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**ARE CANADA'S OLDER ADULTS AGING SUCCESSFULLY? AN ANALYSIS
OF THE CANADIAN COMMUNITY HEALTH SURVEY**

By

Evan Gammon

A Thesis

Submitted to the Faculty of Graduate Studies
Through the Faculty of Human Kinetics
in Partial Fulfillment of the Requirements for
the Degree of Master of Human Kinetics at the
University of Windsor

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2016

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**Are Canada's Older Adults Aging Successfully? An Analysis of the Canadian
Community Health Survey**

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20 September 2016

Declaration of Originality

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Abstract

Defining successful aging (SA) has been a topic of debate amongst researchers since Rowe and Kahn introduced the topic of “usual” versus “successful” aging in the late 1980s. Researchers have criticized their biomedical model of successful aging, which has been used as an unofficial gold standard in determining whether one has aged usually or successfully. This perspective focuses on having high physical and mental functional capacities, being void of disease or disease-related disability, and having an active engagement with life, and is considered too narrow in its focus and lacking subjective interpretations of aging. Using the 2011-2012 version of the Canadian Community Health Survey with Canadian adults aged 60 years and older (N = 15,846), 15.9% of respondents were aging successfully, 81% were aging moderately successfully, and 3.1% were aging unsuccessfully with the biomedical model based on Rowe and Kahn’s (1987; 1997; 1998) three postulates of aging success. Using the psychosocial criteria based on a review of SA literature, 18.3% of respondents were aging successfully, 66.1% were aging moderately successfully, and 15.6% were aging unsuccessfully. Using the integrative criteria, which combined both the biomedical and psychosocial perspectives, 28.9% of respondents were aging successfully, 55.5% were aging moderately successfully, and 15.6% were aging unsuccessfully. Results from the integrated model are depicted on a continuum that illustrates the difference in aging success based on a combination of predictors unique to each perspective of SA. This model has the potential to demonstrate that those individuals who may not be aging successfully in biomedical terms (attainment), may otherwise be aging successfully in psychosocial terms (adaptation).

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Table of Contents

DECLARATION OF ORIGINALITY	iii
ABSTRACT.....	iv
ACKNOWLEDGEMENTS.....	v
LIST OF FIGURES AND TABLES.....	ix
I. INTRODUCTION.....	1
Review of Literature.....	4
History of the Successful Aging Paradigm.....	4
Rowe and Kahn’s Perspective of Successful Aging.....	7
The Importance of Physically Active Lifestyles in Later Adulthood.....	9
Psychosocial Perspectives of Successful Aging.....	15
The Benefits of Psychosocial Health Resources in Later Adulthood.....	18
Employing Rowe and Kahn’s Biomedical Perspective with the Canadian Community Health Survey Data.....	21
Re-visiting Rowe and Kahn’s Successful Aging Model.....	23
Hypotheses.....	28
II. METHODS.....	29
Database Sample.....	29
Predictive Measures.....	33
Rowe and Kahn’s Biomedical Criteria of Successful Aging.....	33
Psychosocial Criteria of Successful Aging.....	37

Data Analysis.....	44
Integrated Model.....	44
Physical Activity.....	48
Covariates.....	48
III. RESULTS.....	50
Integrated Criteria: Successful Aging Continuum Results.....	57
Comparing Present Results with the Baker et al. (2009) Analysis.....	57
IV. DISCUSSION.....	60
Goals of the Present Study.....	60
Comparing the Present Analysis with the Baker et al. (2009) Results.....	62
Relating Findings from the Present Analysis to Successful Aging Research.....	63
Using the Canadian Community Health Survey Sample Data.....	65
Health and Wellbeing from Biomedical and Psychosocial Perspectives.....	67
Sex and Aging Success.....	69
Living Arrangements and Aging Success.....	70
V. LIMITATIONS AND FUTURE RESEARCH DIRECTIONS.....	72
VI. CONCLUSION.....	76
REFERENCES.....	78
VITA AUCTORIS.....	95

List of Figures and Tables

Figure 1. Population Distribution by Province from the 2003 CCHS Total Population Sample.....	31
Figure 2. Population Distribution by Province from the 2011-2012 CCHS Total Population Sample.....	32
Figure 3. Combined Satisfied Criteria Scores from Both Models of Successful Aging Predictors.....	46
Figure 4. Integrated Criteria: Successful Aging Continuum.....	47
Table 1 Canadian Community Health Survey Biomedical Predictors (Attainment) of Successful Aging.....	36
Table 2. Psychological and Social Factors Identified within Lay-Based Definitions of Successful Aging.....	39
Table 3. Rotated Factor Matrix Results using Carr’s Review of Psychosocial Successful Aging Research.....	42
Table 4. Canadian Community Health Survey Psychosocial Predictors (Adaptation) of Successful Aging.....	43
Table 5. Successful Aging Groups and Frequencies Based on the Three Successful Aging Models.....	51
Table 6. Variables Used in the Analysis, including Covariates.....	53
Table 7. Multivariate Ordinal Regression Results: Odds Associated with SA and the Covariates in the Study.....	56

Introduction

In July 2015 in Canada, the number of individuals aged 65 and older surpassed the number of children under the age of 15, and our oldest citizens accounted for approximately 16.1% of the total Canadian population (Evans, 2015). There were an estimated 5,780,900 Canadians aged 65 years and older, with one in every six Canadians now in this age group (Evans, 2015). The world population of adults aged 65 years and older was approximately 500 million in 2006 and is expected to nearly double by 2030 (Foot & Stoffman, 1996; Ortman, Velkoff & Hogan, 2014). In Canada, the generation of “baby boomers” was born between 1946 and 1965, and began to reach age 65 in 2011 (Statistics Canada, 2011).

The number of older adults worldwide is anticipated to increase and consequences are believed to follow, affecting healthcare resources, economics, education, and the employment sector (Evans 2015; National Institute on Aging, 2016; Parkinson, McFarland, & McKenna, 2015; Weir, Meisner, & Baker, 2010). However, individuals do not age homogenously (Freedman, Martin, & Scoeni, 2002), and instead will have different experiences of aging that can be affected by health, lifestyle choices, as well as attitudes and beliefs towards aging (Chodzko-Zajko, Schwingel, & Park, 2009; Huy, Schneider, & Thiel, 2010).

A unified definition of successful aging (SA) remains elusive, although theories do exist that include interpreting personal meanings attached to aging by older individuals, as well as gauging health in later life based on physical and functional abilities, and the presence of disease. With the cohort of baby boomers beginning to retire, it is feared that this large group of older adults will strain Social Security and Medicaid

programs in the United States which in turn could affect the quality of healthcare resources available to younger generations (Dillaway & Byrnes, 2009; Gross, 2006; Kolata, 2006). Similarly, the Canadian government will experience a greater demand placed on healthcare resources, as well as income supplement programs like Old Age Security and the Canadian Pension Plan (Parkinson, McFarland, & McKenna, 2015). Research investigating SA has grown (Pruchno, 2015) and with older adults living longer than ever before, the focus for policy makers, researchers, and practitioners has been to provide individuals with choice, autonomy, and opportunity into old age (Mallers, Claver, & Lares, 2013).

SA has become a ubiquitous term in gerontology research with some overlapping concepts. SA has also been referred to in the literature as optimal aging (Aldwin, Spiro, & Park, 2005), positive aging (Bowling, 1993), aging well, healthy aging (Peel, McClure, & Bartlett 2005), and productive aging (Wahrendorf, van dem Knesebeck, & Siegrist, 2006; Warburton & Peel, 2008). SA was first introduced in the late 1950s, where the concept focused on extending activity patterns and values from middle adulthood into late adulthood (Aird & Buys, 2014; Walker, 2002). Productive aging models were later proposed in the 1980s, which emphasized removing barriers for either paid or unpaid work, so that older adults could engage in productive activities past their retirement years (Aird & Buys, 2014). Walker (2002) reported the rise of active aging in the 1990s, where “healthy aging” emerged as the important connection between activity and health.

Bowling (2007) criticized some of the recent SA research for not even attempting to define SA and noted that many inconsistencies exist among studies. These inconsistencies exist primarily where SA is defined in terms of medical versus social

perspectives on aging (Glass, 2003). For example, Gibson (1995) incorporates reaching one's potential, as well as psychological and social well-being, in prediction of psychosocial aging success, whereas Baltes and Baltes (1990) consider adaptation, control, productivity, social competence and skill, self-mastery, cognitive efficiency, and social functioning in their psychosocial perspective on SA. In contrast, biomedical perspectives mainly have followed medically-based perspectives of aging success, such as being void of health problems or disease, not showing any signs of depression, having satisfactory cognitive function (self-rated), and a high level of functional capacity relative to age (Bowling, 2007; Uotinen, Suutama, & Ruoppila, 2003). The present paper attempts to develop a more comprehensive model of SA by merging both psychosocial and biomedical components.

Review of Literature

History of the Successful Aging Paradigm

Before the popularization of the field of SA, earlier theories existed that showcased and played upon stereotypes about older adults. Disengagement theory, as posited by Cumming and Henry (1961), included the idea that individuals were believed to age successfully by withdrawing from society. This withdrawal was based on the assumption that, with age, roles change, and older individuals begin to interact less with society. Further, an assumption embedded in disengagement theory is that as individuals begin to interact less, they deteriorate and eventually succumb to their diseases (Cumming & Henry, 1961).

Other early models of SA included predictors such as the amount of physical activity (PA) undertaken, ability to cope with disengagement, life satisfaction, and maturity (Havighurst, 1957). The aforementioned variables were used as predictors for aging success, in that researchers believed they reflect upon fulfilling social roles in individuals aged 40-70 years. Using this definition of SA, it was suggested that individuals' social competence plateaus in this age range of the lifespan and begins to taper off as individuals reach the later years of life (Havighurst, 1957). Differences in social class were also reflected in the results, such that those individuals at the lower end of social class were determined to be less socially competent than individuals on the higher end of social class (Havighurst, 1957).

In contrast, Williams & Wirths (1965) defined SA as a state in which a person has an "overall relation... to his social system that is both autonomous and persistent" (p. 10). In this sense, the relationship is either autonomous or dependent, as judged by significant

others to the individual, and precarious or persistent, as judged by the stability of the system (Williams & Wirths, 1965). With the use of this model, the sample studied by Williams and Wirths (1965) was judged to be mostly successful (64%) with only 10% falling into the lowest success category. In this study, individuals aged 49-90 years were stratified based on sex and social class. It was believed that these categorical variables combined with the effects of attrition gave the sample an advantage in aging successfully (Tobin, 1966).

Selective optimization with compensation is a life-span approach model which focuses on both the constants and changes in behaviour as individuals age (Baltes & Baltes, 1990; Baltes & Dickson, 2001). Selection is the decision as to which goals and outcomes should be undertaken, and optimization is the allocation of resources to reach the selected aging goals, such as maintaining functional abilities, and social ventures, as some resources may become scarce with older age (Baltes & Baltes, 1990; Baltes & Dickson, 2001). This model shows how resources, such as mental, physical, and environmental assets, are not constant, and that when losses arise, individuals must devise how to allocate the remaining resources to compensate or optimize resources used to achieve their aging goals (Baltes & Dickson, 2001). Goals associated with aging, such as personal development and maintenance of function, are what some individuals set out to achieve (Rothermund & Brandtstädter, 2003). Sometimes these goals occur in a hierarchy, as opposed to individually or are based on compensation for losses, such as the goal of minimizing declines in physical or mental abilities (Baltes & Dickson, 2001).

Clark and Anderson (1967) studied two groups of older individuals, one of whom lived part-time in a community residence, and the other part-time in a hospital for the

mentally ill. This research employed anthropological methods. The results suggested that mental health, physical health, adequate standard of living, being native-born (United States), and being on the younger end of the old-age continuum determined the extent of depression or satisfaction experienced by the individual (Clark & Anderson, 1967).

Results from interviews indicated that individuals over the age of 65 who have sufficient financial resources exhibit fewer depressive symptoms than those who are older or have a lower socio-economic status (Clark & Anderson, 1967). Individuals who were depressed, or who had borderline mental and physical disabilities were less socially involved and more likely to go unnoticed living in large metropolitan areas (Clark & Anderson, 1967).

Palmore (1979) studied SA in older adults longitudinally and defined aging success with three criteria: longevity to age 75, lack of disability, and happiness. The status of aging success was “correctly” predicted with the combination of initial health status at the beginning of the study, and happiness (Palmore, 1979). It was also suggested that group (social) activities as well as participation in PA might also play a role in predicting aging success (Palmore, 1979).

The concept of SA is noted as gerontology’s most successful idea (Katz & Calasanti, 2015). SA gained traction within the community of aging research after the MacArthur Foundation recruited 16 researchers in the late 1980s and urged them to “do something innovative!” (Kahn, 2004, p. 2). Between geneticists, epidemiologists, psychologists, and sociologists involved in these various research ventures, they learned from each other’s respective disciplines and scientific approaches and identified how some older adults do better in older age than others (Kahn, 2004).

SA received ample attention after Rowe and Kahn (1987) published their findings from the MacArthur Foundation studies (using data from longitudinal surveys), and defined SA in mostly medical terms. This research examined the physiological declines of aging individuals with respect to carbohydrate metabolism with age, increasing rates of osteoporosis with age, aging and cognitive functions, and psychosocial components associated with aging such as social support, bereavement and relocation, and support and control (Rowe & Kahn, 1987). From these data, Rowe and Kahn developed a biomedical perspective of SA, which has since been used as the unofficial gold standard in SA definitions and categorizing individuals' aging success (Katz & Calasanti, 2015). The term biomedical refers to medical health, or more specifically, the existence of chronic conditions and the corresponding impact on activities of daily living, which is arguably a crucially important aspect of the aging process (Bowling & Iliffe, 2011).

Rowe and Kahn's Perspective of Successful Aging

Rowe and Kahn (1987) postulated that SA encompasses three essential components: the absence of disease and disease-related disability, high physical and mental functional capacity, and an active engagement with life. Having an active engagement with life in this context included having interpersonal relationships and contact with others, as well as participation in productive activities that are meaningful to the individual and beneficial to society (Kahn, 2004; Rowe & Kahn, 1997; 1998). Rowe and Kahn (1987) defined usual aging as typical, non-pathological age-related losses of cognitive and physical functioning, whereas individuals who were aging successfully did not see these same declines (Rowe & Kahn, 1987; 1997; 1998). These successful individuals exhibited minimal-to-no cognitive and physical losses. Rowe and Kahn

(1997; 1998) also concluded that older adults have more control over their aging than was previously thought.

In revisiting some of their earlier work, Rowe and Kahn (1997; 1998) augmented their findings, and added that having higher levels of education and high self-efficacy, as well as social contacts and support, were all further predictors of aging success. The core of this model maintains that individuals are responsible for their own aging success through lifestyle choices, including habits and diet, that are more internally driven (i.e., what people want and choose to do), and that external influences, such as psychosocial and environmental influences (i.e., active engagement with life, autonomy/control, social relationships) are modifiable at the individual's discretion through environmental mastery (Baltes & Baltes, 1990; Rowe & Kahn, 1987; 1997; 1998).

The latter aspect of this perspective, having an active engagement with life, is more psychosocially-based, and has been criticized as being an afterthought to the initial two determinants of aging success as a result of scrutiny received from Rowe and Kahn's (1987; 1997) earlier work (Riley, 1998). It was not until a letter to the editor of *The Gerontologist* by Riley (1998) that engagement was included as a precondition to SA in Rowe and Kahn's perspective. This addition has helped to broaden the paradigm by including interpersonal relationships and productive activities (Rowe & Kahn, 1998). However, there has been much onus placed on older adults being in control of their own health, and there has been ample evidence to support the first two postulates of Rowe and Kahn's model (Britton, Shipley, Singh-Manoux, & Marmot, 2008; Peel, McClure, and Bartlett 2005; Pruchno & Wilson-Gendersen, 2015).

The Importance of Physically Active Lifestyles in Later Adulthood

With a greater number of older adults in the general population, stereotypes persist and are pervasive amongst this age group. In these stereotypes, older adults are often seen as fragile and feeble. Ageism is discrimination based on the chronological or assumed age of an individual and often discourages older adults from participating in PA based on societal norms (Horton, Baker, & Deakin, 2007; O'Brien Cousins, 2005). Unfortunately, because of these stereotypes, many older adults have learned to 'act their age' rather than seeking opportunities to be physically active, leading to sedentary lifestyles and a tendency to ignore the potential benefits of PA. As a result, a greater degree of risk has been associated with high intensity physical activities, like running, and instead, older adults are participating in activities with less risk, such as lawn bowling, curling, fishing, and gentle walks (O'Brien Cousins, 2005).

The Canadian Society for Exercise Physiology (CSEP) recommends that adults 65 years of age and older participate in a total of 150 minutes of moderate-to-vigorous intensity of aerobic exercises each week to improve functional abilities (CSEP, 2016). CSEP emphasizes the health benefits associated with daily PA, which include strengthening exercises using the major muscle groups a minimum of two times per week, in addition to taking part in aerobic exercises. Older adults with poor mobility are also encouraged to take part in PA to improve balance and prevent the incidence of falls. Every year, approximately one third of adults over the age of 65 will experience a fall (Franco, Pereira, Leani, & Ferreira, 2014; Gillespie et al., 2012). Falls and fractures have been shown to occur as a result of declining levels of PA (Gillespie et al., 2012), and

once a fall occurs, the individual is two to three times most likely to fall again in the next six months (Stahl & Albert, 2014; Stevens & Soglow, 2008).

With advanced age, predominantly individuals over 80 years, the likelihood of experiencing adverse health related disorders/syndromes increases, even in those who have high fitness levels (Cho, Martin, & Poon, 2012; Smith, 2003). PA is strongly promoted for weight loss and weight maintenance, but the effects of PA go beyond weight control and contribute to the treatment and prevention of obesity-related health outcomes as well as a reduction in all-cause mortality in individuals with diabetes (Church et al., 2004; Herman et al., 2012; Kerr, Rosenberg & Frank, 2012). Walking has been shown to have favourable implications for health promotion and disease reduction. Research has shown that walking reduces body fat, cholesterol levels, glucose levels, and has been shown to improve aerobic capacity in older adults (Kerr, Rosenberg & Frank, 2012; Wong, Wong, Pang, Azizah & Dass, 2003). Both Dogra (2011) and Herman and colleagues (2012) found that adverse health-related quality of life was most strongly predicted by physical inactivity. These researchers also reported that BMI was a strong predictor of health-related quality of life when examined in combination with the level of PA undertaken (De Melo, de Sa & Gucciardi, 2013; Herman et al., 2012).

Perhaps due in part to social norms and stereotypes, less than 20% of Canadian adults 60 years of age and older are considered to be physically active (≈ 3.0 kcal/kg/day, similar to the exertion achieved in walking at least 60 minutes per day). Of interest, men are more active than women in the same age group (Herman, 2010). Immigrant and individuals in lower income groups are associated with lower prevalence rates of PA participation and exercise program adherence (Dogra, Al-Sahab, Manson & Tamim,

2015; Herman, 2010). Geographically, there is a larger representation of older adults in British Columbia, the Yukon, Alberta, and Ontario who are more active than the national average, opposite that of individuals residing in the Prairie and Maritime provinces and Québec, who are less active than the national average (Herman, 2010).

There are a multitude of benefits associated with taking part in PA and being fit in late adulthood that include cardiovascular health, as well as a reduction in the incidence of osteoporosis and cancer (Wu et al., 2015). PA has been shown to reduce the risk of developing cardiovascular disease by half, as well as decrease the risk of developing type-2 diabetes by 6% (Warburton, et al., 2006). The decrease in prevalence of diabetes was even more pronounced in higher risk individuals, with reductions of 40%-60% of developing type-2 diabetes by losing weight through exercise over the span of 3-4 years, and a 30%-40% reduction in the relative risk of developing colon cancer, while bone mineral loss associated with aging decreased by 1% per year with weight loss from PA (Grossman & Stewart, 2003; Warburton et al., 2006).

Health professionals agree that a minimum expenditure of 1,000 kcal every week is the appropriate volume of PA and that higher energy expenditures above this rate have added benefits (Warburton et al., 2006). By increasing energy expenditure by one metabolic equivalent (MET), or by 1,000 kcal, this showed an association with a reduction in mortality by approximately 20% (Warburton et al., 2006). Energy expenditure can be easily monitored through the use of heart rate monitors and pedometers. PA lowers the risk of premature death and increases the primary and secondary prevention of many chronic diseases in older adults (Leenders et al., 2012; Warburton et al., 2006). However, physical inactivity is noted to be the greatest

modifiable risk factor for chronic disease and premature death, above cigarette smoking, and excessive alcohol consumption (Fedor, Garcia, & Gunstad, 2015; Warburton, Nicol, & Bredin, 2006).

Behaviours like healthy eating, medication adherence, and participation in PA can all be predicted by attitudes, beliefs, aging expectations, and socioeconomic status (SES) (Carr, 2012; Dogra et al., 2015; Trail, Chambers, & Butler, 2012). The theory of planned behaviour posits three components necessary to intention and, ultimately, behaviour.

These components include attitudes, subjective norms, and perceived behavioural control (Ajzen, 1991). Hausenblas, Carron, and Mack (1997) conducted a meta-analysis that suggested individuals' intentions had a large effect on PA participation. However, these exercise behaviours were more significantly affected by positive attitudes, such as good feelings toward exercise outcomes, than by subjective norms, such as feeling too old to participate in exercise, in determining PA participation. It has also been suggested that older adults who have better aging expectations and attach positive values to aging are more likely to engage in PA than those who have lower aging expectations (Huy, Schneider, & Thiel, 2010). In turn, those who have negative or fewer aging expectations participate less in leisure and PA, and will not experience the same positive outcomes in later life (Huy, Schneider, & Thiel, 2010).

Dogra (2011) used the Canadian Community Health Survey (CCHS) to examine the relationship between self-perceived health and levels of PA in older Canadian adults afflicted with chronic disease. The results of this analysis indicated that there was a larger portion of individuals with cardio-metabolic (high blood pressure, heart disease) and musculoskeletal disease (arthritis or back pain), than individuals with respiratory (asthma,

emphysema) or other diseases, such as cancer, bowel disorders. For individuals afflicted with cardio-metabolic and musculoskeletal disease, these individuals tend to perceive their health as good, whereas those with respiratory and other chronic diseases tend to perceive their health as good or poor. In general, individuals reporting poor health were more likely to be physically inactive and were less likely to adhere to exercise recommendations than those who reported good health. Ultimately, self-perceived health better predicted PA participation than the presence or absence of disease in older adults (Dogra, 2011).

When self-rated and proxy-rated health were examined in older adults, it was more likely to be rated as fair or poor with advanced age, and self-reported limitations to activities also increased as age increased (Cho, Martin, & Poon, 2015; Herman et al., 2012). Smith and colleagues performed an analysis on Canadian seniors who do not participate in PA and yet did not identify themselves as having a health condition limitation, illness, or any injury that would preclude them from being physically active (Smith et al., 2012). In contrast to Dogra (2011), the relationship between the different barriers to PA participation, self-reported health, and chronic health conditions was examined and results suggested that traditional barriers and self-reported health status were not to blame for nonparticipation in PA (Smith et al., 2012). Instead, chronic health conditions best-predicted nonparticipation in PA, highlighting a potential disconnect between reported self-health status and underlying health conditions (Smith et al., 2012).

Sitting time has been examined in independently living Canadian older adults aged 65 years and older with the use of the CCHS. Dogra and Stathokostas (2014) highlight how personal, social, and environmental determinants correlate with extended

sitting times in older populations, as this demographic typically engages in 8-10 hours of sedentary activities each day. Very low amounts of PA are associated with four or more hours of sitting per day as opposed to those who were classified as being highly physically active (Dogra & Stathokostas, 2014). Along with PA levels, age, retirement status, dwelling type (detached versus attached homes), chronic disease, self-perceived health, BMI, mood disorders, and a sense of belonging were also associated with sitting times of four or more hours each day (Dogra & Stathokostas, 2014). Differences between sexes revealed that older men sit for extended periods of time compared with older women (Dogra & Stathokostas, 2014). It is also suggested that those who live in detached homes and drive also engage in less overall sitting time than those who live in attached homes and are passengers instead of drivers in vehicles (Dogra & Stathokostas, 2014).

Finally, major life events, such as interpersonal loss (i.e., death of a loved one) and retirement, have also been examined amongst older adults as to whether or not an association can be found between these events and moderate-to-vigorous PA involvement (Koeneman et al., 2012). Of these two major life events, widowhood was not observed to be correlated with individuals taking part in moderate-to-vigorous levels of PA, whereas retirement was positively associated with significant amounts of time spent in moderate-to-vigorous PA pursuits, especially in older retirees (Koeneman et al., 2012).

Clearly, the above research suggests that these aspects (i.e. disease and physical activity) have been broadly explored as integral components of Rowe and Kahn's (1997; 1998) SA perspective. Although Rowe and Kahn retrospectively added a third component to incorporate psychosocial variables (i.e., active engagement with life), other researchers have suggested that this component of the model is insufficient and incomplete (Bowling,

2007; Bowling & Dieppe, 2005; Pruchno, 2015; Young, Frick, & Phelan, 2009). As a result, a body of research focusing on psychosocial perspectives has emerged. Thus, the next section of the document focuses on the psychosocial aspects of aging.

Psychosocial Perspectives of Successful Aging

Psychosocial perspectives result in an emphasis on the importance of quality of life in aging successfully and are more subjectively measured. Success, in terms of aging, is a dynamic concept resulting from a number of fluid components (Johnson & Mutchler, 2013; Young et al., 2009). Researchers have begun to narrow their focus on how to increase desirable aging outcomes, while minimizing undesirable ones (Baltes & Dickson, 2001; Johnson & Mutchler, 2013). More specifically, psychosocial research aims to define SA with less emphasis placed on PA, and mental and functional capacities, and more focus on satisfaction with life, social engagement, aging with dignity, self-efficacy, and psychological resources (Bowling & Dieppe, 2005; Walker, 2002).

Psychosocial aspects also showcase the adaptive quality of humans, wherein an individual's happiness three months following a traumatic event no longer impacted their level of happiness, with only a few exceptions (Gilbert, 2004). Therefore, losses of physical functioning can be mitigated through gains in other aspects of life, where we learn to change the views about our worlds and accept our new ones (Gilbert, 2004). These perspectives are important as some researchers argue that the influences of genetics and natural aging declines are often exaggerated, and that the benefits from healthy lifestyles and psychosocial factors are underestimated (Vaillant, 2002; Vaillant & Mukamal, 2001).

Some of the more recent SA research has been criticised for being inconsistent in defining SA or failing to define it altogether (Bowling, 2007). These differences can be observed in medical versus social perspectives on aging, and what features specific to each provide meaningful definitions of SA (Bowling, 2007; Glass, 2003). Glass (2003) has criticized research that attempts to define SA quantitatively and uses disability or physical functioning as part of their working definition. In doing so, this has created inherent limitations within these terms (Depp & Jeste, 2006; Katz & Calasanti, 2015). Researchers have offset these limited terms by proposing theories and perspectives that complement individual perspectives of the aging process, utilizing lay-based definitions to define aging success (Bowling, 2007; Bowling & Dieppe, 2005; Depp & Jeste, 2006).

Despite early conceptions of aging, such as disengagement theory (Cumming & Henry, 1961), older adults have shown competency into late adulthood with their compensatory abilities to negate the effects of physical and mental functional impairments (Rothermund & Brandtstädter, 2003). Compensatory efforts to offset these functional impairments were noted to increase in individuals up to the age of 70, at which point these skills became less efficient as age continued to increase. In general, an individual's goals must change with advanced age to remain realistic, as the resources to compensate for functional losses are themselves subject to decline (Rothermund & Brandtstädter, 2003). A balance of losses and gains is to be expected with age, and keeping a positive outlook is essential in the personal development and adaptations required for aging success (Baltes & Baltes, 1990; Rothermund & Brandtstädter, 2003).

Within the literature, there has been a lack of agreement amongst researchers as to which indicators, either objective, subjective, or a combination of both, best indicate SA.

This question has been widely debated (Johnson & Mutchler, 2013; Phelan, Anderson, Lacroix, & Larson, 2010; Strawbridge, Wallhagen, & Cohen, 2002; Reichstadt, Sengupta, Depp, Palinkas, & Jeste, 2010). In a systematic review of SA literature, Bowling and Iliffe (2011) have identified that social functioning (i.e., social activity engagement, social contacts, and number of helper/supporters) and psychological resources (i.e., self-efficacy, optimism, sense of purpose, overcoming difficulties, coping, self-confidence, and self-worth) were identified by researchers as predictors of aging success. Similarly, lay perspectives (the thoughts and beliefs of interviewed participants) also incorporated aspects of social functioning, psychological resources, as well as income, perceived social capital, and area problems (i.e., having somewhere nice to walk, feeling safe walking during the day or night) in predicting aging success. It was suggested that the psychological resources, mainly self-efficacy and optimism, best predicted global quality of life in older adults, thus leading to aging success, and that a reliance on health (biomedical) models in predicting quality of life in old age may be more of a detriment than a benefit (Bowling & Iliffe, 2011).

Psychosocial views have been explored both qualitatively and quantitatively, and have been found to closely match empirical analyses definitions of SA given by older adults, who, as stakeholders, are most qualified to define SA (Bowling & Dieppe, 2005; Keating, 2005). In comparison to academic conceptualizations of active aging, lay perspectives offer many similarities to the elements of theoretical models (Bowling, 2006; Jopp et al., 2015). For example, some adults aged 50 years of age and older rate themselves as aging well or successfully, and very few believe they will experience memory loss, become housebound, or have to enter a nursing home (Bowling & Dieppe,

2005; Von Faber et al., 2001). These positive beliefs associated with aging by older populations contradict the pathological perspectives of aging, in which the inherent heterogeneity of older populations is not considered, and chronic illness is instead attributed solely to the aging process (Bowling & Iliffe, 2011). Instead, researchers who focus on psychosocial perspectives (Bowling & Dieppe, 2005; Cho et al., 2015; Jopp et al., 2015), and laypersons alike would rather measure and conceptualize the aging experience based on empirical evidence that highlights the importance of meaningful aging attributes defined by aging individuals themselves (Jopp et al., 2015).

Self-rated measures of SA are important in terms of understanding personal beliefs about aging and health, but these measures usually lack objectivity. This limits how useful these definitions can be in terms of health promotion, although these definitions are more socially relevant because the source is older adults (Bowling, 2007; Strawbridge et al., 2002). Self-rated health however, has been shown to predict mortality in those who rate their health as being poor (Schoenfeld, Malmrose, Blazer, Gold, & Seeman (1994). Research has shown that, despite many older adults having been afflicted with chronic disease and/or disability, they still consider themselves as aging successfully (Montross et al., 2006; Strawbridge et al., 2002). Contrary to Rowe and Kahn's biomedical perspective of SA, not all older adults who are highly physically active, or who are considered to have good health, will be considered successful agers, depending on the model of aging success employed (Cho et al., 2015).

The Benefits of Psychosocial Health Resources in Later Adulthood

Similar to the benefits observed with participation in PA, psychological and social resources play an increasingly important role in achieving subjective and psychological

well-being (Windle & Woods, 2004). Social participation in particular has been suggested to offer health benefits to older adults (Chen, Lauderdale, & Waite, 2016). Older adults with either social groups or close connections receive social support, a sense of belonging, and access to information crucial to maintaining health and well-being (Chen, Lauderdale, & Waite, 2016). As individuals age, their social networks and ties become smaller, but contrary to beliefs involving these shrinking connections, it has been suggested that older adults are actually more involved in their communities and volunteer pursuits than their younger adult counterparts who may have larger social circles (Cornwell & Harrison, 2004).

With advanced age, the abilities of older adults to differentiate themselves from negatively evaluated age groups (i.e., ageist beliefs about declining physical, cognitive, and social functioning) increases, and at the same time, serves to protect individuals' sense of self-worth (Weiss & Lang, 2012; Weiss, Sassenberg, & Freund, 2013). This differentiation is termed 'age group dissociation,' and allows for individuals to counteract negative information about their age groups, and permits these individuals to rate themselves as feeling younger than their biological age (Hummert, Garstka, O'Brien, Greenwald, & Mellott, 2002). It is also possible that individuals will be inspired by the success of others (i.e., role models) (Lockwood, Chasteen, & Wong, 2005). This was especially true for masters' athletes who cited leisure and competition from sport participation as methods of empowerment (Dionigi, 2006). Despite the pervasive stereotypes associated with aging, it is possible for individuals to preserve their self-esteem and psychological well-being; both of which are important adaptive qualities

associated with the aging process and maintenance of good health (Weiss, Sassenberg, & Freund, 2013).

Self-compassion is a form of SA that is based on an aspect of psychological well-being. The construct of self-compassion (Neff, 2011) is comprised of three key aspects: self-kindness (i.e., giving oneself comfort when confronted with feelings of inadequacy), a sense of common humanity (i.e., viewing failure or discomfort as part of a human experience), and mindfulness (i.e. being open and accepting of difficult experiences). Self-compassion is indicated to be positively associated with positive affect, ego integrity, and having meaning in life; all of which have been identified as key features of positive aging (Phillips & Ferguson, 2013).

In an attempt to find meaning in life after retirement, older adults take part in new activities, such as leisure pursuits, hobbies, or volunteer work. In particular, regular volunteer involvement reflects having a sense of common humanity, especially in women, who reported improved quality of life and access to social networks and support from volunteering (Parkinson, Warburton, Sibbritt, & Byles, 2010). However, older individuals were more likely to volunteer if they were in a higher SES group, and had better physical and mental health (Parkinson et al., 2010). It seems as though the ability to volunteer parallels ability to participate in recreational physical activity pursuits; that is, resources allow for better and more opportunities, which in turn increases the amount of participation (Dupuis & Alzheimer, 2008).

Older adults have the chance to take advantage of opportunities to do things that they have always wanted to do, but never had time for in the past in their busy working lives. These opportunities create new and exciting experiences that individuals look

forward to in their lives, and these opportunities also have the ability to keep them productive in healthy, engaging activities (Matthiesen, 2009). Adults over the age of 65 who participated in the arts (e.g., painting, sculptures, and music) were documented to have fewer doctors' visits, lower incidence rates of depression, and less required medication (Matthiesen, 2009; Zausner, 2010).

Until recently, the physiological benefits of taking part in less physically strenuous activities, as well as social and productive activities, have been underestimated. These activities accrue the same benefits to older adults as more strenuous activities, such as longevity (i.e., reduced mortality), improved self-health ratings, and lower levels of functional dependence (Dupuis & Alzheimer, 2008; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003; Shmotkin, Blumstein, & Modan, 2003). Cognitively stimulating activities into late adulthood, either socially or physically, were shown to be associated with a reduction in cognitive declines, higher levels of cognitive function, and a reduced risk of Alzheimer's Disease (Dupuis & Alzheimer, 2008; Verghese et al., 2003; Wilson, Barnes, & Bennett, 2003). This is important in highlighting the ability of social and cognitive activities to prevent adverse health effects, similarly to PA.

Employing Rowe and Kahn's Biomedical Perspective Using Canadian Community

Health Survey Data

In determining aging success of older Canadian adults, Baker, Meisner, Logan, Kungl, & Weir (2009) used the CCHS for sample data (N = 12,042), while employing the biomedical perspective proposed by Rowe and Kahn (1987; 1997; 1998), which has three essential components. The first predictor is that individuals must be void of disease or disease-related disability. This was captured by whether respondents to the CCHS

identified as having a chronic condition that has lasted, or was expected to last at least 6 months, and had been diagnosed by a health professional. The second predictor of aging success is that individuals must have a high physical and mental functional capacity. Baker et al. (2009) predicted this by noting whether individuals reported having any restrictions, as a result of poor health, in the “restriction of activities” scale of the CCHS. Finally, Rowe and Kahn (1987) postulated that individuals must have an active engagement with life. Using the CCHS, Baker et al. (2009), examined the number of hours spent in sedentary activities, whether or not the respondent was a member of a volunteer organization, and the individual’s sense of belonging to a local community.

Results from the analysis by Baker and colleagues (2009) indicated that older Canadians who were physically active were 2.74 times more likely to age successfully than those who were inactive, and that moderately active individuals were 1.83 times more likely to be categorized as aging successfully than inactive individuals. Individuals aged 65-69 years were 2.33 times more likely to be categorized as aging successfully than the oldest group of individuals (age 80 years and older), and individuals aged 75-79 years were 1.28 times more likely to age successfully than the oldest group. This study also indicated that men were 1.42 times more likely to age successfully than women. The researchers also inferred that those in lowest SES group (\$0 to \$14,999) were 1.70 times less likely to age successfully than those in highest SES group (\$80,000 and over), and those earning \$15,000 to \$29,999 annually, were 1.5 times less likely to age successfully than those in the highest SES groups.

Baker et al. (2009) indicated that only 11% of Canadian older adults were aging successfully using Rowe and Kahn’s biomedical perspective of SA with this CCHS while

77.6% were classified as aging moderately successfully, and 11.4% were considered to be aging unsuccessfully. With such a small percentage of the population being considered successful agers using biomedical criteria, the importance of re-examining the SA approach, given the existence of alternate theories, will help to explain the more psychosocially-based aspects that the biomedical models tend to ignore.

Re-visiting Rowe and Kahn's Model of Successful Aging

Due to the strict guidelines of Rowe and Kahn's (1987) perspective, few older adults are objectively categorized as aging successfully, which has led some researchers to suggest SA should be redefined (Katz & Calasanti, 2015; Strawbridge, Wallhagen, & Cohen, 2002). Researchers have noted important factors in defining SA, which include having good mental and physical health, ability to function independently, having a positive outlook on life, being satisfied with and appreciating life, having good relationships, being able to adjust to changes in life, a sense of making a contribution to society, learning new things, and being able to grow personally (Bowling & Dieppe, 2005; Knight & Ricciardelli, 2003; Kramer & De Jonge, 1998; Phelan, Anderson, LaCroix, & Larson, 2004; Reichstadt, Depp, Palinkas, Folsom, & Jeste, 2007; Tate, Leedine & Cuddy, 2003).

Biomedical perspectives of SA have been criticized for their narrow focus and lack of individual interpretations of aging (Bowling & Dieppe, 2005; Bowling & Iliffe, 2011; Cho et al., 2015; Dillaway & Byrnes, 2009; Knight & Ricciardelli, 2003; Young et al., 2009). In the late 1980s, biomedical perspectives on aging made it easier for governments to unburden themselves from providing adequate health and social services to older adults experiencing adverse age-related health outcomes (Carr, Smith, Weir, &

Horton, under review; Dillaway & Byrnes, 2009). In this respect, individuals were ultimately seen as being in control of their own health as they age, and those who had fallen ill, were seen as having done so through their own actions (i.e., smoking, bad eating habits, not exercising) (Dillaway & Byrnes, 2009).

Biomedical perspectives essentially gave the government justification to maintain ageist values and cut funding sources and insurance coverage essential to the survival of some elderly individuals (Dillaway & Byrnes, 2009). These funding cuts affected resources such as social assistance and Medicare access, which limited the amount of available resources to these individuals and forced them to rely on their own devices or family members for support (Dillaway & Byrnes, 2009). Moreover, Dillaway and Byrnes (2009) argued that because Rowe is both a medical doctor and a businessman, where he served as president and CEO of Mount Sinai and New York University Medical Centers and CEO of Aetna insurance from 2000 to 2006, that his perspective and influence on SA resources reflected his dealings with the United States government and the private insurance sector. Before Dr. Rowe was appointed as CEO of Aetna, few doctors from Mount Sinai accepted patients' coverage from Aetna insurance (Gottlieb, 2000).

With so many Canadian seniors requiring assistance in some form or another in their daily lives, it appears as though researchers who emphasize Rowe and Kahn's biomedical definition of SA are giving policy makers justification to cut essential resources, like healthcare funding and pension plans, that some individuals may rely on for survival. Inferring that older adults are responsible for their own adverse health, whether that decline is associated with the normal aging process (i.e., arthritis), or not (i.e., cigarette smoking) could be considered a modern day form of geronticide (Brogden,

2001). With some seniors having few social contacts, and requiring assistance with financial and medical resources, such limitations add continued stress and further erode health conditions of these individuals (Strohschein, 2012).

Researchers examining the SA aging paradigm agree that aging success should be viewed on a continuum of attainment and adaptation, and that the concept of SA is too complex to be strictly based on ability and competency alone as biomedical views suggest (Bowling, 2007; Dionigi, Horton, & Bellamy, 2011; Grossman & Stewart, 2003; Horton, Dionigi & Bellamy, 2013). Researchers also insist that using biomedical viewpoints perpetuate the ‘blaming of the victim’ mentality, and that these models are rudimentary in their lackluster definitions of aging success (Cosco, Stephan, & Brayne, 2014; Dillaway & Byrnes, 2009; McLaughlin, Jette, & Connell, 2012).

This is not the first time a debate has arisen amongst researchers over the limited definition of a term that is pivotal to the area of research. In fact, the term ‘health,’ as defined by the World Health Organization (WHO) more than 60 years ago, has not been updated since, despite criticism (Green, 2015; Üstün & Jakob, 2005). The WHO defines health as, “a complete state of physical, mental and social well-being, and not merely the absence of disease or infirmity” (World Health Organization, 1948). Critics argue that using the term ‘complete’ in the definition makes it highly unlikely for individuals to achieve ‘health’ or maintain it, and that ‘social well-being’ corresponds more with happiness than health (Saracci, 1997). In the same way, researchers argue that the widely used biomedical perspective with respect to SA is problematic in the sense that the likelihood of individuals attaining aging success is limited. A more integrative definition

and model of SA would be more encompassing of various theories and better serve the individuals being defined by the criteria.

Though many contributions to the conceptualization of SA have been made since the inception of Rowe and Kahn's model, Dillaway and Byrnes (2009) argued that the discourse about SA inadvertently perpetuates negative perceptions and stereotypes associated with aging. Dillaway and Byrnes (2009) also reported that more critiques are needed of SA research, as well as proposals based on perspectives or theories that adequately represent values of aging by older adults themselves. Expanding beyond researchers' perceptions of what they objectively hold to be true of aging success offers the possibility of including subjective ratings to complement Rowe and Kahn's criteria, more than just disease, disability, and functional limitations alone.

The goal of the present study is to revisit and replicate the analysis performed by Baker and colleagues (2009) using their predictors based on Rowe and Kahn's biomedical perspective of SA. By using more recent data from the 2011-2012 version of the CCHS, the objective is to observe changes in the population's status of aging success from that of the 2003 CCHS data over the past decade. Due to the fact that there has been criticism of the narrow scope and objective nature of Rowe and Kahn's biomedical model, psychosocial perspectives will also be employed to extend the analyses to capture the more subjective components using an integrative model (Bowling, 2006; Hilton, Gonzalez, Saleh, Maitoza & Anngela-Cole, 2012; Knight & Ricciardelli, 2003; Matsubayashi & Okumiya, 2006; Lee & Fan, 2008; Reichstadt, Sengupta, Depp, Palinkas & Jeste, 2010; Tate, Leedine & Cuddy, 2003).

Psychosocial predictors were used with those individuals whose categorization of aging success has also been captured using the biomedical perspective. Results are depicted on a continuum, where aging success based on attainment (biomedical aging success) and adaptation (psychosocial aging success) recognizes the contribution both make to SA, thus creating a more ecologically valid model (Dionigi, Horton, & Bellamy, 2011; Poon, Gueldner, & Sprouse, 2003). Aging success is difficult to ascertain through the use of a single-theory model. By using a SA model that encompasses both dynamic approaches I will show how biomedical and psychosocial perspectives contrast in predicting aging success. In turn, these integrated criteria will help to alleviate concerns about a model that is lacking crucial SA predictors that would otherwise be excluded from each SA perspective used independently (i.e., using a biomedical perspective that does not include psychosocial criteria and psychosocial criteria that do not include biomedical criteria).

Hypotheses

It was hypothesized that by employing variables from psychosocial perspectives in conjunction with biomedical perspectives:

- 1) There would be a larger number of Canadian older adults observed as successful agers when psychosocial factors were used as opposed to biomedical criteria.
- 2) There would be a larger number of older Canadian adults considered as aging moderately successfully based on the psychosocial criteria than there would be using the biomedical criteria.
- 3) The number of older Canadian adults categorized as unsuccessful agers would be the smallest group, irrespective of the SA model employed independently.
- 4) There would be a larger number of older adults classified as successful agers using an integrative model that encompasses both the biomedical and psychosocial criteria than either the psychosocial or biomedical model used independently.
- 5) The same covariates identified as confounds in the Baker et al. (2009) study would yield similar results in the present analysis. This was to confirm that age, sex, income, activity level, marital status, living arrangement, and education would all be independent predictors of SA.

Methods

Database Sample

Data for this study were obtained from the 2011-2012 cycle of the CCHS (previously defined as the Canadian Community Health Survey) public-use micro data file (PUMF), which included a full sample size in comparison to the traditional annual or single-year version of the survey (Statistics Canada, 2012). The two-year data samples take longer to compile as they include a larger sample size and require extra time to survey more individuals. The CCHS is a cross-sectional survey that is a highly generalizable representation of the Canadian population and includes data on persons from all provinces and territories. In the present study, the sample population included all Canadians aged 60 years and older who answered all questions related to the variables under analysis.

For the purposes of this study, 15,846 individuals were assessed using the biomedical model, and 11,030 respondents of that sample were used for the psychosocial and integrated models. Respondents included residents from Ontario, and Newfoundland and Labrador. Because the results of Baker and colleague's (2009) study were similar whether the population data were weighted or not, the current study's population data were not weighted to represent the actual number of older Canadians. Weighting simply ensures proportional representation to the actual population size. Therefore, the same procedures used by Baker and colleagues (2009) were used in the current study to preserve as many of the original conditions as is feasible.

Demographic information from the 2011-2012 CCHS sample was used as it closely matches the demographic information from the Baker et al. (2009) analysis,

which used the 2003 CCHS (see Figures 1 and 2). This was important in establishing the concurrent validity of the proposed study, as the database sample is comparable to that of the original analysis.

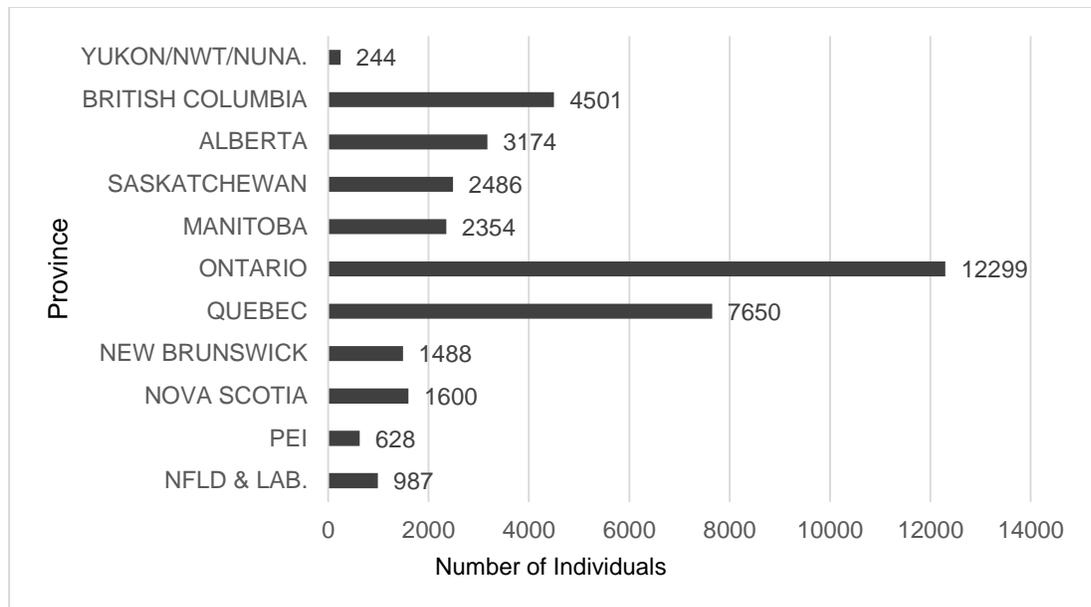


Figure 1. Population Distribution by Province from the 2003 CCHS Total Population Sample

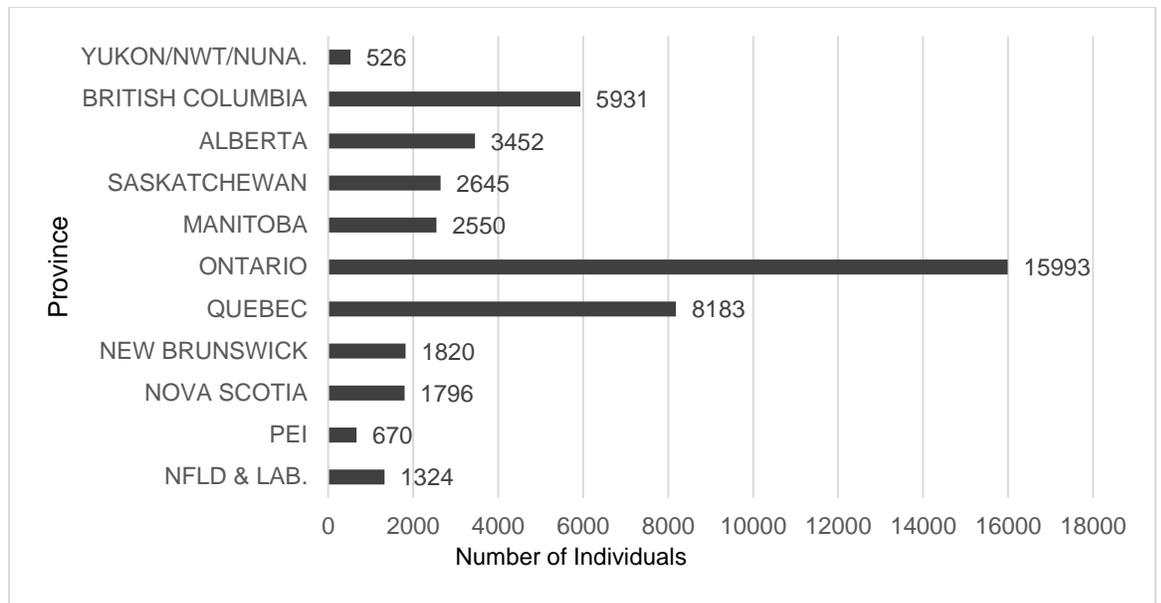


Figure 2. Population Distribution by Province from the 2011-2012 CCHS Total Population Sample

Predictive Measures

Rowe and Kahn's Successful Aging Criteria.

Rowe and Kahn's perspective of SA (1987) encompasses three critical components in measuring and determining whether an individual is aging "usually" or "successfully" (p. 145). The first component of this model is having a "low probability of disease or disease-related disability." In the CCHS, disease or disease-related disability is classified as any physical health ailment that has persisted for at least six months and has been diagnosed by a health professional. This was assessed using the *Presence of Chronic Conditions* variable of the CCHS. The conditions included in this predictor are *asthma, arthritis (excluding fibromyalgia), back problems (excluding fibromyalgia and arthritis), high blood pressure, chronic obstructive pulmonary disease (COPD) (bronchitis, emphysema), diabetes, heart diseases, cancer, stroke, and urinary incontinence*. If the respondent stated the presence of any one of these conditions, they were categorized as having a chronic condition. Respondents identified these conditions as lasting six months or longer. The 2011-2012 CCHS did not contain information on the incidence or presence of fibromyalgia, cataracts or glaucoma, which means 11 of the 14 original items from Baker et al. (2009) were captured by the 2011-2012 version of the CCHS (see Table 1).

The second postulate of Rowe and Kahn's (1997) perspective on SA is that one must have "high cognitive and physical functional capacity" (p. 439). This was analyzed using the *Restriction of Activities Scale*, where the CCHS incorporates respondents' self-reported ability to perform activities of daily living. Respondents were classified as having a functional limitation if they indicated they require assistance for daily tasks,

such as *preparing meals, attending appointments/running errands, able to perform housework, independently maintain personal care, moving about inside the house, and managing personal finances*. From the original analysis (Baker et al., 2009), this study captured six of the seven items (as shown in Table 1), with the exception of the item, *doing heavy household chores*, which was not available in the 2011-2012 CCHS data.

The final component of Rowe and Kahn's (1997) perspective, having "sustained engagement in social and productive activities," (p. 439) was more difficult to ascertain from the CCHS because of the inherent subjectiveness in defining this concept. Therefore, to gauge one's *engagement with life*, two criteria were used to determine whether the respondents are actively engaged. First, the total number of hours in a typical week spent in sedentary activities were identified from items such as *time spent on the computer, console/handheld video games, watching television or videos, and reading*. As demonstrated by Rowe and Kahn (1987; 1997; 1998), these items were used to show that time spent performing these activities takes away from potential time to take part in social or productive activities. Ancillary to the total number of hours spent in sedentary activities per week, the *Sense of Belonging to a Local Community* variable was used to assess respondents' *engagement with life*. This measure asks respondents to rate their sense of belonging to their local community on a Likert scale as very strong (1), somewhat strong (2), somewhat weak (3), or very weak (4).

In the original analysis by Baker et al. (2009), a third component from the CCHS data was included in the analysis to predict *Sustained Engagement in Social and Productive Activities*. This component was the respondents' involvement in voluntary organizations. This variable was omitted to allow for sufficient cases from the CCHS

PUMF 2011-2012 to be included in the regression analysis (see Table 1). A possible explanation as to why there are so few cases of this variable in the data set is that this question may have only been requested or asked in certain geographic/health regions and was omitted from others.

Table 1

Canadian Community Health Survey Biomedical Predictors (Attainment) of Successful Aging

Absence of these items is predictive of Low probability of Disease/ Disease-Related Disability	Absence of these items is predictive of High Physical and Cognitive Functional Capacity	Active Engagement with Life (total hours spent in sedentary activities, unless otherwise stated)
Asthma	Require assistance preparing meals	Computer
Arthritis (excluding fibromyalgia)	Require assistance attending appointments/running errands	Console/handheld video games
Back problems (excluding fibromyalgia and arthritis)	Able to perform housework	Watching television or videos
High blood pressure	Independently maintain personal care	Reading
COPD (bronchitis, emphysema)	Require assistance moving about inside the house	Sense of belonging to a local community
Diabetes	Require assistance managing personal finances	
Heart diseases		
Cancer		
Stroke		
Urinary incontinence		

Table 1 CCHS Biomedical Predictors

Psychosocial Criteria of Successful Aging.

The next part of the analysis involved analyzing psychosocial variables as SA predictors that have been derived from the CCHS. These variables have been noted by researchers who have interviewed older adults and criticized Rowe and Kahn's perspective of SA for not placing more emphasis on psychosocial aspects of aging success (Bowling & Iliffe, 2011; Cho, Martin, & Poon, 2015; Dillaway & Byrnes, 2009; Knight & Ricciardelli, 2003; Bowling & Dieppe, 2005; Young, Frick, & Phelan, 2009). Adding these additional variables to the analysis increased the construct validity of the study, because it included items that Rowe and Kahn's biomedical criteria alone does not address.

Carr (2013) identified seven critical psychosocial components from a review of current research with SA definitions provided by laypersons. These components help to explain personal notions attached to SA that go beyond the principles postulated in biomedical perspectives (see Table 2). These components fell into two categories: psychological health and social health. Psychological health components that were used in this analysis included *happiness/enjoyment with life* (Bowling, 2006; Knight & Ricciardelli, 2003; Matsubayashi & Okumiya, 2006; Tate et al., 2003), a *positive outlook on life* (Charbonneau-Lyons et al., 2002; Hilton et al., 2012; Tate et al., 2003), *personal growth* (Charbonneau-Lyons et al., 2002; Fisher & Specht, 1999; Knight & Ricciardelli, 2003; Sneed & Whitbourne, 2003; Tate et al., 2003; Westerhof, 2003), and *acceptance with oneself* (Charbonneau-Lyons et al., 2002; Hilton et al., 2012; Reichstadt et al., 2010; Sneed & Whitbourne, 2003; Tate et al., 2003; Uotinen et al., 2003). The social health function included *close, personal relationships* (Charbonneau-Lyons et al., 2002; Hilton

et al., 2012; Knight & Ricciardelli, 2003; Lee & Fan, 2008; Matsubayashi & Okumiya, 2006; Tate et al., 2003; Westerhof, 2003), *social roles* (Bowling, 2006), and *active engagement* (Bowling, 2006; Charbonneau-Lyons et al., 2002; Hilton et al., 2012; Knight & Ricciardelli, 2003; Lee & Fan, 2008; Reichstadt et al., 2010; Tate et al., 2003; Westerhof, 2003; Uotinen et al, 2003). All seven identified components of psychosocial SA were used based on the available data from the 2011-2012 CCHS.

Table 2

*Psychological and Social Factors Identified within Lay-Based Definitions of Successful Aging
Adapted with permission from Carr, 2013*

Reference	Psychological Health					Social Health	
	Happiness/ Enjoyment of life	Positive outlook on life	Personal growth	Acceptance of oneself	Social roles	Active Engagement	Close, personal relationships
Bowling, 2006	X				X	X	
Charbonneau-Lyons et al., 2002		X	X	X			X
Fisher & Specht, 1999			X				
Hilton et al., 2012		X		X		X	X
Knight & Ricciardelli, 2003	X		X			X	X
Lee & Fan, 2008						X	X
Matsubayashi & Okumiya, 2006	X						X
Reichstadt et al., 2010				X		X	
Sneed & Whitbourne, 2003			X	X			
Tate et al., 2003	X	X	X	X		X	X
Uotinen et al., 2003				X		X	
Westerhof, 2003			X				X

Table 2 Psychosocial and Social Factors

In order to group the psychosocial variables together from the CCHS to satisfy the predictors of SA as identified by Carr (2013), I performed a factor analysis (see Table 3). A factor analysis is used to cluster variables into homogenous subsets to create larger ‘super’ variables, and is useful when performing a regression analysis when there are multiple independent variables that tap into the same construct, such as ‘happiness’. The CCHS variables were used to create the psychosocial predictors based on the amount of shared variance for the components identified by Carr (2013) (i.e. *happiness/enjoyment with life, a positive outlook on life, personal growth, acceptance of oneself, social roles, active engagement, and close, personal relationships*). The seven psychosocial constructs of SA have been further categorized into four factors that predict SA based on their correlation from the factor analysis.

First, to capture *acceptance of oneself, close/personal relationships, and personal growth*, variables from the CCHS consisted of items for which respondents were asked to indicate whether in the past month, individuals felt *they liked most of their personality, had trusting relationships, confident to express himself or herself, life had a sense of direction, good at managing responsibilities, and that challenge makes them better* (see Table 4). In order for individuals to satisfy this component, respondents must have reported these items as occurring every day, or almost every day, as opposed to two or three times a week, once a week, once or twice, or never, to all of the aforementioned variables.

Second, to determine whether one was experiencing *happiness/enjoyment with life*, variables from the CCHS that were used are whether in the past month, individuals felt *satisfied with life, interested in life, happy*, as well as the respondent’s *self-perceived*

health (see Table 4). Individuals must have responded every day, or almost every day, as opposed to two or three times a week, once a week, once or twice, or never, and rated their health as excellent, very good, or good, as opposed to fair, or poor.

Thirdly, to encapsulate whether respondents had a *positive outlook on life*, the CCHS was used to determine whether, in the past month, individuals felt that *society makes sense*, that *society is becoming a better place*, and that *people are good* (see Table 4). Individuals must have responded stating every day, or almost every day, as opposed to two or three times a week, once a week, once or twice, or never, to satisfy this constituent.

Lastly, the fourth predictor of psychosocial aging success assessed respondent's *active engagement*, and *social roles*. Variables from the CCHS that were used to predict this item were whether in the past month, individuals felt *they were contributing to society*, and the frequency to which they felt they *belonged to a community* (see Table 4). In order for individuals to satisfy this component, respondents must have reported these items as occurring every day, or almost every day, as opposed to two or three times a week, once a week, once or twice, or never.

Table 3

Rotated Factor Matrix Results using Carr's Review of Psychosocial Successful Aging Research

CCHS Variable	Factor 1	Factor 2	Factor 3	Factor 4
Past mth, felt liked most of personality	.579	.256	.185	.075
Past mth, felt had trusting relationships	.563	.191	.153	.138
Past month, felt confident express self	.550	.142	.065	.203
Past mth, felt life had sense of direction	.531	.370	.183	.298
Past mth, felt good@managing responsibil.	.490	.311	.116	.095
Past mth, felt challenge make you better	.432	.125	.183	.354
Past month, felt satisfied with life	.313	.716	.184	.139
Past month, felt interested in life	.293	.671	.104	.152
Past month, felt happy	.244	.651	.149	.127
Self-perceived health	.069	.310	.068	.184
Past month, felt society makes sense	.130	.122	.699	.093
Past mth, felt society becoming better place	.120	.138	.671	.227
Past month, felt people are good	.337	.137	.420	.059
Past mth, felt were contributing to society	.213	.222	.119	.685
Past month, felt belonged to a community	.193	.200	.240	.446

Table 3 Rotated Factor Matrix

Table 4

Canadian Community Health Survey Psychosocial Predictors (Adaptation) of Successful Aging

Acceptance of oneself, close/personal relationships, personal growth	Happiness/enjoyment with life	Positive outlook on life	Active engagement, Social roles
Liked most of personality	Satisfied with life	Society makes sense	Contributing to society
Had trusting relationships	Interested in life	Society becoming a better place	Belonged to a community
Confident to express self	Happy	People are good	
Life has a sense of direction	Self-perceived health		
Good at managing responsibilities			
Challenge makes you better			

Table 4 CCHS Psychosocial Predictors

Data Analysis

Aging success was defined by how many of the predictor variables derived from the biomedical and psychosocial models that each respondent satisfied. Respondents were given a score of 0 to 2 for the biomedical and psychosocial models assessed independently, where 0 represented none of the respective predictors being satisfied, a score of 1 indicated that at least one predictor had been satisfied, and a score of 2 was given if all of the respective predictors were satisfied. Objectively, respondents were classified as “unsuccessful agers” (score of 0), “moderately successful agers” (score of 1), and “successful agers” (score of 2).

A frequency count was performed using the variables identified by Baker et al. (2009) on the 2011-2012 CCHS to determine aging success based on the three predictors of the biomedical criteria. Subsequently, using the psychosocial predictors that were established through the use of a factor analysis (see Table 3), a frequency count of the satisfied predictors was performed. This frequency count included the four aforementioned predictors of the psychosocial criteria (see Table 4) to categorize the same individuals who were assessed using the biomedical criteria as successful agers, moderately successful agers, and unsuccessful agers.

Integrated Model

Finally, using the integrated criteria (i.e., scores from 0 to 2 combined across both biomedical and psychosocial predictors), a frequency count was performed. While the individual models depict SA on a scale of 0 to 2, the combined (integrated) model, which includes both biomedical and psychosocial variables, sums those values to yield a measure of SA ranging between the scores of 0 to 4 (see Figure 3). Individual scores

from each successful aging group (i.e., 0, 1, or 2) were then summed and placed on a continuum of aging success that depicts SA from both biomedical and psychosocial perspectives (see Figure 4).

By examining Figure 4, it can be seen that with more SA variables being met by the respondents, they were shown in the middle of the model, where the highest number of satisfied predictors is depicted (i.e., a score of 3 or 4 from combining the biomedical and psychosocial successful aging groups) and represents successful aging. Moderate aging success was shown between the respective end points on either side, and the middle point of the spectrum (i.e., a combined score of 2 from both SA models). Finally, unsuccessful agers were shown on the outer ends of the model, where the fewest number of satisfied predictors from either model was shown (i.e., a combined score of 0 or 1).

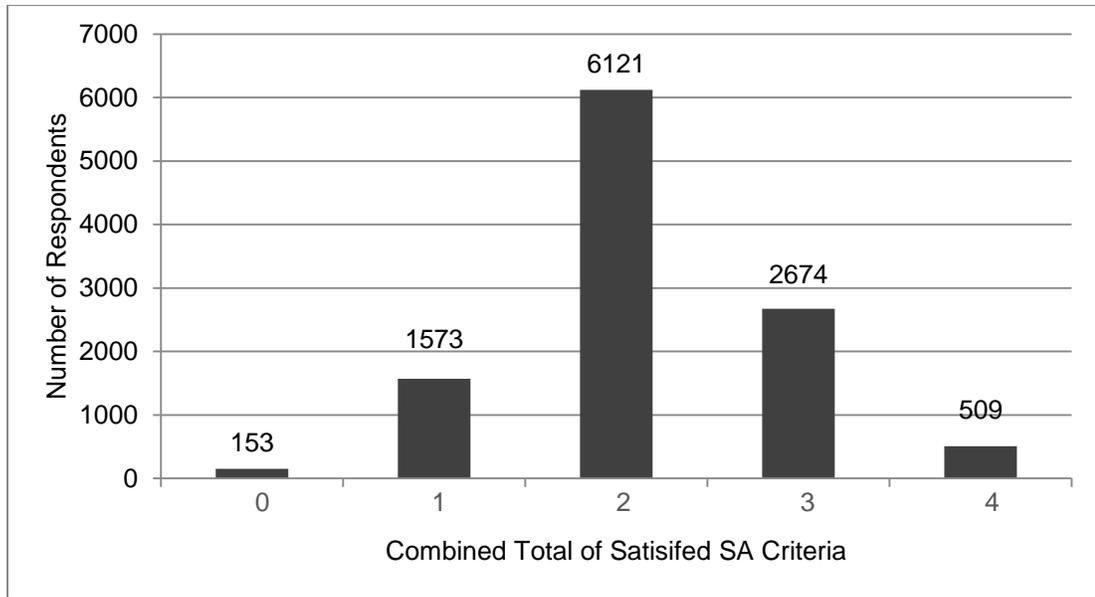


Figure 3. Combined Satisfied Criteria Scores from Both Models of Successful Aging Predictors

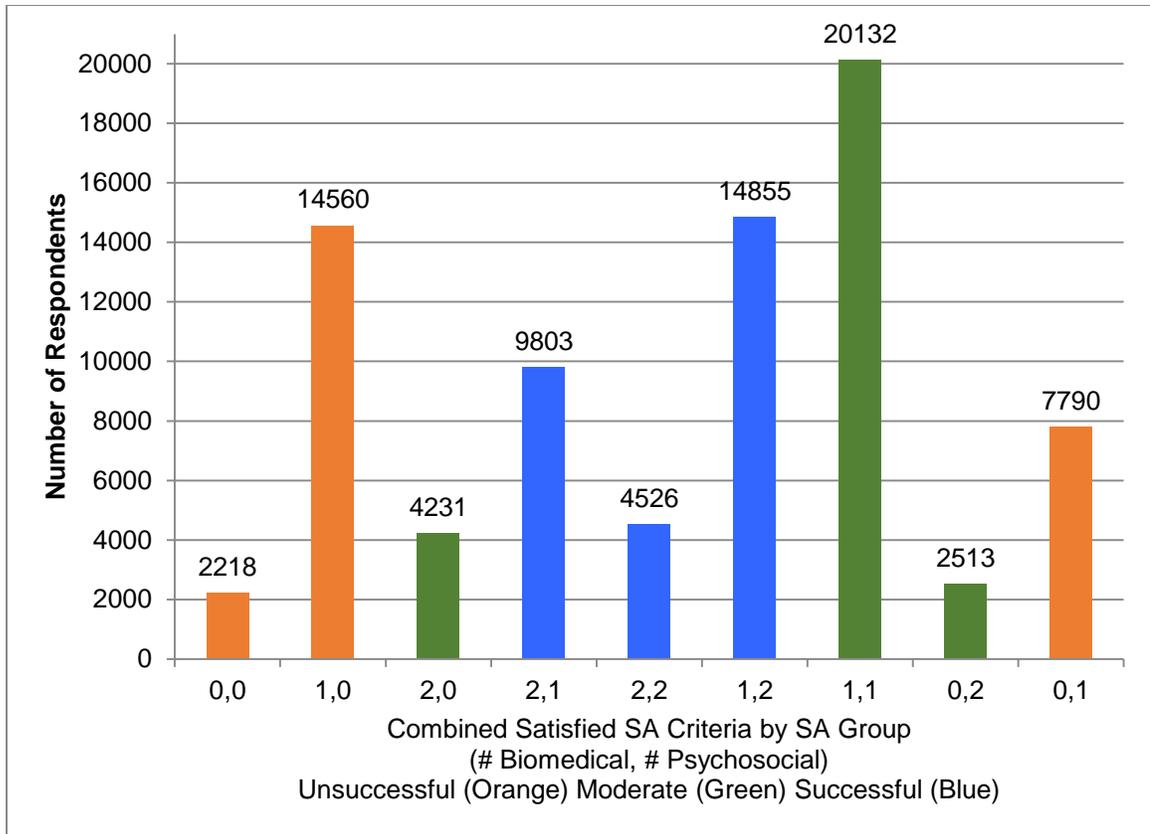


Figure 4. Integrated Criteria: Successful Aging Continuum

Physical Activity

With the *Physical Activity Index* from the 2011-2012 version of the CCHS, individuals in this study were categorized as active, moderately active, or inactive based on their average daily energy expenditure values. A composite score for each level of PA was derived through average values that were assigned to different daily activities ranging from personal care, to leisure, to athletic pursuits. The CCHS 2011-2012 does not require individuals to report the intensity of their activity, and hence, the low values of metabolic equivalents (METs) of each activity were used (Baker et al., 2009). Individuals considered physically active exerted greater than 3 METs, whereas moderately active and inactive individuals exerted 1.5-3 METs, and less than 1.5 METs, respectively.

Covariates

Based on prior research, covariates were used to control for any confounding influence they may have (Baker et al., 2009; Trost, Owen, Bauman, Sallis, & Brown, 2002). Confounding variables (i.e., age, sex, income, marital status, living arrangements, and education) are independent predictors of biomedical and psychosocial variables, and thus may potentially influence SA scores positively or negatively. As such, confounding variables were included as covariates in the present study as defined below.

Age in years was classified in cohorts in the CCHS. These cohorts were ages *60-64*, *65-69*, *70-74*, *75-79*, and *80 years or more*. SES was measured from the total household income reported from all sources. This was recorded into five aggregates: *none or < \$20,000*, *\$20,000-\$39,999*, *\$40,000-\$59,999*, *\$60,000-\$79,999*, and *\$80,000 or more*. Marital status was examined, where respondents reported whether they were *married*, *common law*, *widow/separated/divorced*, or *single/never married*. The living

arrangements of the respondents was considered, where respondents listed their living arrangements as living in an *unattached home and alone*, *living in an unattached home - other*, *living with spouse/partner*, *living with parent, spouse, and/or child*, *living with parent, and/or child*, *living with child, parent, and/or sibling(s)*, and *other*. Respondents' level of education was also considered, which included: *less than secondary school graduate*, *secondary school graduate*, *some post-secondary education*, and *post-secondary certification*. Finally, sex was incorporated into the model. To identify whether the covariates used in Baker et al. (2009) yielded similar results to the current study, the variables identified above were analyzed to control for any confounding influence.

A multivariate ordinal regression analysis was performed using the aforementioned covariates and physical activity levels. This analysis was used to determine the odds ratios associated with each level of the variables, which were then used to determine the likelihood of aging success. Contrary to Baker et al.'s (2009) analysis, only the multivariate results were reported in this document. For all analysis, alpha was set at .05 to establish statistical significance.

Results

Assessing the CCHS with the predictors based on Rowe and Kahn's biomedical perspective, 15.9% (2,510) of respondents were aging successfully, 81% (12,839) were aging moderately successfully, and 3.1% (n = 497) were aging unsuccessfully (see Table 5). Using the psychosocial criteria based on a review of SA literature, 18.3% (n = 2,016) of respondents were aging successfully, 66.1% (n = 7,293) were aging moderately successfully, and 15.6% (n = 1,721) were aging unsuccessfully (see Table 5). Using the integrative criteria, which combined both the biomedical and psychosocial perspectives, 28.9% (n = 3,183) of respondents were aging successfully, 55.5% (n = 6,121) were aging moderately successfully, and 15.6% (n = 1,726) were aging unsuccessfully (see Table 5; Figure 3). Of the total sample used for this analysis, 4,816 could not be assessed using the psychosocial or integrated models, as they did not respond to all of the psychosocial variables (i.e. missing data) used for this thesis.

Table 5

Successful Aging Groups and Frequencies based on the three Successful Aging Models

SA Groups	Biomedical Model	Psychosocial Model	Integrated Model
Unsuccessful Agers	3.1% (n = 497)	15.6% (n = 1,721)	15.6% (n = 1,726)
Moderately Successful Agers	81% (n = 12,839)	66.1% (n = 7,293)	55.5% (n = 6,121)
Successful Agers	15.9% (n = 2,510)	18.3% (n = 2,016)	28.9% (n = 3,183)

Table 5 Successful Aging Frequencies

In Table 6, a full list of variables can be observed for the present analysis. Of the total sample (N = 15,846), males comprised 40.4% (n = 6,407) of responses from the sample, and females made up 59.6% (n = 9,439) of responses. The largest age aggregate was comprised of those aged 60-64, (27.2%, n = 4,308), the second largest was individuals aged 65-69 (23.3%, n = 3,698), respondents aged 70-74 (17.4%, n = 2,761) were the fourth largest group, the smallest group were individuals aged 75-79 (14.1%, n = 2,237), and individuals aged 80 years and older were the third largest group (17.9%, n = 2,842).

The largest income group was the \$20,000-\$39,999 group (32.9%, n = 5,214), the second largest group was the \$40,000-\$59,999 income range (22.7%, n = 3,591), the third largest group was the largest income bracket, \$80,000 or more (17.1%, n = 2,706), fourth was the no income or less than \$20,000 group (14%, n = 2,215), and the smallest group was the \$60,000-\$79,999 range (13.3%, n = 2,105). There were 15 respondents who did not state their income. With respect to activity level, 22.3% (n = 3,535) respondents were classified as being physically active, 24.1 % (n = 3,810) were classified as being moderately active, and 53.6 % (n = 8,481) were categorized as physically inactive.

Table 6

Variables Used in the Analysis, including Covariates

Variable	Category	Frequency	Valid Percent
Age	60-64	4308	27.2
	65-69	3698	23.3
	70-74	2761	17.4
	75-79	2237	14.1
	80+	2842	17.9
Sex	Male	6407	40.4
	Female	9439	59.6
Income	0-<\$20,000	2215	14.0
	\$20,000-\$39,999	5214	32.9
	\$40,000-\$59,999	3591	22.7
	\$60,000-\$79,999	2105	13.3
	\$80,000+	2706	17.1
Activity level	Active	3,535	22.3
	Moderately active	3,810	24.1
	Inactive	8,481	53.6
Marital status	Married	8416	53.2
	Common-law	431	2.7
	Widow/sep/divorced	6008	38.0
	Single/never married	957	6.1
Living arrangements	Unattached alone	6555	41.5
	Unattached other	244	1.5
	Spouse/partner	7959	50.4
	Parent, spouse, child	410	2.6
	Parent, child	267	1.7
	Child, parent, sibling	58	0.4
	Other	307	1.9
Education	< Sec. school gr	4178	27.5
	Sec. school. gr.	2829	18.6
	Some post-sec ed.	459	3.0
	Post-sec cert	7704	50.8

Table 6 All Variables Used

As can be seen in Table 7, there were several variables that had associations with aging success, including age, sex, activity level, income, and living arrangement. From the analysis, it was observed that as age increased, the likelihood associated with aging successfully decreased. Respondents aged 60-64 were 1.36 times more likely to be aging successfully than the oldest group, those aged 80 years and older (estimate = .308, CI = .181 to .434). Respondents 65-69 were 1.24 times more likely to be aging successfully than the oldest group (estimate = .222, CI = .094 to .350). Finally, those aged 70-74 were 1.18 times more likely to be aging successfully than the oldest group (estimate = .169, CI = .033 to .304). In examining sex, males were .91 times less likely to be aging successfully than females (estimate = -.088, CI = -.167 to -.009).

As the total reported household income increased, the odds of being classified as aging successfully also increased. Individuals in the lowest SES group, \$0 to less than \$20,000, were .48 times less likely to be classified as aging successfully than the highest income group of \$80,000 or more (estimate = -.717, CI = -.876 to -.558). Those who reported an income of \$20,000 to \$39,999 were .63 times less likely to be aging successfully than the highest income group (estimate = -.453, CI = -.575 to -.332). Respondents reporting an income of \$40,000 to \$59,999 were .80 times less likely to be aging successfully than the highest income group (estimate = -.215, CI = -.334 to -.097). Finally, those who reported an income of \$60,000 to \$79,999 were .76 times less likely to be aging successfully than the highest income group (estimate = -.267, CI = -.399 to -1.36).

In regards to physical activity level, more activity related to an observed increase in the probability of respondents being classified a successful ager. Individuals

considered to be moderately active (i.e., those who exerted 1.5 to 3.0 METs per day) were 1.59 times more likely to be aging successfully (estimate = .464, CI = .371 to .556) than those who were inactive (i.e., those who exerted less than 1.5 METs per day). Active individuals (i.e., those who exerted more than 3.0 METs per day) were 2.09 times more likely to be considered aging successfully than the inactive group (estimate = .741, CI = .645 to .838).

With regards to living arrangements, individuals who lived alone in an unattached home were 1.57 times more likely to be aging successfully than those with living arrangements categorized as other (estimate = .451, CI = .120 to .783), and those who lived with a spouse or partner were 1.36 times more likely to be aging successfully than those with living arrangements categorized as other (estimate = .309, CI = .015 to .603). There was no relationship between aging success and marital status, or education level.

Table 7

Multivariate Ordinal Regression Results: Odds Associated with SA and the Covariates Used in the Study

Variable	Category	Estimate	Odds ratio	SE	Wald	p	Lower 95% CI	Upper 95% CI
Age	60-64	.308	1.360	.064	22.768	.000	.181	.434
	65-69	.222	1.248	.065	11.518	.001	.094	.350
	70-74	.169	1.183	.069	5.962	.015	.033	.304
	75-79	.077	1.079	.073	1.108	.293	-.066	.220
Referent	80+							
Sex	Male	-.088	0.915	.040	4.819	.028	-.167	-.009
	Referent	Female						
Income	0-<\$20,000	-.717	0.488	.081	78.287	.000	-.876	-.558
	\$20,000-\$39,999	-.453	0.635	.062	53.482	.000	-.575	-.332
	\$40,000-\$59,999	-.215	0.806	.060	12.724	.000	-.334	-.097
	\$60,000-\$79,999	-.267	0.765	.067	15.972	.000	-.399	-.136
	Referent	\$80,000+						
Activity level	Active	.741	2.098	.049	227.450	.000	.645	.838
	Moderately active	.464	1.590	.047	96.663	.000	.371	.556
	Referent	Inactive						
Marital status	Married	.222	1.248	.147	2.282	.131	-.066	.511
	Common-law	-.229	0.795	.183	1.566	.211	-.588	.130
	Widow/sep/divorced	.019	1.019	.086	.048	.826	-.150	.188
Referent	Single/never married							
Living arrange.	Unattached alone	.451	1.570	.169	7.122	.008	.120	.783
	Unattached other	.306	1.358	.235	1.692	.193	-.155	.767
	Spouse/partner	.309	1.362	.150	4.257	.039	.015	.603
	Parent, spou., child	.261	1.297	.188	1.929	.165	-.107	.628
	Parent, child	.008	1.008	.226	.001	.971	-.436	.452
	Child, parent, sibling	.191	1.210	.356	.289	.591	-.506	.889
	Referent	Other						
Education	< Sec. school gr	-.011	0.988	.057	.038	.845	-.123	.101
	Sec. school. gr.	.022	1.022	.054	.160	.689	-.085	.129
	Some post-sec ed.	-.173	0.841	.120	2.086	.149	-.408	.062
Referent	Post-sec cert							

Table 7 Multivariate Ordinal Regression Results

Integrated Criteria: Successful Aging Continuum Results

The respondents who met none of the biomedical criteria ($n = 497$) met at least one of the psychosocial predictors ($n = 7,293$). Overall, the majority of the sample met at least one of the predictors for each model (i.e., biomedical model, $n = 12,839$; psychosocial model, $n = 7,293$), categorizing respondents as aging moderately successfully in all three models used for this study. When examining the sums of the respondents who met both the biomedical and psychosocial moderately successful criteria, more respondents met all of the psychosocial criteria (21,894 respondents combined), than those who met all of the biomedical criteria (18,560 respondents combined). Not all respondents who were assessed using the biomedical model were able to be included in the psychosocial and integrated analyses because their responses to all of the psychosocial variables under study were not solicited.

Comparing Present Results with the Baker et al. (2009) Analysis

In comparing the results of the present analysis to that of Baker and colleagues (2009), differences are noted between the frequencies of the aging success groups. Baker et al. (2009) reported that 11% of Canadians were aging successfully, 77.6% were aging moderately successfully, and 11.4% were aging unsuccessfully, whereas the current analysis demonstrated that, nine years later, 15.9% of Canadians were aging successfully, 81% were aging moderately successfully, and 3.1% were aging unsuccessfully (see Table 5). There were also similarities in the associations between aging success and the covariates. These associations can be observed in the results of the multivariate ordinal regression analyses (see Table 7). Baker et al. (2009) revealed higher probabilities of SA with greater amounts of physical activity, and these findings were supported by the

current study. The present results yielded a 2.09 greater likelihood of SA compared to those who were inactive, slightly smaller than the 2.74 odds ratio from Baker and colleague's (2009) study. Relative to the inactive group of respondents, moderately active individuals in the Baker et al. (2009) paper were 1.83 times more likely to be successful agers compared to 1.59 from the present analysis.

The same pattern was also observed within each of the age aggregates and the likelihood of aging successfully in comparison to the oldest group (age 80 years and older). In comparing the four relatively younger age groups to the oldest group, the Baker et al. (2009) analysis showed that respondents aged 60-64 years were 3.61 times more likely to be classified as aging successfully compared to 1.36 in the present analysis. Those aged 65-69 years were 2.99 times more likely to be successful agers compared to 1.24. Respondents aged 70-74 years were 2.05 compared to 1.18 times more likely to be classified as aging successfully. Finally, individuals aged 75-79 years were 1.49 compared to 1.07 times more likely to be aging successfully than the oldest group.

The income groups have changed since the Baker et al. (2009) analysis compared to the present study, which included: \$0 to \$14,999, \$15,000 to \$29,999, \$30,000 to \$49,999, \$50,000 to \$79,999, and \$80,000 or more per annum. The income groups used for the present analysis can be seen in Table 6. Consistent with the Baker et al. (2009) study, which indicated a positive relationship between total household income and aging success, so too did the present analysis.

Only in one instance were the results dissimilar from the Baker et al. (2009) results. Specifically, males were 0.91 times less likely to be aging successfully than females in the present analysis, however Baker et al. (2009) indicated that males were

1.79 times more likely to be aging successfully than females. Over the course of nine years, the gap between sex and SA has narrowed and reversed.

Discussion

Goals of the Present Study

The present study examined SA from perspectives encompassing both adaptive (i.e. psychosocial) and attainment (i.e., biomedical) components (Dionigi et al., 2011) to determine how much of the Canadian population is aging successfully using data from the 2011-2012 CCHS. By adding more variables to the present analysis, the probability of individuals being classified as successful agers was expected to increase. Each of the biomedical and psychosocial models of SA tap into specific domains of aging, such that they will produce differing outcomes with respect to the number of individuals who are aging successfully. Each model used independently is not an exhaustive interpretation of aging success. Therefore, combining the two independent models creates a single one that taps into more total dimensions of SA and thus makes the resulting model more ecologically valid.

The first goal of this study was to determine whether a greater number older Canadian adults would be classified as successful agers using psychosocial criteria over the number observed using biomedical criteria. From the analyses, there were more successful agers observed using psychosocial criteria. Due to the fact that the psychosocial criteria are comprised of lay definitions of SA, these more subjective components were seen as being most important to respondents (Bowling & Dieppe, 2005; Jopp et al., 2015; Keating, 2005). Therefore, these criteria can help to explain the greater number of observed successful agers using the psychosocial model. For example, *being happy* despite having functional limitations or chronic conditions may be seen as more important to individuals than having perfect health, as the latter may not necessarily be

attainable for them. This highlights the adaptive quality of these criteria and shows that aging has more dimensions than just physical and mental health into later adulthood (Cho et al., 2015).

The second goal of this study was to determine whether there would be more Canadians observed as moderately successful agers using psychosocial criteria than there would be using biomedical criteria. The analyses showed that more respondents were classified as aging moderately successfully using the biomedical criteria than the psychosocial components. Slightly more than 80% of respondents were considered to have a chronic condition or functional limitation. This finding prevented most respondents from being classified as a successful ager as they were not able to satisfy all of the biomedical criteria because of a chronic condition or functional limitation identified, regardless of the severity or type.

Next, the third goal of the study was to determine whether the unsuccessful agers would be the smallest group, irrespective of the criteria used. The analysis revealed this to be the case. Each model covers a range of variables that allowed for respondents to meet at least one or some of that model's predictors. Therefore, most of the respondents could be categorized as aging successfully or moderately successfully as the majority of respondents met at least one of the criteria for either model.

The fourth goal of the study was to determine if the integrated criteria would have the greatest number of successful agers, and this hypothesis was supported. Since each model examines specific domains of aging, combining the biomedical and psychosocial models together allowed respondents to be scored less stringently as a whole. That is, respondents were able to rely on the criteria of either model to supplement their

successful aging score.

Lastly, in order to assess the previous goals, the covariates were also reported in order to determine whether they imposed a confounding influence on SA. Age, sex, income, PA level, as well as certain living arrangements were found to have a significant relationship with SA. These findings will be further discussed below.

Comparing the Present Analysis with the Baker et al. (2009) Results

In comparing the results of the biomedical model used in the present analysis with that of Baker and colleagues (2009), there were more successful agers, more moderately successful agers, and fewer unsuccessful agers using the 2011-2012 version of the CCHS. Baker et al. (2009) confirmed the importance of PA stressed by Rowe and Kahn (1987). Their analysis included more variables related to chronic disease and functional limitations, due to changes in the 2011-2012 data set from the 2003 version of the survey. This change in 2011-2012 may account for the greater number of moderate and successful agers, as well as the decrease in unsuccessful agers as fewer variables of the biomedical model were used in the present analysis.

Supporting the findings of Baker and colleagues (2009), the present analysis found that those who have greater financial resources were more likely to be classified as aging successfully. Having greater financial resources grants individuals better access to health resources, such as fitness and leisure pursuits, as well as food choices than those with a lower SES (Pampel, Krueger, & Denney, 2010). Individuals with a higher SES are also less likely to use alcohol, tobacco products, or engage in high-risk behaviours (Pampel et al., 2010). Also supporting the Baker et al. (2009) findings, as PA level increased, so too did the odds associated with aging successfully. With more PA

involvement, individuals are likely to experience positive effects, such as an increase in balance and strength, improved mobility, a reduced number falls, better controlled diabetes, and a reduction in all-cause mortality (CSEP, 2016; Gillespie et al., 2012; Herman et al., 2012; Rosenberg & Frank, 2012).

As the age of the respondents increased, individuals were less likely to age successfully, again supporting the findings of Baker and colleagues (2009). As individuals age, they are more likely to succumb to adverse health conditions and complications as a result of osteoporosis, diabetes, reduced aerobic capacity, reduced muscular strength, cognitive losses, and loss of independence (Darbà et al., 2015; Rowe & Kahn, 1987; 1997; 1998). Younger respondents may experience fewer pathological declines (i.e., a fracture due to osteoporosis) than respondents in the older age groups.

Relating Findings from the Present Analysis to Successful Aging Research

Researchers believe an integrative model would better serve older adult populations in defining SA (Martinson & Berridge, 2014; Stowe & Cooney, 2014; Young et al., 2009). The integrative model in the present analysis is comprised of multidimensional constructs that target key principles of the aging experience, expanding upon concepts used in previous research (Bowling, 2007; Young et al., 2009). By supplementing the widely accepted biomedical criteria with psychosocial criteria has the potential to allow individuals who may be experiencing chronic disease or functional limitations to adapt in other ways and still be classified as aging successfully. Examples of some these additional factors include good health (i.e. biomedical perspectives), or coping strategies (i.e. psychosocial perspectives) (Young et al., 2009), which can help to explain the increase in the observed number of successful agers using the present study's

integrated model.

The current body of SA research tends to focus primarily on Rowe and Kahn's (1987; 1997; 1998) biomedical perspective, leaving comparatively less room for subjective criteria or interpretations of the aging process (see Cho et al., 2015; Young et al., 2009). However, it has been argued that older adults themselves are best positioned to define SA through their own experiences, although a definition encompassing both biomedical and psychosocial perspectives remains elusive (Bowling & Dieppe, 2005; Bowling & Iliffe, 2011; Vaillant, 2002).

The present analysis highlights the importance of incorporating both SA perspectives into one model. Researchers have suggested that an encompassing definition of SA would incorporate more of the aging experience than just physical and mental health alone (Katz & Calasanti, 2015; Strawbridge, Wallhagen, & Cohen, 2002). My thesis highlights that by adding a psychosocial perspective, more Canadian older adults were classified as aging successfully. Looking at more aspects of people's lives, rather than a focus primarily upon health, may help explain how our aging population compensates for losses in meaningful and effective ways.

Engaging socially with others and having meaningful relationships have been suggested to provide a multitude of benefits to older adults, including reduced mortality, improved morale, a sense of belonging, and improved overall health (Chen et al., 2016; Dupuis & Alzheimer, 2008; Morrow-Howell et al., 2003). The present analysis helps to support these findings; individuals who had trusting relationships, and who felt good about society and were satisfied with life, were more likely to be classified as aging successfully than those who were comparatively lacking in these areas.

Using the Canadian Community Health Survey Sample Data

As the CCHS questions vary from year to year, data collected on certain variables in one year are not always collected in subsequent years, which results in missing data that would have allowed for a better comparison between models of the current study and the Baker et al. (2009) analysis. For example, data derived from the CCHS that allowed Baker et al. (2009) to make inferences about ‘taking responsibility for one’s health’, could not be derived from the later dataset, making it difficult to compare the models directly. Thus, it was difficult to infer whether individuals compensated for losses and were happy with their lives in other ways. With the stringent biomedical criteria individuals are perhaps too easily depicted as being incompetent or inept, as opposed to flourishing and enjoying later life despite natural age-related declines.

In addition to the stringent biomedical criteria used to assess SA, another issue from the 2011-2012 CCHS sample is that it contained limited data (i.e. only respondents from Ontario and Newfoundland and Labrador were surveyed) on some biomedical variables, such as how often respondents have seen an eye specialist, a dentist, or whether they have a regular family doctor. For example, few respondents indicated receiving a physical check-up and of those who receive a physical check-up, only 7% of respondents indicated a regular pattern of medical check-ups. Therefore, this does not fully consider all potential reasons for medical visits, the frequency of those visits, or medication adherence. Having a regular visit with health care providers is important in assessing and differentiating pathological (i.e. arthritis) or non-pathological (i.e., emphysema from smoking) declines associated with aging (McCoy, 2013). It is especially important for mental health, where the psychological (i.e., Alzheimer’s) declines are less noticeable

than physical (i.e., arthritis) ones. To provide a broader perspective on individual health responsibility, including responses from all health regions on physical and mental health-related questions could augment the CCHS.

By focusing predominantly on biomedical perspectives, which encourages individuals to take ‘responsibility for their own health’, has the potential for negative consequences in resource allocation. Due to limitations, not all seniors are able to be physically active. Thus, it is problematic to portray seniors as “burdening society” by costing healthcare systems when they experience ill health in later life (Katz & Calasanti, 2015). Such views give policy makers justification to treat those identified as unsuccessful agers differently than those considered aging successfully (Katz & Calasanti, 2015; Minkler & Fadem, 2002), as all adverse health conditions are being attributed to inactivity. Therefore, using physically active lifestyles as the gold standard for improving health outcomes in later life marginalizes older adults who are unable to meet these expectations (Katz & Calasanti, 2015).

In Eastern cultures, elderly members have traditionally been revered, although there are suggestions that this is starting to change (Lee, 2015). The economic growth in Eastern cultures have diverted the attention of society to maintaining financial goals, essentially ignoring the elderly members of their society because they are more dependent and use up more resources than they are contributing (Lee, 2015). Historically, some societal norms have facilitated the discontinuation of support for the elderly members of their society as a means of preserving resources, like food, when it became scarce in winter months (Brogden, 2001; Schwierer, 2009). Society has since become more accepting and accommodating of this age group as it continues to grow, and

governments are aiming to help improve seniors' quality of life into late adulthood (Canada NewsWire, 2016). Notably, society has had, and perhaps always will have, a complex relationship towards its older citizens, as positive and negative views seem to co-exist simultaneously.

Health and Wellbeing from Biomedical and Psychosocial Perspectives

In promoting wellbeing, quality of life, and overall aging success, it is important that policy makers consider resources of individuals, such as psychological, and social resources, rather than strictly examining an individual's self-reported health status, including physical and mental health (Bowling & Iliffe, 2011). The current analysis suggests that these points should be emphasized when interviewing older Canadian adults, as the current CCHS data are missing many quality-of-life measures that have been cited by aging researchers (Jopp et al., 2015; Martinson & Berridge, 2014). Similar to CSEP, the United States' Centers for Disease Control (CDC) promotes healthy lifestyle choices, addressing impairments to cognitive processes or functions, mental and physical health, preventive services, and provides education on planning for end of life (Centers for Disease Control, 2016). These programs and services show the benefits that biomedical perspectives present.

The CDC releases an annual report examining the prior year at a glance. The 2015 report provides statistics on the incidence of chronic disease, such as Alzheimer's disease, cancer, heart disease, diabetes, and other infectious diseases, like pneumonia, and flu. The report emphasizes how healthy behaviours (i.e., lifestyle factors such as: healthy diets, physical activity, and social activities) and supporting environments can prevent such illnesses, disability, premature death, and promote better quality of life for both

older adults and the individuals who care for them (Centers for Disease Control, 2016). The present analysis also showed that those who take part in more PA increased their likelihood of aging successfully. This finding supports the research that PA improves health outcomes, aerobic capacity, mood states, quality of life, and promotes longevity (Herman et al., 2012; Huy et al., 2010; Kerr et al., 2012).

With more respondents being classified as successful agers using the psychosocial model compared to the biomedical model, this finding helps to demonstrate how happy people experience positive health outcomes and quality of life through means other than through good physical and mental health states alone. By using an integrated model with the psychosocial and biomedical perspectives, the benefits of positive social health, acceptance of oneself, strong relationships, a positive outlook on life, and social engagement may help to bolster biomedical outcomes. Individuals who are active through activities such as gardening, housework, and social pursuits, accrue similar benefits as those who are more physically active, including longevity, and higher levels of functional independence (Dupuis & Alzheimer, 2008; Morrow-Howell, Hinterlong, Rozario, & Tang, 2003; Shmotkin, Blumstein, & Modan, 2003). Similarly, cognitively stimulating activities, such as social ventures have been suggested to reduce the incidence of mental declines as well as reduce the risk for Alzheimer's Disease (Dupuis & Alzheimer, 2008; Verghese et al., 2003; Wilson, Barnes, & Bennett, 2003).

The continuum depicting the combined biomedical and psychosocial aging success groups showed the greatest number of respondents as aging moderately successfully overall (with a combined score of 2). The largest number of successful agers (with a combined score of 3) were considered to be aging moderately successfully with

the biomedical model (with a score of 1), and aging successfully using psychosocial criteria (with a score of 2). This combined result shows that, despite respondents having functional limitations or chronic conditions, they could still be considered successful agers due to having other important aspects of their lives compensate for these losses (i.e., having a purpose, being happy, being part of a community, or having goals that challenge them). Therefore, those considered to be aging “usually” from ‘objective viewpoints’ can still be successful agers with criteria considered equally as important. This highlights how biomedical perspectives are rudimentary when they stand-alone and showcases the ability of aging success to be viewed on a continuum of attainment and adaptation (Bowling, 2007; Dionigi et al., 2011; Grossman & Stewart, 2003; Horton et al., 2013).

Sex and Aging Success

Women are more likely to be affected by osteoporosis and experience greater losses of muscular strength in advanced age compared to men (Darbà et al., 2015; Milanović et al., 2013). However, there are more women who take part in exercise programs than men at their local gyms, likely due to the enjoyment of the group dynamic with other women (Matthews, Wilson, & Melkerson-Granryd, 2014). Dogra & Stathokostas (2014) also found that men engaged in more sitting time than women, which is suggested to be associated with higher incidence of hypertension and diabetes mellitus (Meneguci, Sasaki, Da Silva, Scatena, & Damião, 2015).

In this study, the results showed that women were more likely to be aging successfully than men. This contrasts with the findings from Baker and colleagues (2009). Historically, women refrained from PA to avoid injury and to appear more feminine (Bell, 2007; Dionigi et al., 2011). With women taking part in more PA pursuits, especially into

late adulthood, may possibly explain why they experienced greater aging success than the men in the current sample. That is, women are experiencing the benefits associated with PA and may also be leading healthier lives into old age.

This finding of sex differences and aging success could also be due to the fact that the female average life expectancy in Canada is 83 years, compared to 78 years for males (Proudfoot, 2010). As females have a higher life expectancy than males, they may already be experiencing better health outcomes in later life, including fewer functional limitations and chronic diseases, than males who were the same age. This finding could also reflect the stringent criteria of the predictors used for the Baker et al. (2009) analysis. That is, there were more criteria used related to identifying respondents as having chronic disease or requiring assistance with daily tasks as a result of functional limitations compared to the present study.

Living Arrangements and Aging Success

In assessing close, personal relationships using the CCHS, the data limit the ability to gauge or interpret how happy individuals are with family and friends, as well as how the respondents feel about themselves. The findings suggested that individuals who live alone or with a spouse/partner were more likely to be considered successful agers. Living alone may be associated with aging successfully because these individuals are more likely to be independent, mentally and physically competent, and not suffer from chronic disease or functional limitations, and be better able to care for themselves. Because of this more independent lifestyle, individuals who live alone may not necessarily need to rely on others (Wiles, Leibing, Guberman, Reeve, & Allen, 2012) in comparison to those who lived with someone other than their spouse (i.e., children,

parents, sibling, or other arrangement) who were not as likely to be considered aging successfully.

The CCHS creates a large database, however there is, in certain instances, limited information specific to the population under study. Because of this, the attempt to quantify many components of SA principles proved difficult. However, the results do reflect that, although not all older adults have ideal mental or physical health, there are ways to adapt to these shortcomings and still be considered aging successfully (Young et al., 2009). Self-perceived health, and attitudes toward aging are important (Dogra, 2011; Dogra, Al-Sahab, Manson, & Tamin 2015; Huy, Schneider, & Thiel, 2010) and the present study emphasizes the value older adults themselves place on these concepts and how they can contribute to positive outcomes in later life.

Limitations and Future Research Directions

The use of the CCHS presents several limitations. Firstly, the CCHS does not include data on individuals living on Native Reserves or Crown lands, institutional residents, some remote regions, or full-time members of the Canadian Armed Forces. The CCHS also does not include information on the incidence or prevalence of Alzheimer's disease or dementia, both of which are significant age-associated chronic conditions.

Measuring respondents' active engagement with life was difficult using data from the CCHS. This is partly due to the difficulty in defining 'active engagement' and is an active area of research (Baker et al., 2009; Carr, 2013). This problem was further exacerbated in the current study, as there was not enough data to use the *member of a voluntary organization* variable utilized by Baker et al. (2009). Thus, precise replication of their 'active engagement' predictor was problematic.

Future researchers who use the CCHS would benefit from a more comprehensive dataset of the two-year version of the survey. Further, by having all questions in the survey asked in all health regions of the country, not just a select few, would also broaden its utility considerably. A more comprehensive and inclusive questionnaire, administered across all provinces, would allow researchers to track health trends in the aging population and identify potential funding/personnel shifts where required.

From the CCHS data, there were several items related to the biomedical and psychosocial SA perspectives that had zero or very few cases, or were scored as "not applicable". These missing items limit the scope of the survey for the current sample, and necessarily impact the available data. Some items that could have been added to the biomedical model include the prevalence and cause of injuries, as well as information on

falls. Information on falls is important because they are a common cause of hip fractures and death among seniors (Franco et al., 2014). Missing responses that could have been used to supplement the psychosocial model include: satisfaction with financial situation, overall satisfaction with self, attitudes towards friends, family, or self, amount and type of social support, and spirituality. These psychosocial items were noted in a systematic review of SA literature (Bowling & Iliffe, 2011) and could be used to supplement an integrated SA model.

For questions pertinent to the perspectives used in this thesis, some survey questions provided limited data for the sample under study. As one example, respondents were asked whether they had made positive changes to improve their health. Only 8% of the total sample were asked this question from the 2011-2012 CCHS and indicated whether they had made some positive change to improve their health. Respondents were also surveyed in regards to increasing the amount of PA undertaken to improve health, where only two provinces (i.e., Ontario and Newfoundland and Labrador) from the total sample for this study were asked this question. These data were also restricted in that they were presented as the lowest limits of the METs averaged for all daily activities (Statistics Canada, 2012).

Exploring the amount of PA undertaken with the population under study was important because it helps to decipher whether positive changes in regards to lifestyle factors were contributing toward positive biomedical health outcomes. These questions in particular are especially important as biomedical researchers believe that promoting PA participation is important in achieving many health-related benefits and predicting overall SA (Pruchno, 2015; Rowe & Kahn, 1987; 1997; 1998). These benefits are related to

physical and cognitive health and have been suggested to improve with even a small amount of physical or leisure activity, even performed “incidentally” (i.e. walking around the house, gardening, or performing daily chores) (Fox, Stathi, McKenna, & Davis, 2007; Kerr, Rosenberg & Frank, 2012) and have also been suggested to help socially integrate older adults into actively engaged lifestyles (Dogra, Mesiner, & Baker, 2008).

Another limitation to the CCHS is one of autonomy. Responses indicated that 77% of surveys were completed in person. There were 11% individuals who reported not being alone when completing the survey, as well as 11% of respondents reported their answers being affected by another person. With this many respondents admitting that someone else influenced their answers (i.e. family member, care taker, or surveyor), it raises questions as to the validity of the responses. For example, respondents may take issue with being depicted as being incompetent, unhealthy, or irresponsible when it comes to making health decisions. In contrast, reporting more positively on these self-health rating items has the potential to perpetuate the ‘blame the victim’ mentality by placing the onus on the individuals to rely less on social and healthcare resources because they are essentially admitting to not needing them. This is problematic because it requires seniors to maintain good health and independence in later life. There were approximately 4% of respondents who did not state whether another person affected their responses and therefore may have failed to report such influence. Therefore, it is also unclear whether there may have been even more respondents who felt their answers were influenced by someone else.

Lastly, respondents were asked to self-report on variables that made up composite scores (e.g., self-perceived health and mental health, depression index), as to how they

felt towards these concepts in the past month prior to completing the survey. These feelings could change from month to month, depending on their mood or current circumstances, and do not necessarily reflect their feelings accurately toward the item or if it would be consistently rated (Heidi & Gronhaug, 1991). Controlling for how people's emotions may bias their responses could be accomplished through an intra-class correlation to assess test-re-test reliability of responses.

Conclusion

With the current body of SA research, the CCHS places more emphasis on biomedical perspectives within the population under study. These perspectives emphasize the importance for older adults to be void of disease or disability, as well as to have high physical and mental functional capacities to be considered aging successfully. Relying on these attitudes overlook individual aging experiences and is problematic as they have dominated the SA field over the last 30 years (Bowling & Dieppe, 2005; Bowling & Iliffe, 2011; Cho et al., 2015; Dillaway & Byrnes, 2009; Knight & Ricciardelli, 2003; Young et al., 2009).

The goal of the present thesis was to examine what portion of the older Canadian population was aging successfully using the 2011-2012 CCHS. As no unified definition of SA currently exists, this study combined the biomedical and psychosocial perspectives of SA to create an integrated SA model. Since the two perspectives view aging success using different, but complementary criteria, the integrated model was able take into account more health domains and assess aging from a more holistic perspective. Results showed that using the integrative criteria, 28.9% of respondents were aging successfully, 55.5% were aging moderately successfully, and 15.6% were aging unsuccessfully. Future studies using the CCHS would benefit from a more inclusive questionnaire, where all health regions are required to answer more of the survey questions. No one question can be completely representative of SA constructs. Including more regions would allow additional variables to be included in future criteria. This would permit a more in-depth look at both biomedical and psychosocial perspectives.

Key findings from this study include a comparison of results from the present study to that of Baker and colleagues (2009) where more moderate and successful agers were observed as well as fewer unsuccessful agers. This thesis replicated the methods to this initial study as closely as possible and extended the previous research by including two other models, both a psychosocial model as well as an integrated model. There were more successful agers identified using the integrated model than either the biomedical or psychosocial models used independently. A possible explanation for this may be that the gap between sex and aging success is shrinking, such that women are now aging more successfully than men; a pattern that is opposite to that of Baker and colleagues (2009).

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