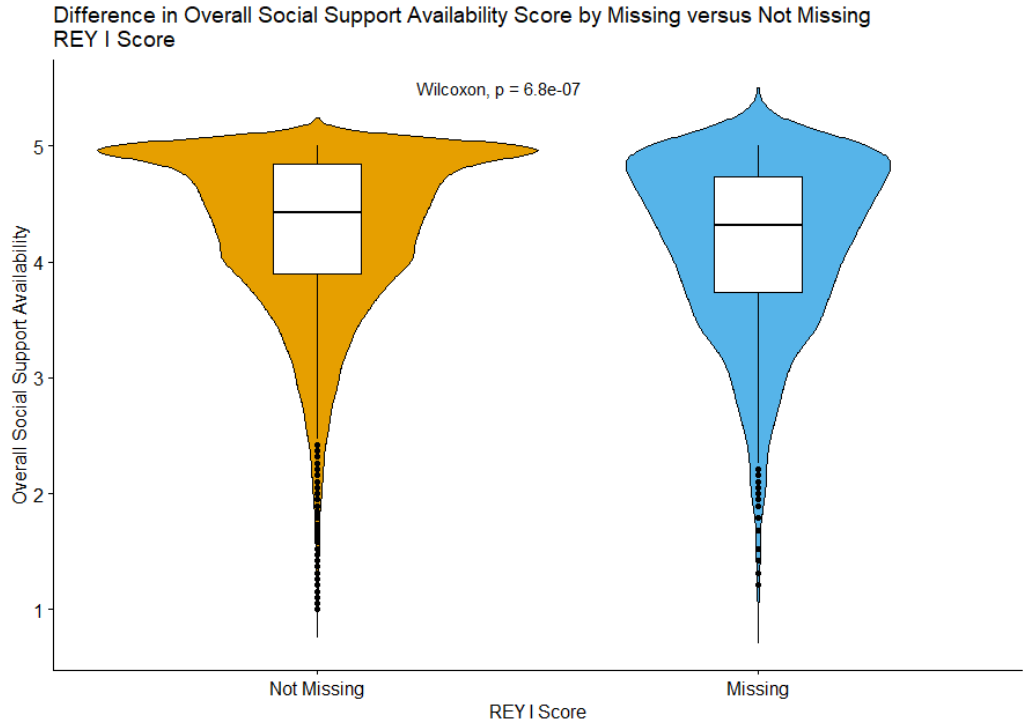

Figure I3. Distribution of Wilcoxon scores for overall social support availability, comparing groups with no missing versus missing data on REY I

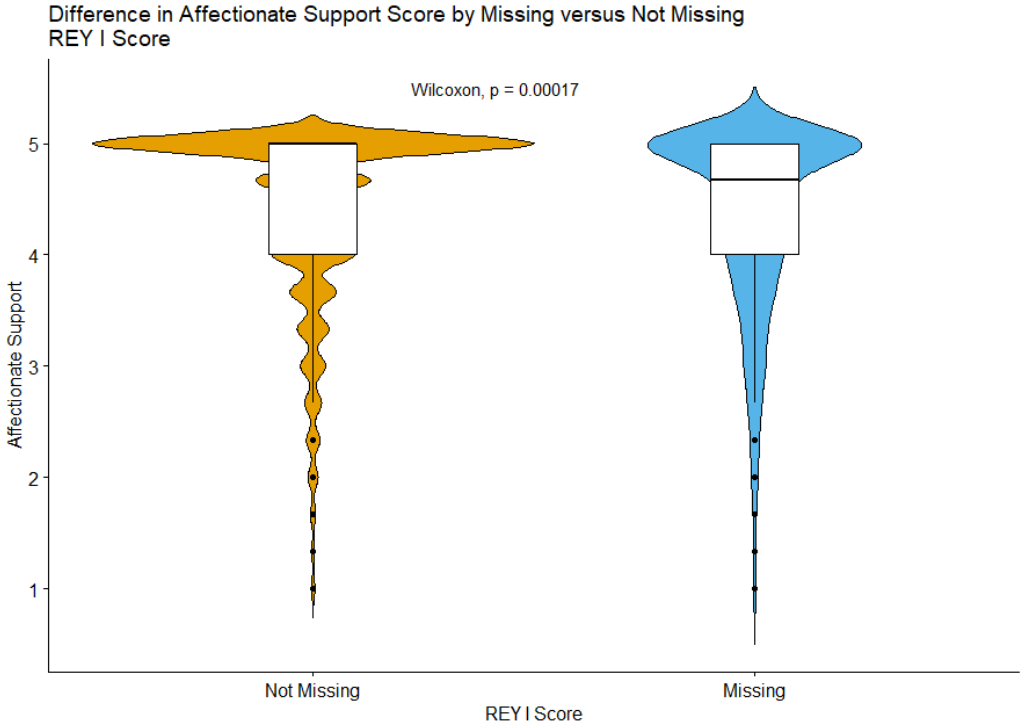

Figure I4. Distribution of Wilcoxon scores for affectionate support, comparing groups with no missing versus missing data on REY I

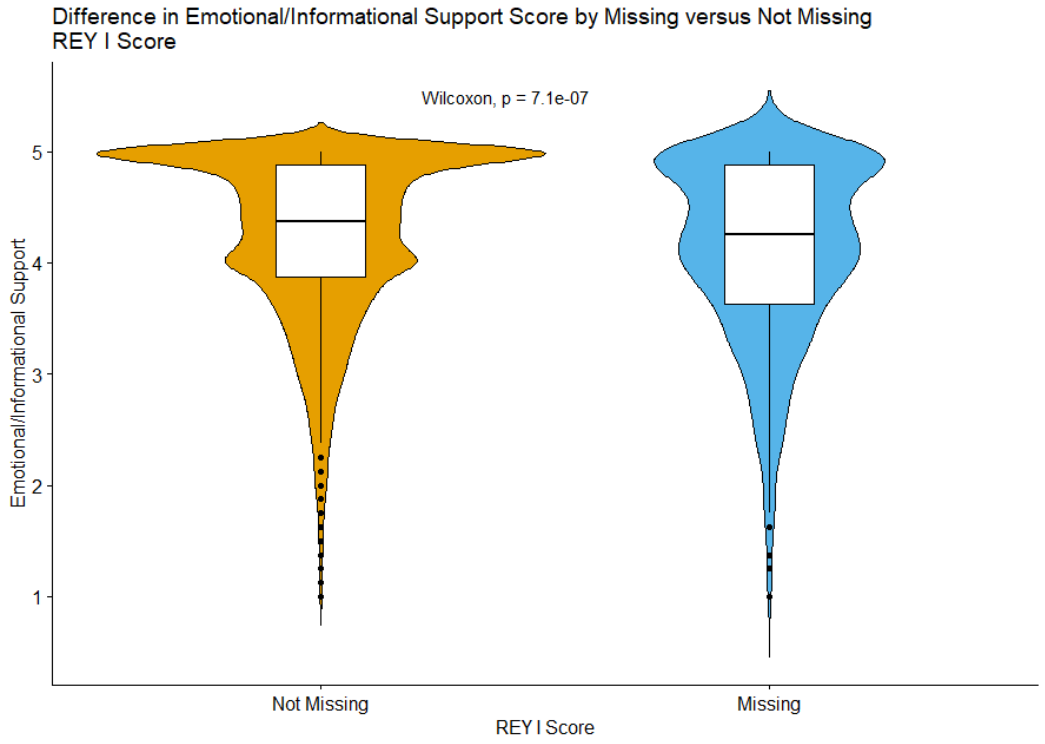

Figure I5. Distribution of Wilcoxon scores for emotional/informational support, comparing groups with no missing versus missing data on REY I

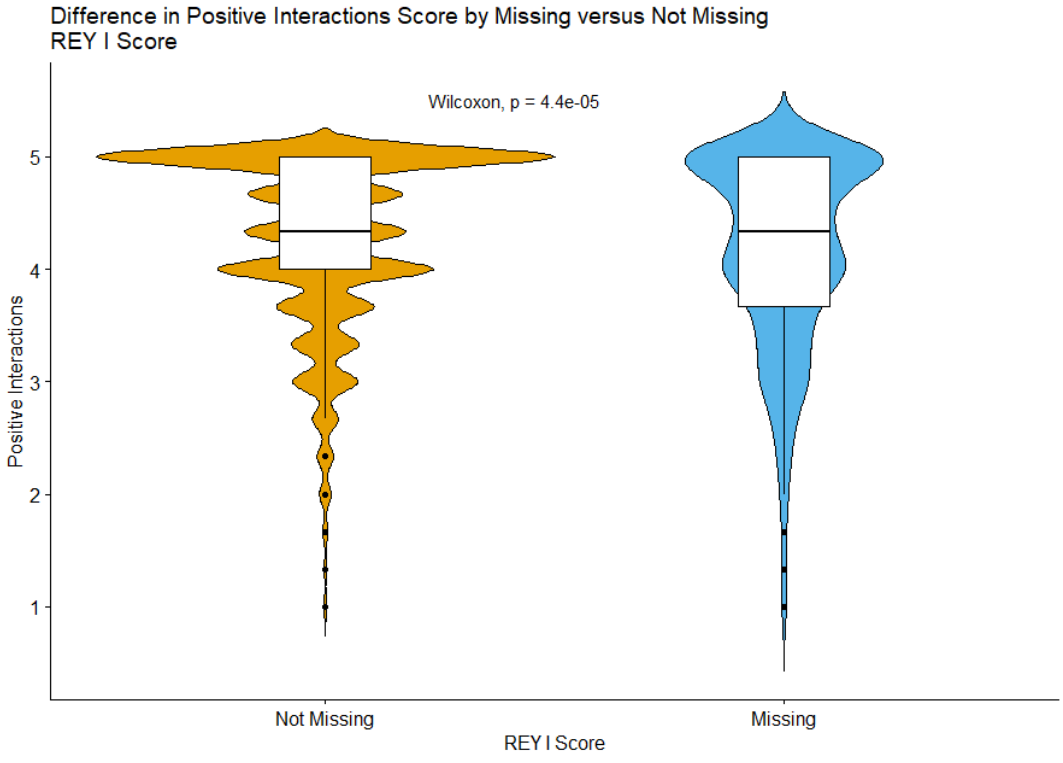

Figure I6. Distribution of Wilcoxon scores for positive interactions, comparing groups with no missing versus missing data on REY I

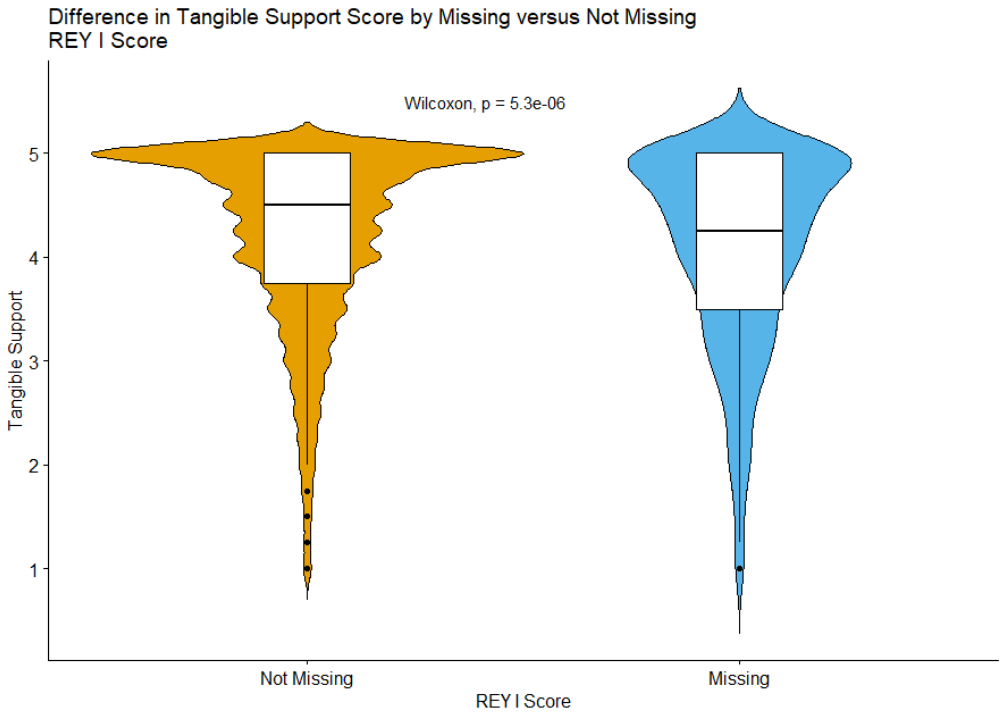

Figure I7. Distribution of Wilcoxon scores for tangible support, comparing groups with no missing versus missing data on REY I

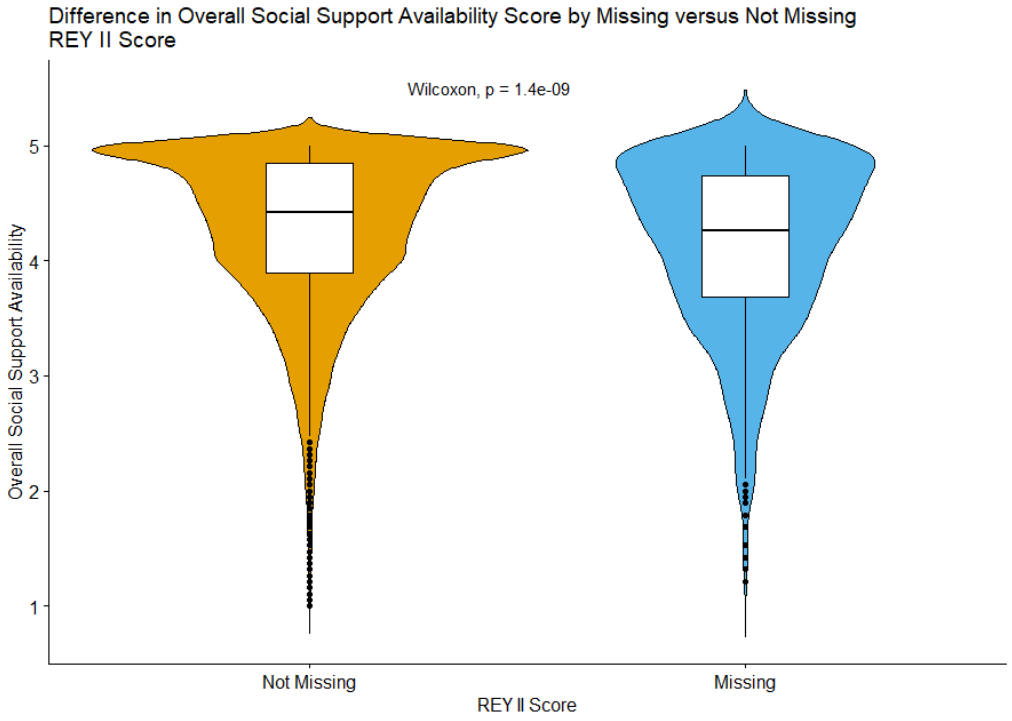

Figure I8. Distribution of Wilcoxon scores for overall social support availability, comparing groups with no missing versus missing data on REY II

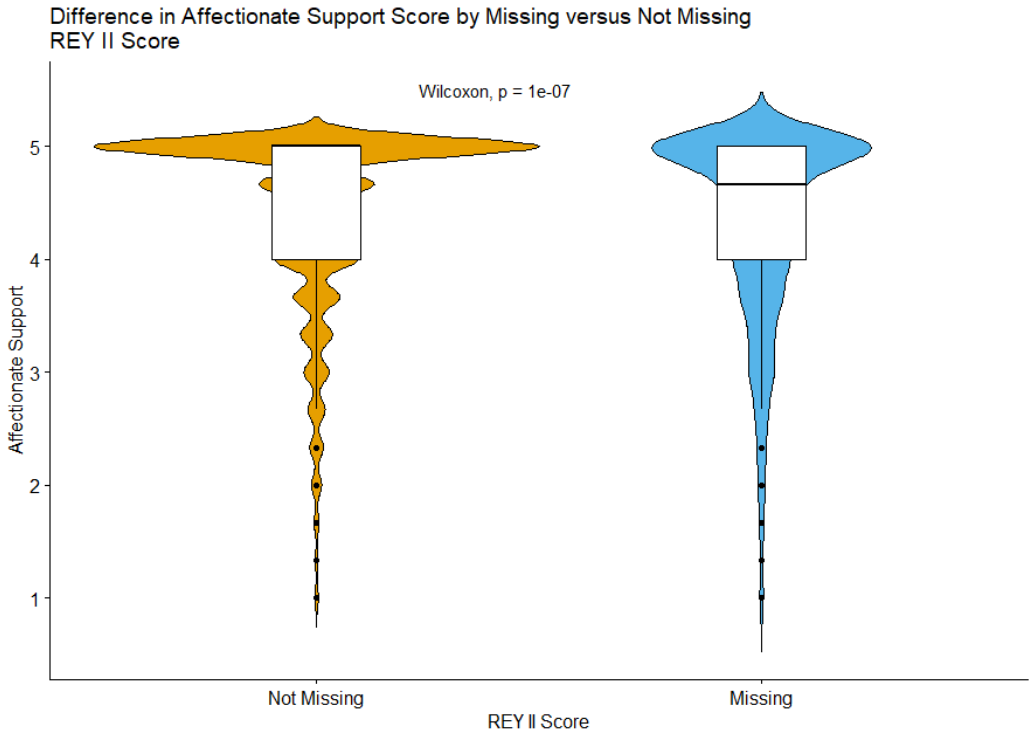

Figure I9. Distribution of Wilcoxon scores for affectionate support, comparing groups with no missing versus missing data on REY II

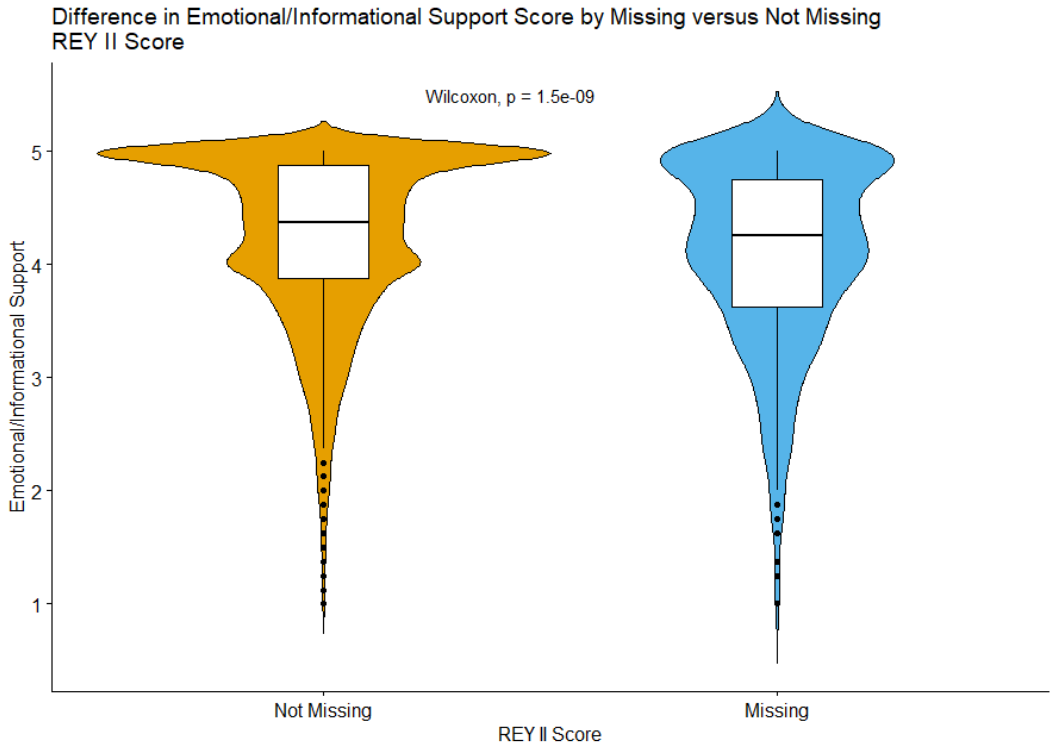

Figure I10. Distribution of Wilcoxon scores for emotional/informational support comparing groups with no missing versus missing data on REY II

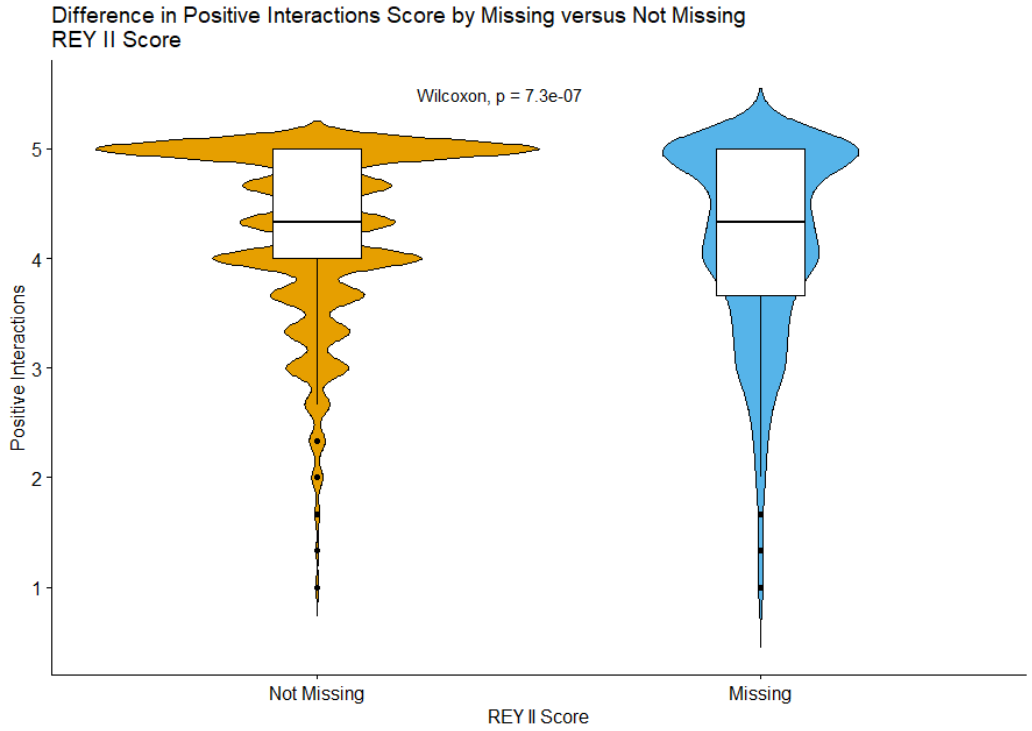

Figure I11. Distribution of Wilcoxon scores for positive interactions, comparing groups with no missing versus missing data on REY II

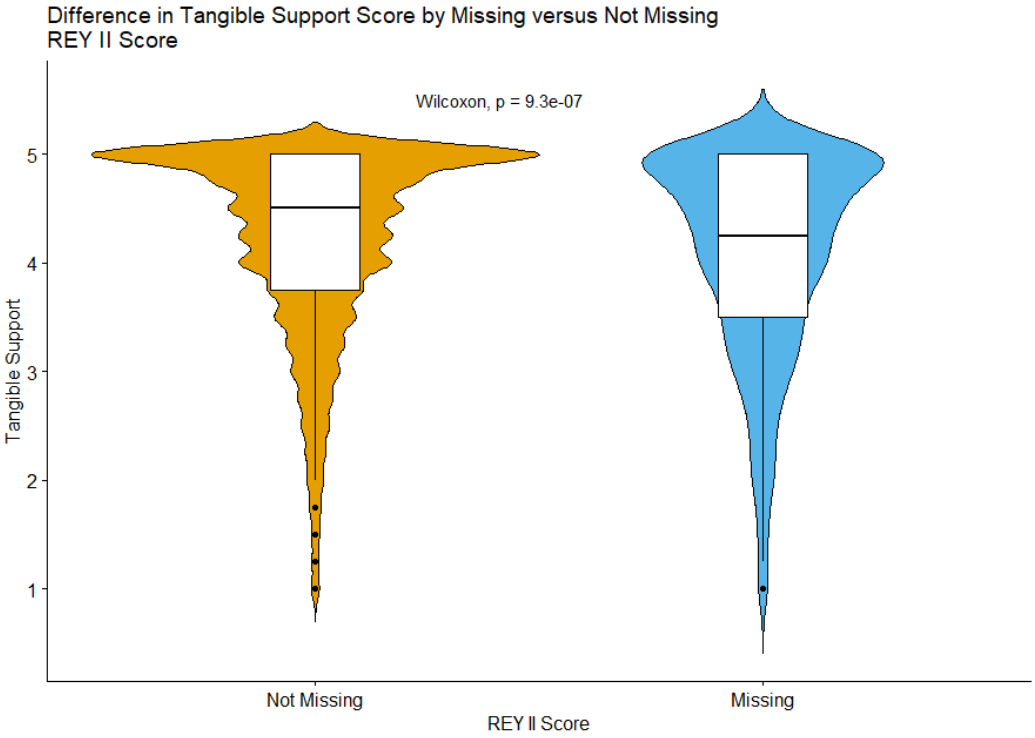

Figure I12. Distribution of Wilcoxon scores for tangible support, comparing groups with no missing versus missing data on REY II

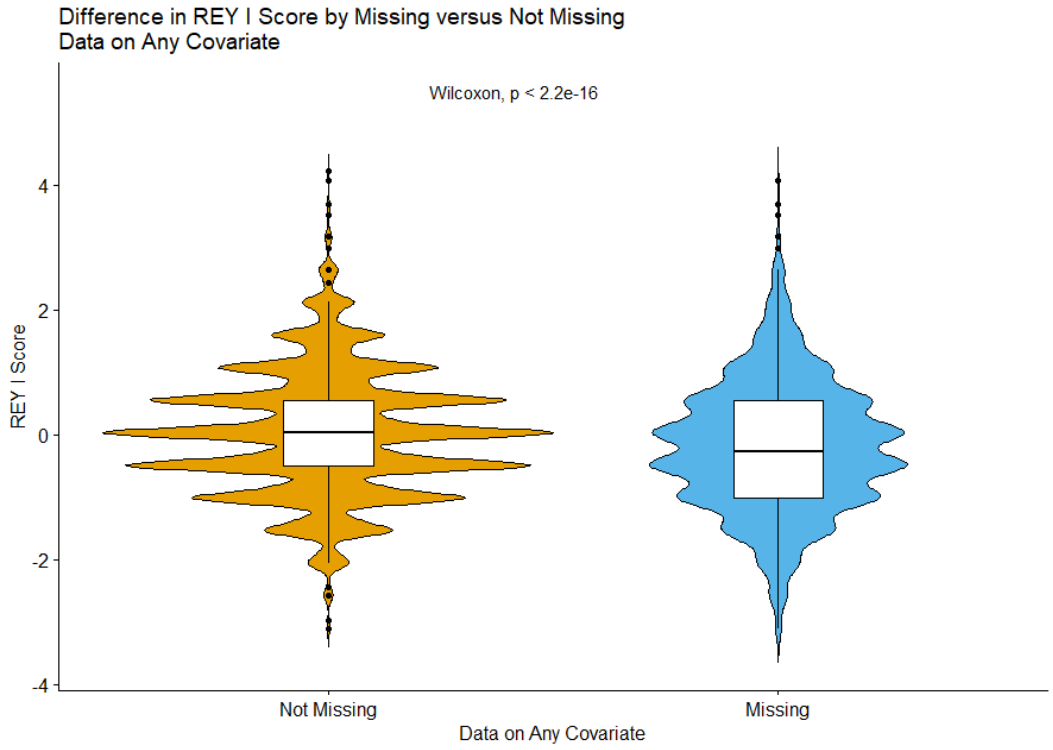

Figure I13. Distribution of Wilcoxon scores for REY I, comparing groups with no missing data on any covariate versus missing data on any covariate

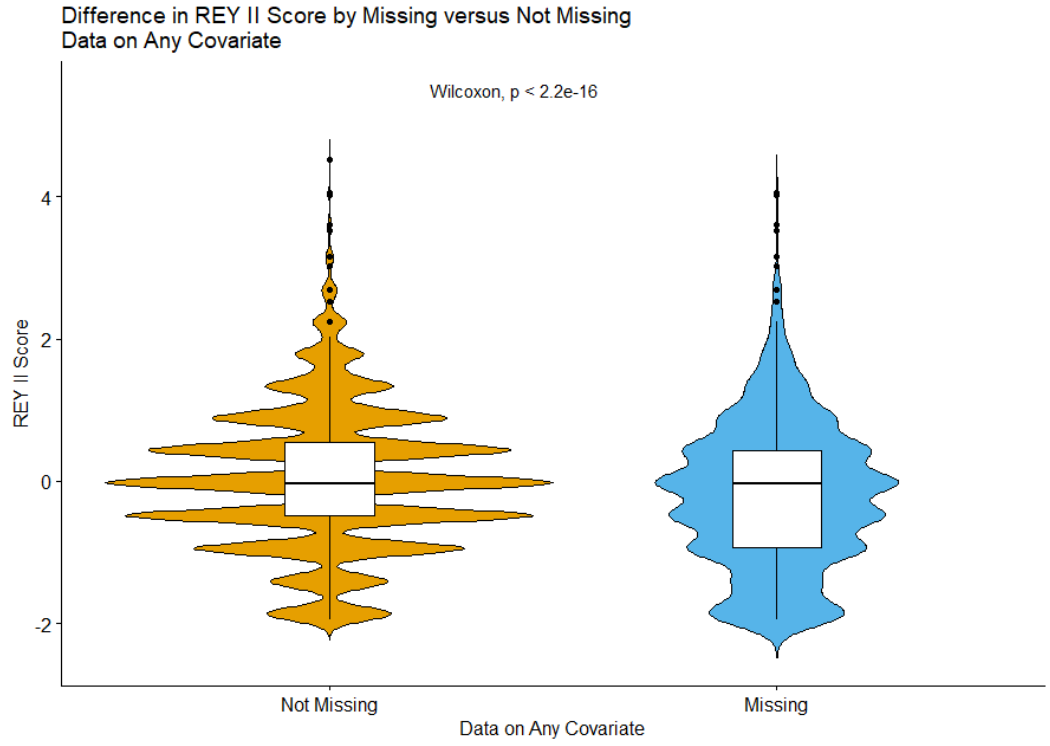

Figure I14. Distribution of Wilcoxon scores for REY II, comparing groups with no missing data on any covariate versus missing data on any covariate

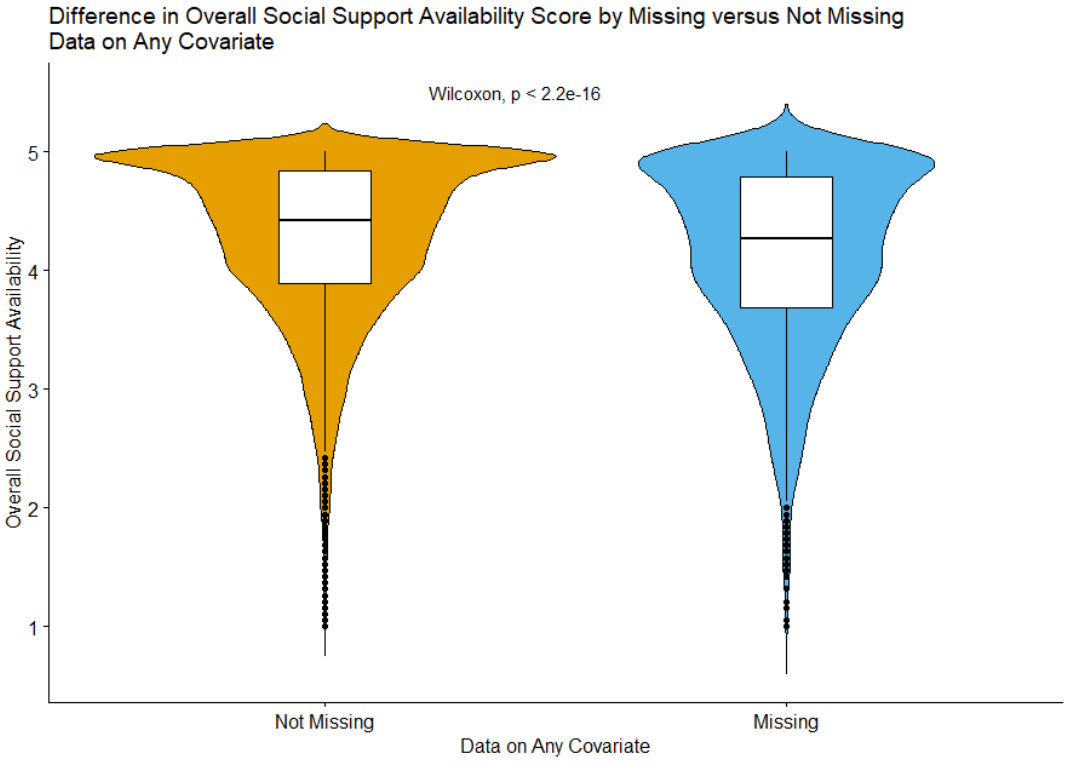

Figure I15. Distribution of Wilcoxon scores for overall social support availability, comparing groups with no missing data on any covariate versus missing data on any covariate

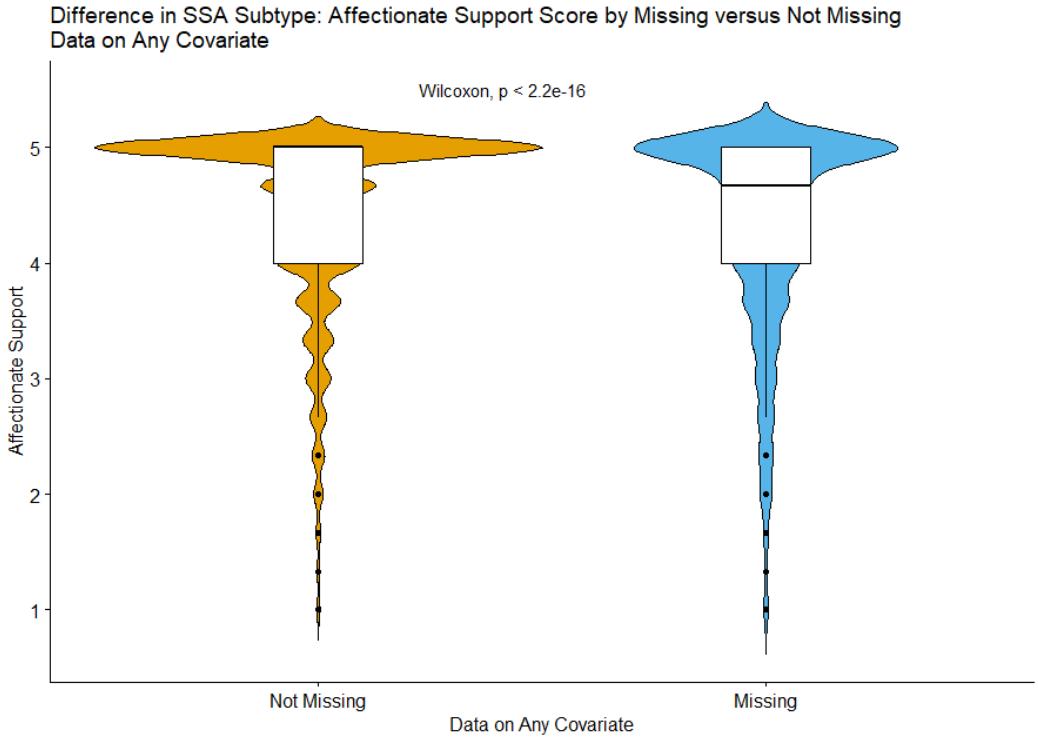

Figure I16. Distribution of Wilcoxon scores for affectionate support, comparing groups with no missing data on any covariate versus missing data on any covariate

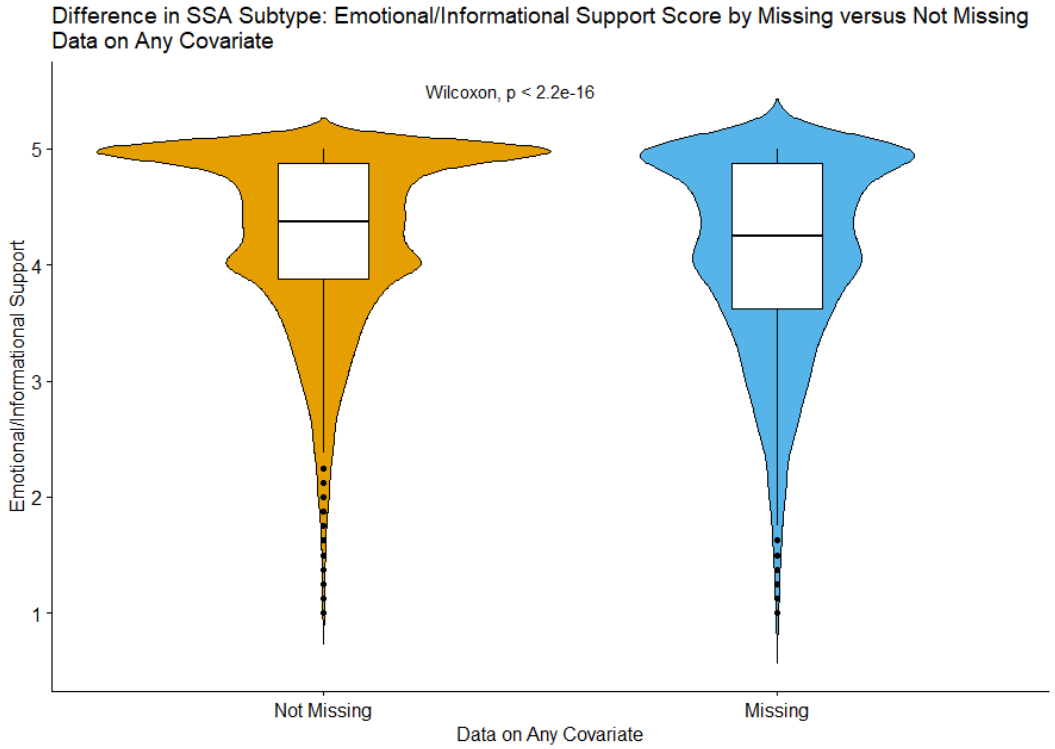

Figure I17. Distribution of Wilcoxon scores for emotional/informational support, comparing groups with no missing data on any covariate versus missing data on any covariate

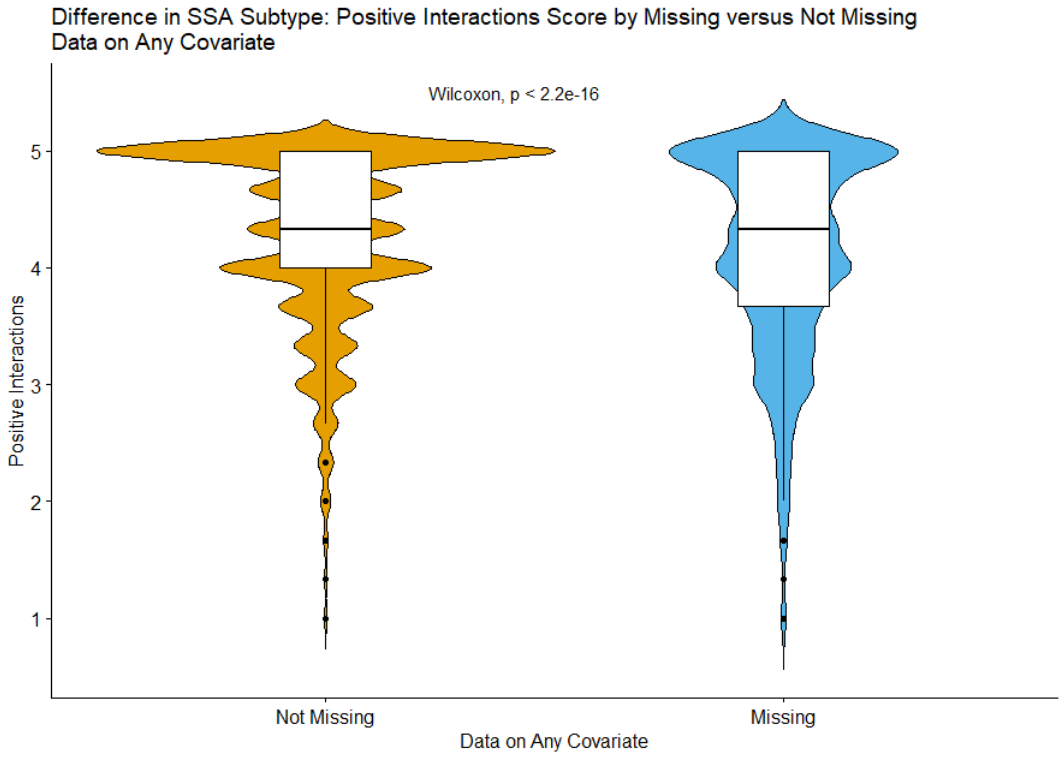

Figure I18. Distribution of Wilcoxon scores for positive interactions, comparing groups with no missing data on any covariate versus missing data on any covariate

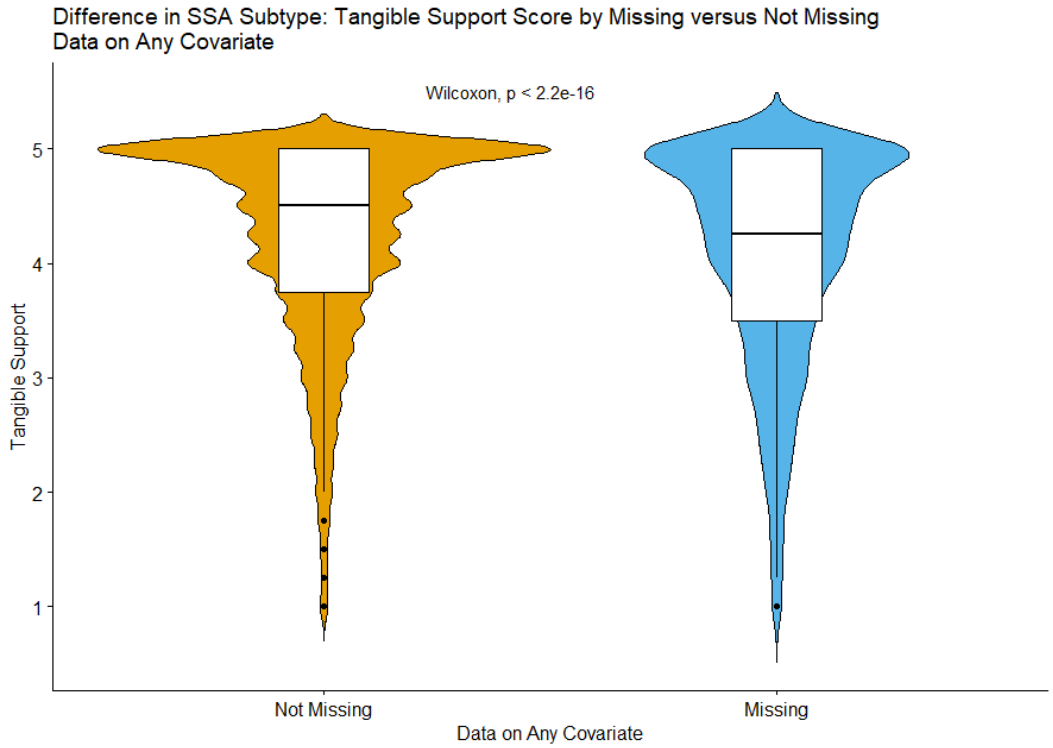

Figure I19. Distribution of Wilcoxon scores for tangible support, comparing groups with no missing data on any covariate versus missing data on any covariate

Appendix J: Multiple linear regression models

Table J1. Multiple linear regression analysis of the association between overall social support availability and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Main effect:					
Overall social support availability	**0.13 (0.11-0.15)**	**0.09 (0.06-0.11)**	***0.07 (0.05-0.09)***	**0.07 (0.05-0.09)**	**0.07 (0.04-0.09)**
R^2 value	0.1358	0.1602	*0.1627*	0.1628	0.1663
Covariate:					
Base:					
Sex (females versus males)	**0.41 (0.38-0.43)**	**0.43 (0.41-0.46)**	***0.43 (0.40-0.46)***	**0.43 (0.40-0.46)**	**0.43 (0.41-0.46)**
Age group (vs 45-54 years)					
55-64 years	**-0.18 (-0.21-[-0.15])**	**-0.14 (-0.17-[-0.11])**	***-0.14 (-0.17-[-0.11])***	**-0.14 (-0.17-[-0.11])**	**-0.14 (-0.17-[-0.11])**
65-74 years	**-0.46 (-0.50-[-0.43])**	**-0.36 (-0.40-[-0.33])**	***-0.36 (-0.40-[-0.33])***	**-0.36 (-0.40-[-0.33])**	**-0.37 (-0.40-[-0.33])**
≥ 75 years	**-0.92 (-0.95-[-0.88])**	**-0.77 (-0.81-[-0.73])**	***-0.76 (-0.80-[-0.72])***	**-0.76 (-0.80-[-0.72])**	**-0.77 (-0.81-[-0.73])**
Province (vs Ontario)					
Alberta	-0.01 (-0.07-0.04)	-0.03 (-0.09-0.02)	*-0.03 (-0.09-0.02)*	-0.03 (-0.09-0.02)	-0.03 (-0.08-0.02)
British Columbia	**0.08 (0.03-0.12)**	**0.09 (0.05-0.13)**	***0.09 (0.05-0.13)***	**0.09 (0.05-0.13)**	**0.10 (0.06-0.13)**
Manitoba	**-0.09 (-0.14-[-0.04])**	**-0.06 (-0.11-[-0.01])**	***-0.06 (-0.11-[-0.01])***	**-0.06 (-0.11-[-0.01])**	**-0.06 (-0.10-[-0.01])**
Newfoundland and Labrador	-0.05 (-0.10-0.01)	-0.04 (-0.09-0.01)	*-0.04 (-0.09-0.01)*	-0.04 (-0.09-0.01)	-0.03 (-0.08-0.02)
Nova Scotia	**-0.19 (-0.24-[-0.14])**	**-0.17 (-0.22-[-0.12])**	***-0.16 (-0.21-[-0.11])***	**-0.16 (-0.21-[-0.11])**	**-0.15 (-0.20-[-0.10])**
Quebec	**-0.06 (-0.10-[-0.02])**	0.00 (-0.03-0.04)	*0.01 (-0.03-0.04)*	0.01 (-0.03-0.05)	0.00 (-0.03-0.04)

Table J1, continued. Multiple linear regression analysis of the association between overall social support availability and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.21 (0.14-0.28)**	***0.20 (0.13-0.27)***	**0.20 (0.13-0.27)**	**0.19 (0.12-0.25)**
Some post-secondary education		**0.33 (0.26-0.40)**	***0.32 (0.25-0.39)***	**0.32 (0.25-0.39)**	**0.30 (0.23-0.37)**
Post-secondary graduation		**0.44 (0.38-0.49)**	***0.42 (0.37-0.48)***	**0.42 (0.36-0.48)**	**0.39 (0.34-0.45)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.15 (0.08-0.22)**	***0.14 (0.06-0.21)***	**0.13 (0.06-0.20)**	**0.12 (0.05-0.19)**
$50,000-$99,999		**0.29 (0.21-0.36)**	***0.26 (0.19-0.33)***	**0.26 (0.19-0.33)**	**0.23 (0.16-0.30)**
$100,000-$149,999		**0.37 (0.29-0.45)**	***0.34 (0.26-0.42)***	**0.33 (0.26-0.41)**	**0.30 (0.22-0.37)**
≥$150,000		**0.44 (0.36-0.52)**	***0.40 (0.32-0.48)***	**0.40 (0.32-0.48)**	**0.35 (0.27-0.43)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		**0.06 (0.01-0.11)**	***0.06 (0.01-0.11)***	**0.06 (0.01-0.11)**	**0.06 (0.01-0.11)**
Widowed		0.04 (-0.01-0.08)	*0.03 (-0.01-0.08)*	0.03 (-0.01-0.08)	0.03 (-0.02-0.08)
Divorced		**0.09 (0.04-0.15)**	***0.08 (0.04-0.13)***	**0.08 (0.04-0.13)**	**0.08 (0.04-0.13)**
Separated		0.06 (-0.03-0.15)	*0.05 (-0.04-0.15)*	0.05 (-0.04-0.15)	0.05 (-0.04-0.14)
Urban/rural living status (rural versus urban living)		**0.06 (0.01-0.10)**	***0.06 (0.01-0.10)***	**0.06 (0.01-0.10)**	**0.05 (0.01-0.10)**

Table J1, continued. Multiple linear regression analysis of the association between overall social support availability and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			*0.05 (-0.07-0.17)*	0.04 (-0.07-0.16)	0.03 (-0.09-0.14)
Good			*0.03 (-0.08-0.14)*	0.02 (-0.09-0.14)	0.00 (-0.11-0.11)
Very good			***0.13 (0.02-0.24)***	**0.12 (0.00-0.23)**	0.08 (-0.04-0.13)
Excellent			***0.13 (0.02-0.24)***	**0.12 (0.01-0.24)**	0.08 (-0.03-0.20)
Number of chronic conditions (vs 0)					
1			*-0.01 (-0.04-0.02)*	-0.01 (-0.04-0.02)	0.00 (-0.04-0.03)
2-3			*-0.01 (-0.05-0.02)*	-0.01 (-0.05-0.02)	-0.01 (-0.04-0.03)
≥4			***-0.07 (-0.13-[-0.01])***	**-0.07 (-0.13-[-0.01])**	-0.05 (-0.11-0.01)
Depressive symptoms:					
Depressive symptoms (yes versus no)				-0.03 (-0.07-0.01)	-0.02 (-0.06-0.02)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.08 (-0.10-[-0.05])**
Current smoker					**-0.11 (-0.16-[-0.06])**

Table J1, continued. Multiple linear regression analysis of the association between overall social support availability and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.02 (-0.03-0.07)
Regular user					**0.12 (0.08-0.17)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J2. Multiple linear regression analysis of the association between affectionate support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Main effect:					
Affectionate support	**0.10 (0.08-0.11)**	**0.06 (0.04-0.08)**	**0.06 (0.04-0.08)**	***0.05 (0.03-0.07)***	**0.05 (0.03-0.07)**
R^2 value	0.1338	0.1593	0.1621	*0.1622*	0.1659
Covariate:					
Base:					
Sex (females versus males)	**0.41 (0.38-0.43)**	**0.43 (0.41-0.46)**	**0.43 (0.40-0.45)**	***0.43 (0.40-0.46)***	**0.43 (0.41-0.46)**
Age group (vs 45-54 years)					
55-64 years	**-0.18 (-0.21-[-0.15])**	**-0.14 (-0.17-[-0.11])**	**-0.14 (-0.17-[-0.11])**	***-0.14 (-0.17-[-0.11])***	**-0.14 (-0.17-[-0.11])**
65-74 years	**-0.47 (-0.50-[-0.43])**	**-0.36 (-0.39-[-0.32])**	**-0.36 (-0.40-[-0.32])**	***-0.36 (-0.40-[-0.32])***	**-0.36 (-0.40-[-0.33])**
≥ 75 years	**-0.92 (-0.96-[-0.89])**	**-0.77 (-0.81-[-0.73])**	**-0.76 (-0.81-[-0.72])**	***-0.77 (-0.81-[-0.72])***	**-0.77 (-0.82-[-0.73])**
Province (vs Ontario)					
Alberta	-0.02 (-0.07-0.04)	-0.03 (-0.09-0.02)	-0.03 (-0.09-0.02)	*-0.04 (-0.09-0.02)*	-0.03 (-0.08-0.02)
British Columbia	**0.08 (0.04-0.12)**	**0.09 (0.05-0.13)**	**0.09 (0.05-0.13)**	***0.09 (0.05-0.13)***	**0.10 (0.06-0.14)**
Manitoba	**-0.09 (-0.14-[-0.05])**	**-0.06 (-0.11-[-0.01])**	**-0.06 (-0.11-[-0.01])**	***-0.06 (-0.11-[-0.01])***	**-0.06 (-0.11-[-0.01])**
Newfoundland and Labrador	-0.05 (-0.10-0.01)	-0.04 (-0.09-0.01)	-0.04 (-0.09-0.01)	*-0.04 (-0.09-0.01)*	-0.03 (-0.08-0.02)
Nova Scotia	**-0.19 (-0.25-[-0.14])**	**-0.16 (-0.21-[-0.11])**	**-0.16 (-0.21-[-0.11])**	***-0.16 (-0.21-[-0.11])***	**-0.15 (-0.20-[-0.10])**
Quebec	**-0.06 (-0.10-[-0.02])**	0.01 (-0.03-0.05)	0.01 (-0.03-0.05)	*0.01 (-0.03-0.05)*	0.01 (-0.03-0.05)

Table J2, continued. Multiple linear regression analysis of the association between affectionate support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.21 (0.15-0.28)**	**0.20 (0.13-0.27)**	***0.20 (0.13-0.27)***	**0.19 (0.12-0.26)**
Some post-secondary education		**0.33 (0.26-0.40)**	**0.32 (0.24-0.39)**	***0.32 (0.24-0.39)***	**0.30 (0.23-0.37)**
Post-secondary graduation		**0.44 (0.38-0.50)**	**0.42 (0.36-0.48)**	***0.42 (0.36-0.48)***	**0.39 (0.34-0.45)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.16 (0.09-0.23)**	**0.14 (0.07-0.21)**	***0.14 (0.06-0.21)***	**0.12 (0.05-0.19)**
$50,000-$99,999		**0.30 (0.22-0.37)**	**0.27 (0.19-0.34)**	***0.26 (0.19-0.34)***	**0.23 (0.16-0.30)**
$100,000-$149,999		**0.38 (0.30-0.46)**	**0.34 (0.27-0.42)**	***0.34 (0.26-0.42)***	**0.30 (0.22-0.38)**
≥$150,000		**0.45 (0.37-0.54)**	**0.41 (0.33-0.49)**	***0.40 (0.32-0.49)***	**0.36 (0.28-0.44)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		**0.07 (0.02-0.12)**	**0.07 (0.01-0.11)**	***0.06 (0.01-0.12)***	**0.06 (0.01-0.12)**
Widowed		0.04 (-0.01-0.09)	0.04 (-0.01-0.08)	*0.04 (-0.01-0.08)*	0.03 (-0.02-0.08)
Divorced		**0.09 (0.04-0.14)**	**0.08 (0.04-0.13)**	***0.08 (0.04-0.13)***	**0.09 (0.04-0.13)**
Separated		0.06 (-0.04-0.15)	0.05 (-0.04-0.15)	*0.05 (-0.04-0.15)*	0.05 (-0.04-0.15)
Urban/rural living status (rural versus urban living)		**0.06 (0.01-0.10)**	**0.06 (0.01-0.10)**	***0.06 (0.01-0.10)***	**0.06 (0.01-0.10)**

Table J2, continued. Multiple linear regression analysis of the association between affectionate support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	**Model 3**[c] β (95% CI)	***Model 4***[d] *β (95% CI)*	**Model 5**[e] β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			0.05 (-0.07-0.17)	*0.05 (-0.07-0.17)*	0.03 (-0.09-0.15)
Good			0.04 (-0.07-0.15)	*0.03 (0.09-0.14)*	0.00 (-0.11-0.11)
Very good			**0.14 (0.03-0.25)**	***0.12 (0.01-0.23)***	0.09 (-0.03-0.20)
Excellent			**0.15 (0.03-0.26)**	***0.13 (0.01-0.24)***	0.09 (-0.02-0.20)
Number of chronic conditions (vs 0)					
1			-0.01 (-0.04-0.02)	*-0.01 (-0.04-0.02)*	-0.01 (-0.04-0.03)
2-3			-0.01 (-0.05-0.02)	*-0.01 (-0.05-0.02)*	-0.01 (-0.04-0.03)
≥4			**-0.07 (-0.13-[-0.01])**	***-0.07 (-0.13-[-0.01])***	-0.05 (-0.11-0.01)
Depressive symptoms:					
Depressive symptoms (yes versus no)				*-0.04 (-0.08-0.00)*	-0.03 (-0.07-0.01)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.08 (-0.10-[-0.05])**
Current smoker					**-0.11 (-0.16-[-0.06])**

Table J2, continued. Multiple linear regression analysis of the association between affectionate support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	**Model 3**[c] β (95% CI)	***Model 4***[d] *β (95% CI)*	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.02 (-0.03-0.07)
Regular user					**0.12 (0.08-0.17)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J3. Multiple linear regression analysis of the association between emotional/informational support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Main effect:					
Emotional/informational support	**0.11 (0.09-0.13)**	**0.07 (0.05-0.09)**	***0.06 (0.04-0.08)***	**0.06 (0.04-0.08)**	**0.06 (0.04-0.07)**
R^2 value	0.1351	0.1601	*0.1626*	0.1628	0.1664
Covariate:					
Base:					
Sex (females versus males)	**0.40 (0.37-0.42)**	**0.43 (0.40-0.46)**	***0.43 (0.40-0.45)***	**0.43 (0.40-0.45)**	**0.43 (0.40-0.46)**
Age group (vs 45-54 years)					
55-64 years	**-0.18 (-0.21-[-0.15])**	**-0.14 (-0.17-[-0.11])**	***-0.14 (-0.17-[-0.11])***	**-0.14 (-0.17-[-0.11])**	**-0.14 (-0.17-[-0.11])**
65-74 years	**-0.46 (-0.49-[-0.43])**	**-0.36 (-0.39-[-0.32])**	***-0.36 (-0.40-[-0.32])***	**-0.36 (-0.40-[-0.32])**	**-0.36 (-0.40-[-0.33])**
≥ 75 years	**-0.91 (-0.95-[-0.87])**	**-0.76 (-0.80-[-0.72])**	***-0.76 (-0.80-[-0.72])***	**-0.76 (-0.80-[-0.72])**	**-0.77 (-0.81-[-0.73])**
Province (vs Ontario)					
Alberta	-0.02 (-0.07-0.04)	-0.03 (-0.09-0.02)	*-0.03 (-0.09-0.02)*	-0.03 (-0.09-0.02)	-0.03 (-0.08-0.02)
British Columbia	**0.07 (0.03-0.11)**	**0.09 (0.05-0.13)**	***0.09 (0.05-0.13)***	**0.09 (0.05-0.13)**	**0.09 (0.06-0.13)**
Manitoba	**-0.09 (-0.14-[-0.04])**	**-0.06 (-0.11-[-0.01)**	***-0.06 (-0.11-[-0.01])***	**-0.06 (-0.11-[-0.01])**	**-0.06 (-0.11-[-0.01])**
Newfoundland and Labrador	-0.04 (-0.10-0.01)	-0.04 (-0.09-0.01)	*-0.04 (-0.09-0.01)*	-0.04 (-0.09-0.01)	-0.03 (-0.08-0.02)
Nova Scotia	**-0.19 (-0.24-[-0.14])**	**-0.16 (-0.21-[-0.12])**	***-0.16 (-0.21-[-0.11])***	**-0.16 (-0.21-[-0.11])**	**-0.15 (-0.20-[-0.10])**
Quebec	**-0.05 (-0.10-[-0.02])**	0.01 (-0.03-0.05)	*0.01 (-0.03-0.05)*	0.01 (-0.03-0.05)	0.01 (-0.03-0.05)

Table J3, continued. Multiple linear regression analysis of the association between emotional/informational support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.21 (0.14-0.28)**	***0.20 (0.13-0.27)***	**0.20 (0.13-0.27)**	**0.19 (0.12-0.25)**
Some post-secondary education		**0.33 (0.26-0.40)**	***0.32 (0.25-0.39)***	**0.32 (0.25-0.39)**	**0.30 (0.23-0.37)**
Post-secondary graduation		**0.44 (0.39-0.49)**	***0.42 (0.36-0.48)***	**0.42 (0.36-0.48)**	**0.39 (0.34-0.45)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.16 (0.08-0.23)**	***0.14 (0.07-0.21)***	**0.14 (0.07-0.21)**	**0.12 (0.05-0.19)**
$50,000-$99,999		**0.29 (0.22-0.36)**	***0.26 (0.19-0.34)***	**0.26 (0.19-0.33)**	**0.23 (0.16-0.30)**
$100,000-$149,999		**0.38 (0.30-0.45)**	***0.34 (0.26-0.42)***	**0.34 (0.26-0.42)**	**0.30 (0.22-0.38)**
≥$150,000		**0.44 (0.36-0.52)**	***0.40 (0.32-0.48)***	**0.40 (0.32-0.48)**	**0.35 (0.27-0.43)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		0.04 (-0.01-0.09)	*0.04 (-0.01-0.09)*	0.04 (-0.01-0.09)	0.04 (-0.01-0.09)
Widowed		0.03 (-0.02-0.07)	*0.02 (-0.02-0.07)*	0.02 (-0.02-0.07)	0.02 (-0.03-0.07)
Divorced		**0.07 (0.02-0.11)**	***0.07 (0.02-0.11)***	**0.07 (0.02-0.11)**	**0.07 (0.02-0.11)**
Separated		0.04 (-0.05-0.13)	*0.04 (-0.05-0.13)*	0.04 (-0.05-0.13)	0.04 (-0.05-0.13)
Urban/rural living status (rural versus urban living)		**0.06 (0.01-0.10)**	***0.06 (0.01-0.10)***	**0.06 (0.01-0.10)**	**0.06 (0.01-0.10)**

Table J3, continued. Multiple linear regression analysis of the association between emotional/informational support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			*0.05 (-0.07-0.17)*	0.05 (-0.07-0.17)	0.03 (-0.09-0.15)
Good			*0.04 (-0.07-0.15)*	0.03 (-0.08-0.17)	0.00 (-0.11-0.11)
Very good			***0.13 (0.02-0.25)***	**0.12 (0.01-0.23)**	0.08 (-0.03-0.20)
Excellent			***0.14 (0.03-0.25)***	**0.12 (0.01-0.24)**	0.09 (-0.02-0.20)
Number of chronic conditions (vs 0)					
1			*-0.01 (-0.04-0.02)*	-0.01 (-0.04-0.02)	0.00 (-0.04-0.03)
2-3			*-0.01 (-0.04-0.02)*	-0.01 (-0.05-0.02)	0.00 (-0.04-0.03)
≥4			***-0.07 (-0.12-[-0.01])***	**-0.07 (-0.12-[-0.01])**	-0.05 (-0.11-0.01)
Depressive symptoms:					
Depressive symptoms (yes versus no)				-0.03 (-0.07-0.01)	-0.03 (-0.07-0.01)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.08 (-0.10-[-0.04])**
Current smoker					**-0.11 (-0.16-[-0.06])**

Table J3, continued. Multiple linear regression analysis of the association between emotional/informational support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.02 (-0.03-0.08)
Regular user					**0.12 (0.08-0.17)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J4. Multiple linear regression analysis of the association between positive interactions and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Main effect:					
Positive interactions	**0.09 (0.07-0.10)**	**0.05 (0.03-0.07)**	**0.04 (0.02-0.06)**	***0.03 (0.01-0.05)***	**0.03 (0.01-0.05)**
R^2 value	0.1328	0.1586	0.1614	*0.1616*	0.1653
Covariate:					
Base:					
Sex (females versus males)	**0.41 (0.38-0.44)**	**0.44 (0.41-0.46)**	**0.43 (0.41-0.46)**	***0.43 (0.41-0.46)***	**0.44 (0.41-0.46)**
Age group (vs 45-54 years)					
55-64 years	**-0.18 (-0.21-[-0.15])**	**-0.14 (-0.17-[-0.11])**	**-0.14 (-0.17-[-0.11])**	***-0.14 (-0.17-[-0.11])***	**-0.14 (-0.17-[-0.11])**
65-74 years	**-0.47 (-0.50-[-0.44])**	**-0.36 (-0.40-[-0.32])**	**-0.36 (-0.40-[-0.33])**	***-0.36 (-0.40-[-0.33])***	**-0.37 (-0.40-[-0.33])**
≥ 75 years	**-0.93 (-0.96-[-0.89])**	**-0.77 (-0.81-[-0.73])**	**-0.77 (-0.81-[-0.72])**	***-0.77 (-0.81-[-0.73])***	**-0.77 (-0.82-[-0.73])**
Province (vs Ontario)					
Alberta	-0.02 (-0.07-0.04)	-0.03 (-0.09-0.02)	-0.04 (-0.09-0.02)	*-0.04 (-0.09-0.02)*	-0.03 (-0.08-0.02)
British Columbia	**0.08 (0.04-0.12)**	**0.09 (0.05-0.13)**	**0.09 (0.06-0.13)**	***0.09 (0.05-0.13)***	**0.10 (0.06-0.14)**
Manitoba	**-0.09 (-0.14-[-0.04])**	**-0.06 (-0.11-[-0.01])**	**-0.06 (-0.11-[-0.01])**	***-0.06 (-0.11-[-0.01])***	**-0.06 (-0.11-[-0.01])**
Newfoundland and Labrador	-0.04 (-0.10-0.01)	-0.04 (-0.09-0.01)	-0.04 (-0.09-0.01)	*-0.04 (-0.09-0.01)*	-0.03 (-0.08-0.02)
Nova Scotia	**-0.19 (-0.24-[-0.14])**	**-0.16 (-0.21-[-0.11])**	**-0.16 (-0.21-[-0.11])**	***-0.16 (-0.21-[-0.11])***	**-0.15 (-0.20-[-0.10])**
Quebec	**-0.07 (-0.11-[-0.03])**	0.00 (-0.04-0.04)	0.00 (-0.04-0.04)	*0.00 (-0.04-0.04)*	0.00 (-0.04-0.04)

Table J4, continued. Multiple linear regression analysis of the association between positive interactions and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.21 (0.14-0.28)**	**0.20 (0.13-0.27)**	***0.20 (0.13-0.27)***	**0.19 (0.12-0.25)**
Some post-secondary education		**0.33 (0.26-0.40)**	**0.32 (0.24-0.39)**	***0.31 (0.24-0.39)***	**0.30 (0.23-0.37)**
Post-secondary graduation		**0.44 (0.38-0.50)**	**0.42 (0.36-0.48)**	***0.42 (0.36-0.48)***	**0.39 (0.34-0.45)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.16 (0.09-0.23)**	**0.14 (0.07-0.21)**	***0.14 (0.07-0.21)***	**0.12 (0.05-0.19)**
$50,000-$99,999		**0.30 (0.23-0.37)**	**0.27 (0.20-0.34)**	***0.27 (0.19-0.34)***	**0.24 (0.17-0.31)**
$100,000-$149,999		**0.39 (0.21-0.46)**	**0.35 (0.27-0.43)**	***0.35 (0.27-0.42)***	**0.31 (0.23-0.39)**
≥$150,000		**0.46 (0.38-0.54)**	**0.41 (0.33-0.50)**	***0.41 (0.33-0.49)***	**0.36 (0.28-0.44)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		0.04 (-0.01-0.09)	0.04 (-0.01-0.09)	*0.04 (-0.01-0.09)*	0.04 (-0.01-0.09)
Widowed		0.03 (-0.02-0.08)	0.02 (-0.02-0.07)	*0.02 (-0.02-0.07)*	0.02 (-0.03-0.07)
Divorced		**0.07 (0.03-0.12)**	**0.07 (0.02-0.11)**	***0.07 (0.02-0.11)***	**0.07 (0.02-0.11)**
Separated		0.04 (-0.05-0.14)	0.04 (-0.05-0.13)	*0.04 (-0.05-0.13)*	0.04 (-0.05-0.13)
Urban/rural living status (rural versus urban living)		**0.06 (0.01-0.10)**	**0.06 (0.01-0.10)**	***0.06 (0.01-0.10)***	**0.06 (0.01-0.10)**

Table J4, continued. Multiple linear regression analysis of the association between positive interactions and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			0.05 (-0.06-0.17)	*0.04 (-0.07-0.16)*	0.03 (-0.09-0.15)
Good			0.04 (-0.07-0.15)	*0.03 (-0.09-0.14)*	0.00 (-0.11-0.11)
Very good			**0.14 (0.03-0.25)**	***0.12 (0.01-0.23)***	0.09 (-0.03-0.20)
Excellent			**0.15 (0.03-0.26)**	***0.13 (0.01-0.24)***	0.09 (-0.02-0.21)
Number of chronic conditions (vs 0)					
1			-0.01 (-0.04-0.02)	*-0.01 (-0.04-0.02)*	0.00 (-0.04-0.03)
2-3			-0.01 (-0.05-0.02)	*-0.01 (-0.05-0.02)*	0.00 (-0.04-0.03)
≥4			**-0.07 (-0.13-[-0.01])**	***-0.07 (-0.12-[-0.01])***	-0.05 (-0.11-0.01)
Depressive symptoms:					
Depressive symptoms (yes versus no)				***-0.04 (-0.08-0.00)***	-0.04 (-0.08-0.00)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.08 (-0.10-[-0.05])**
Current smoker					**-0.11 (-0.16-[-0.07])**

Table J4, continued. Multiple linear regression analysis of the association between positive interactions and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	**Model 3**[c] β (95% CI)	***Model 4***[d] *β (95% CI)*	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.02 (-0.03-0.08)
Regular user					**0.12 (0.08-0.17)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J5. Multiple linear regression analysis of the association between tangible support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Main effect:					
Tangible support	**0.09 (0.08-0.11)**	**0.06 (0.04-0.08)**	***0.05 (0.04-0.07)***	**0.05 (0.03-0.07)**	**0.05 (0.03-0.07)**
R^2 value	0.1343	0.1595	*0.1623*	0.1625	0.1661
Covariate:					
Base:					
Sex (females versus males)	**0.42 (0.40-0.45)**	**0.44 (0.42-0.47)**	***0.44 (0.41-0.46)***	**0.44 (0.41-0.47)**	**0.44 (0.41-0.47)**
Age group (vs 45-54 years)					
55-64 years	**-0.19 (-0.22-[-0.15])**	**-0.14 (-0.17-[-0.11])**	***-0.14 (-0.17-[-0.11])***	**-0.14 (-0.18-[-0.11])**	**-0.14 (-0.17-[-0.11])**
65-74 years	**-0.47 (-0.51-[-0.44])**	**-0.36 (-0.40-[-0.33])**	***-0.37 (-0.40-[-0.33])***	**-0.37 (-0.40-[-0.33])**	**-0.37 (-0.41-[-0.33])**
≥ 75 years	**-0.93 (-0.96-[-0.89])**	**-0.77 (-0.81-[-0.73])**	***-0.77 (-0.81-[-0.72])***	**-0.77 (-0.81-[-0.73])**	**-0.78 (-0.82-[-0.73])**
Province (vs Ontario)					
Alberta	-0.02 (-0.07-0.04)	-0.03 (-0.09-0.02)	*-0.03 (-0.09-0.02)*	-0.03 (-0.09-0.02)	-0.03 (-0.08-0.02)
British Columbia	**0.08 (0.04-0.12)**	**0.09 (0.05-0.13)**	***0.09 (0.06-0.13)***	**0.09 (0.05-0.13)**	**0.10 (0.06-0.14)**
Manitoba	**-0.09 (-0.13-[-0.04])**	**-0.06 (-0.11-[-0.01])**	***-0.05 (-0.10-[-0.01])***	**-0.06 (-0.10-[-0.01])**	**-0.05 (-0.10-[-0.01])**
Newfoundland and Labrador	-0.05 (-0.10-0.01)	-0.04 (-0.09-0.01)	*-0.04 (-0.09-0.01)*	-0.04 (-0.09-0.01)	-0.03 (-0.08-0.02)
Nova Scotia	**-0.19 (-0.24-[-0.14])**	**-0.16 (-0.21-[-0.12])**	***-0.16 (-0.21-[-0.11])***	**-0.16 (-0.21-[-0.11])**	**-0.15 (-0.20-[-0.10])**
Quebec	**-0.07 (-0.11-[-0.03])**	0.00 (-0.04-0.04)	*0.01 (-0.04-0.05)*	0.00 (-0.03-0.04)	0.00 (-0.04-0.04)

Table J5, continued. Multiple linear regression analysis of the association between tangible support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.21 (0.15-0.28)**	***0.20 (0.13-0.27)***	**0.20 (0.13-0.27)**	**0.19 (0.12-0.26)**
Some post-secondary education		**0.33 (0.26-0.40)**	***0.32 (0.25-0.39)***	**0.32 (0.25-0.39)**	**0.30 (0.23-0.37)**
Post-secondary graduation		**0.44 (0.38-0.50)**	***0.42 (0.36-0.48)***	**0.42 (0.36-0.48)**	**0.39 (0.34-0.45)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.16 (0.09-0.23)**	***0.14 (0.07-0.21)***	**0.14 (0.07-0.21)**	**0.12 (0.05-0.19)**
$50,000-$99,999		**0.30 (0.22-0.37)**	***0.27 (0.19-0.34)***	**0.26 (0.19-0.33)**	**0.23 (0.16-0.30)**
$100,000-$149,999		**0.38 (0.31-0.46)**	***0.34 (0.27-0.42)***	**0.34 (0.26-0.42)**	**0.30 (0.22-0.38)**
≥$150,000		**0.45 (0.37-0.53)**	***0.41 (0.33-0.49)***	**0.40 (0.32-0.48)**	**0.36 (0.28-0.44)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		**0.06 (0.01-0.12)**	***0.06 (0.01-0.11)***	**0.06 (0.01-0.11)**	**0.06 (0.01-0.11)**
Widowed		0.04 (0.00-0.09)	*0.04 (-0.01-0.09)*	0.04 (-0.01-0.09)	0.04 (-0.01-0.09)
Divorced		**0.10 (0.05-0.14)**	***0.09 (0.04-0.14)***	**0.09 (0.04-0.13)**	**0.09 (0.04-0.14)**
Separated		0.07 (-0.03-0.16)	*0.06 (-0.03-0.15)*	0.06 (-0.03-0.15)	0.06 (-0.03-0.15)
Urban/rural living status (rural versus urban living)		**0.06 (0.01-0.10)**	***0.06 (0.01-0.10)***	**0.06 (0.01-0.10)**	**0.05 (0.01-0.10)**

Table J5, continued. Multiple linear regression analysis of the association between tangible support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			*0.05 (-0.07-0.17)*	0.04 (-0.08-0.16)	0.03 (-0.09-0.14)
Good			*0.04 (-0.07-0.15)*	0.02 (-0.09-0.14)	0.00 (-0.11-0.11)
Very good			***0.14 (0.02-0.25)***	**0.12 (0.01-0.23)**	0.08 (-0.02-0.20)
Excellent			***0.14 (0.03-0.26)***	**0.13 (0.01-0.24)**	0.09 (-0.03-0.20)
Number of chronic conditions (vs 0)					
1			*-0.01 (-0.04-0.02)*	-0.01 (-0.04-0.02)	0.00 (-0.04-0.02)
2-3			*-0.01 (-0.05-0.02)*	-0.01 (-0.05-0.02)	-0.01 (-0.04-0.03)
≥4			***-0.07 (-0.13-[-0.01])***	**-0.07 (-0.13-[-0.01])**	-0.05 (-0.11-0.01)
Depressive symptoms:					
Depressive symptoms (yes versus no)				**-0.04 (-0.09-0.00)**	-0.03 (-0.07-0.00)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.08 (-0.10-[-0.05])**
Current smoker					**-0.11 (-0.16-[-0.06])**

Table J5, continued. Multiple linear regression analysis of the association between tangible support and REY I score (n=24,945)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.02 (-0.03-0.08)
Regular user					**0.12 (0.08-0.17)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J6. Multiple linear regression analysis of the association between overall social support availability and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	**Model 4[d]** β (95% CI)	***Model 5[e]*** *β (95% CI)*
Main effect:					
Overall social support availability	**0.10 (0.08-0.12)**	**0.07 (0.05-0.09)**	**0.06 (0.04-0.08)**	**0.06 (0.03-0.08)**	***0.05 (0.03-0.07)***
R^2 value	0.1436	0.1606	0.1632	0.1633	*0.1658*
Covariate:					
Base:					
Sex (females versus males)	**0.45 (0.42-0.48)**	**0.47 (0.45-0.50)**	**0.47 (0.44-0.49)**	**0.47 (0.44-0.50)**	***0.47 (0.44-0.50)***
Age group (vs 45-54 years)					
55-64 years	**-0.23 (-0.26-[-0.20])**	**-0.20 (-0.23-[-0.17])**	**-0.20 (-0.23-[-0.17])**	**-0.20 (-0.23-[-0.17])**	***-0.20 (-0.23-[-0.17])***
65-74 years	**-0.51 (-0.54-[-0.47])**	**-0.43 (-0.46-[-0.39])**	**-0.43 (-0.47-[-0.39])**	**-0.43 (-0.47-[-0.40])**	***-0.44 (-0.48-[-0.40])***
≥ 75 years	**-0.94 (-0.98-[-0.90])**	**-0.82 (-0.86-[-0.78])**	**-0.82 (-0.86-[-0.78])**	**-0.82 (-0.86-[-0.78])**	***-0.83 (-0.87-[-0.78])***
Province (vs Ontario)					
Alberta	**0.09 (0.04-0.15)**	**0.08 (0.02-0.13)**	**0.08 (0.02-0.13)**	**0.07 (0.02-0.13)**	***0.08 (0.02-0.13)***
British Columbia	**0.17 (0.13-0.22)**	**0.18 (0.13-0.22)**	**0.18 (0.14-0.22)**	**0.18 (0.14-0.22)**	***0.18 (0.14-0.22)***
Manitoba	0.04 (-0.01-0.09)	**0.06 (0.01-0.11)**	**0.06 (0.01-0.11)**	**0.06 (0.01-0.11)**	***0.06 (0.01-0.11)***
Newfoundland and Labrador	0.04 (-0.02-0.10)	0.04 (-0.02-0.09)	0.04 (-0.02-0.10)	0.04 (-0.02-0.10)	*0.05 (-0.01-0.10)*
Nova Scotia	-0.04 (-0.10-0.01)	-0.02 (-0.07-0.02)	-0.02 (-0.07-0.03)	-0.02 (-0.07-0.03)	*-0.01 (-0.06-0.04)*
Quebec	0.02 (-0.02-0.06)	**0.07 (0.03-0.11)**	**0.07 (0.03-0.12)**	**0.07 (0.03-0.12)**	***0.07 (0.03-0.11)***

Table J6, continued. Multiple linear regression analysis of the association between overall social support availability and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	**Model 4[d]** β (95% CI)	***Model 5[e]*** *β (95% CI)*
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.16 (0.09-0.23)**	**0.15 (0.08-0.22)**	**0.15 (0.08-0.21)**	***0.14 (0.08-0.21)***
Some post-secondary education		**0.30 (0.22-0.36)**	**0.28 (0.21-0.35)**	**0.28 (0.21-0.35)**	***0.27 (0.20-0.34)***
Post-secondary graduation		**0.39 (0.34-0.45)**	**0.38 (0.32-0.43)**	**0.37 (0.32-0.43)**	***0.36 (0.30-0.41)***
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.11 (0.04-0.18)**	**0.09 (0.03-0.16)**	**0.09 (0.02-0.16)**	***0.08 (0.01-0.14)***
$50,000-$99,999		**0.22 (0.15-0.29)**	**0.19 (0.12-0.26)**	**0.19 (0.12-0.26)**	***0.16 (0.09-0.14)***
$100,000-$149,999		**0.30 (0.23-0.38)**	**0.27 (0.19-0.34)**	**0.27 (0.19-0.34)**	***0.23 (0.15-0.30)***
≥$150,000		**0.30 (0.22-0.38)**	**0.26 (0.18-0.33)**	**0.26 (0.18-0.34)**	***0.22 (0.14-0.29)***
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		0.05 (0.00-0.10)	0.05 (-0.01-0.10)	0.05 (-0.01-0.10)	*0.05 (-0.01-0.10)*
Widowed		0.02 (-0.03-0.38)	0.01 (-0.03-0.06)	0.01 (-0.03-0.06)	*0.01 (-0.04-0.06)*
Divorced		**0.07 (0.02-0.12)**	**0.06 (0.02-0.11)**	**0.06 (0.01-0.11)**	***0.06 (0.01-0.11)***
Separated		**0.10 (0.02-0.19)**	**0.10 (0.01-0.18)**	**0.10 (0.01-0.18)**	***0.09 (0.01-0.18)***
Urban/rural living status (rural versus urban living)		-0.01 (-0.06-0.04)	-0.01 (-0.06-0.04)	-0.01 (-0.06-0.04)	*-0.01 (-0.06-0.04)*

Table J6, continued. Multiple linear regression analysis of the association between overall social support availability and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	**Model 4[d]** β (95% CI)	***Model 5[e]*** *β (95% CI)*
Health-related:					
Self-rated health (vs poor)					
Fair			0.10 (-0.02-0.22)	0.09 (-0.03-0.22)	*0.08 (-0.05-0.20)*
Good			0.11 (-0.01-0.23)	0.10 (-0.02-0.22)	*0.08 (-0.04-0.19)*
Very good			**0.17 (0.05-0.29)**	**0.16 (0.04-0.28)**	***0.13 (0.01-0.25)***
Excellent			**0.23 (0.11-0.35)**	**0.22 (0.10-0.34)**	***0.19 (0.07-0.30)***
Number of chronic conditions (vs 0)					
1			-0.01 (-0.04-0.02)	-0.01 (-0.04-0.02)	*-0.01 (-0.04-0.03)*
2-3			-0.01 (-0.04-0.03)	0.00 (-0.04-0.03)	*0.00 (-0.04-0.04)*
≥4			-0.05 (-0.10-0.01)	-0.05 (-0.10-0.01)	*-0.03 (-0.09-0.02)*
Depressive symptoms:					
Depressive symptoms (yes versus no)				-0.03 (-0.07-0.01)	*-0.02 (-0.06-0.02)*
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					***-0.05 (-0.07-[-0.02])***
Current smoker					***-0.08 (-0.13-[-0.03])***

Table J6, continued. Multiple linear regression analysis of the association between overall social support availability and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	**Model 3**[c] β (95% CI)	**Model 4**[d] β (95% CI)	***Model 5***[e] *β (95% CI)*
Alcohol use (vs not user)					
Occasional user					*0.05 (0.00-0.11)*
Regular user					***0.13 (0.09-0.18)***

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J7. Multiple linear regression analysis of the association between affectionate support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Main effect:					
Affectionate support	**0.08 (0.07-0.10)**	**0.06 (0.04-0.08)**	***0.05 (0.03-0.07)***	**0.05 (0.03-0.07)**	**0.05 (0.03-0.07)**
R^2 value	0.1429	0.1604	*0.1632*	0.1633	0.1659
Covariate:					
Base:					
Sex (females versus males)	**0.45 (0.42-0.48)**	**0.47 (0.44-0.50)**	***0.47 (0.44-0.49)***	**0.47 (0.44-0.49)**	**0.47 (0.44-0.50)**
Age group (vs 45-54 years)					
55-64 years	**-0.23 (-0.26-[-0.20])**	**-0.20 (-0.23-[-0.17])**	***-0.20 (-0.23-[-0.17])***	**-0.20 (-0.23-[-0.17])**	**-0.20 (-0.23-[-0.17])**
65-74 years	**-0.50 (-0.54-[-0.47])**	**-0.42 (-0.46-[-0.39])**	***-0.43 (-0.47-[-0.39])***	**-0.43 (-0.47-[-0.39])**	**-0.44 (-0.47-[-0.40])**
≥ 75 years	**-0.95 (-0.98-[-0.91])**	**-0.82 (-0.86-[-0.78])**	***-0.82 (-0.86-[-0.78])***	**-0.82 (-0.87-[-0.78])**	**-0.83 (-0.87-[-0.78])**
Province (vs Ontario)					
Alberta	**0.09 (0.04-0.15)**	**0.08 (0.02-0.13)**	***0.07 (0.02-0.13)***	**0.07 (0.02-0.13)**	**0.08 (0.02-0.13)**
British Columbia	**0.17 (0.13-0.22)**	**0.18 (0.14-0.22)**	***0.18 (0.14-0.22)***	**0.18 (0.14-0.22)**	**0.18 (0.14-0.22)**
Manitoba	0.04 (-0.01-0.09)	**0.06 (0.01-0.10)**	***0.06 (0.01-0.11)***	**0.06 (0.01-0.11)**	**0.06 (0.01-0.11)**
Newfoundland and Labrador	0.04 (-0.02-0.10)	0.04 (-0.02-0.09)	*0.04 (-0.02-0.10)*	0.04 (-0.02-0.10)	0.05 (-0.01-0.10)
Nova Scotia	-0.04 (-0.86-0.01)	-0.02 (-0.07-0.03)	*-0.02 (-0.06-0.03)*	-0.02 (-0.06-0.03)	-0.01 (-0.06-0.04)
Quebec	0.02 (-0.02-0.06)	**0.07 (0.03-0.12)**	***0.08 (0.03-0.12)***	**0.08 (0.03-0.12)**	**0.07 (0.03-0.11)**

Table J7, continued. Multiple linear regression analysis of the association between affectionate support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.16 (0.10-0.23)**	***0.15 (0.09-0.22)***	**0.15 (0.08-0.22)**	**0.14 (0.08-0.21)**
Some post-secondary education		**0.29 (0.22-0.36)**	***0.28 (0.21-0.35)***	**0.28 (0.21-0.35)**	**0.27 (0.20-0.34)**
Post-secondary graduation		**0.39 (0.34-0.45)**	***0.38 (0.32-0.43)***	**0.37 (0.32-0.43)**	**0.35 (0.30-0.41)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.11 (0.05-0.18)**	***0.09 (0.03-0.16)***	**0.09 (0.02-0.16)**	**0.08 (0.01-0.14)**
$50,000-$99,999		**0.23 (0.16-0.30)**	***0.20 (0.13-0.27)***	**0.19 (0.12-0.26)**	**0.16 (0.09-0.23)**
$100,000-$149,999		**0.31 (0.23-0.38)**	***0.27 (0.19-0.34)***	**0.27 (0.19-0.34)**	**0.23 (0.15-0.31)**
≥$150,000		**0.31 (0.24-0.39)**	***0.27 (0.19-0.34)***	**0.26 (0.18-0.34)**	**0.22 (0.14-0.30)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		**0.07 (0.01-0.12)**	***0.06 (0.01-0.11)***	**0.06 (0.00-0.11)**	**0.06 (0.01-0.11)**
Widowed		0.03 (-0.02-0.07)	*0.02 (-0.03-0.07)*	0.02 (-0.03-0.07)	0.02 (-0.03-0.06)
Divorced		**0.08 (0.03-0.13)**	***0.07 (0.02-0.13)***	**0.07 (0.02-0.12)**	**0.07 (0.02-0.12)**
Separated		**0.11 (0.02-0.20)**	***0.10 (0.01-0.19)***	**0.10 (0.01-0.19)**	**0.10 (0.01-0.19)**
Urban/rural living status (rural versus urban living)		-0.01 (-0.05-0.04)	*-0.01 (-0.05-0.04)*	-0.01 (-0.05-0.04)	-0.01 (-0.06-0.04)

Table J7, continued. Multiple linear regression analysis of the association between affectionate support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			*0.10 (-0.03-0.22)*	0.09 (-0.03-0.22)	0.08 (-0.04-0.20)
Good			*0.11 (-0.01-0.23)*	0.10 (-0.01-0.22)	0.08 (-0.04-0.19)
Very good			***0.18 (0.06-0.29)***	**0.16 (0.05-0.28)**	**0.13 (0.01-0.25)**
Excellent			***0.24 (0.12-0.36)***	**0.22 (0.10-0.35)**	**0.19 (0.07-0.31)**
Number of chronic conditions (vs 0)					
1			*-0.01 (-0.04-0.02)*	-0.01 (-0.04-0.03)	0.00 (-0.04-0.03)
2-3			*-0.01 (-0.04-0.03)*	0.00 (-0.04-0.03)	0.00 (-0.04-0.04)
≥4			*-0.05 (-0.11-0.01)*	-0.05 (-0.11-0.01)	-0.03 (-0.09-0.02)
Depressive symptoms:					
Depressive symptoms (yes versus no)				-0.03 (-0.07-0.01)	-0.02 (-0.06-0.02)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.05 (-0.07-[-0.02])**
Current smoker					**-0.08 (-0.13-[-0.03])**

Table J7, continued. Multiple linear regression analysis of the association between affectionate support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.05 (0.00-0.11)
Regular user					**0.13 (0.09-0.18)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J8. Multiple linear regression analysis of the association between emotional/informational support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Main effect:					
Emotional/informational support	**0.09 (0.07-0.11)**	**0.06 (0.04-0.08)**	***0.05 (0.03-0.07)***	**0.05 (0.03-0.07)**	**0.05 (0.03-0.06)**
R^2 value	0.1433	0.1607	*0.1633*	0.1634	0.1659
Covariate:					
Base:					
Sex (females versus males)	**0.44 (0.42-0.47)**	**0.47 (0.44-0.50)**	***0.46 (0.44-0.49)***	**0.47 (0.44-0.49)**	**0.47 (0.44-0.50)**
Age group (vs 45-54 years)					
55-64 years	**-0.23 (-0.26-[-0.20])**	**-0.20 (-0.23-[-0.17])**	***-0.20 (-0.23-[-0.17])***	**-0.20 (-0.23-[-0.17])**	**-0.20 (-0.23-[-0.17])**
65-74 years	**-0.50 (-0.54-[-0.47])**	**-0.42 (-0.46-[-0.39])**	***-0.43 (-0.47-[-0.39])***	**-0.43 (-0.47-[-0.39])**	**-0.44 (-0.47-[-0.40])**
≥ 75 years	**-0.94 (-0.98-[-0.90])**	**-0.82 (-0.86-[-0.78])**	***-0.82 (-0.86-[-0.77])***	**-0.82 (-0.86-[-0.78])**	**-0.82 (-0.87-[-0.78])**
Province (vs Ontario)					
Alberta	**0.09 (0.04-0.15)**	**0.08 (0.02-0.13)**	***0.08 (0.02-0.13)***	**0.07 (0.02-0.13)**	**0.08 (0.02-0.13)**
British Columbia	**0.17 (0.13-0.21)**	**0.17 (0.13-0.22)**	***0.18 (0.14-0.22)***	**0.18 (0.13-0.22)**	**0.18 (0.14-0.22)**
Manitoba	0.04 (-0.01-0.09)	**0.06 (0.01-0.10)**	***0.06 (0.01-0.11)***	**0.06 (0.01-0.11)**	**0.06 (0.01-0.11)**
Newfoundland and Labrador	0.04 (-0.01-0.10)	0.04 (-0.02-0.10)	*0.04 (-0.01-0.10)*	0.04 (-0.01-0.10)	0.05 (-0.01-0.10)
Nova Scotia	-0.04 (-0.09-0.01)	-0.02 (-0.07-0.03)	*-0.02 (-0.07-0.03)*	-0.02 (-0.07-0.03)	-0.01 (-0.06-0.04)
Quebec	0.03 (-0.02-0.07)	**0.08 (0.04-0.12)**	***0.08 (0.04-0.12)***	**0.08 (0.04-0.12)**	**0.07 (0.03-0.12)**

Table J8, continued. Multiple linear regression analysis of the association between emotional/informational support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	***Model 3[c]*** *β (95% CI)*	**Model 4[d]** β (95% CI)	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.16 (0.09-0.22)**	***0.15 (0.08-0.22)***	**0.15 (0.08-0.22)**	**0.14 (0.08-0.21)**
Some post-secondary education		**0.29 (0.22-0.36)**	***0.29 (0.21-0.35)***	**0.28 (0.21-0.35)**	**0.27 (0.21-0.34)**
Post-secondary graduation		**0.39 (0.34-0.44)**	***0.38 (0.32-0.43)***	**0.37 (0.32-0.43)**	**0.35 (0.30-0.41)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.11 (0.05-0.18)**	***0.09 (0.03-0.16)***	**0.09 (0.03-0.16)**	**0.08 (0.01-0.14)**
$50,000-$99,999		**0.23 (0.16-0.29)**	***0.20 (0.13-0.27)***	**0.19 (0.12-0.26)**	**0.16 (0.10-0.23)**
$100,000-$149,999		**0.31 (0.23-0.38)**	***0.27 (0.19-0.38)***	**0.27 (0.19-0.34)**	**0.23 (0.16-0.31)**
≥$150,000		**0.31 (0.23-0.38)**	***0.26 (0.23-0.34)***	**0.26 (0.18-0.34)**	**0.22 (0.14-0.30)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		0.03 (-0.02-0.09)	*0.03 (-0.02-0.08)*	0.03 (-0.02-0.08)	0.03 (-0.02-0.08)
Widowed		0.01 (-0.04-0.06)	*0.00 (-0.04-0.05)*	0.01 (-0.04-0.05)	0.00 (-0.04-0.05)
Divorced		**0.06 (0.01-0.10)**	***0.05 (0.00-0.10)***	**0.05 (0.00-0.10)**	**0.05 (0.00-0.10)**
Separated		**0.09 (0.00-0.18)**	*0.08 (0.00-0.17)*	0.08 (0.00-0.17)	0.08 (0.00-0.17)
Urban/rural living status (rural versus urban living)		-0.01 (-0.05-0.04)	*-0.01 (-0.05-0.04)*	-0.01 (-0.06-0.04)	-0.01 (-0.06-0.04)

Table J8, continued. Multiple linear regression analysis of the association between emotional/informational support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			*0.10 (-0.03-0.22)*	0.09 (-0.03-0.22)	0.08 (-0.04-0.21)
Good			*0.11 (-0.01-0.23)*	0.10 (-0.02-0.22)	0.08 (-0.04-0.20)
Very good			***0.18 (0.06-0.29)***	**0.16 (0.04-0.28)**	**0.13 (0.01-0.25)**
Excellent			***0.23 (0.11-0.36)***	**0.22 (0.10-0.34)**	**0.19 (0.07-0.31)**
Number of chronic conditions (vs 0)					
1			*-0.01 (-0.04-0.02)*	-0.01 (-0.04-0.03)	-0.01 (-0.04-0.03)
2-3			*0.00 (-0.04-0.03)*	0.00 (-0.04-0.03)	0.00 (-0.04-0.04)
≥4			*-0.05 (-0.10-0.01)*	-0.04 (-0.10-0.01)	-0.03 (-0.09-0.03)
Depressive symptoms:					
Depressive symptoms (yes versus no)				-0.03 (-0.07-0.01)	-0.02 (-0.06-0.02)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.05 (-0.07-[-0.02])**
Current smoker					**-0.08 (-0.13-[-0.03])**

Table J8, continued. Multiple linear regression analysis of the association between emotional/informational support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	***Model 3***[c] *β (95% CI)*	**Model 4**[d] β (95% CI)	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.05 (0.00-0.11)
Regular user					**0.13 (0.09-0.18)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J9. Multiple linear regression analysis of the association between positive interactions and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Main effect:					
Positive interactions	**0.06 (0.05-0.08)**	**0.04 (0.02-0.06)**	**0.03 (0.01-0.05)**	***0.02 (0.00-0.04)***	0.02 (0.00-0.04)
R^2 value	0.1414	0.1595	0.1623	*0.1625*	0.1651
Covariate:					
Base:					
Sex (females versus males)	**0.45 (0.43-0.48)**	**0.48 (0.45-0.50)**	**0.47 (0.44-0.50)**	***0.47 (0.44-0.50)***	**0.47 (0.45-0.50)**
Age group (vs 45-54 years)					
55-64 years	**-0.23 (-0.27-[-0.20])**	**-0.20 (-0.23-[-0.17])**	**-0.20 (-0.23-[-0.17])**	***-0.20 (-0.24-[-0.17])***	**-0.20 (-0.23-[-0.17])**
65-74 years	**-0.51 (-0.55-[-0.48])**	**-0.43 (-0.46-[-0.39])**	**-0.43 (-0.47-[-0.39])**	***-0.43 (-0.47-[-0.38])***	**-0.44 (-0.48-[-0.40])**
≥ 75 years	**-0.95 (-0.99-[-0.91])**	**-0.82 (-0.86-[-0.78])**	**-0.82 (-0.87-[-0.78])**	***-0.82 (-0.87-[-0.78])***	**-0.83 (-0.87-[-0.79])**
Province (vs Ontario)					
Alberta	**0.09 (0.04-0.14)**	**0.07 (0.02-0.13)**	**0.07 (0.02-0.13)**	***0.07 (0.02-0.13)***	**0.08 (0.02-0.13)**
British Columbia	**0.17 (0.13-0.22)**	**0.18 (0.14-0.22)**	**0.18 (0.14-0.22)**	***0.18 (0.14-0.22)***	**0.18 (0.14-0.22)**
Manitoba	0.04 (-0.01-0.09)	**0.06 (0.01-0.10)**	**0.06 (0.01-0.11)**	***0.06 (0.01-0.11)***	**0.06 (0.01-0.11)**
Newfoundland and Labrador	0.04 (-0.01-0.10)	0.04 (-0.02-0.10)	0.04 (-0.01-0.10)	*0.04 (-0.01-0.10)*	0.05 (-0.01-0.11)
Nova Scotia	-0.04 (-0.09-0.01)	-0.02 (-0.07-0.03)	-0.01 (-0.06-0.03)	*-0.01 (-0.06-0.03)*	-0.01 (-0.06-0.04)
Quebec	0.01 (-0.03-0.05)	**0.07 (0.03-0.11)**	**0.07 (0.03-0.12)**	***0.07 (0.03-0.12)***	**0.07 (0.03-0.11)**

Table J9, continued. Multiple linear regression analysis of the association between positive interactions and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.16 (0.09-0.23)**	**0.15 (0.09-0.22)**	***0.15 (0.08-0.22)***	**0.14 (0.08-0.21)**
Some post-secondary education		**0.29 (0.22-0.36)**	**0.28 (0.21-0.35)**	***0.28 (0.21-0.35)***	**0.27 (0.20-0.34)**
Post-secondary graduation		**0.39 (0.34-0.45)**	**0.38 (0.32-0.43)**	***0.37 (0.32-0.43)***	**0.35 (0.30-0.41)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.12 (0.05-0.19)**	**0.10 (0.03-0.17)**	***0.10 (0.03-0.16)***	**0.08 (0.01-0.15)**
$50,000-$99,999		**0.23 (0.16-0.30)**	**0.20 (0.13-0.27)**	***0.20 (0.13-0.27)***	**0.17 (0.10-0.24)**
$100,000-$149,999		**0.32 (0.24-0.39)**	**0.28 (0.20-0.35)**	***0.27 (0.20-0.35)***	**0.24 (0.16-0.31)**
≥$150,000		**0.32 (0.24-0.40)**	**0.27 (0.20-0.35)**	***0.27 (0.19-0.35)***	**0.23 (0.15-0.31)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		0.03 (-0.02-0.09)	0.03 (-0.02-0.08)	*0.03 (-0.02-0.08)*	0.03 (-0.02-0.08)
Widowed		0.01 (-0.04-0.06)	0.00 (-0.04-0.05)	*0.00 (-0.04-0.05)*	0.00 (-0.04-0.05)
Divorced		**0.06 (0.01-0.11)**	**0.05 (0.00-0.10)**	***0.05 (0.00-0.10)***	**0.05 (0.00-0.10)**
Separated		**0.09 (0.00-0.18)**	0.08 (-0.01-0.17)	*0.08 (-0.01-0.17)*	0.08 (-0.01-0.17)
Urban/rural living status (rural versus urban living)		-0.01 (-0.05-0.04)	-0.01 (-0.05-0.04)	*-0.01 (-0.05-0.04)*	-0.01 (-0.05-0.04)

Table J9, continued. Multiple linear regression analysis of the association between positive interactions and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	**Model 3**[c] β (95% CI)	***Model 4***[d] *β (95% CI)*	**Model 5**[e] β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			0.10 (-0.03-0.22)	*0.09 (-0.03-0.22)*	0.08 (-0.04-0.20)
Good			0.11 (0.00-0.23)	*0.10 (-0.02-0.22)*	0.08 (-0.04-0.20)
Very good			**0.18 (0.06-0.30)**	***0.17 (0.05-0.29)***	**0.14 (0.02-0.25)**
Excellent			**0.24 (0.12-0.36)**	***0.23 (0.10-0.35)***	**0.19 (0.07-0.32)**
Number of chronic conditions (vs 0)					
1			-0.01 (-0.04-0.02)	*-0.01 (-0.04-0.03)*	-0.01 (-0.04-0.03)
2-3			0.00 (-0.04-0.03)	*0.00 (-0.04-0.03)*	0.00 (-0.04-0.04)
≥4			-0.05 (-0.10-0.01)	*-0.05 (-0.10-0.01)*	-0.03 (-0.09-0.03)
Depressive symptoms:					
Depressive symptoms (yes versus no)				*-0.04 (-0.08-0.00)*	-0.03 (-0.07-0.01)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.05 (-0.07-[-0.02])**
Current smoker					**-0.08 (-0.13-[-0.04])**

Table J9, continued. Multiple linear regression analysis of the association between positive interactions and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	**Model 3**[c] β (95% CI)	***Model 4***[d] *β (95% CI)*	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.05 (0.00-0.11)
Regular user					**0.13 (0.09-0.18)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Table J10. Multiple linear regression analysis of the association between tangible support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Main effect:					
Tangible support	**0.07 (0.05-0.08)**	**0.05 (0.03-0.06)**	**0.04 (0.02-0.06)**	***0.03 (0.02-0.05)***	**0.03 (0.01-0.05)**
R^2 value	0.1421	0.1599	0.1628	*0.1629*	0.1654
Covariate:					
Base:					
Sex (females versus males)	**0.46 (0.43-0.49)**	**0.48 (0.45-0.51)**	**0.47 (0.45-0.51)**	***0.47 (0.45-0.50)***	**0.48 (0.45-0.50)**
Age group (vs 45-54 years)					
55-64 years	**-0.24 (-0.27-[-0.20])**	**-0.20 (-0.23-[-0.17])**	**-0.20 (-0.24-[-0.17])**	***-0.20 (-0.24-[-0.17])***	**-0.20 (-0.24-[-0.17])**
65-74 years	**-0.52 (-0.55-[-0.48])**	**-0.43 (-0.47-[-0.39])**	**-0.43 (-0.47-[-0.40])**	***-0.44 (-0.47-[-0.40])***	**-0.44 (-0.48-[-0.40])**
≥ 75 years	**-0.96 (-0.99-[-0.91])**	**-0.82 (-0.86-[-0.78])**	**-0.82 (-0.87-[-0.78])**	***-0.83 (-0.87-[-0.78])***	**-0.83 (-0.87-[-0.79])**
Province (vs Ontario)					
Alberta	**0.09 (0.03-0.14)**	**0.08 (0.02-0.13)**	**0.07 (0.02-0.13)**	***0.07 (0.02-0.13)***	**0.08 (0.02-0.13)**
British Columbia	**0.17 (0.13-0.22)**	**0.18 (0.14-0.22)**	**0.18 (0.14-0.22)**	***0.18 (0.14-0.22)***	**0.18 (0.14-0.22)**
Manitoba	0.04 (0.00-0.09)	**0.06 (0.01-0.11)**	**0.06 (0.01-0.11)**	***0.06 (0.01-0.11)***	**0.06 (0.01-0.11)**
Newfoundland and Labrador	0.04 (-0.02-0.10)	0.04 (-0.02-0.09)	0.04 (-0.02-0.10)	*0.04 (-0.02-0.10)*	0.05 (-0.01-0.10)
Nova Scotia	-0.04 (-0.09-0.01)	-0.02 (-0.07-0.03)	-0.02 (-0.07-0.03)	*-0.02 (-0.07-0.03)*	-0.01 (-0.06-0.04)
Quebec	0.02 (-0.02-0.06)	**0.07 (0.03-0.11)**	**0.07 (0.03-0.12)**	***0.07 (0.03-0.12)***	**0.07 (0.03-0.11)**

Table J10, continued. Multiple linear regression analysis of the association between tangible support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Sociodemographic:					
Highest level of education (vs less than secondary school):					
Secondary school only		**0.16 (0.10-0.23)**	**0.15 (0.09-0.22)**	***0.15 (0.09-0.22)***	**0.14 (0.08-0.21)**
Some post-secondary education		**0.29 (0.22-0.36)**	**0.28 (0.21-0.35)**	***0.28 (0.21-0.35)***	**0.27 (0.20-0.34)**
Post-secondary graduation		**0.39 (0.34-0.45)**	**0.38 (0.32-0.43)**	***0.38 (0.32-0.43)***	**0.36 (0.30-0.41)**
Total annual household income (vs < $20,000)					
$20,000 - $49,999		**0.12 (0.05-0.18)**	**0.10 (0.03-0.16)**	***0.09 (0.03-0.16)***	**0.08 (0.01-0.15)**
$50,000-$99,999		**0.23 (0.16-0.30)**	**0.20 (0.13-0.27)**	***0.20 (0.13-0.26)***	**0.17 (0.10-0.24)**
$100,000-$149,999		**0.31 (0.24-0.39)**	**0.27 (0.20-0.35)**	***0.27 (0.20-0.34)***	**0.23 (0.16-0.31)**
≥$150,000		**0.32 (0.24-0.40)**	**0.27 (0.19-0.35)**	***0.26 (0.19-0.34)***	**0.22 (0.15-0.30)**
Marital status (vs married or living with a partner in a common-law relationship)					
Single, never married or never lived with a partner		0.05 (0.00-0.10)	0.05 (-0.01-0.10)	*0.05 (-0.01-0.10)*	0.05 (-0.01-0.10)
Widowed		0.02 (-0.03-0.07)	0.02 (-0.03-0.06)	*0.02 (-0.03-0.06)*	0.01 (-0.04-0.06)
Divorced		**0.07 (0.02-0.13)**	**0.06 (0.02-0.11)**	***0.06 (0.01-0.11)***	**0.06 (0.01-0.11)**
Separated		**0.11 (0.02-0.19)**	**0.10 (0.01-0.18)**	***0.10 (0.01-0.19)***	**0.09 (0.01-0.18)**
Urban/rural living status (rural versus urban living)		-0.01 (-0.05-0.04)	-0.01 (-0.05-0.04)	*-0.01 (-0.06-0.04)*	-0.01 (-0.06-0.04)

Table J10, continued. Multiple linear regression analysis of the association between tangible support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2[b]** β (95% CI)	**Model 3[c]** β (95% CI)	***Model 4[d]*** *β (95% CI)*	**Model 5[e]** β (95% CI)
Health-related:					
Self-rated health (vs poor)					
Fair			0.10 (-0.03-0.22)	*0.09 (-0.04-0.22)*	0.08 (-0.05-0.20)
Good			0.11 (-0.01-0.23)	*0.10 (-0.02-0.22)*	0.08 (-0.04-0.19)
Very good			**0.18 (0.06-0.30)**	***0.17 (0.05-0.28)***	**0.13 (0.02-0.25)**
Excellent			**0.24 (0.12-0.36)**	***0.22 (0.10-0.35)***	**0.19 (0.07-0.31)**
Number of chronic conditions (vs 0)					
1			-0.01 (-0.04-0.02)	*-0.01 (-0.04-0.02)*	-0.01 (-0.04-0.03)
2-3			-0.01 (-0.04-0.03)	*0.00 (-0.04-0.03)*	0.00 (-0.04-0.04)
≥4			-0.05 (-0.10-0.01)	*-0.05 (-0.10-0.01)*	-0.03 (-0.09-0.02)
Depressive symptoms:					
Depressive symptoms (yes versus no)				*-0.04 (-0.08-0.00)*	-0.03 (-0.07-0.01)
Health behaviours:					
Smoking status (vs never smoker)					
Former smoker					**-0.05 (-0.09-[-0.02])**
Current smoker					**-0.08 (-0.13-[-0.03])**

Table J10, continued. Multiple linear regression analysis of the association between tangible support and REY II score (n=24,719)*

	Model 1[a] β (95% CI)	**Model 2**[b] β (95% CI)	**Model 3**[c] β (95% CI)	***Model 4***[d] *β (95% CI)*	**Model 5**[e] β (95% CI)
Alcohol use (vs not user)					
Occasional user					0.05 (0.00-0.11)
Regular user					**0.13 (0.09-0.18)**

* β represents regression coefficient; CI is confidence interval

[a] Model 1 is the base model including social support availability, age, sex and province

[b] Model 2 includes Model 1 and sociodemographic covariates

[c] Model 3 includes Models 1 and 2, and health-related covariates

[d] Model 4 includes Models 1-3 and depressive symptoms

[e] Model 5 includes Models 1-4 and health behaviour covariates

Statistically significant values ($p<0.05$) are **bolded**

Optimal model is *italicized*

Appendix K: Multiple linear regression models stratified by age or sex

Table K1. Multiple linear regression of optimal model for the association between overall social support availability and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Overall social support availability	**0.09 (0.06-0.12)**	**0.06 (0.03-0.09)**	**0.07 (0.03-0.11)**	**0.07 (0.04-0.11)**	**0.08 (0.04-0.12)**	**0.08 (0.04-0.12)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.36 (0.31-0.41)**	**0.47 (0.43-0.51)**	**0.52 (0.47-0.57)**	**0.50 (0.44-0.56)**
Age group (vs 45-54 years)						
55-64 years	**-0.18 (-0.23-[-0.14])**	**-0.10 (-0.14-[-0.05])**	---	---	---	---
65-74 years	**-0.43 (-0.48-[-0.38])**	**-0.29 (-0.35-[-0.24])**	---	---	---	---
≥ 75 years	**-0.82 (-0.88-[-0.76])**	**-0.69 (-0.76-[-0.63])**	---	---	---	---
Province (vs Ontario)						
Alberta	**-0.09 (-0.17-[-0.02])**	0.03 (-0.04-0.11)	-0.03 (-0.12-0.07)	0.00 (-0.08-0.08)	-0.05 (-0.15-0.04)	-0.10 (-0.21-0.01)
British Columbia	0.04 (-0.01-0.10)	**0.15 (0.09-0.20)**	**0.17 (0.09-0.24)**	0.03 (-0.03-0.09)	0.07 (-0.01-0.14)	0.06 (-0.02-0.15)
Manitoba	**-0.08 (-0.14-[-0.01])**	-0.03 (-0.10-0.03)	-0.02 (-0.11-0.07)	**-0.07 (-0.15-0.00)**	-0.07 (-0.16-0.01)	**-0.10 (-0.21-0.00)**
Newfoundland and Labrador	-0.03 (-0.10-0.04)	-0.04 (-0.11-0.04)	0.00 (-0.10-0.09)	**-0.10 (-0.18-[-0.02])**	-0.04 (-0.14-0.06)	0.01 (-0.11-0.13)
Nova Scotia	**-0.21 (-0.27-[-0.15])**	**-0.10 (-0.18-[-0.03])**	**-0.13 (-0.22-[-0.05])**	**-0.19 (-0.27-[-0.11])**	**-0.17 (-0.26-[-0.08])**	**-0.15 (-0.26-[-0.04])**
Quebec	-0.03 (-0.08-0.03)	0.04 (-0.02-0.10)	0.06 (-0.01-0.14)	-0.06 (-0.12-0.00)	-0.04 (-0.11-0.03)	0.04 (-0.04-0.14)

Table K1, continued. Multiple linear regression of optimal model for the association between overall social support availability and REY I by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.14 (0.04-0.23)**	**0.25 (0.16-0.34)**	**0.31 (0.15-0.48)**	**0.19 (0.06-0.32)**	**0.29 (0.18-0.41)**	0.10 (-0.01-0.21)
Some post-secondary education	**0.32 (0.22-0.43)**	**0.32 (0.22-0.41)**	**0.43 (0.26-0.61)**	**0.37 (0.23-0.50)**	**0.36 (0.24-0.48)**	**0.15 (0.03-0.28)**
Post-secondary graduation	**0.42 (0.33-0.50)**	**0.43 (0.35-0.51)**	**0.59 (0.44-0.74)**	**0.42 (0.30-0.54)**	**0.47 (0.38-0.57)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	**0.11 (0.01-0.22)**	**0.15 (0.05-0.24)**	**0.20 (0.03-0.38)**	0.08 (-0.03-0.20)	0.09 (-0.02-0.20)	**0.14 (0.03-0.25)**
$50,000-$99,999	**0.22 (0.12-0.33)**	**0.29 (0.20-0.39)**	**0.33 (0.17-0.50)**	**0.21 (0.09-0.32)**	**0.24 (0.12-0.35)**	**0.26 (0.14-0.38)**
$100,000-$149,999	**0.31 (0.20-0.42)**	**0.37 (0.26-0.47)**	**0.39 (0.22-0.57)**	**0.29 (0.17-0.41)**	**0.39 (0.26-0.52)**	**0.26 (0.12-0.40)**
≥$150,000	**0.40 (0.29-0.52)**	**0.38 (0.27-0.49)**	**0.49 (0.32-0.66)**	**0.31 (0.19-0.44)**	**0.35 (0.21-0.50)**	**0.26 (0.09-0.43)**
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.11 (0.03-0.18)**	0.02 (-0.06-0.09)	0.08 (0.00-0.17)	0.02 (-0.05-0.10)	0.09 (-0.02-0.19)	-0.02 (-0.16-0.12)
Widowed	-0.02 (-0.10-0.07)	0.02 (-0.03-0.09)	0.09 (-0.16-0.35)	-0.04 (-0.14-0.07)	0.04 (-0.04-0.12)	-0.02 (-0.10-0.05)
Divorced	0.07 (0.00-0.14)	**0.07 (0.02-0.14)**	**0.12 (0.02-0.21)**	0.03 (-0.05-0.10)	**0.10 (0.02-0.19)**	0.06 (-0.04-0.17)
Separated	0.02 (-0.10-0.15)	0.08 (-0.05-0.21)	0.06 (-0.09-0.21)	0.01 (-0.12-0.14)	**0.22 (0.05-0.39)**	-0.05 (-0.25-0.15)

Table K1, continued. Multiple linear regression of optimal models for the association between overall social support availability and REY I by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	0.02 (-0.04-0.08)	**0.10 (0.04-0.16)**	**0.10 (0.03-0.18)**	0.00 (-0.07-0.07)	**0.11 (0.02-0.19)**	-0.03 (-0.14-0.09)
Health-related:						
Self-rated health (vs poor)						
Fair	0.00 (-0.16-0.17)	0.09 (-0.08-0.26)	0.02 (-0.19-0.24)	0.03 (-0.18-0.24)	0.13 (-0.07-0.34)	0.06 (-0.22-0.35)
Good	-0.02 (-0.18-0.13)	0.09 (-0.06-0.25)	-0.08 (-0.27-0.12)	0.08 (-0.11-0.28)	0.19 (0.00-0.38)	0.06 (-0.22-0.33)
Very good	0.06 (-0.10-0.22)	**0.20 (0.04-0.36)**	0.03 (-0.17-0.22)	0.15 (-0.05-0.35)	**0.28 (0.08-0.47)**	0.18 (-0.09-0.46)
Excellent	0.06 (-0.10-0.22)	**0.21 (0.05-0.37)**	0.04 (-0.16-0.24)	0.17 (-0.04-0.37)	**0.27 (0.07-0.47)**	0.19 (-0.09-0.47)
Number of chronic conditions (vs 0)						
1	-0.03 (-0.07-0.01)	0.02 (-0.03-0.06)	0.02 (-0.03-0.08)	-0.03 (-0.08-0.02)	-0.03 (-0.10-0.03)	-0.05 (-0.14-0.04)
2-3	-0.02 (-0.07-0.02)	0.01 (-0.04-0.06)	-0.03 (-0.10-0.05)	-0.02 (-0.07-0.04)	-0.01 (-0.08-0.05)	0.01 (-0.08-0.09)
≥4	-0.03 (-0.11-0.05)	**-0.09 (-0.17-[-0.01])**	-0.15 (-0.31-0.01)	-0.02 (-0.13-0.09)	-0.06 (-0.16-0.04)	-0.09 (-0.20-0.01)
Depressive symptoms:						
Depressive symptoms (yes versus no)	---	**---**	---	---	**---**	---

Table K1, continued. Multiple linear regression of optimal model for the association between overall social support availability and REY I by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K2. Multiple linear regression of optimal models for the association between affectionate support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Affectionate support	**0.07 (0.04-0.10)**	**0.03 (0.00-0.06)**	**0.07 (0.03-0.10)**	**0.03 (0.00-0.06)**	**0.07 (0.03-0.10)**	**0.04 (0.00-0.08)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.36 (0.31-0.41)**	**0.48 (0.43-0.52)**	**0.51 (0.47-0.56)**	**0.50 (0.44-0.57)**
Age group (vs 45-54 years)						
55-64 years	**-0.18 (-0.23-[-0.14])**	**-0.10 (-0.14-[-0.05])**	---	---	---	---
65-74 years	**-0.43 (-0.48-[-0.38])**	**-0.29 (-0.35-[-0.24])**	---	---	---	---
≥ 75 years	**-0.83 (-0.88-[-0.77])**	**-0.70 (-0.76-[-0.63])**	---	---	---	---
Province (vs Ontario)						
Alberta	**-0.09 (-0.17-[-0.02])**	0.03 (-0.04-0.11)	-0.03 (-0.12-0.06)	0.00 (-0.08-0.08)	-0.05 (-0.15-0.04)	-0.10 (-0.21-0.01)
British Columbia	0.04 (-0.01-0.10)	**0.15 (0.09-0.20)**	**0.17 (0.09-0.24)**	0.03 (-0.03-0.09)	0.07 (0.00-0.14)	0.06 (-0.02-0.15)
Manitoba	**-0.08 (-0.15-[-0.01])**	-0.04 (-0.10-0.03)	-0.02 (-0.11-0.06)	**-0.08 (-0.15-0.00)**	-0.08 (-0.16-0.01)	**-0.11 (-0.21-0.00)**
Newfoundland and Labrador	-0.03 (-0.10-0.04)	-0.04 (-0.11-0.04)	0.00 (-0.10-0.09)	**-0.10 (-0.18-[-0.02])**	-0.04 (-0.14-0.06)	0.02 (-0.10-0.14)
Nova Scotia	**-0.21 (-0.27-[-0.14])**	**-0.10 (-0.17-[-0.03])**	**-0.13 (-0.22-[-0.04])**	**-0.19 (-0.27-[-0.11])**	**-0.16 (-0.25-[-0.07])**	**-0.14 (-0.25-[-0.03])**
Quebec	-0.03 (-0.08-0.03)	0.04 (-0.02-0.10)	0.06 (-0.01-0.14)	-0.06 (-0.12-0.00)	-0.04 (-0.11-0.03)	0.05 (-0.04-0.14)

Table K2, continued. Multiple linear regression of optimal model for the association between affectionate support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.13 (0.03-0.23)**	**0.25 (0.16-0.35)**	**0.32 (0.15-0.48)**	**0.19 (0.06-0.32)**	**0.30 (0.18-0.41)**	0.10 (-0.01-0.21)
Some post-secondary education	**0.32 (0.22-0.43)**	**0.31 (0.22-0.41)**	**0.43 (0.26-0.61)**	**0.36 (0.23-0.50)**	**0.36 (0.24-0.48)**	**0.15 (0.02-0.27)**
Post-secondary graduation	**0.42 (0.33-0.50)**	**0.43 (0.35-0.51)**	**0.59 (0.44-0.74)**	**0.42 (0.30-0.54)**	**0.48 (0.38-0.57)**	**0.22 (0.13-0.30)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	0.10 (-0.01-0.21)	**0.15 (0.05-0.24)**	**0.20 (0.03-0.38)**	0.08 (-0.03-0.19)	0.10 (-0.01-0.21)	**0.14 (0.03-0.25)**
$50,000-$99,999	**0.21 (0.11-0.32)**	**0.30 (0.20-0.39)**	**0.33 (0.16-0.50)**	**0.20 (0.09-0.32)**	**0.25 (0.13-0.36)**	**0.27 (0.15-0.39)**
$100,000-$149,999	**0.30 (0.18-0.41)**	**0.37 (0.26-0.47)**	**0.39 (0.22-0.57)**	**0.28 (0.16-0.41)**	**0.40 (0.27-0.53)**	**0.27 (0.12-0.41)**
≥$150,000	**0.39 (0.28-0.51)**	**0.39 (0.27-0.49)**	**0.49 (0.31-0.67)**	**0.31 (0.19-0.43)**	**0.36 (0.22-0.51)**	**0.27 (0.10-0.44)**
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.12 (0.04-0.20)**	0.02 (-0.06-0.09)	**0.10 (0.01-0.19)**	0.01 (-0.06-0.09)	0.10 (-0.00-0.21)	-0.02 (-0.17-0.12)
Widowed	-0.01 (-0.10-0.08)	0.02 (-0.04-0.08)	0.11 (-0.14-0.37)	-0.04 (-0.15-0.07)	0.04 (-0.04-0.12)	-0.03 (-0.11-0.05)
Divorced	**0.07 (0.00-0.15)**	**0.08 (0.02-0.14)**	**0.13 (0.04-0.23)**	0.01 (-0.06-0.09)	**0.11 (0.02-0.19)**	0.05 (-0.05-0.16)
Separated	0.03 (-0.10-0.15)	0.08 (-0.06-0.21)	0.07 (-0.09-0.22)	0.00 (-0.12-0.13)	**0.22 (0.05-0.39)**	-0.06 (-0.26-0.14)

Table K2, continued. Multiple linear regression of optimal models for the association between affectionate support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	0.01 (-0.04-0.07)	**0.10 (0.04-0.16)**	**0.10 (0.03-0.18)**	0.00 (-0.07-0.07)	**0.11 (0.02-0.19)**	-0.02 (-0.14-0.09)
Health-related:						
Self-rated health (vs poor)						
Fair	-0.01 (-0.17-0.16)	0.09 (-0.08-0.26)	0.02 (-0.19-0.24)	0.02 (-0.19-0.23)	0.14 (-0.07-0.35)	0.06 (-0.23-0.34)
Good	-0.04 (-0.20-0.11)	0.09 (-0.07-0.25)	-0.08 (-0.27-0.12)	0.06 (-0.13-0.26)	**0.20 (0.01-0.40)**	0.05 (-0.23-0.32)
Very good	0.04 (-0.12-0.20)	**0.20 (0.04-0.36)**	0.03 (-0.16-0.23)	0.13 (-0.07-0.32)	**0.29 (0.10-0.49)**	0.17 (-0.10-0.45)
Excellent	0.04 (-0.12-0.20)	**0.22 (0.06-0.38)**	0.04 (-0.16-0.25)	0.14 (-0.06-0.35)	**0.29 (0.09-0.49)**	0.18 (-0.10-0.47)
Number of chronic conditions (vs 0)						
1	-0.03 (-0.07-0.01)	0.02 (-0.03-0.06)	0.02 (-0.03-0.08)	-0.03 (-0.08-0.02)	-0.03 (-0.10-0.03)	-0.05 (-0.14-0.04)
2-3	-0.02 (-0.07-0.02)	0.01 (-0.04-0.06)	-0.03 (-0.10-0.04)	-0.01 (-0.07-0.04)	-0.01 (-0.07-0.05)	0.01 (-0.08-0.09)
≥4	-0.03 (-0.11-0.05)	**-0.09 (-0.17-[-0.01])**	-0.15 (-0.32-0.01)	-0.01 (-0.12-0.10)	-0.06 (-0.17-0.04)	-0.09 (-0.20-0.01)
Depressive symptoms:						
Depressive symptoms (yes versus no)	**-0.06 (-0.12-0.00)**	-0.02 (-0.07-0.03)	-0.01 (-0.08-0.06)	**-0.11 (-0.17-[-0.04])**	0.03 (-0.05-0.10)	-0.06 (-0.14-0.02)

Table K2, continued. Multiple linear regression of optimal model for the association between affectionate support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K3. Multiple linear regression of optimal model for the association between emotional/informational support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Emotional/informational support	**0.07 (0.05-0.10)**	**0.05 (0.02-0.08)**	**0.05 (0.02-0.09)**	**0.07 (0.04-0.10)**	**0.07 (0.03-0.10)**	**0.05 (0.02-0.09)**
Covariate						
Base:						
Sex (females versus males)	**---**	**---**	**0.36 (0.31-0.41)**	**0.46 (0.42-0.51)**	**0.51 (0.46-0.56)**	**0.50 (0.43-0.56)**
Age group (vs 45-54 years)						
55-64 years	**-0.18 (-0.23-[-0.14])**	**-0.10 (-0.14-[-0.05])**	**---**	**---**	**---**	**---**
65-74 years	**-0.43 (-0.48-[-0.38])**	**-0.29 (-0.34-[-0.24])**	**---**	**---**	**---**	**---**
≥ 75 years	**-0.82 (-0.87-[-0.76])**	**-0.69 (-0.75-[-0.63])**	**---**	**---**	**---**	**---**
Province (vs Ontario)						
Alberta	**-0.09 (-0.17-[-0.02])**	0.03 (-0.04-0.11)	-0.03 (-0.12-0.07)	0.00 (-0.08-0.08)	-0.05 (-0.15-0.04)	-0.10 (-0.21-0.01)
British Columbia	0.04 (-0.01-0.09)	**0.15 (0.09-0.20)**	**0.17 (0.09-0.24)**	0.03 (-0.04-0.09)	0.06 (-0.01-0.14)	0.06 (-0.02-0.14)
Manitoba	**-0.08 (-0.15-[-0.01])**	-0.04 (-0.10-0.03)	-0.02 (-0.11-0.06)	**-0.07 (-0.15-0.00)**	-0.08 (-0.16-0.01)	**-0.11 (-0.21-[-0.01])**
Newfoundland and Labrador	-0.03 (-0.10-0.05)	-0.04 (-0.11-0.04)	0.00 (-0.09-0.09)	**-0.10 (-0.18-[-0.02])**	-0.04 (-0.14-0.06)	0.01 (-0.11-0.14)
Nova Scotia	**-0.21 (-0.27-[-0.14])**	**-0.11 (-0.18-[-0.04])**	**-0.13 (-0.22-[-0.05])**	**-0.19 (-0.27-[-0.11])**	**-0.17 (-0.25-[-0.08])**	**-0.15 (-0.26-[-0.04])**
Quebec	-0.02 (-0.07-0.04)	0.04 (-0.01-0.10)	0.06 (0.00-0.14)	-0.05 (-0.12-0.01)	-0.03 (-0.11-0.04)	0.05 (-0.04-0.14)

Table K3, continued. Multiple linear regression of optimal model for the association between emotional/informational support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.13 (0.04-0.23)**	**0.25 (0.16-0.34)**	**0.31 (0.14-0.48)**	**0.19 (0.06-0.32)**	**0.30 (0.18-0.41)**	0.10 (-0.01-0.21)
Some post-secondary education	**0.32 (0.21-0.42)**	**0.32 (0.22-0.41)**	**0.43 (0.26-0.60)**	**0.37 (0.23-0.50)**	**0.36 (0.24-0.48)**	**0.15 (0.03-0.28)**
Post-secondary graduation	**0.42 (0.33-0.50)**	**0.43 (0.35-0.51)**	**0.59 (0.44-0.73)**	**0.42 (0.30-0.54)**	**0.47 (0.38-0.57)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	**0.12 (0.01-0.23)**	**0.15 (0.05-0.24)**	**0.20 (0.03-0.38)**	0.09 (-0.03-0.20)	0.10 (-0.01-0.21)	**0.14 (0.03-0.25)**
$50,000-$99,999	**0.23 (0.13-0.34)**	**0.29 (0.20-0.39)**	**0.34 (0.17-0.51)**	**0.21 (0.09-0.32)**	**0.24 (0.13-0.36)**	**0.27 (0.15-0.39)**
$100,000-$149,999	**0.32 (0.20-0.43)**	**0.37 (0.26-0.47)**	**0.40 (0.23-0.57)**	**0.29 (0.17-0.41)**	**0.39 (0.26-0.52)**	**0.26 (0.12-0.41)**
≥$150,000	**0.41 (0.29-0.52)**	**0.38 (0.27-0.49)**	**0.49 (0.32-0.67)**	**0.31 (0.19-0.44)**	**0.36 (0.21-0.50)**	**0.27 (0.10-0.44)**
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.08 (0.01-0.15)**	0.00 (-0.07-0.07)	0.06 (-0.02-0.15)	0.01 (-0.07-0.08)	0.06 (-0.04-0.17)	-0.04 (-0.17-0.10)
Widowed	-0.03 (-0.12-0.05)	0.02 (-0.04-0.08)	0.08 (-0.17-0.34)	-0.05 (-0.15-0.06)	0.03 (-0.05-0.11)	-0.04 (-0.12-0.03)
Divorced	0.04 (-0.03-0.12)	**0.07 (0.01-0.13)**	**0.11 (0.01-0.20)**	0.01 (-0.06-0.08)	0.08 (0.00-0.16)	0.04 (-0.06-0.14)
Separated	0.00 (-0.12-0.12)	0.07 (-0.06-0.20)	0.05 (-0.10-0.19)	-0.01 (-0.13-0.12)	**0.20 (0.03-0.37)**	-0.08 (-0.28-0.13)

Table K3, continued. Multiple linear regression of optimal model for the association between emotional/informational support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	0.01 (-0.04-0.07)	**0.10 (0.04-0.16)**	**0.10 (0.03-0.18)**	0.00 (-0.07-0.07)	**0.11 (0.02-0.19)**	-0.03 (-0.14-0.09)
Health-related:						
Self-rated health (vs poor)						
Fair	0.01 (-0.16-0.18)	0.09 (-0.08-0.26)	0.02 (-0.19-0.24)	0.03 (-0.18-0.24)	0.14 (-0.06-0.35)	0.07 (-0.22-0.35)
Good	-0.02 (-0.18-0.14)	0.09 (-0.06-0.25)	-0.07 (-0.27-0.13)	0.08 (-0.12-0.28)	**0.20 (0.01-0.39)**	0.07 (-0.20-0.34)
Very good	0.07 (-0.09-0.22)	**0.20 (0.05-0.36)**	0.04 (-0.16-0.23)	0.15 (-0.05-0.35)	**0.29 (0.10-0.48)**	0.20 (-0.08-0.47)
Excellent	0.07 (-0.09-0.23)	**0.22 (0.06-0.38)**	0.05 (-0.16-0.25)	0.16 (-0.04-0.37)	**0.28 (0.08-0.48)**	0.20 (-0.08-0.48)
Number of chronic conditions (vs 0)						
1	-0.03 (-0.07-0.01)	0.02 (-0.03-0.06)	0.02 (-0.03-0.08)	-0.03 (-0.08-0.02)	-0.03 (-0.10-0.03)	-0.05 (-0.14-0.04)
2-3	-0.02 (-0.07-0.03)	0.01 (-0.04-0.06)	-0.02 (-0.10-0.05)	-0.02 (-0.07-0.04)	-0.01 (-0.07-0.06)	0.01 (-0.08-0.09)
≥4	-0.03 (-0.11-0.06)	**-0.09 (-0.17-[-0.01])**	-0.15 (-0.31-0.02)	-0.02 (-0.13-0.09)	-0.05 (-0.16-0.05)	-0.09 (-0.20-0.01)
Depressive symptoms:						
Depressive symptoms (yes versus no)	---	---	---	---	---	---

Table K3, continued. Multiple linear regression of optimal model for the association between emotional/informational support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K4. Multiple linear regression of optimal model for the association between positive interactions and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Positive interactions	**0.03 (0.00-0.06)**	**0.03 (0.01-0.06)**	0.01 (-0.02-0.05)	0.03 (0.00-0.06)	**0.07 (0.03-0.11)**	**0.07 (0.03-0.11)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.37 (0.32-0.41)**	**0.48 (0.44-0.52)**	**0.52 (0.47-0.57)**	**0.50 (0.44-0.57)**
Age group (vs 45-54 years)						
55-64 years	**-0.18 (-0.23-[-0.14])**	**-0.10 (-0.14-[-0.05])**	---	---	---	---
65-74 years	**-0.43 (-0.48-[-0.39])**	**-0.29 (-0.35-[-0.24])**	---	---	---	---
≥ 75 years	**-0.83 (-0.88-[-0.77])**	**-0.70 (-0.76-[-0.63])**	---	---	---	---
Province (vs Ontario)						
Alberta	**-0.09 (-0.17-[-0.02])**	0.03 (-0.04-0.11)	-0.03 (-0.12-0.06)	0.00 (-0.08-0.08)	-0.06 (-0.15-0.04)	-0.10 (-0.21-0.01)
British Columbia	0.04 (-0.01-0.10)	**0.15 (0.09-0.21)**	**0.17 (0.09-0.24)**	0.03 (-0.04-0.09)	0.06 (-0.01-0.14)	0.06 (-0.02-0.15)
Manitoba	**-0.08 (-0.15-[-0.01])**	-0.04 (-0.10-0.03)	-0.03 (-0.11-0.06)	**-0.07 (-0.15-0.00)**	-0.08 (-0.16-0.01)	**-0.10 (-0.20-0.00])**
Newfoundland and Labrador	-0.03 (-0.10-0.04)	-0.04 (-0.11-0.04)	0.00 (-0.09-0.09)	**-0.10 (-0.18-[-0.02])**	-0.04 (-0.14-0.06)	0.01 (-0.11-0.14)
Nova Scotia	**-0.21 (-0.27-[-0.14])**	**-0.10 (-0.17-[-0.03])**	**-0.13 (-0.21-[-0.04])**	**-0.19 (-0.27-[-0.11])**	**-0.16 (-0.25-[-0.08])**	**-0.15 (-0.26-[-0.04])**
Quebec	-0.03 (-0.08-0.03)	0.04 (-0.02-0.09)	0.06 (-0.01-0.14)	-0.06 (-0.13-0.00)	-0.05 (-0.12-0.03)	0.04 (-0.05-0.13)

Table K4, continued. Multiple linear regression of optimal model for the association between positive interactions and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.13 (0.03-0.23)**	**0.25 (0.16-0.34)**	**0.31 (0.14-0.48)**	**0.19 (0.06-0.32)**	**0.30 (0.18-0.41)**	0.10 (-0.01-0.21)
Some post-secondary education	**0.32 (0.22-0.43)**	**0.31 (0.22-0.41)**	**0.43 (0.26-0.60)**	**0.37 (0.23-0.50)**	**0.36 (0.24-0.48)**	**0.15 (0.03-0.27)**
Post-secondary graduation	**0.42 (0.33-0.50)**	**0.43 (0.35-0.51)**	**0.59 (0.44-0.74)**	**0.42 (0.30-0.54)**	**0.47 (0.38-0.57)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	**0.12 (0.01-0.23)**	**0.15 (0.06-0.24)**	**0.21 (0.04-0.39)**	0.08 (-0.03-0.20)	0.09 (-0.01-0.21)	**0.13 (0.02-0.24)**
$50,000-$99,999	**0.23 (0.12-0.34)**	**0.30 (0.20-0.39)**	**0.35 (0.18-0.52)**	**0.20 (0.09-0.32)**	**0.24 (0.13-0.36)**	**0.25 (0.13-0.37)**
$100,000-$149,999	**0.32 (0.20-0.43)**	**0.37 (0.26-0.48)**	**0.41 (0.24-0.59)**	**0.29 (0.16-0.41)**	**0.39 (0.26-0.52)**	**0.25 (0.11-0.40)**
≥$150,000	**0.41 (0.30-0.53)**	**0.39 (0.27-0.50)**	**0.51 (0.34-0.69)**	**0.31 (0.19-0.44)**	**0.36 (0.21-0.50)**	**0.25 (0.08-0.42)**
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.07 (0.00-0.15)**	0.01 (-0.06-0.08)	0.06 (-0.03-0.14)	0.00 (-0.07-0.08)	0.08 (-0.03-0.18)	-0.03 (-0.17-0.10)
Widowed	-0.04 (-0.13-0.04)	0.02 (-0.04-0.08)	0.08 (-0.17-0.34)	-0.05 (-0.16-0.06)	0.03 (-0.04-0.11)	-0.03 (-0.10-0.05)
Divorced	0.04 (-0.04-0.11)	**0.08 (0.02-0.14)**	**0.10 (0.01-0.20)**	0.01 (-0.06-0.08)	**0.09 (0.01-0.18)**	0.06 (-0.05-0.16)
Separated	0.00 (-0.13-0.12)	0.07 (-0.06-0.21)	0.04 (-0.11-0.19)	0.00 (-0.13-0.13)	**0.21 (0.04-0.38)**	-0.05 (-0.25-0.15)

Table K4, continued. Multiple linear regression of optimal model for the association between positive interactions and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	0.02 (-0.04-0.08)	**0.10 (0.04-0.16)**	**0.10 (0.03-0.18)**	0.00 (-0.07-0.07)	**0.10 (0.02-0.19)**	-0.03 (-0.14-0.09)
Health-related:						
Self-rated health (vs poor)						
Fair	-0.01 (-0.17-0.16)	0.09 (-0.08-0.26)	0.02 (-0.19-0.23)	0.02 (-0.19-0.23)	0.13 (-0.07-0.34)	0.05 (-0.24-0.34)
Good	-0.04 (-0.20-0.11)	0.09 (-0.07-0.25)	-0.08 (-0.27-0.12)	0.06 (-0.13-0.26)	**0.20 (0.00-0.39)**	0.04 (-0.24-0.32)
Very good	0.04 (-0.12-0.20)	**0.20 (0.04-0.36)**	0.03 (-0.16-0.23)	0.13 (-0.07-0.32)	**0.29 (0.09-0.48)**	0.16 (-0.12-0.44)
Excellent	0.05 (-0.12-0.21)	**0.21 (0.05-0.38)**	0.05 (-0.15-0.25)	0.14 (-0.06-0.34)	**0.28 (0.08-0.47)**	0.16 (-0.12-0.45)
Number of chronic conditions (vs 0)						
1	-0.03 (-0.07-0.01)	0.02 (-0.03-0.06)	0.02 (-0.03-0.08)	-0.03 (-0.08-0.02)	-0.03 (-0.10-0.03)	-0.05 (-0.14-0.04)
2-3	-0.02 (-0.07-0.03)	0.01 (-0.04-0.06)	-0.02 (-0.10-0.05)	-0.01 (-0.07-0.04)	-0.01 (-0.08-0.05)	0.01 (-0.08-0.09)
≥4	-0.02 (-0.11-0.06)	**-0.09 (-0.17-[-0.01])**	-0.14 (-0.31-0.02)	-0.01 (-0.12-0.10)	-0.06 (-0.16-0.04)	-0.09 (-0.20-0.01)
Depressive symptoms:						
Depressive symptoms (yes versus no)	**-0.08 (-0.14-[-0.02])**	-0.02 (-0.07-0.04)	-0.03 (-0.10-0.04)	**-0.10 (-0.17-[-0.04])**	0.04 (-0.04-0.11)	-0.05 (-0.13-0.04)

Table K4, continued. Multiple linear regression of optimal model for the association between positive interactions and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K5. Multiple linear regression of optimal model for the association between tangible support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Tangible support	**0.07 (0.05-0.11)**	**0.04 (0.01-0.06)**	**0.06 (0.03-0.10)**	**0.04 (0.01-0.07)**	**0.05 (0.01-0.08)**	**0.06 (0.03-0.09)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.37 (0.32-0.42)**	**0.48 (0.44-0.52)**	**0.52 (0.47-0.57)**	**0.51 (0.45-0.57)**
Age group (vs 45-54 years)						
55-64 years	**-0.19 (-0.23-[-0.14])**	**-0.10 (-0.15-[-0.05])**	---	---	---	---
65-74 years	**-0.44 (-0.49-[-0.39])**	**-0.30 (-0.35-[-0.24])**	---	---	---	---
≥ 75 years	**-0.83 (-0.88-[-0.77])**	**-0.70 (-0.76-[-0.63])**	---	---	---	---
Province (vs Ontario)						
Alberta	**-0.09 (-0.17-[-0.02])**	0.03 (-0.04-0.11)	-0.03 (-0.12-0.07)	0.00 (-0.08-0.08)	-0.06 (-0.15-0.04)	-0.10 (-0.21-0.01)
British Columbia	0.04 (-0.01-0.10)	**0.15 (0.09-0.21)**	**0.17 (0.09-0.24)**	0.03 (-0.03-0.09)	0.07 (0.00-0.14)	0.07 (-0.02-0.15)
Manitoba	**-0.07 (-0.14-0.00)**	-0.03 (-0.10-0.03)	-0.02 (-0.11-0.07)	-0.07 (-0.15-0.00)	-0.07 (-0.16-0.02)	-0.10 (-0.20-0.00])
Newfoundland and Labrador	-0.03 (-0.10-0.04)	-0.04 (-0.11-0.04)	0.00 (-0.10-0.09)	**-0.10 (-0.18-[-0.01])**	-0.04 (-0.14-0.06)	0.01 (-0.11-0.14)
Nova Scotia	**-0.21 (-0.27-[-0.15])**	**-0.11 (-0.18-[-0.03])**	**-0.13 (-0.22-[-0.05])**	**-0.19 (-0.27-[-0.11])**	**-0.16 (-0.25-[-0.07])**	**-0.15 (-0.26-[-0.04])**
Quebec	-0.03 (-0.09-0.03)	0.04 (-0.02-0.09)	0.06 (-0.01-0.13)	-0.06 (-0.13-0.00)	-0.04 (-0.11-0.03)	0.04 (-0.05-0.14)

Table K5, continued. Multiple linear regression of optimal model for the association between tangible support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.14 (0.04-0.24)**	**0.26 (0.17-0.35)**	**0.32 (0.15-0.48)**	**0.19 (0.06-0.32)**	**0.30 (0.18-0.41)**	0.10 (-0.01-0.22)
Some post-secondary education	**0.33 (0.22-0.43)**	**0.32 (0.22-0.41)**	**0.44 (0.26-0.61)**	**0.37 (0.23-0.50)**	**0.36 (0.24-0.48)**	**0.15 (0.03-0.28)**
Post-secondary graduation	**0.42 (0.34-0.51)**	**0.43 (0.35-0.51)**	**0.59 (0.44-0.74)**	**0.42 (0.30-0.54)**	**0.47 (0.38-0.57)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	**0.12 (0.01-0.23)**	**0.15 (0.06-0.24)**	**0.21 (0.03-0.38)**	0.09 (-0.02-0.21)	0.09 (-0.01-0.21)	**0.14 (0.03-0.25)**
$50,000-$99,999	**0.23 (0.12-0.34)**	**0.30 (0.20-0.39)**	**0.34 (0.17-0.50)**	**0.22 (0.10-0.33)**	**0.24 (0.13-0.36)**	**0.27 (0.15-0.39)**
$100,000-$149,999	**0.32 (0.20-0.43)**	**0.37 (0.26-0.48)**	**0.40 (0.22-0.56)**	**0.30 (0.18-0.42)**	**0.40 (0.27-0.53)**	**0.27 (0.12-0.41)**
≥$150,000	**0.41 (0.29-0.53)**	**0.39 (0.28-0.50)**	**0.49 (0.32-0.66)**	**0.33 (0.21-0.45)**	**0.36 (0.22-0.51)**	**0.27 (0.10-0.44)**
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.12 (0.04-0.19)**	0.02 (-0.05-0.09)	**0.10 (0.01-0.18)**	0.02 (-0.06-0.09)	0.08 (-0.02-0.19)	-0.02 (-0.16-0.11)
Widowed	-0.01 (-0.10-0.08)	0.03 (-0.03-0.09)	0.08 (-0.17-0.34)	-0.04 (-0.15-0.07)	0.04 (-0.04-0.12)	-0.02 (-0.10-0.06)
Divorced	**0.09 (0.01-0.16)**	**0.09 (0.03-0.15)**	**0.13 (0.04-0.23)**	0.02 (-0.05-0.10)	**0.10 (0.02-0.19)**	0.07 (-0.03-0.18)
Separated	0.03 (-0.09-0.16)	0.08 (-0.05-0.22)	0.08 (-0.15-0.36)	0.01 (-0.12-0.14)	**0.21 (0.04-0.38)**	-0.05 (-0.25-0.15)

Table K5, continued. Multiple linear regression of optimal model for the association between tangible support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	0.02 (-0.04-0.08)	**0.10 (0.04-0.16)**	**0.10 (0.03-0.18)**	0.00 (-0.07-0.07)	**0.11 (0.02-0.19)**	-0.03 (-0.14-0.09)
Health-related:						
Self-rated health (vs poor)						
Fair	0.01 (-0.16-0.17)	0.09 (-0.08-0.25)	0.01 (-0.20-0.23)	0.03 (-0.17-0.24)	0.13 (-0.07-0.34)	0.07 (-0.22-0.35)
Good	-0.02 (-0.17-0.14)	0.09 (-0.06-0.25)	-0.08 (-0.28-0.12)	0.09 (-0.10-0.29)	**0.20 (0.01-0.39)**	0.07 (-0.20-0.34)
Very good	0.07 (-0.09-0.23)	**0.20 (0.05-0.36)**	0.03 (-0.17-0.23)	0.16 (-0.03-0.36)	**0.29 (0.09-0.48)**	0.20 (-0.08-0.47)
Excellent	0.07 (-0.09-0.24)	**0.22 (0.06-0.38)**	0.04 (-0.16-0.24)	0.18 (-0.01-0.38)	**0.28 (0.08-0.48)**	0.21 (-0.08-0.49)
Number of chronic conditions (vs 0)						
1	-0.03 (-0.07-0.01)	0.02 (-0.03-0.06)	0.02 (-0.03-0.08)	-0.03 (-0.08-0.02)	-0.03 (-0.10-0.03)	-0.05 (-0.14-0.04)
2-3	-0.02 (-0.07-0.02)	0.01 (-0.04-0.06)	-0.03 (-0.10-0.04)	-0.02 (-0.07-0.04)	-0.01 (-0.08-0.05)	0.01 (-0.08-0.09)
≥4	-0.03 (-0.11-0.05)	**-0.09 (-0.17-[-0.01])**	-0.15 (-0.32-0.02)	-0.02 (-0.13-0.09)	-0.06 (-0.16-0.04)	-0.09 (-0.20-0.01)
Depressive symptoms:						
Depressive symptoms (yes versus no)	---	---	---	---	---	---

Table K5, continued. Multiple linear regression of optimal model for the association between tangible support and REY I stratified by sex or age (n=24,945)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K6. Multiple linear regression of optimal model for the association between overall social support availability and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Overall social support availability	**0.07 (0.03-0.10)**	**0.03 (0.00-0.07)**	**0.07 (0.02-0.11)**	0.03 (0.00-0.07)	0.03 (-0.01-0.07)	**0.07 (0.02-0.11)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.43 (0.39-0.48)**	**0.49 (0.45-0.53)**	**0.56 (0.51-0.61)**	**0.48 (0.41-0.54)**
Age group (vs 45-54 years)						
55-64 years	**-0.19 (-0.26-[-0.17])**	**-0.19 (-0.24-[-0.14])**	---	---	---	---
65-74 years	**-0.49 (-0.54-[-0.44])**	**-0.39 (-0.45-[-0.34])**	---	---	---	---
≥ 75 years	**-0.83 (-0.88-[-0.77])**	**-0.82 (-0.89-[-0.75])**	---	---	---	---
Province (vs Ontario)						
Alberta	0.03 (-0.04-0.11)	**0.13 (0.05-0.21)**	0.08 (-0.02-0.18)	**0.11 (0.03-0.18)**	0.07 (-0.03-0.16)	0.08 (-0.03-0.19)
British Columbia	**0.14 (0.08-0.19)**	**0.23 (0.17-0.29)**	**0.27 (0.19-0.35)**	**0.14 (0.07-0.20)**	**0.10 (0.02-0.17)**	**0.11 (0.03-0.19)**
Manitoba	0.04 (-0.03-0.11)	**0.08 (0.02-0.15)**	**0.11 (0.02-0.20)**	0.02 (-0.05-0.10)	0.06 (-0.02-0.15)	0.00 (-0.11-0.10)
Newfoundland and Labrador	0.06 (-0.01-0.14)	0.04 (-0.05-0.12)	0.10 (0.00-0.20)	0.02 (-0.07-0.10)	0.10 (0.00-0.20)	0.11 (-0.02-0.23)
Nova Scotia	-0.06 (-0.12-0.00)	0.04 (-0.04-0.11)	-0.01 (-0.10-0.08)	0.01 (-0.07-0.09)	-0.02 (-0.12-0.08)	0.01 (-0.10-0.11)
Quebec	0.01 (-0.05-0.11)	**0.13 (0.07-0.19)**	**0.10 (0.02-0.17)**	0.04 (-0.03-0.11)	0.05 (-0.02-0.13)	0.06 (-0.03-0.15)

Table K6, continued. Multiple linear regression of optimal model for the association between overall social support availability and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.13 (0.04-0.23)**	**0.15 (0.06-0.25)**	**0.19 (0.04-0.35)**	**0.15 (0.03-0.28)**	**0.28 (0.17-0.39)**	0.05 (-0.06-0.17)
Some post-secondary education	**0.26 (0.15-0.36)**	**0.29 (0.19-0.38)**	**0.37 (0.21-0.54)**	**0.31 (0.18-0.43)**	**0.27 (0.14-0.39)**	**0.18 (0.05-0.30)**
Post-secondary graduation	**0.35 (0.27-0.43)**	**0.37 (0.29-0.44)**	**0.47 (0.33-0.61)**	**0.37 (0.26-0.48)**	**0.40 (0.31-0.50)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	0.10 (-0.01-0.21)	0.06 (-0.02-0.15)	**0.16 (0.00-0.32)**	0.05 (-0.06-0.16)	0.07 (-0.04-0.18)	0.00 (-0.11-0.12)
$50,000-$99,999	**0.17 (0.07-0.28)**	**0.17 (0.08-0.26)**	**0.24 (0.09-0.39)**	**0.15 (0.04-0.27)**	**0.16 (0.04-0.28)**	0.09 (-0.03-0.22)
$100,000-$149,999	**0.26 (0.15-0.37)**	**0.21 (0.11-0.31)**	**0.26 (0.10-0.42)**	**0.23 (0.11-0.35)**	**0.32 (0.18-0.45)**	**0.15 (0.01-0.30)**
≥$150,000	**0.26 (0.15-0.38)**	**0.18 (0.07-0.29)**	**0.26 (0.10-0.42)**	**0.21 (0.08-0.33)**	**0.24 (0.10-0.39)**	0.08 (-0.09-0.26)
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.09 (0.01-0.17)**	0.02 (-0.06-0.09)	0.06 (-0.03-0.15)	0.02 (-0.06-0.10)	0.10 (-0.01-0.21)	-0.03 (-0.17-0.10)
Widowed	-0.05 (-0.14-0.04)	0.02 (-0.04-0.08)	-0.23 (-0.49-0.03)	-0.01 (-0.11-0.09)	0.05 (-0.03-0.13)	0.00 (-0.08-0.07)
Divorced	0.04 (-0.04-0.12)	**0.07 (0.01-0.13)**	0.02 (-0.07-0.12)	0.06 (-0.01-0.14)	0.09 (0.00-0.18)	0.08 (-0.03-0.20)
Separated	0.05 (-0.05-0.16)	0.13 (0.00-0.26)	0.12 (-0.02-0.26)	0.00 (-0.11-0.11)	**0.24 (0.05-0.23)**	-0.03 (-0.23-0.16)

Table K6, continued. Multiple linear regression of optimal model for the association between overall social support availability and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	-0.03 (-0.10-0.03)	0.02 (-0.05-0.08)	0.01 (-0.07-0.09)	-0.05 (-0.12-0.02)	0.03 (-0.06-0.11)	-0.01 (-0.13-0.12)
Health-related:						
Self-rated health (vs poor)						
Fair	-0.03 (-0.20-0.14)	**0.18 (0.00-0.36)**	-0.09 (-0.33-0.15)	0.19 (0.00-0.38)	0.13 (-0.11-0.38)	0.26 (-0.06-0.57)
Good	-0.04 (-0.20-0.12)	**0.18 (0.02-0.35)**	-0.12 (-0.34-0.10)	**0.20 (0.02-0.38)**	0.17 (-0.06-0.40)	0.21 (-0.09-0.51)
Very good	0.00 (-0.17-0.16)	**0.26 (0.09-0.43)**	-0.06 (-0.28-0.16)	**0.23 (0.05-0.41)**	0.23 (0.00-0.47)	0.29 (-0.01-0.59)
Excellent	0.05 (-0.12-0.22)	**0.32 (0.15-0.50)**	0.02 (-0.21-0.26)	**0.26 (0.07-0.44)**	**0.28 (0.04-0.52)**	**0.37 (0.06-0.68)**
Number of chronic conditions (vs 0)						
1	-0.04 (-0.08-0.01)	0.03 (-0.02-0.08)	0.02 (-0.03-0.07)	-0.04 (-0.09-0.01)	-0.01 (-0.08-0.05)	0.02 (-0.07-0.12)
2-3	-0.02 (-0.07-0.03)	0.02 (-0.03-0.08)	-0.05 (-0.12-0.03)	0.00 (-0.06-0.05)	0.05 (-0.02-0.11)	0.08 (-0.01-0.17)
≥4	-0.01 (-0.09-0.07)	-0.04 (-0.14-0.04)	-0.12 (-0.28-0.03)	-0.03 (-0.13-0.08)	-0.01 (-0.12-0.10)	0.05 (-0.06-0.15)
Depressive symptoms:						
Depressive symptoms (yes versus no)	-0.05 (-0.11-0.01)	0.00 (-0.06-0.05)	0.02 (-0.05-0.09)	**-0.07 (-0.13-[-0.01])**	-0.05 (-0.13-0.12)	-0.02 (-0.10-0.06)

Table K6, continued. Multiple linear regression of optimal model for the association between overall social support availability and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	**-0.04 (-0.08-0.00)**	**-0.04 (-0.08-0.00)**	**-0.06 (-0.12-[0.01])**	**-0.04 (-0.09-0.00)**	0.00 (-0.05-0.05)	-0.01 (-0.06-0.05)
Current smoker	-0.06 (-0.13-0.01)	**-0.10 (-0.17-[0.02])**	**-0.10 (-0.18-[-0.02])**	-0.06 (-0.13-0.02)	0.01 (-0.09-0.11)	-0.12 (-0.28-0.04)
Alcohol use (vs not user)						
Occasional user	0.03 (-0.05-0.11)	0.07 (-0.01-0.14)	**0.11 (0.00-0.22)**	0.00 (-0.09-0.08)	-0.01 (-0.11-0.09)	0.08 (-0.02-0.19)
Regular user	**0.11 (0.04-0.17)**	**0.15 (0.09-0.22)**	**0.20 (0.11-0.29)**	0.06 (0.00-0.14)	**0.11 (0.03-0.18)**	**0.10 (0.02-0.18)**

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K7. Multiple linear regression of optimal model for the association between affectionate support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Affectionate support	**0.07 (0.04-0.10)**	**0.03 (0.01-0.06)**	**0.08 (0.04-0.12)**	0.03 (0.00-0.06)	**0.05 (0.01-0.08)**	0.03 (-0.01-0.07)
Covariate						
Base:						
Sex (females versus males)	---	---	**0.43 (0.38-0.47)**	**0.48 (0.44-0.52)**	**0.55 (0.50-0.60)**	**0.47 (0.41-0.53)**
Age group (vs 45-54 years)						
55-64 years	**-0.22 (-0.26-[-0.17])**	**-0.19 (-0.23-[-0.14])**	---	---	---	---
65-74 years	**-0.48 (-0.53-[-0.43])**	**-0.38 (-0.44-[-0.33])**	---	---	---	---
≥ 75 years	**-0.82 (-0.88-[-0.77])**	**-0.81 (-0.87-[-0.75])**	---	---	---	---
Province (vs Ontario)						
Alberta	0.03 (-0.04-0.11)	**0.13 (0.04-0.21)**	0.07 (-0.02-0.17)	**0.11 (0.03-0.18)**	0.07 (-0.03-0.16)	0.08 (-0.03-0.19)
British Columbia	**0.14 (0.08-0.19)**	**0.22 (0.16-0.29)**	**0.26 (0.18-0.36)**	**0.14 (0.08-0.21)**	**0.10 (0.02-0.17)**	**0.11 (0.03-0.20)**
Manitoba	0.04 (-0.02-0.11)	**0.08 (0.01-0.15)**	**0.11 (0.02-0.21)**	0.02 (-0.05-0.10)	0.06 (-0.03-0.14)	-0.01 (-0.12-0.09)
Newfoundland and Labrador	0.06 (-0.01-0.14)	0.03 (-0.05-0.11)	0.08 (-0.02-0.19)	0.01 (-0.07-0.10)	-0.02 (-0.12-0.08)	0.11 (-0.02-0.24)
Nova Scotia	-0.06 (-0.12-0.00)	0.03 (-0.04-0.10)	-0.02 (-0.11-0.07)	0.00 (-0.07-0.08)	-0.03 (-0.12-0.06)	0.01 (-0.09-0.12)
Quebec	0.02 (-0.04-0.07)	**0.14 (0.08-0.20)**	**0.10 (0.03-0.18)**	0.04 (-0.03-0.11)	0.06 (-0.02-0.14)	0.08 (-0.01-0.17)

Table K7, continued. Multiple linear regression of optimal model for the association between affectionate support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.14 (0.05-0.24)**	**0.16 (0.07-0.25)**	**0.21 (0.05-0.37)**	**0.16 (0.04-0.29)**	**0.29 (0.18-0.40)**	0.05 (-0.06-0.17)
Some post-secondary education	**0.27 (0.16-0.37)**	**0.30 (0.20-0.39)**	**0.40 (0.23-0.56)**	**0.32 (0.19-0.44)**	**0.28 (0.16-0.40)**	**0.18 (0.06-0.31)**
Post-secondary graduation	**0.37 (0.29-0.45)**	**0.39 (0.31-0.46)**	**0.51 (0.37-0.65)**	**0.39 (0.28-0.50)**	**0.42 (0.32-0.51)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	0.10 (0.00-0.21)	0.06 (-0.02-0.15)	**0.17 (0.01-0.34)**	0.06 (-0.05-0.17)	0.08 (-0.03-0.19)	0.00 (-0.11-0.12)
$50,000-$99,999	**0.19 (0.09-0.30)**	**0.17 (0.08-0.26)**	**0.28 (0.12-0.43)**	**0.18 (0.07-0.29)**	**0.18 (0.03-0.30)**	0.09 (-0.03-0.22)
$100,000-$149,999	**0.27 (0.17-0.40)**	**0.21 (0.11-0.31)**	**0.31 (0.14-0.47)**	**0.26 (0.14-0.38)**	**0.34 (0.21-0.48)**	**0.15 (0.01-0.30)**
≥$150,000	**0.30 (0.18-0.41)**	**0.18 (0.07-0.29)**	**0.32 (0.16-0.48)**	**0.24 (0.12-0.37)**	**0.27 (0.13-0.42)**	0.08 (-0.09-0.26)
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.11 (0.03-0.19)**	0.03 (-0.04-0.09)	0.09 (0.00-0.18)	0.02 (-0.06-0.10)	**0.12 (0.01-0.23)**	-0.05 (-0.18-0.09)
Widowed	-0.04 (-0.13-0.04)	0.02 (-0.04-0.08)	-0.19 (-0.45-0.08)	-0.01 (-0.11-0.09)	0.06 (-0.02-0.14)	-0.02 (-0.09-0.06)
Divorced	0.05 (-0.03-0.13)	**0.07 (0.01-0.14)**	0.05 (-0.05-0.15)	0.06 (-0.01-0.14)	**0.11 (0.02-0.20)**	0.07 (-0.05-0.18)
Separated	0.07 (-0.04-0.18)	0.13 (-0.01-0.26)	0.14 (0.00-0.29)	0.00 (-0.12-0.11)	**0.25 (0.06-0.44)**	-0.06 (-0.25-0.13)

Table K7, continued. Multiple linear regression of optimal model for the association between affectionate support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	-0.03 (-0.10-0.03)	0.02 (-0.05-0.09)	0.01 (-0.07-0.09)	-0.05 (-0.12-0.02)	0.03 (-0.06-0.12)	0.00 (-0.13-0.12)
Health-related:						
Self-rated health (vs poor)						
Fair	-0.01 (-0.18-0.16)	**0.20 (0.02-0.38)**	-0.06 (-0.30-0.18)	**0.20 (0.01-0.39)**	0.14 (-0.10-0.38)	0.26 (-0.05-0.57)
Good	-0.01 (-0.17-0.15)	**0.22 (0.06-0.39)**	-0.08 (-0.30-0.14)	**0.23 (0.06-0.41)**	0.20 (-0.03-0.43)	0.22 (-0.08-0.52)
Very good	0.04 (-0.13-0.20)	**0.31 (0.14-0.48)**	-0.01 (-0.23-0.21)	**0.28 (0.10-0.46)**	**0.27 (0.03-0.50)**	**0.31 (0.01-0.62)**
Excellent	0.10 (-0.07-0.26)	**0.38 (0.21-0.55)**	0.08 (-0.15-0.30)	**0.31 (0.13-0.49)**	**0.32 (0.08-0.56)**	**0.40 (0.10-0.71)**
Number of chronic conditions (vs 0)						
1	-0.04 (-0.09-0.01)	0.03 (-0.02-0.07)	0.02 (-0.03-0.08)	-0.04 (-0.09-0.01)	-0.02 (-0.08-0.05)	0.02 (-0.07-0.12)
2-3	-0.03 (-0.08-0.02)	0.02 (-0.03-0.08)	-0.06 (-0.13-0.02)	-0.01 (-0.06-0.04)	0.04 (-0.02-0.11)	0.08 (0.00-0.17)
≥4	-0.03 (-0.11-0.05)	-0.06 (-0.14-0.02)	-0.15 (-0.31-0.01)	-0.04 (-0.15-0.06)	-0.03 (-0.13-0.08)	0.04 (-0.06-0.15)
Depressive symptoms:						
Depressive symptoms (yes versus no)	---	---	---	---	---	---

Table K7, continued. Multiple linear regression of optimal model for the association between affectionate support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K8. Multiple linear regression of optimal model for the association between emotional/informational support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Emotional/informational support	**0.06 (0.04-0.09)**	**0.04 (0.01-0.07)**	**0.06 (0.02-0.10)**	**0.05 (0.02-0.08)**	0.03 (0.00-0.06)	**0.05 (0.02-0.09)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.43 (0.38-0.47)**	**0.48 (0.44-0.52)**	**0.55 (0.50-0.60)**	**0.47 (0.41-0.53)**
Age group (vs 45-54 years)						
55-64 years	**-0.22 (-0.26-[-0.17])**	**-0.19 (-0.24-[-0.14])**	---	---	---	---
65-74 years	**-0.48 (-0.53-[-0.43])**	**-0.38 (-0.44-[-0.33])**	---	---	---	---
≥ 75 years	**-0.82 (-0.88-[-0.76])**	**-0.81 (-0.87-[-0.74])**	---	---	---	---
Province (vs Ontario)						
Alberta	0.03 (-0.04-0.11)	**0.13 (0.05-0.21)**	0.07 (-0.02-0.17)	**0.11 (0.03-0.18)**	0.06 (-0.03-0.16)	0.08 (-0.03-0.19)
British Columbia	**0.13 (0.08-0.19)**	**0.22 (0.16-0.28)**	**0.26 (0.18-0.33)**	**0.14 (0.07-0.20)**	**0.10 (0.02-0.17)**	**0.11 (0.02-0.19)**
Manitoba	0.04 (-0.03-0.11)	**0.08 (0.01-0.15)**	**0.11 (0.02-0.20)**	0.02 (-0.05-0.09)	0.06 (-0.03-0.14)	-0.01 (-0.12-0.09)
Newfoundland and Labrador	0.07 (-0.01-0.14)	0.03 (-0.05-0.11)	0.00 (-0.01-0.19)	0.01 (-0.08-0.10)	-0.02 (-0.12-0.08)	0.11 (-0.02-0.24)
Nova Scotia	-0.06 (-0.12-0.00)	0.03 (-0.04-0.10)	-0.02 (-0.11-0.07)	0.00 (-0.07-0.08)	-0.03 (-0.12-0.06)	0.01 (-0.09-0.11)
Quebec	0.02 (-0.04-0.08)	**0.14 (0.08-0.20)**	**0.11 (0.03-0.19)**	0.04 (-0.02-0.11)	0.06 (-0.01-0.14)	0.08 (-0.01-0.17)

Table K8, continued. Multiple linear regression of optimal model for the association between emotional/informational support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.14 (0.04-0.23)**	**0.16 (0.07-0.25)**	**0.21 (0.05-0.36)**	**0.16 (0.04-0.29)**	**0.29 (0.18-0.40)**	0.05 (-0.06-0.16)
Some post-secondary education	**0.27 (0.16-0.37)**	**0.30 (0.20-0.39)**	**0.39 (0.23-0.56)**	**0.32 (0.19-0.44)**	**0.28 (0.16-0.40)**	**0.18 (0.06-0.31)**
Post-secondary graduation	**0.37 (0.29-0.45)**	**0.39 (0.31-0.46)**	**0.50 (0.37-0.64)**	**0.39 (0.28-0.50)**	**0.42 (0.32-0.51)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	**0.12 (0.01-0.22)**	0.09 (0.00-0.17)	**0.18 (0.02-0.34)**	0.06 (-0.05-0.17)	0.09 (-0.03-0.20)	0.00 (-0.11-0.12)
$50,000-$99,999	**0.20 (0.10-0.31)**	**0.21 (0.11-0.30)**	**0.29 (0.13-0.44)**	**0.18 (0.06-0.29)**	**0.18 (0.07-0.30)**	0.09 (-0.03-0.22)
$100,000-$149,999	**0.27 (0.17-0.40)**	**0.26 (0.16-0.36)**	**0.31 (0.15-0.47)**	**0.26 (0.14-0.38)**	**0.35 (0.21-0.48)**	**0.15 (0.01-0.30)**
≥$150,000	**0.30 (0.19-0.41)**	**0.23 (0.12-0.34)**	**0.33 (0.17-0.49)**	**0.24 (0.11-0.36)**	**0.28 (0.13-0.42)**	0.08 (-0.09-0.26)
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	0.01 (-0.06-0.08)	0.03 (-0.04-0.09)	0.05 (-0.04-0.13)	0.01 (-0.06-0.09)	0.09 (-0.02-0.19)	-0.05 (-0.18-0.08)
Widowed	-0.07 (-0.15-0.02)	0.02 (-0.04-0.08)	-0.23 (-0.50-0.04)	-0.01 (-0.11-0.09)	0.05 (-0.03-0.13)	-0.02 (-0.09-0.06)
Divorced	0.02 (-0.06-0.10)	0.06 (0.00-0.12)	0.01 (-0.08-0.11)	0.06 (-0.01-0.13)	0.08 (-0.01-0.17)	0.07 (-0.05-0.17)
Separated	0.04 (-0.07-0.15)	0.12 (-0.01-0.25)	0.12 (-0.02-0.26)	-0.01 (-0.13-0.10)	**0.23 (0.04-0.42)**	-0.06 (-0.25-0.13)

Table K8, continued. Multiple linear regression of optimal model for the association between emotional/informational support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	-0.03 (-0.09-0.03)	0.02 (-0.05-0.09)	0.01 (-0.07-0.09)	-0.05 (-0.12-0.02)	0.03 (-0.06-0.12)	-0.01 (-0.13-0.12)
Health-related:						
Self-rated health (vs poor)						
Fair	-0.01 (-0.18-0.16)	**0.20 (0.02-0.38)**	-0.06 (-0.30-0.18)	**0.20 (0.01-0.39)**	0.15 (-0.09-0.38)	0.27 (-0.04-0.58)
Good	0.00 (-0.17-0.16)	**0.22 (0.06-0.39)**	-0.08 (-0.30-0.14)	**0.23 (0.05-0.40)**	0.21 (-0.02-0.43)	0.22 (-0.08-0.52)
Very good	0.04 (-0.12-0.20)	**0.31 (0.14-0.48)**	-0.01 (-0.23-0.22)	**0.27 (0.09-0.45)**	**0.27 (0.04-0.50)**	**0.32 (0.02-0.61)**
Excellent	0.10 (-0.07-0.26)	**0.38 (0.20-0.55)**	0.07 (-0.15-0.30)	**0.30 (0.12-0.48)**	**0.33 (0.09-0.56)**	**0.40 (0.10-0.71)**
Number of chronic conditions (vs 0)						
1	-0.04 (-0.08-0.01)	0.03 (-0.02-0.07)	0.02 (-0.03-0.08)	-0.04 (-0.09-0.01)	-0.02 (-0.08-0.05)	0.02 (-0.07-0.11)
2-3	-0.03 (-0.08-0.02)	0.02 (-0.03-0.08)	-0.05 (-0.13-0.02)	-0.01 (-0.06-0.04)	0.05 (-0.02-0.11)	0.08 (-0.01-0.17)
≥4	-0.02 (-0.10-0.06)	-0.05 (-0.14-0.03)	-0.14 (-0.29-0.02)	-0.04 (-0.15-0.07)	-0.02 (-0.13-0.08)	0.04 (-0.06-0.15)
Depressive symptoms:						
Depressive symptoms (yes versus no)	---	---	---	---	---	---

Table K8, continued. Multiple linear regression of optimal model for the association between emotional/informational support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K9. Multiple linear regression of optimal model for the association between positive interactions and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Positive interactions	0.02 (-0.01-0.05)	0.03 (-0.01-0.05)	0.02 (-0.02-0.06)	0.01 (-0.02-0.04)	0.02 (-0.01-0.06)	**0.07 (0.02-0.10)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.43 (0.39-0.48)**	**0.49 (0.45-0.53)**	**0.56 (0.50-0.61)**	**0.47 (0.41-0.54)**
Age group (vs 45-54 years)						
55-64 years	**-0.22 (-0.27-[-0.18])**	**-0.19 (-0.24-[-0.14])**	---	---	---	---
65-74 years	**-0.49 (-0.54-[-0.44])**	**-0.39 (-0.44-[-0.33])**	---	---	---	---
≥ 75 years	**-0.83 (-0.89-[-0.77])**	**-0.81 (-0.88-[-0.74])**	---	---	---	---
Province (vs Ontario)						
Alberta	0.03 (-0.05-0.10)	**0.13 (0.04-0.21)**	0.07 (-0.03-0.17)	**0.10 (0.03-0.18)**	0.06 (-0.03-0.16)	0.08 (-0.03-0.19)
British Columbia	**0.14 (0.08-0.19)**	**0.22 (0.16-0.28)**	**0.26 (0.18-0.34)**	**0.14 (0.07-0.20)**	**0.10 (0.02-0.17)**	**0.11 (0.03-0.20)**
Manitoba	0.04 (-0.03-0.11)	**0.08 (0.01-0.15)**	**0.11 (0.02-0.20)**	0.02 (-0.05-0.10)	0.06 (-0.03-0.14)	-0.01 (-0.11-0.10)
Newfoundland and Labrador	0.06 (-0.01-0.14)	0.03 (-0.05-0.12)	0.00 (-0.01-0.19)	0.01 (-0.08-0.10)	-0.02 (-0.12-0.08)	0.11 (-0.01-0.24)
Nova Scotia	-0.06 (-0.12-0.00)	0.03 (-0.04-0.11)	-0.02 (-0.11-0.07)	0.00 (-0.07-0.08)	-0.03 (-0.11-0.06)	0.01 (-0.09-0.11)
Quebec	0.02 (-0.04-0.07)	**0.13 (0.07-0.19)**	**0.10 (0.02-0.18)**	0.04 (-0.03-0.10)	0.06 (-0.02-0.14)	0.07 (-0.02-0.16)

Table K9, continued. Multiple linear regression of optimal model for the association between positive interactions and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.14 (0.05-0.24)**	**0.16 (0.07-0.25)**	**0.21 (0.05-0.37)**	**0.17 (0.04-0.29)**	**0.29 (0.17-0.40)**	0.05 (-0.07-0.16)
Some post-secondary education	**0.27 (0.17-0.37)**	**0.30 (0.20-0.39)**	**0.40 (0.23-0.56)**	**0.32 (0.19-0.44)**	**0.28 (0.16-0.40)**	**0.18 (0.06-0.31)**
Post-secondary graduation	**0.37 (0.29-0.45)**	**0.39 (0.31-0.46)**	**0.51 (0.37-0.64)**	**0.39 (0.28-0.50)**	**0.42 (0.32-0.51)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	**0.12 (0.01-0.22)**	0.09 (0.00-0.18)	**0.19 (0.03-0.35)**	0.06 (-0.05-0.17)	0.08 (-0.03-0.20)	0.01 (-0.11-0.13)
$50,000-$99,999	**0.20 (0.10-0.31)**	**0.21 (0.12-0.30)**	**0.30 (0.15-0.46)**	**0.18 (0.07-0.29)**	**0.18 (0.06-0.30)**	0.10 (-0.03-0.23)
$100,000-$149,999	**0.30 (0.19-0.41)**	**0.26 (0.16-0.37)**	**0.33 (0.17-0.49)**	**0.26 (0.14-0.38)**	**0.34 (0.21-0.48)**	**0.16 (0.02-0.31)**
≥$150,000	**0.31 (0.20-0.43)**	**0.23 (0.13-0.34)**	**0.35 (0.19-0.51)**	**0.24 (0.12-0.36)**	**0.27 (0.13-0.42)**	0.10 (-0.08-0.27)
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	0.06 (-0.02-0.04)	0.01 (-0.06-0.08)	0.04 (-0.04-0.13)	0.00 (-0.08-0.08)	0.09 (-0.01-0.20)	-0.05 (-0.18-0.08)
Widowed	-0.07 (-0.16-0.01)	0.02 (-0.04-0.08)	-0.22 (-0.49-0.04)	-0.02 (-0.12-0.08)	0.05 (-0.03-0.13)	-0.01 (-0.08-0.07)
Divorced	0.01 (-0.07-0.09)	0.06 (0.00-0.13)	0.01 (-0.09-0.11)	0.05 (-0.02-0.12)	0.09 (0.00-0.18)	0.07 (-0.04-0.19)
Separated	0.04 (-0.07-0.15)	0.12 (-0.01-0.25)	0.11 (-0.03-0.26)	-0.01 (-0.13-0.10)	**0.24 (0.05-0.43)**	-0.04 (-0.24-0.15)

Table K9, continued. Multiple linear regression of optimal model for the association between positive interactions and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	-0.03 (-0.09-0.03)	0.02 (-0.05-0.08)	0.01 (-0.07-0.09)	-0.05 (-0.12-0.02)	0.03 (-0.06-0.12)	-0.01 (-0.13-0.12)
Health-related:						
Self-rated health (vs poor)						
Fair	-0.02 (-0.19-0.15)	**0.20 (0.02-0.38)**	-0.07 (-0.30-0.17)	0.19 (0.00-0.38)	0.14 (-0.10-0.38)	0.25 (-0.06-0.57)
Good	-0.03 (-0.19-0.13)	**0.22 (0.05-0.39)**	-0.08 (-0.30-0.15)	**0.21 (0.04-0.39)**	0.19 (-0.04-0.42)	0.21 (-0.10-0.51)
Very good	0.02 (-0.15-0.18)	**0.31 (0.14-0.48)**	0.00 (-0.23-0.22)	**0.25 (0.08-0.43)**	**0.25 (0.02-0.49)**	0.29 (-0.01-0.60)
Excellent	0.08 (-0.09-0.25)	**0.38 (0.20-0.55)**	0.09 (-0.14-0.32)	**0.29 (0.10-0.47)**	**0.30 (0.06-0.54)**	**0.37 (0.06-0.68)**
Number of chronic conditions (vs 0)						
1	-0.04 (-0.09-0.01)	0.03 (-0.02-0.07)	0.02 (-0.03-0.08)	-0.04 (-0.09-0.01)	-0.02 (-0.08-0.05)	0.02 (-0.07-0.12)
2-3	-0.03 (-0.08-0.02)	0.02 (-0.03-0.08)	-0.05 (-0.13-0.02)	-0.01 (-0.06-0.05)	0.04 (-0.02-0.11)	0.08 (-0.01-0.17)
≥4	-0.02 (-0.10-0.06)	-0.06 (-0.14-0.03)	-0.14 (-0.29-0.02)	-0.04 (-0.15-0.07)	-0.02 (-0.13-0.08)	0.04 (-0.06-0.15)
Depressive symptoms:						
Depressive symptoms (yes versus no)	-0.07 (-0.13-0.01)	-0.01 (-0.07-0.04)	-0.01 (-0.08-0.07)	**-0.08 (-0.15-[-0.02])**	-0.06 (-0.13-0.12)	-0.02 (-0.10-0.06)

Table K9, continued. Multiple linear regression of optimal model for the association between positive interactions and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**

Table K10. Multiple linear regression of optimal model for the association between tangible support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Main effect:						
Tangible support	**0.05 (0.03-0.08)**	0.02 (-0.01-0.04)	**0.05 (0.02-0.09)**	0.02 (-0.01-0.05)	0.01 (-0.02-0.05)	**0.05 (0.02-0.08)**
Covariate						
Base:						
Sex (females versus males)	---	---	**0.44 (0.39-0.49)**	**0.49 (0.45-0.53)**	**0.56 (0.51-0.61)**	**0.48 (0.42-0.55)**
Age group (vs 45-54 years)						
55-64 years	**-0.22 (-0.27-[-0.18])**	**-0.19 (-0.24-[-0.14])**	---	---	---	---
65-74 years	**-0.49 (-0.54-[-0.44])**	**-0.39 (-0.44-[-0.33])**	---	---	---	---
≥ 75 years	**-0.83 (-0.89-[-0.78])**	**-0.81 (-0.88-[-0.75])**	---	---	---	---
Province (vs Ontario)						
Alberta	0.03 (-0.04-0.10)	**0.13 (0.04-0.21)**	0.07 (-0.02-0.17)	**0.10 (0.03-0.18)**	0.06 (-0.03-0.16)	0.08 (-0.03-0.19)
British Columbia	**0.14 (0.08-0.19)**	**0.22 (0.16-0.29)**	**0.26 (0.18-0.34)**	**0.14 (0.07-0.20)**	**0.10 (0.02-0.17)**	**0.11 (0.03-0.20)**
Manitoba	0.05 (-0.02-0.11)	**0.08 (0.01-0.15)**	**0.12 (0.03-0.21)**	0.02 (-0.05-0.10)	0.06 (-0.03-0.15)	-0.01 (-0.11-0.10)
Newfoundland and Labrador	0.06 (-0.01-0.14)	0.03 (-0.05-0.11)	0.09 (-0.01-0.19)	0.01 (-0.08-0.10)	-0.02 (-0.12-0.08)	0.11 (-0.02-0.24)
Nova Scotia	-0.06 (-0.12-0.00)	0.03 (-0.04-0.11)	-0.02 (-0.11-0.07)	0.00 (-0.07-0.08)	-0.03 (-0.11-0.06)	0.01 (-0.09-0.11)
Quebec	0.01 (-0.05-0.07)	**0.14 (0.07-0.20)**	**0.10 (0.02-0.18)**	0.04 (-0.03-0.10)	0.06 (-0.02-0.14)	0.07 (-0.02-0.17)

Table K10, continued. Multiple linear regression of optimal model for the association between tangible support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Sociodemographic:						
Highest level of education (vs less than secondary school):						
Secondary school only	**0.14 (0.05-0.24)**	**0.16 (0.07-0.25)**	**0.21 (0.06-0.37)**	**0.17 (0.04-0.29)**	**0.29 (0.17-0.40)**	0.05 (-0.06-0.17)
Some post-secondary education	**0.27 (0.17-0.38)**	**0.30 (0.20-0.39)**	**0.40 (0.24-0.57)**	**0.32 (0.19-0.44)**	**0.28 (0.15-0.40)**	**0.18 (0.06-0.31)**
Post-secondary graduation	**0.37 (0.29-0.45)**	**0.39 (0.31-0.46)**	**0.51 (0.37-0.65)**	**0.39 (0.28-0.50)**	**0.42 (0.32-0.51)**	**0.22 (0.13-0.31)**
Total annual household income (vs < $20,000)						
$20,000 - $49,999	**0.11 (0.00-0.22)**	**0.09 (0.00-0.18)**	**0.19 (0.03-0.35)**	0.06 (-0.05-0.17)	0.08 (-0.03-0.20)	0.01 (-0.10-0.13)
$50,000-$99,999	**0.19 (0.09-0.30)**	**0.21 (0.12-0.30)**	**0.29 (0.14-0.44)**	**0.17 (0.06-0.29)**	**0.18 (0.06-0.30)**	0.11 (-0.02-0.24)
$100,000-$149,999	**0.29 (0.18-0.40)**	**0.26 (0.16-0.37)**	**0.32 (0.16-0.48)**	**0.26 (0.14-0.38)**	**0.35 (0.21-0.48)**	**0.17 (0.03-0.32)**
≥$150,000	**0.30 (0.18-0.41)**	**0.24 (0.13-0.34)**	**0.33 (0.17-0.50)**	**0.24 (0.11-0.36)**	**0.28 (0.13-0.42)**	0.11 (-0.07-0.29)
Marital status (vs married or living with a partner in a common-law relationship)						
Single, never married or never lived with a partner	**0.10 (0.02-0.08)**	0.01 (-0.06-0.08)	0.07 (-0.02-0.16)	0.01 (-0.06-0.09)	0.09 (-0.01-0.20)	-0.04 (-0.17-0.10)
Widowed	-0.04 (-0.13-0.05)	0.02 (-0.04-0.08)	-0.21 (-0.48-0.06)	-0.01 (-0.11-0.09)	0.05 (-0.03-0.13)	0.00 (-0.08-0.07)
Divorced	0.05 (-0.03-0.13)	**0.07 (0.00-0.13)**	0.04 (-0.07-0.14)	0.06 (-0.01-0.13)	0.09 (-0.01-0.18)	0.08 (-0.03-0.20)
Separated	0.07 (-0.04-0.18)	0.12 (-0.01-0.26)	0.14 (0.00-0.28)	0.00 (-0.12-0.11)	**0.23 (0.04-0.42)**	-0.04 (-0.23-0.15)

Table K10, continued. Multiple linear regression of optimal model for the association between tangible support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Urban/rural living status (rural versus urban living)	-0.03 (-0.09-0.03)	0.02 (-0.05-0.08)	0.01 (-0.07-0.09)	-0.05 (-0.12-0.02)	0.03 (-0.06-0.12)	-0.01 (-0.13-0.12)
Health-related:						
Self-rated health (vs poor)						
Fair	-0.02 (-0.20-0.15)	**0.20 (0.02-0.38)**	-0.07 (-0.30-0.17)	0.19 (0.00-0.38)	0.14 (-0.10-0.38)	0.26 (-0.05-0.58)
Good	-0.03 (-0.19-0.14)	**0.22 (0.05-0.39)**	-0.08 (-0.31-0.14)	**0.21 (0.03-0.39)**	0.19 (-0.04-0.42)	0.22 (-0.08-0.52)
Very good	0.02 (-0.15-0.18)	**0.31 (0.14-0.48)**	-0.01 (-0.24-0.22)	**0.25 (0.07-0.43)**	**0.26 (0.02-0.49)**	**0.31 (0.01-0.62)**
Excellent	0.07 (-0.09-0.24)	**0.38 (0.20-0.55)**	0.08 (-0.15-0.31)	**0.29 (0.10-0.46)**	**0.31 (0.07-0.55)**	**0.40 (0.10-0.71)**
Number of chronic conditions (vs 0)						
1	-0.03 (-0.08-0.01)	0.03 (-0.02-0.08)	0.02 (-0.03-0.08)	-0.04 (-0.09-0.01)	-0.02 (-0.08-0.05)	0.02 (-0.07-0.12)
2-3	-0.03 (-0.08-0.03)	0.02 (-0.03-0.08)	-0.05 (-0.13-0.02)	-0.01 (-0.06-0.04)	0.05 (-0.02-0.11)	0.08 (-0.01-0.17)
≥4	-0.02 (-0.10-0.06)	-0.06 (-0.14-0.03)	-0.14 (-0.30-0.02)	-0.04 (-0.14-0.07)	-0.02 (-0.13-0.08)	0.04 (-0.07-0.15)
Depressive symptoms:						
Depressive symptoms (yes versus no)	**-0.07 (-0.13-[0.01])**	-0.01 (-0.07-0.04)	0.00 (-0.07-0.08)	**-0.08 (-0.14-[-0.02])**	-0.06 (-0.14-0.12)	-0.03 (-0.11-0.05)

Table K10, continued. Multiple linear regression of optimal model for the association between tangible support and REY II stratified by sex or age (n=24,719)*

	Males β (95% CI)	**Females** β (95% CI)	**45-54 Years** β (95% CI)	**55-64 Years** β (95% CI)	**65-74 Years** β (95% CI)	**≥75 Years** β (95% CI)
Health behaviours:						
Smoking status (vs never smoker)						
Former smoker	---	---	---	---	---	---
Current smoker	---	---	---	---	---	---
Alcohol use (vs not user)						
Occasional user	---	---	---	---	---	---
Regular user	---	---	---	---	---	---

* β represents regression coefficient; CI is confidence interval; --- indicates that variable is not included in model

Statistically significant values ($p<0.05$) are **bolded**