SELF-REPORTED HEALTH AMONG COMMUNITY-DWELLING OLDER ADULTS

SELF-REPORTED HEALTH AMONG COMMUNITY-DWELLING OLDER ADULTS: A MULTIMETHOD STUDY TO UNDERSTAND THE COMPLEXITY AND ROLE OF ADAPTATION TO HEALTH ADVERSITY

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TITLE: Self-reported health among community-dwelling older adults: A multimethod study to understand the complexity and role of adaptation to health adversity

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Lay Abstract

Self-reported health is a measure of how health is viewed. Older adults who live with many chronic conditions often view their health negatively. Research suggests that as the number of chronic conditions increases, self-reported health decreases. While this relationship between the number of chronic conditions and self-reported health is often described, it is not well understood. For example, little is known about what factors change this relationship, what factors may predict high self-reported health, or how these factors change older adults' view of their health. To help better understand this relationship, four research studies were completed. The first study was a review of past research describing the factors related to self-reported health. The second study used a large dataset to explore if these factors change this relationship and if any of these factors predict high self-reported health. The third study involved interviews with older adults to explore how these factors changed their view of health. The fourth study brought together all these results to find ways this information may be used in future research, policy work, and clinical practice.

Abstract

Self-reported health is typically captured as a response to the question, “In general, would you rate your health as excellent, very good, good, fair or poor?” Among community-dwelling older adults (≥65 years), self-reported health decreases as the number of chronic conditions increases. Despite this well-documented relationship, little is known about how other sociodemographic or health-related factors may shape this relationship, what may predict high self-reported health among this population, or how older adults perceive these factors as influencing their perceptions of health. Informed by the Lifecourse Model of Multimorbidity Resilience, the objective of this multimethod research study was to advance understanding of self-reported health among community-dwelling older adults. To this end, four research studies were completed: 1) scoping review of the factors associated with self-reported health, 2) cross-sectional analysis of baseline data from the Canadian Longitudinal Study on Aging to understand the relationship between multimorbidity and self-reported health and the factors that predict high self-reported health; 3) qualitative case study to explore the influence of individual, social, and environmental factors on self-reported health, including multimorbidity resilience, in community-dwelling older adults, and; 4) a multimethod study that brought together all findings in a matrix analysis. From this work, two meta-inferences were generated: 1) the factors that shape self-reported health are multidimensional and complex; and 2) adaptation to health adversity, resulting from experiences acquired over the lifecourse, shape how older adults perceive their health. Findings from this work advance three implications. First, there is a need to use and apply information gained by asking about self-reported health in clinical practice to inform care planning. Second, there is a need for whole person care to guide health and social care policy for older adults. Third, future health research must further explore longitudinal understanding of self-reported health as well as additional qualitative understanding of the differences of those older adults with the well-being paradox.

Acknowledgements

This work would not have been possible without the support and guidance of many special people. I would first like to thank Dr. Maureen Markle-Reid, my supervisor on this educational journey, for her mentorship, instruction, and support. It has been a true privilege to learn from you. I am additionally grateful for the expertise of my supervisory committee members, Drs. Kathryn Fisher, Carrie McAiney, and Jenny Ploeg. My success is because of your collective guidance, optimism, and vision. I cannot imagine having had a better team supporting me and I look forward to continuing our partnership into the future. Special thanks are also extended to Drs. Nancy Carter, Rebecca Ganann, Sue Jack, and Diana Sherifali, as well as the School of Nursing, and the team in the Aging, Community and Health Research Unit.

I am grateful to the women with whom I have had the privilege of learning alongside in the graduate program over these last few years. Thank you for the laughter and encouragement as we each navigated our own unique challenges and victories. I have learned so much from each of you and am filled with gratitude for the opportunities we have had to collaborate and share. I am especially grateful to fellow PhD student, and now dear friend, Marissa Bird, for her support, listening ears, and companionship. I am so excited to see where our careers take us.

Every achievement and accomplishment I have celebrated is a product of the love and support I receive from my family. To my parents, Connie and Dill Whitmore, who instilled in me a love of learning and taught me to always be curious, everything that I have and will have in this life is because of you. To my sisters, Emily and Megan, thank you for being the best built-in friends and support network I could ever have or ask for. To my partner, Matthieu, it has been your optimism, patience, and conviction that has made all this possible. Thank you for holding it all together while I pursued this big dream. I love you all so much.

Lastly, I extend special gratitude to the older adults who participated in this study and in the research on which these findings are based. Thank you for trusting me with your stories.

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LIST OF ABBREVIATIONS

ADL	Activities of daily living
ANOVA	Analysis of variance
BRS	Brief Resilience Scale
CES-D-10	Centre for Epidemiologic Studies Depression Scale 10-item
CI	Confidence interval (95%, two-sided alpha)
CLSA	Canadian Longitudinal Study on Aging
IADL	Instrumental activities of daily living
MOS	Medical Outcomes Study
OARS	Older Americans Resources and Services
OR	Odds ratio
SD	Standard deviation

DECLARATION OF ACADEMIC ACHIEVEMENT

Carly Whitmore was the lead researcher for the original multimethod research study on which this dissertation is based. Responsibilities of the lead researcher included study conception and design; application for external funding; acquisition of the quantitative data through application to the Canadian Longitudinal Study on Aging data access service; generation of the qualitative data through leading semi-structured interviews; primary analysis of all quantitative and qualitative data; and interpretation of the study findings. Ms. Whitmore is also the primary author on these chapters, including the publications, included in this dissertation. In addition to the above, responsibilities of the primary author included drafting and revising manuscripts; coordinating review and managing versions; and submitting final manuscripts for publication.

Dr. Maureen Markle-Reid (academic supervisor) contributed to the conception and design of the research study, participated in the data analysis and interpretation, and revised the manuscripts. Drs. Kathryn Fisher, Carrie McAiney, and Jenny Ploeg contributed to the conception and design of the study, critically reviewed the analysis and interpretation of findings, and revised manuscripts. Dr. Kathryn Fisher additionally contributed to the quantitative data analysis including quantitative data modelling and diagnostics. Drs. Lauren Griffith, Susan Phillips, and Andrew Wister, co-investigators on a funded research grant that supported part of this study, also contributed to the quantitative data analysis plan, critically reviewed the data analysis and interpretation of findings, and revised Chapter 3 and Chapter 4.

This dissertation is presented in a sandwich thesis format. Following an introductory chapter (Chapter 1), five distinct manuscripts are presented (Chapters 2-6).

Chapter 2 is a manuscript entitled, “What Factors Shape Self-Reported Health Among Community-Dwelling Older Adults? A Scoping Review”. The purpose of this scoping review was to scope the literature related to factors associated with self-reported health among community-dwelling older adults and to identify key areas of future research. This manuscript has been published in the *Canadian Journal on Aging* and findings from this review were presented at the Canadian Academy of Geriatric Psychiatry Annual Scientific Meeting. Support for attending this conference was acquired through the Canadian Institute of Health Research's Institute for Community Support Travel Award ($1,500). The full reference for this manuscript and presentation are:

> Whitmore, C., Markle-Reid, M., Fisher, K., McAiney, C., & Ploeg, J. (2020). What factors shape self-reported health among community-dwelling older adults? A scoping review. *Canadian Journal on Aging, 6*, 1-16. https://doi.org/10.1017/S0714980820000124

> Whitmore, C., Markle-Reid, M., McAiney, C., Fisher, K., & Ploeg, J. (2019, October). *What Factors Influence Self-Reported Health Among Community-Dwelling Older Adults?: A Scoping Review.* Canadian Academy of Geriatric Psychiatry Annual Scientific Meeting, Banff, Alberta. Poster Presentation.

Chapter 3 is a protocol paper entitled, "The Relationship between Multimorbidity and Self-Reported Health among Community-Dwelling Older Adults and the Factors that Shape this Relationship: A Mixed Methods Study Protocol using CLSA Baseline Data". The purpose of this protocol paper was to detail the design of this dissertation project. This protocol has been published in the *International Journal of Qualitative Methods*. Co-authors on this publication represented the full team of investigators for a Canadian Institutes for Health Research Catalyst Grant funded project. The full reference for this publication is:

> Whitmore, C., Markle-Reid, M., Fisher, K., Ploeg, J., McAiney, C., Griffith, L., Phillips, S., & Wister, A. (2021). The relationship between multimorbidity and self-reported health among community-dwelling older adults and the factors that shape this relationship: A mixed methods study protocol using CLSA baseline data. *International Journal of Qualitative Methods, 20*(1), 1-10. https://doi.org/10.1177/16094069211050166

Discussion regarding the methods for this research study were additionally presented at an invited webinar hosted by the Canadian Longitudinal Study on Aging:

> Kirkland, S., McMillan, J., Basta, N., & Whitmore, C. (2020, June). Engaging in research on aging: How trainees and researchers connect with the Canadian Longitudinal Study on Aging. Canadian Longitudinal Study on Aging webinar series. Webinar panel member.

Chapter 4 is a manuscript entitled, “Self-Reported Health and the Well-Being Paradox among Community-Dwelling Older Adults: A Cross-Sectional Study using Baseline Data from the Canadian Longitudinal Study on Aging (CLSA)”. The purpose of this quantitative findings paper was to describe the relationship between multimorbidity and self-reported health among community-dwelling older adults and to identify predictors of high self-reported health. This project, in collaboration with co-investigators Drs. Lauren Griffith, Susan Phillips, and Andrew Wister, was funded by a Canadian Institutes of Health Research Catalyst Grant ($69,000) in the spring of 2020. The full reference for this publication is:

> Whitmore, C., Markle-Reid, M., McAiney, C., Ploeg, J., Griffith, L.E., Phillips, S.P., Wister, A., & Fisher, K. (2022). Self-reported health and the well-being paradox among community-dwelling older adults: A cross-sectional study using baseline data from the Canadian Longitudinal Study on Aging (CLSA). *BMC Geriatrics, 12*(122). https://doi.org/0.1186/s12877-022-02807-z

Chapter 5 is a manuscript entitled, “Understanding How Individual, Social, Environmental, and Resilience Factors Shape Self-Reported Health among Community-Dwelling Older Adults: A Qualitative Case Study”. The purpose of this qualitative findings paper was to explore and describe how individual, social, and environmental factors, including those related to multimorbidity resilience, influence self-reported health among community-dwelling older adults. At the time of submitting this dissertation, this manuscript has been formatted for submission to *Global Qualitative Nursing Research*.

Chapter 6 is a manuscript entitled, "Self-Reported Health among Community-Dwelling Older Adults: A Multimethod Study to Understand the Complexity and Role of Adaptation to Health Adversity". Using a matrix analysis, this multimethod paper brings together the findings from the completed scoping review, cross-sectional study, and the qualitative case study to advance understanding of self-reported health. This paper also poses key implications and recommendations for clinical practice, policy and system leadership, and future research based on the body of work from this dissertation project. At the time of submitting this dissertation, this manuscript has been formatted for submission to the *Journal of Aging and Health*. In addition, findings from this work have been submitted for consideration as an oral presentation at the British Society of Gerontology's annual conference in Bristol, United Kingdom.

CHAPTER ONE

Introduction

The demography of Canada is shifting. In 2016, older adults, those aged 65 years and older, out-represented youth in the Canadian population for the first time in history (Statistics Canada, 2016). By 2031, less than 10 years from now, it is estimated that older adults will represent almost one quarter of the total population (Statistics Canada, 2016). This well-documented demographic shift is often described to be a potential threat to the sustainability of the health and social care system. This is because, excluding newborns and toddlers, health and social care service spending consistently increase alongside the age of the individual, with marked spending increases related to acute care service use at ages 65 and older (Canadian Institute for Health Information, 2011). To mitigate costly acute-care service use and aligned with personal preferences, the focus of healthy aging policy, programming, and service provision has shifted to encourage older adults to remain in their homes and communities longer (Terner et al., 2011). Stemming from this demographic shift, there exists a need to appropriately identify the health status of older adults to inform health and social care planning (Miller et al., 2021).

One measure that has been used to capture the health status of older adults is multimorbidity (Pearson-Studdard et al., 2019). Multimorbidity is defined as the co-existence of two or more chronic conditions and has been described as a significant global challenge (Stirland et al., 2020) warranting urgent applied health research (Pearson-Studdard et al., 2019). Influenced by the social determinants of health (Ingram et al., 2021; Northwood et al., 2018), multimorbidity is associated with numerous negative outcomes for older adults (Markle-Reid et al., 2018; Pearson-Studdard et al., 2019; Stirland et al., 2020) – driving its use as a measure of health status. However, the limitations of multimorbidity as a measure of health status have been acknowledged (Ingram et al., 2021) and include: 1) incomplete understanding of the effect of the chronic conditions (Miller et al., 2021); 2) limited inclusion of mental health (Stirland et al., 2020); and 3) overlooked lived experience of the person, their family, and context (Pearson-Studdard et al., 2019). For this reason, self-reported health has also emerged as a viable means of capturing health status (Miller et al., 2021).

The relationship between multimorbidity and self-reported health among community-dwelling older adults is well-documented. This evidence states that as the level of multimorbidity (i.e., the number of chronic conditions) increases, self-reported health decreases (Heller et al., 2008; Perruccio et al., 2012; Pinquart, 2001; Schüz et al., 2011; Terner et al., 2011). However, what is shaping this relationship, how it is being shaped including the perceptions of older adults, and what factors may predict high self-reported health among community-dwelling older adults remains poorly understood. Considering the need to accurately identify the health status of a growing proportion of the population to inform future health and social care planning, there is an opportunity to further explore the relationship between multimorbidity and self-reported health. Building on the existing evidence base, and with the purpose of advancing understanding of self-reported health among community-dwelling older adults, a multimethod research study was designed and completed. The purpose of this chapter is to introduce the major concepts of the completed multimethod study and, through a description of the evidence base, discuss the significance and importance of this research.

Background

This multimethod study was based on interdisciplinary knowledge from applied health sciences including nursing, psychology, and medicine. Further, this work was supported by broad health literature from the fields of gerontology, sociology, and aging studies. Rooted in these disciplines and fields were several key concepts and terminology including older adults, community-dwelling, multimorbidity, self-reported health, the well-being paradox, and multimorbidity resilience. Each of these is described below.

Older Adults

Variations in how older adults are defined are evident in the literature. This variability is reflected in the age cut-offs (e.g., ≥50 years) as well as the descriptions attributed (e.g., clinical guidelines, frailty). For the purposes of this multimethod research study, older adults were defined as those adults aged 65 years or older. The reason for this decision is multifaceted, and ultimately reflects a junction between commonly defined health and social policies relevant to adults in Canada (e.g., the Canada Pension Plan's standard age of receipt is 65 years), and widely accepted and applied definitions of this population in research (Shenkin et al., 2017)

Community-Dwelling

In Canada, over 90% of older adults live in the community (Statistics Canada, 2018). Community-dwelling older adults include those individuals who live outside of an institutional setting. This includes older adults living in their own home, in an apartment, with a family or friend caregiver, or a retirement home. A focus on this setting for older adults acknowledges the unique impact of the community on health and well-being including optimization of independence and social connectedness (Markle-Reid et al., 2010).

Multimorbidity

Definitions of multimorbidity vary both in the cut-off number of chronic conditions as well as in the chronic conditions considered. For this work, multimorbidity was defined as two or more chronic conditions as this cut-off is often reported in the literature (Marengoni et al., 2011). As adults age, the likelihood of developing chronic conditions and, in turn, multimorbidity, increases (Marengoni et al., 2011; Suls et al., 2019; Vertrano et al., 2018; Wister, Coatta, et al., 2016). As an example, it has been reported that the prevalence of multimorbidity among adults aged 65-74 years was 62%, 76% among those aged 75-84 years, and 81% among those aged 85 years and older (Salive, 2013). However, estimates of the prevalence of multimorbidity vary depending on the conditions and weighting of the conditions included and the source of the information (Ingram et al., 2021; Miller et al., 2021). Despite this variation, an aging global population has highlighted that multimorbidity is one of the greatest healthcare challenges worldwide (Pearson-Studdard et al., 2019).

In this multimethod project, studies drew upon a list of 20 commonly reported chronic conditions among older adults (Fortin et al., 2017) to define multimorbidity. This list has been used in many research studies that report on multimorbidity (Griffith et al., 2019). Of the 20 conditions reported in this list, 18 of them were available in the quantitative dataset used, including: hypertension, depression and anxiety, chronic musculoskeletal conditions, arthritis, osteoporosis, respiratory conditions such as asthma or chronic obstructive pulmonary disease, cardiovascular disease, heart failure, stroke, stomach problems such as ulcers, colon problems including irritable bowel disease, diabetes, thyroid disorder, cancer, kidney disease, urinary incontinence, dementia, and obesity (Fortin et al., 2017).

The presence of multimorbidity among older adults is associated with poorer health-related quality of life, an increased use of costly health and social services, and an increased risk for adverse events (e.g., falls) – often necessitating more complex clinical care (Marengoni et al., 2011; Suls et al., 2019). The complexity of managing multimorbidity has resulted in a shift in focus of gerontological research away from a single condition focus toward the study of multimorbidity (Wister, Kendig, et al., 2016). This shift reflects not only the aging global population that is driving the demand but also serves to attempt to future-proof health and social care systems from this demand (Pearson-Studdard et al., 2019). Aligning with this shift is an increasing interest in the ways that older adults respond to the health-related adversity associated with multimorbidity and how this translates to their self-reported health (Wister et al., 2019).

Self-Reported Health

Self-report measures are low-cost, quick, and commonly used in epidemiology and health research as well as clinical practice (Bhandari & Wagner, 2006). These measures may be influenced by many external and internal factors, including the memory or recollection of the individual, their understanding or comprehension of their experience, and the rapport or power dynamics between the individual and the person who is collecting the information (Garcia & Gustavson, 1997). Yet, despite these potential biases there is evidence showing that self-report measures can be both reliable and valid for quantifying self-reported health data such as exercise frequency and duration (Baranowski et al., 1984; Patterson, 2000), and behaviour, such as alcohol consumption (Williams et al., 1985). This is the case even among specific populations, such as those with intellectual disabilities (Vlot-van Anrooij et al., 2018). One of the most common self-report measures is self-reported health (Benyamini et al., 1999).

Self-reported health is one of the variables collected nationally and internationally as a measure of overall health status (Banerjee et al., 2010). Typically, self-reported health is captured as a response to the question, “In general, would you rate your health as excellent, very good, good, fair or poor?”. The history of self-reported health dates to the 1950s when this measure was first used in sociological health research (Garrity et al., 1978; Maddox, 1962; Suchman et al., 1958). Decades later, the measure has become more prevalent in medical and epidemiological research because of its demonstrated association with morbidity and mortality (Kaplan & Camacho, 1983; Mossey & Shapiro, 1982). More recently, self-reported health has been used in economic analyses (Crossley & Kennedy, 2002; Jurges, 2006), national and international population health surveys (Canadian Longitudinal Study on Aging, 2008), is recommended for use in health risk screening in clinical contexts (May et al., 2006), and for data collection in clinical trials (Fayers & Sprangers, 2002).

Since the initial interest in self-reported health in the 1950s, hundreds of studies have examined its ability to predict morbidity and mortality (Benyamini et al., 1999; Idler & Benyamini, 1997; Idler et al., 2004; Knäuper & Turner, 2003; Tissue, 1972) among various populations, including older adults (Benyamini et al., 2003; Idler & Benyamini, 1997; Mossey & Shapiro, 1982; Schüz et al., 2011; Vuorisalmi et al., 2005). Despite considerable variation in how self-reported health is measured (e.g., “excellent” to “poor”; or “very good” to “very bad”) it has been found that variation in response options represent equivalent assessments of the phenomenon (Eriksson et al., 2001; Jürges et al., 2008). This means that the highest level of health ratings available in different self-reported health scales are largely concordant in identifying health status and predicting associated outcomes such as morbidity or mortality (Jürges et al., 2008).

Despite the seeming simplicity of the question asked, self-reported health has been shown to have greater validity and predictive ability with respect to morbidity and mortality, compared to other more objective measures (Schnittker & Bacak, 2014). Not only does self-reported health have exceptional predictive validity when considering mortality, but it has been found that individuals are becoming more accurate at assessing and appraising their own health (Schnittker & Bacak, 2014). It is estimated that this greater accuracy is due in part to the increasing availability of knowledge and information (e.g., broad uptake of the internet) that can be used to inform subjective assessments of health by the individual (Schnittker & Bacak, 2014).

Straddling the social, psychological, and biological realms, self-reported health is an individual and subjective concept that "is related to the strongest biological indicator – death," (Jylhä, 2009, p. 308). There is an abundance of evidence that has identified that as the number of chronic conditions increases (i.e., the level of multimorbidity), the level of self-reported health decreases (Heller et al., 2008; Perruccio et al., 2012; Pinquart, 2001; Schüz et al., 2011; Terner et al., 2011). However, research that has explored the influence of various factors on this specific relationship is limited. This means that while the relationship is well-documented, what is shaping this relationship, how it is being shaped, and what factors may predict high self-reported health among community-dwelling older adults remain poorly understood. Considering the need for appropriate identification of health status among community-dwelling older adults, there exists an opportunity to identify if there are factors that moderate or mediate this relationship and how these factors may shape self-reported health.

Well-Being Paradox

An increased prevalence of multimorbidity has resulted in a change in the way that successful aging has been conceptualized. Traditionally, successful aging was believed to include the absence of disease, the presence of physical and cognitive capacity, and ongoing social engagement (Rowe & Kahn, 1997; Wister et al., 2016). In recent years, however, this conceptualization has been challenged and instead, a greater emphasis has been placed on the presence of positive emotions such as happiness or satisfaction in aging and throughout the lifecourse (Rybarczyk et al., 2012), despite the presence of multimorbidity. While the relationship between multimorbidity and self-reported health has been well-described in the literature, a subset of older adults, despite living with multiple chronic conditions, continue to self-report their health as positive. This is known as the well-being paradox (Rowe & Kahn, 1987; Wister, Coatta, et al., 2016). The well-being paradox is defined as the presence of wellness amidst illness (Rowe & Kahn, 1987) and, in this research, is operationalized as a high number of chronic conditions (or level of multimorbidity) alongside positive (e.g., excellent or very good) self-reported health.

Since the first reference to the well-being paradox, empirical and theoretical exploration has focused on explaining the stability of self-reported health over the lifecourse – especially considering the known and well-described losses that occur during this time (Abma et al., 2021; Borawski et al., 1996; Branchflower & Oswald, 2008; Chang et al., 2019; Hansen & Slagsvold, 2012; Herschbach, 2002). Despite this, little is known about why these older adults assess their health positively. It is believed that this gap between the expected, negative consequences of adverse health events, such as those commonly associated with multimorbidity, and the actual, described positive experiences of older adults may be indicative of the presence of resilience (Wister et al., 2016).

Resilience

Resilience has historically been framed as a state or a personality trait. There is growing literature, however, that additionally describes resilience as a process and something that is built over the lifecourse as a result of “adversity, trauma, tragedy, threats, or stress” (American Psychological Association, 2015). Drawing upon the broader literature, including that from psychology and sociology, the adaptive, process-oriented nature of resilience was emphasized in this work (Macleod et al., 2016). Compared to exploring resilience as solely a trait that is either present or not, this positioning offered an opportunity to explore implications of life experience, how resilience may shape self-reported health, as well as other factors, among older adults. Further, by accepting that every person has the capacity to develop and demonstrate resilience, as opposed to an inherent trait, an important shift toward acknowledging the complex systems and contexts in which individuals live and learn was made available. This understanding of resilience is captured in a poem by Jane Hirshfield, titled ‘Optimism’:

More and more I have come to admire resilience.
Not the simple resistance of a pillow, whose foam
returns over and over to the same shape, but the sinuous
tenacity of a tree: finding the light newly blocked on one side,
it turns in another. A blind intelligence, true.
But out of such persistence arose turtles, rivers,
mitochondria, figs — all this resinous, unretractable earth. (Hirshfield, 2002)

Studies on resilience have primarily focused on youth and children and populations known to experience significant trauma such as veterans or first responders (Macleod et al., 2016). Recently, however, research on resilience has shifted toward focusing on older adults, including applying resilience to health interventions for older adult populations (Bolton et al., 2016; Macleod et al., 2016). This is in part due to a recognition that the lifecourse shapes the nature of resilience and that older adults can draw upon previous experiences to inform future decisions and actions. While there is a good amount of research that poses resilience as an outcome, there exists opportunities to advance the literature on resilience as a predictor of health status, such as self-reported health – especially among older adults. With this knowledge, there is not only the capacity to further develop and mobilize interventions that aim to build resilience, but also to enhance self-reported health among older adults to shape future care decisions and tailor treatment planning (Linton et al., 2016; Vlot-van Anrooij et al., 2018).

Multimorbidity Resilience

Multimorbidity resilience, described as a dynamic and adaptive process enacted in the face of health adversity (Ungar, 2008; Wister, Coatta, et al., 2016; Wister et al., 2018), has recently gained popularity in gerontological research as it directly responds to the deleterious effects of multimorbidity, such as the exacerbating impact on quality of life, symptom burden, and functional decline (Galenkamp et al., 2011; Rybarczyk et al., 2012). Multimorbidity resilience draws upon an individual’s ability to both navigate and negotiate “psychological, social, cultural, and physical resources” (Ungar, 2008; Windle, 2011) acquired throughout the lifecourse (Wister et al., 2016). While it is understood and accepted that older adults tend to not fully recover from chronic illness (e.g., new diagnoses, symptom flare), there exists a wide variation in the level of adaptation that occurs (Wister et al., 2018). This variation speaks to the complex ways in which older adults adapt, cope, and respond to multimorbidity and is described in the Lifecourse Model of Multimorbidity Resilience (Wister, Coatta, et al., 2016). While resilience frameworks are not novel, the application of these models have tended to be restricted to early development including child and youth populations (Wister et al., 2016). Given the increasing prevalence of multimorbidity in older adult populations, and the recent paradigmatic shift away from the idea that healthy aging occurs in the absence of illness, the application of resilience models to multimorbidity among older adults can enhance understanding of how health, multimorbidity, and resilience overlap (Wister et al., 2016).

The Lifecourse Model of Multimorbidity Resilience

Wister et al.'s (2016) Lifecourse Model of Multimorbidity Resilience was used to guide the research. Developed from a comprehensive review of the literature, and rooted in theoretical foundations that underlay resilience research (e.g., positive psychology, developmental psychology, lifecourse theory), the Lifecourse Model of Multimorbidity Resilience addresses gaps in prior models of resilience, including: how resilience can be understood as a process as opposed to a trait; how resources interact as a social process; and how time and previous experiences of health-related adversity (e.g., of both self and of others) influence future reactions to adverse events (Wister et al., 2016).

Description of the Lifecourse Model of Multimorbidity Resilience. The Lifecourse Model of Multimorbidity Resilience is illustrated in Figure 1. Starting in the upper left corner, the individual is broadly positioned at the centre of an interrelated social and environmental context (Wister et al., 2016). This model posits that resilience, while experienced at the level of the individual, is best understood within the broad “socioenvironmental landscape” (p. 300). The three overlapping circles represent wellness, a concept that involves a full integration between the individual, social, and environmental systems in which the person exists (McMahon & Fleury, 2012; Wister, Coatta, et al., 2016). This wellness permits meaningful engagement in life, provides opportunity to achieve potential, and is a core element of healthy aging (Wister et al., 2016).

Following the model cyclically, the beginning stage of the resilience process is the onset of health-related illness adversity (Windle, 2011; Wister, Coatta, et al., 2016). This is depicted at the top right of the model. Adversity, a common concept in stress and coping research, involves a cognitive appraisal process in which the stressor is assessed and deemed to be either stressful or not stressful for the individual and their daily life (Wister et al., 2016). Within the context of multimorbidity, examples of health-related adversity includes the diagnosis of a new chronic condition, receiving conflicting or discordant advice related to treatment or management of symptoms, or health complications. If deemed stressful, a disruption of “self-concept, behaviours, and worldviews” occurs (Wister et al., 2016, p. 301). Depicted in the top right of the model, this disruption results in the disconnection of what were once integrated circles (representative of the individual, social, and environmental systems) for the individual. This disruption is a result of interrupted or disjointed routine behaviours associated with new onset or episodic return of illness symptoms (Kralik et al., 2006; Wister, Coatta, et al., 2016).

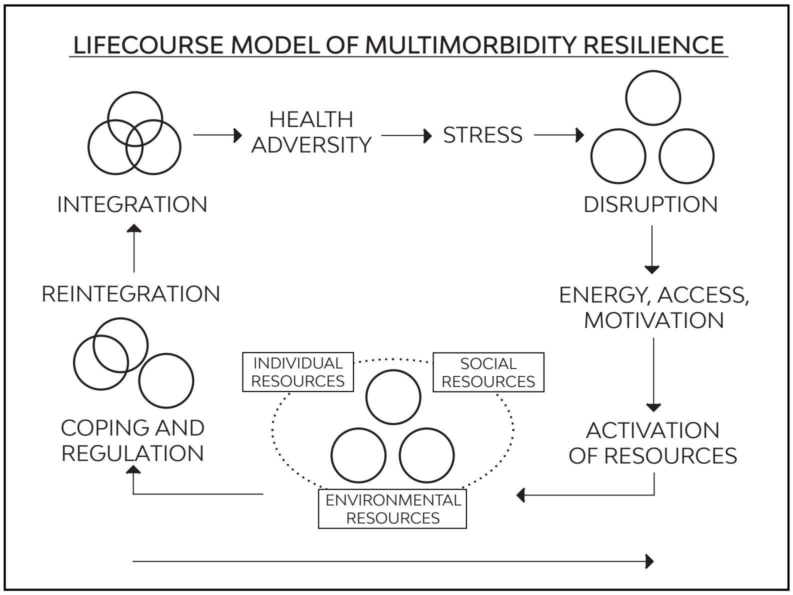

Figure 1. Adapted from Wister et al., (2016) Lifecourse Model of Multimorbidity Resilience

In response to this disruption, the individual activates resources in order to successfully overcome adversity and stress (Wister et al., 2016). This resource activation requires motivation, energy, and access (Wister et al., 2016), and can be either internal and/or external to the person. Internal activation is described by Wister et al. (2016) as an "expression of agency" (p. 301) in which the individual employs and harnesses resources contained within the self. This primary control can include resources such as self-efficacy, self-referent belief patterns, a sense of purpose or goal orientation, optimism, flexibility, socioeconomic resources, and culturally specific coping strategies (Wister et al., 2016). Conversely, external activation of resources will involve those resources external to the person. These may include social resources, such as: relationships, networks, social engagement, support, or capital, and ethnic culture; as well as environmental resources, including: the fit between the person and their environment, cultural connection to their location, programs and services in their community, and the influence of policy on infrastructure (Wister et al., 2016).

The resources activated at this stage of disruption may include a combination of individual, social, and environmental factors. The interaction of these resources is the central component of the Lifecourse Model of Multimorbidity Resilience (Wister et al., 2016). This interaction is depicted in the middle of the model and builds upon literature that explores how certain combinations of resources, (e.g., high self-efficacy and personal control) are related to the activation or promotion of other resources, like social support (Jopp & Rott, 2006). As described by Wister et al. (2016), these interactions can create ripple effects or feedback loops among resources and foster positive and protective movement toward other resources, and ultimately, resilience (Sells et al., 2009).

The activation of resources engages coping and emotional regulation (Wister et al., 2016). Coping is described as process-oriented and dynamic, and involves conscious and purposeful actions employed to a situation appraised to be stressful (Lazarus & Folkman, 1984). Coping either directly addresses the stressor or attempts to regulate the emotions that arise as a consequence of the stressor (Lazarus & Folkman, 1984). The outcome of these coping efforts and emotional regulation, depicted in the middle left of the model, is a reintegration of self and positive adaptation to the illness adversity (Richardson, 2002). This reintegration permits the individual to make modification for positive change as the individual experiences the positive consequences of resilience (Wister et al., 2016). These consequences include concepts such as wellness, recovery, balance, and personal development (Wister et al., 2016). In the Lifecourse Model of Multimorbidity Resilience, the reintegrated self may not resemble the original formation of self. This new configuration of self acknowledges that the individual may not have fully recovered from the adversity, but for the individual with a higher level of resilience, new strengths, new understanding, and a new conceptualization of functioning as a result of positive adaptation, will occur (Richardson, 2002). The new perspective, for example, may influence self-reported health ratings.

Lastly, depicted across the bottom of the model is a lifecourse timeline (Wister et al., 2016). This timeline suggests that past experiences with illness, the cumulative advantages or disadvantages associated with social determinants of health (O'Rand & Hamil-Luker, 2005), and the agency to effect change are embedded in the lifecourse (Wister et al., 2016). This "resilience trajectory is, therefore, the accumulation of previous lifecourse experiences and resources, coupled with nonmutable genetic and less mutable personality factors," (Wister et al., 2016, p. 303).

While the Lifecourse Model of Multimorbidity Resilience is presented cyclically, it is acknowledged that further disruption may interrupt the cyclical or unidirectional nature of the model (Wister et al., 2016). Further disruption may include an individual, because of increasing illness burden or additional adversity, remaining at a stage of the model, or reversing from one stage to a previous one (Wister et al., 2016). This idea of cascading crises (Sells et al., 2009) reflects the episodic nature of multimorbidity and resilience (Wister et al., 2016).

Statement of the Problem

For older adults, living with multimorbidity often represents a unique and powerful form of health adversity. This is because multimorbidity can compound the harmful effects of individual chronic conditions that contribute to symptom burden, decreased quality of life and functional ability, and is associated with increased cost and strain on the healthcare system (Galenkamp et al., 2011; Wister, Coatta, et al., 2016). The desire to optimize health and support successful aging among a growing population of older adults living with chronic conditions has contributed to increased research interest in how older adults manage multimorbidity and adapt to health adversity (Tkatch et al., 2017). This includes the role of resilience in shaping self-reported health among community-dwelling older adults and its role in contributing to the presence of the well-being paradox. Despite the described relationship between multimorbidity and self-reported health, the evidence is mixed regarding the association of other factors with self-reported health. Further, it is unknown whether these other factors shape self-reported health by impacting the relationship between multimorbidity and self-reported health, if their influence is independent of this relationship, and how they shape self-reported health. This multimethod research study addresses several key questions: 1) what are the factors shaping self-reported health; 2) what factors moderate or mediate the relationship between multimorbidity and self-reported health; 3) what are the key predictors of high self-reported health, and; 4) how do older adults describe the influence of these factors on shaping their perceptions of health.

Personal Statement of Disciplinary Orientation and Assumptions

In qualitative research, it is widely accepted that the researcher is the research instrument (Pezalla et al., 2012). This level of researcher involvement within the study, including in the design, the data generation, analysis, interpretation, and sharing of findings, presents the potential for researcher attributes, experiences, values, and beliefs to inform and influence the research process (Finlay, 2002). It is my belief that this is a strength of qualitative research and thus of this multimethod research study, as it is these very aspects of myself that both motivated me and sustained me as I navigated the design and completion of this research project.

As the lead researcher, I bring my experience and knowledge as a Registered Nurse with specialized knowledge in psychiatric and mental health nursing. As a nurse, I have garnered clinical expertise in adult psychiatry and have been credentialed as a Certified Psychiatric and Mental Health Nurse through the Canadian Nurses Association. In both point-of-care and leadership roles within my clinical practice, I have developed a passion for promoting mental health and wellness across the lifespan – especially for older adults. This includes a deep understanding of the role of the social determinants of health and the ways by which structures, including those present in health and social care, create vulnerabilities and inequities. Conducting research that was rooted in resilience among a population that is often viewed and treated from a deficits perspective stemmed from my desire to lead research, both now and in my future career, from a strengths-based position and directly reflects my clinical experience and personal positioning.

In addition to my clinical expertise, I also bring a wealth of knowledge from my work as a trainee in the Aging, Community and Health Research Unit (ACHRU) in McMaster University's School of Nursing. Within ACHRU, I assumed a number of roles and gained varied and valuable experience. This included serving as a co-investigator in large pragmatic trials and as the lead trainer for interdisciplinary intervention teams. This contributed important content knowledge specific to older adult populations, multimorbidity, and the community context relevant to this research. Additionally, it is through this work with ACHRU that I worked alongside several patient and public partners who helped further shape my understanding and solidify my appreciation for lived expertise in research and applied health.

Finally, my disciplinary orientation as a nurse and nurse scientist is a product of my personal experiences. As a daughter and a granddaughter, I bring a set of experiences that have undoubtedly influenced my practice, research, and writing. It is for this reason that I aim to contribute research and writing that reflects the diversity of the population studied with fairness, justice, and equity in the forefront.

Study Purpose and Research Process

Through the operationalization of each of the terms described above, several important research gaps and opportunities were highlighted. Informed by the Lifecourse Model of Multimorbidity Resilience (Wister et al, 2016), the objective of this multimethod research study was to advance understanding of self-reported health among community-dwelling older adults. To this end, four research studies were conducted. The first project was the completion of a scoping review of the factors associated with self-reported health among community-dwelling older adults. The second project was a cross-sectional analysis of baseline data from the Canadian Longitudinal Study on Aging to understand the relationship between multimorbidity and self-reported health and the factors that predict high self-reported health. The third project was a qualitative case study to explore the perceptions of community-dwelling older adults regarding the influence of individual, social, and environmental factors on self-reported health, including multimorbidity resilience. The findings from these studies were then combined in a fourth study using a multimethod matrix analysis to advance understanding beyond what was available individually from each previous study component.

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CHAPTER TWO

Title: What Factors Shape Self-Reported Health among Community-Dwelling Older Adults? A Scoping Review

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Abstract

Self-reported health is a predictive measure of morbidity and mortality across populations. A comprehensive understanding of the factors that shape self-reported health among community-dwelling older adults, a growing population globally, is lacking. The aim of this review was to summarize the factors that are associated with self-reported health among this population and identify key areas for future research. Accordingly, we conducted a scoping review using the stage-wise framework developed by Arksey and O'Malley. We summarized 42 factors, as identified in 30 publications, and organized them into four categories. Key factors shaping self-reported health included the presence of chronic conditions and depressive symptoms. As the population of community-dwelling older adults continues to increase, there remains a need to understand how these identified factors shape self-reported health. To date, empirical research has been limited to observational and cross-sectional designs. There is a need to further explore these factors in longitudinal data.

Key words:

Aging; Self-reported health; Multimorbidity; Depressive symptoms; Older adults; Community-dwelling

Introduction

Global population aging has resulted in a prioritization of healthy aging policy, programming, and service provision for older adults. It is projected that by the year 2050, one in four people will be over the age of 60 years (World Health Organization [WHO], 2018). Parallel to this demographic shift is a healthcare system shift that is emphasizing aging-in-place – a strategy aimed at keeping individuals in their homes and communities longer. In order to best support these community-dwelling older adults, however, there is a need to fully understand how they understand and define health.

Self-reported health, also described as self-rated health or self-assessed health, is an individual appraisal of health status based upon individual perspectives (Banerjee, Perry, Tran, & Arafat, 2010). Self-reported health is a widely used measure in both health and epidemiological research as it has been found to be a highly predictive measure of both morbidity and mortality and is typically inexpensive to administer (Banerjee et al., 2010; Idler & Benyamini, 1997). Within older adult populations, various factors, including economic status, sex, participation in physical activities, and the presence of certain chronic conditions, have been found to be associated with self-reported health (Vuorisalmi, Lintonen, & Jylhä, 2005; Dowd & Zajacova, 2007). However, despite this broad evidence base, there has not been a review that has synthesized these wide-ranging factors among community-dwelling older adults. As self-reported health is a widely used measure to assess health status, there is a need to understand the current state of the literature and the opportunities for future study on this topic – especially as it concerns a growing population that is aging in place.

Purpose

Addressing these gaps in the literature, the scoping review serves as a form of knowledge synthesis that maps key concepts, evidence types, and knowledge gaps in research related to a specific and defined area (Colquhoun et al., 2014; Levac, Colquhoun, & O'Brien, 2010). The scoping review provides a broad overview of the literature through systematic searching and synthesis of existing evidence (Colquhoun et al., 2014). The scoping review methodology was selected for this study as it will provide an opportunity to summarize the evidence, identify research gaps, and make recommendations for future research related to factors associated with self-reported health among community-dwelling older adult populations and how these factors influence it. The aims of this review were to: 1) systematically scope the literature related to factors that are associated with self-reported health among community-dwelling older adults; 2) identify key areas for future research.

Methods

This scoping review followed the stage-wise framework developed by Arksey and O'Malley (2005). This included: 1) identifying the research question; 2) identifying relevant studies; 3) selecting studies for review; 4) charting the data; and 5) collating, summarizing, and reporting the results. The findings of this review are reported in accordance with the PRISMA-ScR guidelines (Tricco et al., 2018).

Identifying the Research Question

To meet the objectives of this review, two exploratory research questions were developed: 1) What factors are associated with self-reported health among community-dwelling older adults? and; 2) What opportunities for future research exist, including other methodologies or designs?

For this review, community-dwelling older adults are those older adults, aged 60 and over, who reside in any setting, exclusive of institutional (e.g., long-term care home) or hospital settings. These settings may include retirement living or transitional care facilities.

Identifying Relevant Studies

Information Sources

Relevant peer-reviewed studies were identified through a comprehensive search of the literature. This search included the following electronic databases: MEDLINE, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Web of Science, and AgeLine. Reference lists of all included articles were hand searched for relevant articles not identified through database searching.

Search Strategy

The search strategy and search terms were developed in consultation with a health sciences librarian. Search terms included: “older adult*” OR “senior” OR “elder*” and “self-report*” OR “self-rate*” OR “subjective health.” The search was conducted using combinations and synonyms of the core concept keywords, including: “older adult” and “self-reported health.” The search was restricted to include only those articles published in the English language and publications between the years of 1975 and 2019.

Study Selection

Titles and abstracts of all articles retrieved were screened for relevance by two independent reviewers. Research articles were selected for review if the study pertained to: 1) a sample of community-dwelling adults aged 60 years and older, and 2) studied self-reported health as an exposure or a measure. Articles were excluded from the review if the study: 1) did not study self-reported health as an exposure or a measure; 2) did not pertain to a community-dwelling population of older adults, 3) was unclear regarding the population studied, and; 4) was not written in English language. For example, a study was excluded if it did not analyze self-reported health for association with other factor(s), or if the study included a population of adults aged 18 and older with no separate analysis of an older adult sub-group. Despite the literature commonly defining older adults as those aged 65 years and older, this review included a less restrictive age range (i.e. adults 60 and older) so as to include some key longitudinal studies on the topic. Full-text copies of relevant articles were retrieved according to study selection criteria.

Charting the Data

Data from articles that met the inclusion criteria were extracted using a standardized data abstraction form created in Microsoft Excel. Data abstracted included: author, year published, country, study aims, age range of the study participants, design and methods, definition of self-reported health, and key findings. Key findings included those factors (variables) associated with self-reported health, the nature of the association observed (e.g., was the factor associated with an increase or decrease in self-reported health), and any factors that were assessed but found to not have a statistically significant association with self-reported health. Key findings and themes from the extracted articles were identified through numeric summary and qualitative thematic analysis.

Collating, Summarizing, and Reporting the Results

From the database searches, 431 articles were identified. Two stages of independent screening were used to identify articles that met study inclusion criteria (see Figure 1 for PRISMA-style study search procedure). An additional 22 articles were identified through hand-searching reference lists of full-text articles. After removing duplicates, 339 titles and abstracts were read and screened for relevance, resulting in 88 papers eligible for full-text review. These articles were read in full and examined for their eligibility for inclusion. Following full-text review of the 88 articles, 30 articles were deemed eligible and included in this scoping review.

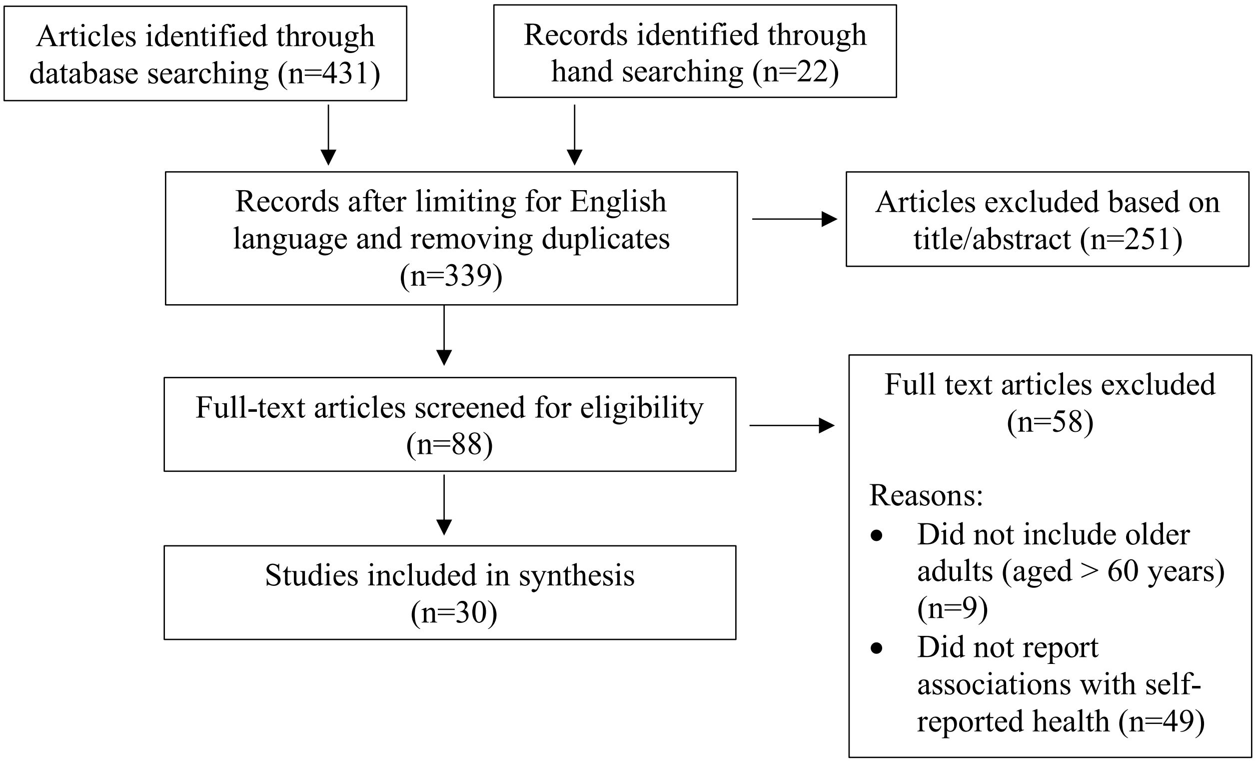

Figure 1. Study search procedure.

Findings

Geographic Locations

Fourteen studies were completed with North American populations (4 in Canada, 10 in the United States of America). The remaining studies were completed with populations from: Europe, including Germany (n=5), Albania (n=1), Finland (n=1), the Netherlands (n=1), Poland (n=1), Turkey (n=1), and Slovenia, Lithuania, and the United Kingdom (n=1); South America, including Brazil (n=2), Colombia (n=1); and Asia, including Japan (n=3), China (n=1), and Taiwan (n=1). See Table 1 for study characteristics including the design, objective, and population.

Table 1. Study characteristics.

Author (year), country	Design and objective	Population
Banerjee, Perry, Tran, & Arafat (2010), USA	Cross-sectional study; use of population-based survey data To determine the association of functional status, chronic disease, and civic participation with self-rated health	Older adults aged 60 years and greater (n=127)
Benyamini, Idler, Leventhal, & Leventhal (2000), USA	Cross-sectional study; use of questionnaire data To gain understanding related to the information that is included in older adults' judgement of self-rated health	Older adults living in a retirement community (n=851)
Beyer, Wolff, Warner, Shuz, & Wurm (2015), Germany	Longitudinal design; 2.5 year follow-up using face-to-face interviews and questionnaires To examine the relationship between self-perceptions of aging and self-rated health, and whether physical activity mediates this relationship in older adults with multimorbidity	Community-dwelling older adults aged 65-85 years with two or more chronic conditions (n=309)
Brenowitz et al. (2014), USA	Longitudinal design; follow-up over 8 years; population-based To evaluate longitudinal, bi-directional associations between self-rated health and performance-based physical function	Older adults aged 65-89 years (n=3610)
Cheng & Chan (2006), China	Cross-sectional study; use of representative questionnaire data To examine the determinants of self-rated health among Chinese older persons	Community-dwelling older adults aged 60 and older (n=1589)
Heller, Ahern, Pringle, & Brown (2008), USA	Longitudinal design; 1 year follow-up using questionnaires	Community-dwelling older adults aged 65 years and older (n=30,535)

Author (year), country	Design and objective	Population
	To examine the impact of changes in comorbidity on self-rated health	
Ho (2018), Taiwan	Cross-sectional study; use of population-based survey data To explore self-rated health among older, widowed adults	Older adults aged 65 years and older (n=2904)
Jerkovic, Sauliune, Sumskas, Birt, & Kersnik (2017), Slovenia, Lithuania, UK	Cross-sectional study; use of population-based survey data To identify factors associated with low self-rated health and investigate differences in urban areas in Slovenia, Lithuania, and United Kingdom	Urban older adults aged 65 years and older (n=2547)
Kara, B. (2017), Turkey	Cross-sectional study; use of client information form To explore the associations between poor self-rated health and participant characteristics glycemic control, perceived family support, and health-related quality of life in older adults with Type 2 Diabetes Mellitus.	Older adults aged 60 years and older with Type 2 Diabetes Mellitus attending a diabetes outpatient clinic (n=113)
Lau et al., (2018), Albania, Brazil, Colombia, and Canada	Cross-sectional study; use of questionnaire data from international study To examine whether resilience can correct the negative consequences of adverse childhood experiences	Older adults aged 65-74 years (n=1506)
Leibson et al. (1999), USA	Cross-sectional study; use of telephone interviews To test whether the association between self-rated physical health and clinically defined illness would differ for persons who do not have depression versus those who report minor or serious depressive disorder	Older adults with depressive symptoms (n=582)
Leinonen, Heikkinen, & Jylha (1999), Finland	Cross-sectional study; use of questionnaires and data collection interviews To examine the structure of self-rated health among a population over the age of 75 years	Older adults aged 75 years and older (n=382)

Author (year), country	Design and objective	Population
Nützel et al. (2014), Germany	Cross-sectional study; use of national survey data To identify factors associated with self-rated health in multimorbid older adults accessing primary care	Older adults aged 65 to 85 years with multimorbidity who were accessing primary care (n=3,189)
Perruccio, Katz, & Losina (2012), USA	Cross-sectional study; use of 3-year questionnaire data To investigate whether medical comorbidity effects are mediated through other health domains and whether these domains have independent effects on self-rated health.	Older adults aged 65 and older receiving Medicare following total hip replacement (n=958)
Pinto, Fontaine, & Neri (2016), Brazil	Cross-sectional study; use of population-based survey data To identify the influence of self-rated health as a mediator between physical/mental health and life satisfaction	Older adults aged 65 years and older (n=2164)
Puts et al. (2013), Canada	Prospective, longitudinal design; follow-up face-to-face and telephone interviews conducted at baseline, 1.5, 3, 6, and 12 months To determine the association between self-rated health and functional status, comorbidity, toxicity, and mortality in those older adults newly diagnosed with cancer	Older adults aged 65 years and older, newly diagnosed with cancer (n=112)
Reyes-Gibby, Aday, & Cleeland (2001), USA	Cross-sectional study; use of population-based household survey data To examine the impact of pain on self-rated health	Older adults aged 70 years and older (n=8222)
Saito, Wakui, & Kai (2016), Japan	Cross-sectional study; use of questionnaire data To examine the impact of serious spousal illness on the self-rated health of older adults	Community-dwelling, married older adults aged 65 years and older (n=1573)
Schuz, Wurm, Schollgen, & Tesch-Romer (2011), Germany	Cross-sectional study; use of national, representative survey data	Older adults aged 65 years and over (n=1174)

Author (year), country	Design and objective	Population
	To determine whether predictors of self-rated health vary according to physical health status	
Segerstrom (2014), USA	Longitudinal design; 6 month wave follow-up over 5 years To test the context of dynamic change between chronological age, disease status, positive and negative affect with self-reported health	Community-dwelling older adults aged 75 years and older who were married (n=150)
Spuling, Wolff, & Wurm (2017), Germany	Cross-sectional study; use of national cohort-sequential survey data To investigate response shift in self-rated health among older adults following a serious health event	Older adults aged 65 years and older (n=1764)
Sun et al. (2007), Japan	Cross-sectional study; use of questionnaire data To investigate and identify the factors associated with self-reported health	Older adults aged 65 years and older who live alone (n=4465)
Terner, Reason, McKeag, Tipper, & Webster (2011), Canada	Cross-sectional study; use of large, primary care survey data To assess whether health status is more impacted by age or number of chronic conditions	Older adults aged 65 years and older (n=3132) separated into "young" seniors (aged 65-74), "middle" seniors (aged 75-84), and "old" seniors (aged 85 years and over)
Tobiasz-Adamcyzk & Zawisza (2017), Poland	Cross-sectional study; data collection via face-to-face data collection To assess the differences between the role of rural or urban social capital and its effect on self-rated health among older Polish people	Older adults aged 65 years and older (n=1299)
Vos et al. (2013), Netherlands	Cross-sectional study; use of health interview data from a large, national primary care survey	Older women (n=315) aged 70-74 years from a large survey

Author (year), country	Design and objective	Population
	To study the relationship between the number of chronic diseases and self-rated health and to explore possible combinations of chronic conditions on self-rated health among older women	
White, Philogene, Fine, & Sinha (2009), USA	Cross-sectional study; use of large, national survey data To determine if lower social support was associated with poorer general health status	Older adults aged 60 years and older (n=3476)
Wurm, Warner, Ziegelmann, Wolff, & Schuz (2013), Germany	Longitudinal study; two measurement points over six months To examine whether negative self-perceptions of aging impair self-regulation strategies, and thus, impact subjective health status	Older adults aged 65 years and older with multiple chronic conditions (n=309)
Yoshimitsu et al. (2017), Japan	Cross-sectional study; face-to-face data collection To investigate the factors that influence self-rated health of older adults who live alone	Older adults aged 65 years and older, living alone for >1 year (n=113)
Zhang & Jang (2017), USA	Cross-sectional study; use of national representative survey data To examine the ways in which internal locus of control is associated with self-reported health	Older adults; range in age from 60 to 84 years (n=1533)
Zunzunegui et al. (2004), Canada	Cross-sectional study; use of two neighbourhood survey data To evaluate the associations between older persons' health status and their social networks and integration	French-speaking population aged 65 years and older (n=3018)

Types of Evidence

This scoping review included cross-sectional surveys (n=24) and longitudinal designs (n=6). There was no difference between the studies that used a cross-sectional design and those that used a longitudinal design with respect to the factors associated with self-reported health.

Description of Population

Included studies were diverse in the populations studied (see Table 1). Characteristics of the study population included: the presence of multiple chronic conditions (n=3); living alone (n=2); being married (n=2). Several of the studies also had specific parameters for age ranges within the older adult population. These parameters of included studies included those: greater than aged 60 years (n=4); greater than 65 years (n=14); those 75 years or greater (n=2); as well as a handful of studies that further segmented the population (e.g., those aged 65-74 years or 60-84 years). One of the included studies included only a population of women while the other studies included both men and women.

Measuring Self-Reported Health

Among included studies, self-reported health, also described as *self-rated health* or *subjective health*, was measured in different ways (see Table 2 for measures of self-reported health). This included measurement on a 5-point Likert scale (n=22) with most studies including anchors of “excellent” to “poor” (n=11), “very good” to “very bad” (n=10), or “very healthy” to “unhealthy” (n=2), while others used 4-point scales (n=3). Two of the studies included did not describe the way that self-reported health was measured. Further, some of the included studies, for analytical purposes, used a collapsed self-reported health measure that converted the original 5- or 4-point scales to dichotomous measures (n=5) or trichotomous measures (n=2). This meant that in some studies, “positive” or “good” self-reported health included original anchors of excellent, very good, and good, while “negative” or “low” health included anchors such as fair or poor health.

Measure of self-reported health	n	Citation
Five-point Likert scale (Excellent, very good, good, fair, poor)	11	Benyamini et al., (2000); Brenowitz et al., (2014); Cheng & Chan (2006); Heller et al., (2009); Ho (2018); Perruccio et al., (2012); Reyes-Gibby et al., (2001); Segerstorm (2014); Vos et al., (2013); White et al., (2009); Zhang & Jang (2017)
Five-point Likert scale **(**Very good to very bad)	10	Beyer et al., (2014); Jerkovic et al., (2017); Lau et al., (2018); Pinto et al., (2016); Puts et al., (2013); Schuz et al., (2011); Spuling et al., (2017); Tobiasz-Adamczyk & Zawisza (2017); Wurm et al., (2013); Zunzunegui et al., (2004)
Five-point Likert scale (Very healthy, healthy, average, somewhat unhealthy, unhealthy; Good to poor)	2	Leibson et al., (1999); Saito et al., (2016)
Four-point Likert scale (Unusually good, good, not so good, extremely bad; Excellent, good, fair, poor; Very good, good, fair, poor)	3	Kara (2017); Leinonen et al., (1999); Sun et al., (2007)
Dichotomous measure (Good versus not good; Positive versus negative; High versus low)	5	Banerjee et al., (2010); Jerkovic et al., (2017); Sun et al., (2007); Vos et al., (2013); Zunzunegui et al., (2004)
Trichotomous measure (Poor/fair, good/very good, excellent; Healthy, average, unhealthy)	2	Ho (2018); White et al., (2009)
Visual Analogous Scale (0 – 100 rating with the higher number being better)	1	Nützel et al. (2014)
No description/not applicable	2	Terner et al., (2011); Yoshimitsu et al., (2017)

Table 2. Measures of self-reported health.

Factors Associated with Self-Reported Health

A total of 42 factors were identified as associated with self-reported health among community-dwelling older adults. The majority of these factors were measured using self-report (e.g., report on nutritional intake). These broad factors are grouped under the following four categories sociodemographic; physical and psychiatric health; health-related behaviour; and emotional factors (see Table 3 for a full description of the factors).

Sociodemographic Factors

Six sociodemographic factors were identified as associated with self-reported health among this population. With consistency, a higher level of education (n=8); a higher economic status (n=6); and White race (n=2) were associated with higher self-reported health. There were also several sociodemographic factors that were reported in some studies to be associated with higher ratings of self-reported health (+), while in others were found to be associated with lower ratings of self-reported health (–). These factors included: older age (+ n=1; – n=6), younger age (+ n=1); identifying with the female sex (+ n=2; – n=5); and living alone because of divorce (– n=1), being widowed (– n=1), or being single (+ n=2).

Physical and Psychiatric Health Factors

Many of the included studies focused on the association between single chronic conditions or a combination of chronic conditions with self-reported health. A higher number of chronic conditions (n=18) and declining functional status (n=8) were consistently associated with lower levels of self-reported health. In addition, it was found that not just the number of chronic conditions, but also the presence of specific conditions consistently were associated with lower self-reported health. These conditions included: a higher number of depressive symptoms (n=10), diabetes (n=3), arthritis (n=3), hypertension (n=2), and stroke (n=2). Other physical or

Table 3. Factors associated with self-reported health.

Factor	Association	Value	n	Citation
SOCIODEMOGRAPHIC FACTORS				
Age	Inconsistent	Age, older (+)	1	Yoshimitsu et al. (2017)
		Age, younger (+)	1	Zhang & Jang (2017)
		Age, older (-)	6	Benyamini et al., (2000); Ho (2018); Nützel et al. (2014); Perruccio et al., (2012); Segerstrom (2014)*; Spuling et al., (2017)
		Age, older (x)	2	Beyer et al., (2015)*; Zuzunegui et al., (2014)
Economic status	Mostly consistent	Economic status, higher (+)	6	Ho (2018); Kara (2017); Lau et al., (2018); Nützel et al. (2014); Perruccio et al., (2012); Zunsunegui et al. (2004)
		Economic status, lower (x)	1	Cheng & Chan, 2006
Education	Mostly consistent	Education, higher level (+)	8	Banerjee et al., (2010); Ho (2018); Jerkovic et al. (2017); Perruccio et al., (2012); Reyes-Gibby et al., (2001); Tobiasz-Adamcyzk & Zawisza (2017); Zhang & Jang (2017); Zunzunegui et al. (2004)
		Education, lower level (x)	1	Beyer et al., (2015)*
Race	Consistent	Race, White (+)	2	Reyes-Gibby et al., (2001); Zhang & Jang (2017)
Marital status	Inconsistent	Marital status, single (+)	2	Heller et al., (2008)*; Jerkovic et al. (2017)
		Marital status, divorced (-)	1	White et al., (2009)
		Marital status, widowed (-)	1	Ho (2018)
Sex	Inconsistent	Sex, female (+)	2	Sun et al. (2007); Zunzunegui et al. (2004)
		Sex, female (-)	5	Banerjee et al., (2010); Jerkovic et al. (2017); Kara (2017); Lau et al., (2018); Schuz et al., (2011);
		Sex, female (x)	2	Beyer et al., (2015)*; Jerkovic et al., (2017)

Factor	Association	Value	n	Citation
PHYSICAL AND PSYCHIATRIC HEALTH FACTORS				
Activities of daily living	Consistent	Activities of daily living, inability to perform (-)	4	Leinonen et al., (1999); Reyes-Gibby et al., (2001); Sun et al. (2007); Zunzunegui et al. (2004)
Body mass index	Inconsistent	Body mass index, higher (-)	1	Nützel et al. (2014)
		Body mass index, higher (x)	1	Kara (2017)
Number of chronic conditions	Consistent	Chronic conditions, higher number (-)	18	Benyamini et al., (2000); Beyer et al., (2015)*; Cheng & Chan (2006); Heller et al., (2008)*; Jerkovic et al. (2017); Kara (2017); Leinonen et al., (1999); Perruccio et al., (2012); Puts et al. (2013)*; Reyes-Gibby et al., (2001); Schuz et al., (2011); Segerstrom (2014)*; Sun et al. (2007); Terner et al. (2011); Tobiasz-Adamcyzk & Zawisza (2017); Vos et al. (2013); Yoshimitsu et al. (2017); Zhang & Jang (2017)
Presence of a chronic condition	Consistent	Chronic conditions, presence of arthritis (-)	3	Banerjee et al., (2010); Ho (2018); Perruccio et al., (2012)
		Chronic conditions, presence of asthma (-)	1	Ho (2018)
		Chronic conditions, higher number of depressive symptoms (-)	10	Lau et al., (2018); Leibson et al. (1999); Leinonen et al., (1999); Nützel et al. (2014); Perruccio et al., (2012); Reyes-Gibby et al., (2001); Schuz et al., (2011); Sun et al. (2007); Vos et al. (2013); Zunzunegui et al. (2004)
		Chronic conditions, presence of diabetes (-)	3	Banerjee et al., (2010); Ho (2018); Reyes-Gibby et al., (2001)
		Chronic conditions, presence of heart condition (-)	1	Ho (2018)
		Chronic conditions, presence of hyperlipidemia (-)	1	Ho (2018)

Factor	Association	Value	n	Citation
		Chronic conditions, presence of hypertension (-)	2	Banerjee et al., (2010); Ho (2018)
		Chronic conditions, presence of kidney disease (-)	1	Ho (2018)
		Chronic conditions, presence of mental illness (-)	2	Jerkovic et al. (2017); Nützel et al. (2014)
		Chronic conditions, presence of migraine (-)	1	Vos et al. (2013)
		Chronic conditions, presence of severe back pain (-)	1	Vos et al. (2013)
		Chronic conditions, stroke (-)	2	Ho (2018); Reyes-Gibby et al., (2001)
Cognitive capacity	Consistent	Cognitive capacity, greater (+)	1	Leinonen et al., (1999)
Falls	Consistent	Falls, decreased risk (+)	1	Sun et al. (2007)
Functional status	Consistent	Functional status, physical, lower (-)	8	Banerjee et al., (2010); Benyamini et al., (2000); Brenowitz et al. (2014)*; Jerkovic et al. (2017); Lau et al., (2018); Reyes-Gibby et al., (2001); Schuz et al., (2011); Zhang & Jang (2017)
HbA1C	No relationship	Hemoglobin A1C level, higher (x)	1	Kara (2017)
Hospital visits	Consistent	Hospital/primary care visits, higher frequency (-)	2	Reyes-Gibby et al., (2001); Yoshimitsu et al. (2017)
Medication use	Consistent	Medication use, increased (-)	1	Benyamini et al., (2000)
Mobility	Consistent	Mobility, decreased (-)	1	Cheng & Chan (2006)
Nutrition	No relationship	Nutrition, low (x)	2	Cheng & Chan (2016); Jerkovic et al. (2017)
Pain	Consistent	Pain, presence of (-)	2	Nützel et al. (2014); Reyes-Gibby et al., (2001)
Physical health	Consistent	Physical health, decreased (-)	1	Perruccio et al., (2012)

Factor	Association	Value	n	Citation
Serious health event	Consistent	Serious health event, presence of (-)	2	Spuling et al., (2017); Wurm et al., (2013)*
Sleep quality	Consistent	Sleep quality, lower (-)	1	Cheng & Chan (2006)
Spousal illness	Consistent	Spousal illness, presence of (-)	1	Saito et al., (2016)
Vision	Consistent	Vision, high acuity (+)	1	Sun et al., 2007
Waist circumference	No relationship	Waist circumference, higher (x)	1	Kara (2017)
Weight loss	Consistent	Weight loss, presence of (-)	2	Benyamini et al., (2000); Sun et al. (2007)
HEALTH-RELATED BEHAVIOURAL FACTORS				
Exercise	Mostly consistent	Exercise, regular (-)	4	Benyamini et al., (2000); Beyer et al. (2015)*; Jerkovic et al. (2017); Zunzunegui et al. (2004)
		Exercise, regular (x)	1	Jerkovic et al. (2017); Schuz et al. (2011)
Religion	No relationship	Religious/faith affiliation, absence of (x)	1	Banerjee et al. (2010)
Smoking	No relationship	Smoking status (x)	2	Jerkovic et al. (2017); Schuz et al. (2011)
Social integration	Consistent	Social integration/participation, presence of (+)	7	Banerjee et al., (2010); Benyamini et al., (2000); Perruccio et al., (2012); Sun et al., (2007); Tobiasz-Adamcyzk & Zawisza (2017); White et al., (2009); Zunzunegui et al. (2004)
Social mobility	Consistent	Social mobility, presence of (+)	1	Sun et al., (2007)
Social networks	Consistent	Social networks, engaging with (+)	5	Kara (2017); Nützel et al. (2014); White et al., (2009); Yoshimitsu et al. (2017); Zunzunegui et al. (2004)
Volunteerism	Consistent	Volunteerism, not participating in (-)	1	Banerjee et al., (2010)

Factor	Association	Value	n	Citation
EMOTIONAL FACTORS				
Affect	Consistent	Affect, positive (+)	4	Benyamini et al., (2000); Cheng & Chan (2006); Schuz et al., (2011); Segerstrom (2014)*
Coping	Consistent	Coping, difficulty with (-)	1	Banerjee et al., (2010)
Emotional support	Consistent	Emotional support, presence of (+)	3	Kara (2017); White et al., (2009); Yoshimitsu et al. (2017)
Health related control beliefs	Consistent	Health related control beliefs, presence of (+)	2	Nützel et al. (2014); Schuz et al., (2011)
Internal health locus of control	Consistent	Internal health locus of control, high (+)	2	Zhang & Jang (2017); Zunzunegui et al. (2004)
Life satisfaction	Consistent	Life satisfaction, presence of (+)	1	Pinto et al., (2016)
Loneliness	Consistent	Loneliness, absence of (+)	2	Tobiasz-Adamcyzk & Zawisza (2017); Zunzunegui et al. (2004)
Self-perceptions of aging	Consistent	Self-perceptions of aging, increased (+)	2	Beyer et al. (2015)*; Wurm et al. (2013)*
Resiliency	Consistent	Resiliency, presence of high (+)	1	Lau et al., (2018)

Notes:
\+ *associated with a higher self-reported health rating*
– *associated with a lower self-reported health rating*
x *no statistical significance with self-reported health rating*
* *longitudinal study design*

psychiatric health factors, consistently found to be associated with lower levels of self-reported health, included: an inability to perform activities of daily living (n=4), the presence of a serious health event (n=2), higher number of hospital or primary care visits (n=2), weight loss (n=2), and the presence of pain (n=2).

Health-related Behaviour Factors

This third category of factors associated with self-rated health refers to those that describe health-related behaviours. These factors include those that relate to routines and habits (e.g., lifestyle, social determinants of health) (Riediger, Bombak, & Mudryj, 2019). Seven health-related behaviour factors were identified. Consistently, engaging in regular exercise (n=4), reporting social integration or participation (n=7), and engaging with social networks (n=5) were associated with higher levels of self-reported health.

Emotional Factors

This fourth and final category encompasses those factors related to emotional processes, personality, and context. Nine emotional factors were identified and were all consistently associated with higher levels of self-reported health: positive affect (n=4), the presence of emotional support (n=3), the presence of health related control beliefs (n=2), a high internal health locus of control (n=2), absence of loneliness (n=2), and increased positive perceptions of aging (n=2).

Factors Not Associated with Self-Reported Health

In addition to synthesizing those factors that were found to be associated with self-reported health, factors that were reported to not have a statistically significant association were also identified from those studies that reported these findings. These factors, found to have no relationship with self-reported health, included: HbA1c level (n=1); nutrition (n=2); waist circumference (n=1); faith affiliation (n=1); and smoking status (n=2).

Summary of Findings

This review identified 42 individual factors encompassing sociodemographic, physical and psychiatric health, health-related behaviour, and emotional factors that were associated with self-reported health among community-dwelling older adults.

The factors associated with self-reported health that were most frequently cited (i.e., greatest number) across the included studies were: age, level of education, the number of chronic conditions present, the presence of depressive symptoms, functional status, and the presence of social participation. This descriptive review contributes new understanding related to the state of the knowledge on the factors associated with self-reported health.

Discussion

The purpose of this scoping review was to summarize the factors associated with self-reported health among community-dwelling older adults, identify gaps in this literature base, and make recommendations for future research. Each of these three points will be further discussed.

Key Factors Associated with Self-Reported Health

In this scoping review, 30 publications were identified and 42 individual factors associated with self-reported health among community-dwelling older adults were summarized. While the review has highlighted a broad range of factors associated with self-reported health, it has also highlighted inconsistencies across studies. It is because of these inconsistencies that further research is required.

Of these broad factors, the number of chronic conditions reported (n=18) and the presence of depressive symptoms (n=10) were the two factors that were most commonly identified as being associated with self-reported health in included studies. However, while the direction of the association of these factors with self-reported health is known, causality cannot be claimed. This is because of the study design (e.g., observational, cross-sectional), and that few studies have explored the mechanism that links these factors with self-reported health.

Multimorbidity, Self-Reported Health, and Community-Dwelling Older Adults

Multimorbidity, defined as the presence of two or more chronic conditions, is increasingly prevalent among older adults (Markle-Reid et al., 2018; Boyd & Fortin, 2010). As the population continues to age and life expectancy subsequently rises, as a result of increasing multimorbidity, health service use demand has also increased (Canadian Institute for Health Information [CIHI], 2011; WHO, 2018). Until recently, single conditions were often studied in isolation. Following the recognition that older adults frequently experience chronic conditions in combination with one another, research on chronic conditions has refocused on multimorbidity to better understand the combined and cumulative effects of multiple chronic conditions (Wister et al., 2016). However, despite upwards of 30% of older adults reporting the presence of multimorbidity (CIHI, 2011), and the presence of chronic conditions appearing as a factor associated with self-rated health in over half of the studies included in this review, there remains a need to understand how chronic conditions, and more specifically, how the presence of multimorbidity influences self-reported health among older adults.

For example, multimorbidity was studied for its influence on self-reported health among older women in a study by Vos et al. (2013). In this study, combinations of the most common chronic conditions, including arthritis, hypertension, diabetes, depression, and chronic pain were studied for their impact on self-reported health. Consistent with other studies in this review, this study found that ratings of low self-reported health were associated with older women with a greater number of chronic conditions (Vos et al., 2013). In addition, this study by Vos et al. (2013) highlighted that all combinations of chronic conditions that were significantly associated with lower levels of self-reported health involved the presence of either chronic back pain or chronic headache. This finding highlights that, in addition to the presence of multimorbidity, underlying symptoms such as pain may be particularly important in understanding the connection between multimorbidity and self-reported health.

This scoping review has highlighted the need to understand how multimorbidity as well as other factors, such as advanced age, functional status, and social connectivity, shape self-reported health among community-dwelling older adults.

Depressive Symptoms, Multimorbidity, and Self-Reported Health

One of the most frequently identified factors associated with self-reported health in this review was the presence of depressive symptoms among older adults. While depressive symptoms and multimorbidity were both found to be independently associated with self-reported health, it is also understood that the risk for depressive symptoms is increased by the presence of multimorbidity (Wilson-Genderson, Heid, & Pruchno, 2017; Harpole et al., 2005). Moreover, the presence of both depressive symptoms and multimorbidity may have a synergistic impact (i.e., an effect that is greater than the sum of the individual effects) on self-reported health.

When considering the wide-reaching impact of depressive symptoms on somatization, social functioning, and activities of daily living (Bruce et al., 2002), for example, it becomes difficult to disentangle what factors are potentially impacting health, physical or psychiatric conditions, or both. Knowing that upwards of 40% of older adults report the presence of depressive symptoms (Bruce et al., 2002; Gallegos-Carrillo et al., 2009), and that depression is a frequently underdiagnosed and undertreated condition among this population (Bruce et al., 2002;

Markle-Reid et al., 2014), future research is warranted in order to explore the ways in which depressive symptoms shape self-reported health and/or interact with multimorbidity in shaping self-reported health, among older adults.

For example, in one study by Reyes-Gibby, Aday, and Cleeland (2001), older adults with depression were found to be twice as likely to report fair or poor self-reported health (73%) in comparison to those who did not report depression (31%). The association of depression and depressive symptoms to subjective health status, as highlighted in a meta-synthesis by Pinquart (2001), is likely related to: 1) an increased risk for depression because of increasing physical illness in older age; 2) the physical symptoms that depression may exacerbate or produce, such as lack of energy, which can worsen health status and, likely, health ratings; and 3) the presence of negative affect and negative evaluation of the self which is a cognitive symptom of depression.

Identified Gaps in Literature

Findings from this scoping review have highlighted that to date, the literature related to self-reported health has mostly been exploratory. This exploratory nature of the literature has resulted in a fragmentary understanding of how, or the process by which, the identified factors shape self-reported health.

Identified by Lau, Guerra, de Souza Barbosa, and Phillips (2018), high resiliency, as measured using the Wagnild Resilience Scale (Wagnild & Young, 1993), was associated with high levels of self-reported health. Resiliency, defined as a process of positive adaptation toward adversity, trauma, or stress (American Psychological Association, 2015) that draws upon dynamic personal characteristics (Masten, 2007), has been linked to successful aging (Stewart, Auais, & Bélanger, 2019). While there has been much study on resilience as an outcome measure, this study is one of the first of its kind to study resilience and its association with self-reported health among community-dwelling older adults (Lau, Guerra, de Souza Barbosa, & Phillips, 2018). This unique finding led Lau et al., (2018) to propose that resiliency may serve to increase the level of self-reported health (i.e., more positive self-reported health), and, in addition, may shape or be shaped by other factors that are fundamental to personal definitions of health.

Drawing upon the literature on resilience, a resilience index was developed by Wister et al., (2018). This resilience index maps functional (e.g., activities of daily living), psychological (e.g., depressive symptoms), and social variables (e.g., social support) to resiliency among older adults. The level of resilience, calculated using this index, and the individual variables that comprise this index, may serve to shape self-reported health among community-dwelling older adults as it was found that total resilience is associated with perceived health status (Wister et al., 2018).

There are further opportunities to explore the relationship between those factors described to be associated with both resilience as well as self-reported health. While only one study in this review identified resilience as an associated factor, several of the factors identified in other studies, from each of the four categories, are factors commonly associated with resilience. For example, these commonalities include sociodemographic factors such as: age (Laird et al., 2019; Gooding et al., 2011), economic status (Wells, 2010), education (Pietrzak & Cook, 2013), ethnicity (Laird et al., 2019), and sex (Hardy et al., 2004); physical and psychiatric health factors: ability to perform instrumental activities of daily living (Hardy et al., 2004), number of chronic conditions (Laird et al., 2019; Wells, 2010; Gooding et al., 2011), mental illness (Pietrzak & Cook, 2013; Wells, 2010; Gooding et al., 2011), including depressive symptoms (Laird et al., 2019; Hardy et al., 2004), cognitive capacity (Laird et al., 2019; Lamond et al., 2008), and physical health (Wells, 2010; Pietrzak & Cook, 2013); behavioural factors: social integration (Lamond et al., 2008; Pietrzak & Cook, 2013), and social networks (Wells, 2010; Fuller-Iglesias, Sellars, & Antonucci, 2008); and emotional factors: coping (Laird et al., 2019; Lamond et al., 2008), locus of control (Lamond et al., 2008), self-perceptions of aging (Lamond et al., 2008).

Beyond the identified associations, and considering the substantial development of the resilience literature and the alignment between factors associated with both resilience and self-reported health, there remains a gap in understanding related to how these factors may shape self-reported health and how this knowledge may in turn shape public policy or health and social interventions. With this knowledge there is the potential to improve health outcomes for this population.

Of the 42 factors identified in this scoping review, 20 of them were categorized as physical and psychiatric health condition factors. Considering this emphasis, and knowing that despite the challenges associated with multimorbidity and depressive symptoms among community-dwelling older adults, self-reported health is not always aligned with objective health status (CLSA, 2018; Wister et al., 2018), there is a need to understand what is considered when community-dwelling older adults define and describe their health and how resilience may shape this process.

Future Opportunities

Identified in this scoping review literature were a number of opportunities for future inquiry and research. These opportunities include the need to understand self-reported health within the context of: 1) resiliency; 2) multimorbidity, including; 3) what factors mediate and modify the relationship between multimorbidity and self-reported health, and; 4) more specifically, how depressive symptoms interact with multimorbidity and other factors to shape self-reported health among community-dwelling older adults. While there has been exploratory, statistical work over the last few decades, there remains a need to study the process and mechanism that drives how self-reported health is shaped by these factors using longitudinal data. This understanding, addressing current gaps in the literature, and framed by theory related to these concepts, could be used to develop effective interventions aimed at building resilience and maintaining high levels of self-reported health into older adulthood.

Limitations

As this review focused upon self-reported health as a health measure or exposure, it is possible that studies that referred to self-reported health simply as the health status of the individual were missed. While a health sciences librarian was consulted on the search strategy and the search terms remained iterative, it is possible that studies that described subjective health status may have been missed due to the key words used. In addition, because this review defined older adults as those 60 years or greater in age, studies with a younger, older adult population (e.g., those aged 55 years or greater) were excluded. It is possible that because of this definition, studies that included a younger population of older adults would have been excluded.

Warranting further study, this review is limited by the current state of the literature itself as it relates to the concept of resilience among this population. While only one study included in this review highlighted that resilience was associated with self-reported health, several of the factors identified, for example an ability to perform activities of daily living, functional status, or social participation, are those which are described to be related to and comprise measures of resilience (Wister, Lear, Schuurman, MacKey, Mitchell, Cosco, & Fyffe, 2018). There is a need to further explore this conceptual literature related to resilience and the ways in which it overlaps with self-reported health among community-dwelling older adults. In addition, there is a need for future research on this topic to study the relationships between additional factors absent in this evidence, such as immigration status or substance use.

Conclusion

In this scoping review, a body of research was identified that focused on factors associated with self-reported health among community-dwelling older adults. While the available literature provided a broad overview of sociodemographic, physical and psychiatric, health-related behaviour, and emotional factors that are associated with self-reported health, this review highlighted the need to further understand these factors in terms of how they shape self-reported health and the mechanism underlying the associations identified. As the population of older adults continues to increase, multimorbidity is becoming an important focus in health research. The results of this review emphasize a need to explain how multimorbidity shapes self-reported health, as well as the potential synergistic impacts of co-existing depressive symptoms. A better understanding of these issues will inform how best to support healthy aging and the factors that may contribute to health and wellness.

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CHAPTER THREE

Title: The Relationship between Multimorbidity and Self-Reported Health among Community-Dwelling Older Adults and the Factors that Shape this Relationship: A Mixed Methods Study Protocol using CLSA Baseline Data

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Abstract

Self-reported health is a common measure predictive of morbidity and mortality among adults. Many factors are known to be associated with self-reported health including the number of chronic conditions (i.e., multimorbidity). While the association between self-reported health and morbidity and mortality has been well-established, the factors that shape the relationship with self-reported health (e.g., modify and mediate) are poorly understood. Further, it is unknown why some older adults, despite having high numbers of chronic conditions, continue to rate their health positively. This is known as the well-being paradox. This mixed methods research study was designed to address these knowledge gaps. The objectives of the proposed research are to (1) determine what factors shape the relationship between multimorbidity and self-reported health and how they do so; (2) describe the ways that older adults define and perceive their individual health; and (3) explain the well-being paradox. Informed by a multimorbidity resilience framework, the quantitative component of research will analyze Canadian Longitudinal Study on Aging data while the qualitative component will collect and analyze interview data from 12 to 20 community-dwelling older adults using a case study design. Findings from this study have the potential to inform and advance future health intervention programs or services aimed at improving health-related quality of life for community-dwelling older adults.

Key words:

Case study; Mixed methods; Secondary data analysis; Cross-sectional

Introduction

Multimorbidity is defined as the co-occurrence of two or more chronic conditions and is recognized as a significant public health issue that negatively affects health-related quality of life and increases the use of costly health and social services – especially among older adults (Wister, Kendig, et al., 2016). The increasing prevalence and complexity of multimorbidity has resulted in a shift in focus of gerontological research away from single conditions toward the study of multimorbidity (Wister, Kendig et al., 2016).

Aligned with this shift, is an increasing interest in the ways that older adults respond to the health-related adversity associated with multimorbidity and how this influences their self-reported health (Wister et al., 2019; Whitmore et al., 2020; Lehti et al., 2021). Self-reported health is a subjective assessment of health based upon individual perceptions (Banerjee et al., 2010). Typically captured as a response to the question, "In general, would you say that your health is excellent, very good, good, fair, or poor?" self-reported health is a widely used and well-validated epidemiological health measure. This is because there is extensive evidence for self-reported health as a predictor of morbidity and mortality in adult populations (Banerjee et al., 2010; Idler & Benyamini, 1997), including older adults (Schüz et al., 2011; Benyamini et al., 2003; Vuorisalmi et al., 2005).

Disease counts are a common approach to defining multimorbidity (Johnston et al., 2018) and can include a broad spectrum of health conditions including risk factors and symptoms (Griffith et al., 2019; Johnston et al, 2018; Willadsen et al., 2016). Regardless of the health conditions included in the disease count, evidence suggests that as the number of conditions increase (i.e., as the level of multimorbidity increases) the level of self-reported health decreases, or becomes more negative (Schüz et al., 2011; Pinquart , 2001; Perruccio et al., 2012; Heller et al., 2008; Terner et al., 2011). While this relationship is well-established, little is known, however, about the role of other factors, such as demographic or other health variables, in shaping this relationship. Further, a subset of older adults with high levels of multimorbidity describe positive self-reported health. This apparent contradiction, the presence of wellness amidst illness, is termed the well-being paradox and pertains to those individuals who achieve and report positive levels of subjective health (e.g., self-reported health) despite having poorer health according to objective indicators (Rowe & Kahn, 1997; Wister, Coatta et al., 2016). The purpose of this paper is to describe a study protocol designed to address these knowledge gaps.

Background

First used in sociological health research, self-reported health is increasingly prevalent in medical and epidemiological research because it has been shown to be a strong predictor of morbidity and mortality and is simple to use (Mossey & Shapiro, 1982; Kaplan & Camacho, 1983). Broadly, self-reported health is conceptualized as a cognitive appraisal process examining individual perceptions of health, health and illness experiences, and future health expectations (Jylhä, 2009; Idler et al., 2004; Knäuper & Turner, 2003).

As adults age, the likelihood of developing chronic conditions and, in turn, multimorbidity, increases (Wister, Kendig, et al., 2016; Marengoni et al., 2011; Suls et al., 2019; Vertrano et al., 2018). The presence of multimorbidity among older adults is associated with poorer health-related quality of life, increased use of costly health and social services, increased caregiver burden, and an increased risk for adverse events (e.g., falls) – often necessitating more complex clinical care (Marengoni et al., 2011; Suls et al., 2019).

The rising prevalence of multimorbidity has resulted in increasing research emphasis on multimorbidity. Traditionally, successful aging was believed to be limited to the absence of disease and the presence of physical and cognitive capacity (Rowe & Kahn, 1987; Wister, Kendig et al., 2016). In recent years, however, this conceptualization has been challenged as there remains a sub-group of older adults with higher levels of self-reported health despite multimorbidity. Termed the well-being paradox, these individuals achieve higher self-reported health despite objective measures of high multimorbidity using biomedical indicators such as disease diagnoses or medications (Netuveli & Blane, 2008). This discrepancy between objective and subjective measures of health suggests that factors other than multimorbidity shape how community-dwelling older adults view their health.

Summary of Pilot Work

A diverse range of factors (e.g., sociodemographic, physical, psychiatric, health-related behaviour, emotional) associated with self-reported health among community-dwelling older adults have been identified in the literature (Whitmore et al., 2020). These include the number of chronic conditions, the ability to perform activities of daily living, the presence of depressive symptoms, and social participation (Whitmore et al., 2020). As reported in a recent scoping review by the authors, while the relationship between the number of chronic conditions (i.e., multimorbidity) and self-reported health is consistent, there remains a lack of consistency in the literature regarding the nature of the relationship between other factors (e.g., sex, age, body mass index) and self-reported health (Whitmore et al., 2020). Further, little is known about how these various factors shape or explain self-reported health among older adults. This includes a need to understand whether certain factors modify or mediate this relationship.

This scoping review also highlighted the opportunity to explore the relationship between resilience and self-reported health. This is due to the fact that many of the factors reported to be associated with self-reported health in the literature (e.g., social integration, coping, and locus of control), are the same factors that comprise common resilience measures (Whitmore et al., 2020). To our knowledge, only one study has reported resilience as a factor associated with higher levels of self-reported health among older adults. For this reason, there are compelling reasons to explore the role of resilience among other factors in shaping or explaining self-reported health. This understanding may help to explain why and how older adults self-reported their health positively despite the presence of multimorbidity (i.e., the well-being paradox).

Multimorbidity, Resilience, and Self-Reported Health

One explanation for this discrepancy between objective measures of health and the subjective experience of well-being may be the presence of multimorbidity resilience. Resilience has been defined as the ability of an individual to both navigate and negotiate psychological, social, cultural, and physical resources (Ungar, 2008) and to “bounce back” in the face of adversity, such as the adversity of multimorbidity (Windle, 2011; Windle et al., 2020). Multimorbidity resilience, which specifically refers to the ways that individuals regain wellness following illness draws upon coping strategies, available resources, and previous life experiences including those related to health and illness at both the individual and environmental level (Wister, Coatta, et al., 2016). Given the increasing prevalence of multimorbidity in older adult populations (Gijzel et al., 2019), the recent paradigmatic shift away from the idea that healthy aging occurs in the absence of illness, as well as the overlap of factors associated with self-reported health and resilience, the concept of resilience can enhance understanding of how individual, social, and environmental factors shape self-reported health in older adults with multimorbidity (Wister, Coatta et al., 2016).

Multimorbidity Resilience Framework

The Lifecourse Model of Multimorbidity Resilience (Wister, Coatta et al., 2016) was selected to guide this mixed methods research. Rooted in theoretical foundations that underlie resilience research, the Lifecourse Model of Multimorbidity Resilience broadly positions the individual at the centre of an interrelated social and environmental context (Wister, Coatta et al., 2016). While multimorbidity resilience is thought to be experienced at the level of the individual, this model posits that it is best understood within an individual's broad socioenvironmental landscape (Wister, Coatta et al., 2016). The three overlapping circles represent wellness, a concept that involves a full integration between the individual, social, and environmental systems of which the person exists (Wister, Coatta et al., 2016). Wellness in the context of this model is described as achieving meaningful engagement in life, opportunity to achieve potential, and is a core element of healthy aging.

The Lifecourse Model of Multimorbidity Resilience was selected as the conceptual framework for this proposed research because it is specific to an older adult population, describes resilience within the context of multimorbidity and health-related adversity, and recognizes the importance of the lifecourse in acquiring resources required to foster a higher level of resilience (Wister, Coatta et al., 2016). This model will be used to guide data collection, data analysis, and interpretation of the findings in both the quantitative and qualitative components of study.

Objective

The purpose of this mixed methodological study is to determine how individual, social, and environmental factors shape the relationship between multimorbidity and self-reported health. The study will also attempt to understand and explain the well-being paradox among community-dwelling older adults by exploring how older adults define and the factors that shape their health. A mixed-methods study design will be employed to address these objectives, including: 1) a secondary analysis of a large Canadian database (the Canadian Longitudinal Study on Aging [CLSA]), and 2) a qualitative case study to understand the way these community-dwelling older adults explain the influence of certain factors on their self-reported health. Following the Good Reporting of a Mixed Methods Study (GRAMMS) (O'Cathain et al., 2008) each component of the study will be described.

Method

Convergent Mixed Methods Research Design

Mixed methodological research uses both quantitative and qualitative research approaches in a single study (Creswell & Plano Clark, 2018). This methodology emphasizes the integration or linking of findings from both individual approaches (Creswell & Plano Clark, 2018; Tashakkori & Creswell, 2007). A convergent design will be used where both quantitative and qualitative data will be collected separately and then integrated. This integrated data will contribute to a richer understanding of the factors shaping the relationship between multimorbidity and self-reported health, advance understanding of the well-being paradox, and facilitate a range of study findings that explain one another in a way that each approach alone could not (Creswell & Plano Clark, 2018). This mixed methods approach ensures that the mechanisms by which these factors shape health as well as their described importance, among older adults can be explored. Further, in using a mixed methods approach, constructs identified in the resilience model but not captured in the chosen dataset, such as those that relate to previous life experience (e.g., experiences with illness), can be explored through qualitative analyses.

Specific research questions have been developed for each component of the study.

Quantitative Questions

1. What is the relationship between multimorbidity and self-reported health in community-dwelling older adults, and what factors are associated with this relationship?
2. What is the prevalence of the well-being paradox among community-dwelling older adults?
3. What are the characteristics of community-dwelling older adults with the well-being paradox, and what factors are associated with the well-being paradox in this population?

Qualitative Questions

4. How do community dwelling older adults define their health?
5. How do community-dwelling older adults explain how individual, social, and environmental factors shape their self-reported health?

Overarching Mixed Methodological Question

6. What is the relationship between multimorbidity, resilience, and self-reported health among community-dwelling older adults, and how does this understanding help to explain the well-being paradox?

Quantitative Component

Design

To address the quantitative research questions, a secondary analysis of CLSA data will be completed. The CLSA is a large, population-based, prospective longitudinal cohort study that is following over 50,000 adults aged 45 to 85 years at baseline (Raina et al., 2009). Designed as a 20-year longitudinal study, the CLSA collects comprehensive data to understand the maintenance of health and development of disease as people age (Raina et al., 2009). CLSA baseline data are separated into two groups: tracking participant data and comprehensive participant data. The tracking group (stratified random sample of 10 Canadian provinces), comprised of over 21,000 adults, complete a telephone questionnaire, while the comprehensive group (stratified random sample of individuals recruited in the surround geographical area of the 11 data collection sites), comprised of just over 30,000 adults, complete an in-home interview as well as a visit to a data collection site (Raina et al., 2019). Participants were excluded from CLSA if they resided in one of Canada's three territories, lived on a federal First Nations reserve, were full-time members of the Canadian Armed Forces, lived in an institutional setting, were not fluent in French or English, or had a cognitive impairment precluding them from providing informed consent or providing data on their own (Raina et al., 2009).

Sample. All community-dwelling older adults aged 65 years or older from the baseline tracking (version 3.4) and comprehensive (version 4.0) datasets will be included.

Data Collection. Use of the CLSA tracking and comprehensive databases provides the opportunity for robust analysis of individual, social, and environmental level factors that may shape the relationship between multimorbidity and self-reported health among the study population. Drawing upon the Lifecourse Model of Multimorbidity Resilience (Wister, Coatta et al., 2016), a validated multimorbidity resilience index (Wister et al., 2018), and a comprehensive scoping review of the literature (Whitmore et al., 2020), a broad range of variables available within the CLSA database will be examined. These variables include factors known to be associated with self-reported health, such as level of multimorbidity, sociodemographic factors (e.g., age, sex, gender, economic status, education); functional status; health behaviour (e.g., exercise, nutrition, activities of daily living); social engagement (e.g., social participation, social network, social support); and emotional wellbeing (e.g., life satisfaction, emotional distress, depressive symptoms) (Whitmore et al., 2020).

Variables of Interest. Based on a completed scoping review and the selected multimorbidity resilience framework, several variables available in CLSA will support the proposed quantitative analysis.

Demographics. These include sex, age, marital or partner status, race, education, economic status, and language spoken at home.

Health. Health variables will include self-reported health, depressive symptoms (Centre for Epidemiologic Studies Depression Scale – 10 item) activities and instrumental activities of daily living (ADL and IADL), Older Americans Resource Scale (OARS), various physical mobility measures, as well as social and environmental variables inclusive of social support availability, satisfaction with life, and the life space index.

In addition, a count of chronic conditions and a level of multimorbidity will be calculated. Using a list of highly prevalent chronic conditions (Fortin et al., 2017), the level of multimorbidity will be calculated using the number of self-reported chronic conditions available in the CLSA (see Supplementary File 1 for a full list of all variables of interest). Each of the chronic condition groups will count as one chronic condition (e.g., the presence of depression and diabetes counts as two conditions whereas the presence of two types of cancer and diabetes also counts as two conditions).

Multimorbidity Resilience. The level of multimorbidity resilience will be determined using the validated resilience index developed from CLSA data by Wister and colleagues (2018). This resilience index maps functional (e.g., activities of daily living), psychological (e.g., distress), and social variables (e.g., social support) to multimorbidity resilience (Wister et al., 2018) using health variables included in these analyses. A summative score, reflective of the functional, social, and psychosocial sub-domain scores, will provide an overall score of multimorbidity resilience with a higher score reflecting a higher level of resilience.

Variables of interest and the corresponding CLSA variable identification codes are provided in Supplementary File 1. Full descriptions of these variables and the data available in CLSA is described in the CLSA cohort profile (Raina et al., 2019) and in the paper by Wister et al., (2018).

Analysis

Data will be analyzed using SAS version 9.4.

Relationship between Self-Reported Health and Multimorbidity. To address the first research question, all community-dwelling adults aged 65 years and older in the CLSA baseline dataset (n=21,503) will be included in the analyses. Descriptive analyses will determine the relationship between differing levels of multimorbidity (0, 1, 2, 3, 4, 5, 6+ chronic conditions) and levels of self-reported health (excellent, very good, good, fair, poor). Consistent with the literature, it is hypothesized that the higher the level of multimorbidity, the more negative the level of self-reported health (Pinquart, 2001). Further stratified analyses of the relationship between multimorbidity and self-reported health will occur based on selected sub-group variables including factors known to be associated with self-reported health, such as sex, age, economic status, and resilience (Pinquart, 2001; Whitmore et al., 2020). This analysis will employ effect modification, interaction, and mediation analysis techniques (Corraini et al., 2017; Frazier et al., 2004), mediator pathway analysis, and logistic regression (Rijnhart et al., 2019) to determine the mechanism by which associated factors shape self-reported health, as well as determine independent predictors of self-reported health. Additionally, differences between men and women will be examined via sex disaggregated analyses.

Factors Shaping the Well-being Paradox. The second and third research questions will explore, in greater detail, the factors that can explain the well-being paradox. Older adults will be classified as exhibiting the well-being paradox if they have high levels of multimorbidity (4+ chronic conditions) and positive self-reported health (very good or excellent). This definition reflects both a higher-than-average response to both the number of chronic conditions for the sample as well as a number of chronic conditions that is likely to include individuals with chronic conditions that extend beyond those that are merely common and often asymptomatic (e.g., hypertension, obesity). Sensitivity analyses will be completed to test whether this operational definition of the well-being paradox is appropriate.

To answer the second research question, descriptive analysis will be completed to identify characteristics of those with the well-being paradox. This will include comparing older adults with the well-being paradox to those without the well-being paradox (i.e., those older adults with 4+ chronic conditions and negative self-reported health) using inferential statistics (i.e., independent t-tests or x^2 tests of independence). Bivariate analyses to identify candidate predictors of the well-being paradox (i.e., positive self-reported health and four or more chronic conditions) will be further explored in the third research question using logistic regression. In these analyses, the criterion for inclusion of any independent variable in the multiple regression model will be relaxed to $p=0.10$ to not eliminate potential associations early in the analysis. It is hypothesized that there are several individual, social, and environmental factors that shape (e.g., modify, mediate, interact with) the presence of the well-being paradox among the study population.

Qualitative Component

Design

An explanatory qualitative single case study design will build upon and inform interpretation of findings in the quantitative component of this research. Case study research aims to understand a phenomenon within its real-world context (Yin, 2014).

Case Under Study. The case or unit of analysis is the way in which community-dwelling older adults explain the influence of individual, social, and/or environmental factors on how they perceive their health. An understanding of this process will help to explain why some community-dwelling older adults with high levels of multimorbidity self-report their health positively (i.e., the well-being paradox).

Propositions. Propositions in a case study direct attention toward what requires further examination within the study, limit the scope of the research, and guide the project (Yin, 2014). Propositions have been developed using the completed scoping review (Whitmore et al., 2020), the existing literature, and the conceptual model.

Case Binding. The population under study is bound by the definitions of community-dwelling and older adults and is further bound by the operational definitions of self-reported health, multimorbidity, and well-being paradox. The study will include older adults living in Southwestern Ontario.

Sampling and Recruitment

Purposive sampling strategies for older adults will include criterion sampling as well as maximum variation sampling to obtain a sample of 12 to 20 older adults. Inclusion criteria include adults: 1) 65 years of age and older; 2) living in the community (e.g., not in long-term care or hospital); 3) and English speaking. Maximum variation sampling will be used to sample older adults with higher levels of multimorbidity via strategic recruitment through specifically selected recruitment sites as well as initial screening questions during participant intake.

Recruitment of community-dwelling older adults will involve both in-person and virtual strategies. Recruitment posters will be distributed at various community-based organizations such as local libraries, fitness facilities, and seniors' centres as well as other community-facing locations such as grocery stores and laundry mats. Virtual means of recruitment will involve use of existing email listservs and social media to share study recruitment information. In addition, study participants will be encouraged to share recruitment materials within their own social circles using snowball methods.

Data Collection

One-on-one telephone interviews will serve as the main data collection approach and will be completed by the first author. The interviews will be semi-structured, using pre-developed questions that are open-ended and flexible. Additional prompts and follow-up questions will be used as appropriate. Interview questions will address the broad range of concepts in the resilience model (Wister, Coatta et al., 2016) and literature. Demographic data as well as data related to self-reported health, multimorbidity, and depressive symptoms will be collected. To measure the level of self-reported health, the same question used in the CLSA will be asked of study participants. To measure the level of multimorbidity, a multimorbidity index, based on Fortin and colleague's (2017) work, aligned with the variables available in the CLSA database, will be used. This multimorbidity measure will be the same one used in the quantitative component of this proposed research. The level of depressive symptoms will be measured using the validated ten item Centre for Epidemiologic Studies Depression Scale (Andreson et al., 1994).

Researcher reflection notes will be written and analysed to add context and understanding to the qualitative data collected. These will be completed during the interview (e.g., emphasis on specific experiences or observations made during the interview) as well as after the completion of the interview. All interviews and documents (e.g., observation notes) will be transcribed verbatim or scanned and imported into NVivo v.12©.

Analysis

All data sources will be reviewed and analyzed together so that study findings are based upon data convergence and not merely conclusions from individual data sources (Yin, 2014). The qualitative data will be collected and analyzed concurrently to inform future interviews, the quantitative analysis, and the need for further sampling (Yin, 2014; Baxter & Jack, 2008). Data analysis will follow Yin's five iterative stages, including: compiling, disassembling, reassembling, interpreting, and concluding (Yin, 2014), and will be guided by Braun and Clarke's reflexive thematic analysis (Braun & Clarke, 2006). Quantitative data collected (e.g., demographic data, depressive symptoms score) in this case study component of the proposed research will be analyzed and serve as context for interpreting and understanding qualitative study findings.

Mixed Methods Analysis and Interpretation

An explanatory bidirectional approach will be used for data integration (Moseholm & Fetters, 2017). This approach uses an initially quantitative framed analysis, followed by a qualitatively framed analysis, with iterative and repeated feedback between components before reaching a final interpretation (Moseholm & Fetters, 2017). As such, the quantitative findings will inform the qualitative sample (e.g., participant characteristics for maximum variation sampling) and the semi-structured interview guide (e.g., probes for specific relationships identified in the quantitative findings). As qualitative data are collected, analyzed, and interpreted, this initial quantitative framing will then be reversed to inform quantitative analyses that may not have been explored initially.

Once all data have been collected and analyzed, the findings from both components will be integrated in a matrix analysis. The intent of convergent mixed methodological data integration is to develop interpretations of the data collected that expand understanding and confirm or disconfirm hypotheses and propositions. To this end, this research will compare findings from the quantitative and qualitative components using the following four steps: 1) look for common concepts across both sets of findings; 2) develop tables that organize the findings so that the comparisons are easily observed; 3) compare the results of the tables to determine the ways in which the findings confirm, disconfirm, or expand upon one another; and 4) advance interpretation of the ways in which the converging, diverging, and expanding evidence enhances understanding of the phenomenon under study (Creswell & Plano Clarke, 2018). Following this comparison, integrated findings will be presented in a narrative discussion. This discussion will offer an interpretation of how the data answers the mixed methodological research question identified.

Rigour

Guided by Dellinger and Leech's (2007) validation framework, the rigour of this convergent mixed methods research study will be reflected in the methodological decisions and considerations made in each component.

Quantitative Validity

Data collected and made available by CLSA is held to rigorous standards (Raina et al., 2019). Validated instruments, where available, and standardized processes are utilized. Where validated instruments or definitions do not exist (e.g., operationalizing the well-being paradox), a critical review of the literature and consultation with experts will be completed alongside sensitivity analyses. This critical review of the literature has also contributed to the formation of a priori study purpose, design, methodology, and sampling strategies (Dellinger & Leech, 2007; O'Cathain et al., 2010).

Qualitative Credibility

Credibility of the qualitative component of this proposed research will be enhanced through multiple methodological decisions made. This includes clear and justified statements regarding the research questions of interest, the guiding propositions, as well as the sampling approach (Baxter & Jack, 2008). In addition, case study research promotes the use of data triangulation through the inclusion of multiple data sources (interview data, researcher reflections, demographic data, quantitative data) to support overall data integration (Yin, 2014). This triangulation contributes to the phenomenon being viewed and explored from multiple perspectives and overall enhances overall data and idea convergence (Baxter & Jack, 2008). Analytic logic, evidenced through the maintenance of a documented audit trail, will also be employed, and include careful documentation of decisions made during data collection and analysis.

Mixed Methods Validity and Quality

One of the challenges that impacts the potential meta-inferences made in this study are the limitations associated with conducting a secondary analysis. As the quantitative component of this study will use a large, pre-existing database, the research team will not be in control of the representativeness of the sample, variables collected, or the instruments used to measure constructs. Considerations for enhancing inferential consistency and to mitigate these challenges include using the extant literature to guide study decisions (Creswell, 2013); investigating all associations, whether statistically significant, expected, or not (Ivankova et al., 2006); further clarifying those meta-inferences made; and describing differences in the sample between the quantitative and qualitative components.

Ethical Considerations

Institutional ethics approval was granted for this work through the Hamilton Integrated Research Ethics Board (#8271V3; #8337V4). An application for CLSA data access was reviewed and accepted in May 2019 and an amendment was approved in August 2019. Informed consent, either written or verbal, will be obtained by the first author for all participants in the qualitative component. Participants can discontinue the study at any time without consequence as outlined in the consent form.

Significance and Implications

The proposed research is timely and important for several reasons. The quantitative, qualitative, and mixed methods findings will contribute novel understanding of the relationship between multimorbidity and self-reported health. This understanding will enhance knowledge about the nature and role of certain factors in this relationship and enrich understanding of the well-being paradox among community-dwelling older adults. As the demography of Canada shifts with a growing older adult population, high quality evidence is required to address the needs of older adults to promote optimal aging at home. To date, most studies that have explored self-reported health and the well-being paradox have not focused on how resilience or other factors shape self-reported health or have provided an explanation of the well-being paradox. This research, informed by a model of multimorbidity resilience, will address these gaps to contribute novel understanding for practice and policy application.

Conclusion

Findings from this proposed research aim to extend beyond the average experience of health among community-dwelling older adults by examining factors that shape self-reported health - a widely used but poorly understood health indicator. Further, these findings will contribute novel understanding of why some older adults report positive health despite health-related adversity.

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Supplementary File 1. Variables of Interest

Variable of Interest	CLSA Tracking Dataset	CLSA Comprehensive Dataset	Notes
Chronic Conditions			
Hypertension	CCT_HBP_TRM	CCC_HBP_COM	
Mood Disorder	Anxiety CCT_ANXI_TRM or Depression CCT_MOOD_TRM	Anxiety CCC_ANXI_COM or Depression CCC_MOOD_COM	
Chronic Musculoskeletal Conditions	Back Problems CCT_BCKP_TRM	Back Problems CCC_BCKP_COM	
Arthritis	Osteo / Rheumatoid Arthritis CCT_OAKNEE_TRM or CCT_OAHIP_TRM or CCT_OAHAND_TRM or CCT_RA_TRM	Osteo / Rheumatoid Arthritis CCC_OAKNEE_COM or CCC_OAHIP_COM or CCC_OAHAND_COM or CCC_RA_COM	
Osteoporosis	CCT_OSTPO_TRM	CCC_OSTPO_COM	
Respiratory Conditions	Asthma CCT_ASTHM_TRM or Chronic Obstructive Pulmonary Disease CCT_COPD_TRM	Asthma CCC_ASTHM_COM or Chronic Obstructive Pulmonary Disease CCC_COPD_COM	
Cardiovascular Disease	Angina CCT_ANGI_TRM or Myocardial Infarction CCT_AMI_TRM or Peripheral Vascular Disease / Poor Circulation of Limbs CCT_PVD_TRM	Angina CCC_ANGI_COM or Myocardial Infarction CCC_AMI_COM or Peripheral Vascular Disease / Poor Circulation of Limbs CCC_PVD_COM	
Heart Failure	Heart Disease CCT_HEART_TRM	Heart Disease CCT_HEART_TRM	
Stroke	Cerebrovascular Accident CCT_CVA_TRM	Cerebrovascular Accident CCC_CVA_COM	

	or Transient Ischemic Attack CCT_TIA_TRM	or Transient Ischemic Attack CCC_TIA_COM	
Stomach Conditions	Intestinal / Stomach Ulcer CCT_ULCR_TRM	Intestinal / Stomach Ulcer CCC_ULCR_COM	
Colon Conditions	Bowel Disorder CCT_IBDIBS_TRM	Bowel Disorder CCC_IBDIBS_COM	
Diabetes	CCT_DIAB_TRM	DIA_DIAB_COM	
Thyroid Disorder	Thyroid Disorder CCT_UTHYR_TRM or CCT_OTHYR_TRM	Thyroid Disorder CCC_UTHYR_COM or CCC_OTHYR_COM	
Cancer	CCT_CANC_TRM or Breast Cancer CCT_CANTP_BR_TRM or Colorectal Cancer CCT_CANTP_COL_TRM or Skin Cancer (Melanoma) CCT_CANTP_SM_TRM or Bladder Cancer CCT_CANTP_BL_TRM or Kidney Cancer CCT_CANTP_KD_TRM or Lung Cancer CCT_CANTP_LU_TRM or Thyroid Cancer CCT_CANTP_TH_TRM or Prostate Cancer CCT_CANTP_PR_TRM or Ovarian Cancer CCT_CANTP_OV_TRM or Leukemia CCT_CANTP_LK_TRM or Pancreatic Cancer CCT_CANTP_PA_TRM	CCC_CANC_COM or Breast Cancer CCC_CANTP_BR_COM or Colorectal Cancer CCC_CANTP_COL_COM or Skin Cancer (Melanoma) CCC_CANTP_SM_COM or Bladder Cancer CCC_CANTP_BL_COM or Kidney Cancer CCC_CANTP_KD_COM or Lung Cancer CCC_CANTP_LU_COM or Thyroid Cancer CCC_CANTP_TH_COM or Prostate Cancer CCC_CANTP_PR_COM or Ovarian Cancer CCC_CANTP_OV_COM or Leukemia CCC_CANTP_LK_COM or Pancreatic Cancer CCC_CANTP_PA_COM	

	or Non-Hodgkin Lymphoma CCT_CANTP_NHL_TRM	or Non-Hodgkin Lymphoma CCC_CANTP_NHL_COM	
Kidney Disease	CCT_KIDN_TRM	CCC_KIDN_COM	
Chronic Urinary Conditions	Urinary Incontinence CCT_URIINC_TRM	Urinary Incontinence CCC_URIINC_COM	
Dementia	CCT_ALZH_TRM	CCC_ALZH_COM	
Obesity	Obesity HWT_DBMI_TRM	Obesity HWT_DBMI_COM	
Health Variables			
Self-Reported Health	GEN_HLTH_TRM	GEN_HLTH_COM	
Depressive Symptom Screen	DEP_DPSFD_TRM	DEP_DPSFD_COM	
Life Space Index	LSI_DSCR_TRM	LSI_DSCR_COM	
Multimorbidity Resilience Index			
Functional Resilience			
Activities of Daily Living (ADL)	Ability to Dress ADL_ABLDR_TRM ADL_HPDR_TRM ADL_UNDR_TRM Ability to Feed ADL_ABLFD_TRM ADL_HPFD_TRM ADL_UNFD_TRM Ability to Take Care of Appearance ADL_ABLAP_TRM ADL_HPAP_TRM ADL_UNAP_TRM Ability to Walk ADL_ABLWK_TRM ADL_HPWK_TRM ADL_UNWK_TRM Ability to Get Out of Bed ADL_ABLBD_TRM ADL_HPBD_TRM ADL_UNBD_TRM Ability to Take a Bath	Ability to Dress ADL_ABLDR_COM ADL_HPDR_COM ADL_UNDR_COM Ability to Feed ADL_ABLFD_COM ADL_HPFD_COM ADL_UNFD_COM Ability to Take Care of Appearance ADL_ABLAP_COM ADL_HPAP_COM ADL_UNAP_COM Ability to Walk ADL_ABLWK_COM ADL_HPWK_COM ADL_UNWK_COM Ability to Get Out of Bed ADL_ABLBD_COM ADL_HPBD_COM ADL_UNBD_COM Ability to Take a Bath	Total ADL score is calculated based on these seven items. A score of 0 is given when completely unable to perform the activity (e.g. ADL_UNDR_TRM) and 2 is completely able (ADL_ABLDR_TRM). The highest score is 14 and the lowest score is 0.

	ADL_ABLBT_TRM ADL_HPBT_TRM ADL_UNBT_TRM Ability to Get to Bathroom on Time (Incontinence) ADL_BATH_TRM ADL_INCNT_TRM	ADL_ABLBT_COM ADL_HPBT_COM ADL_UNBT_COM Ability to Get to Bathroom on Time (Incontinence) ADL_BATH_COM ADL_INCNT_COM	
Instrumental Activities of Daily Living (IADL)	Ability to Use Telephone IAL_ABLTEL_TRM IAL_HPTEL_TRM IAL_UNTEL_TRM Ability to Travel IAL_ABLTRV_TRM IAL_HPTRV_TRM IAL_UNTRV_TRM Ability to Go Shopping IAL_ABLGRO_TRM IAL_HPGRO_TRM IAL_UNGRO_TRM Ability to Prepare Meals IAL_ABLML_TRM IAL_HPML_TRM IAL_UNML_TRM Ability to Work IAL_ABLWRK_TRM IAL_HPWRK_TRM IAL_UNWRK_TRM Ability to Take Medication IAL_ABLMED_TRM IAL_HPMED_TRM IAL_UNMED_TRM Ability to Handle Money IAL_ABLMO_TRM IAL_HPMO_TRM IAL_UNMO_TRM	Ability to Use Telephone IAL_ABLTEL_COM IAL_HPTEL_COM IAL_UNTEL_COM Ability to Travel IAL_ABLTRV_COM IAL_HPTRV_COM IAL_UNTRV_COM Ability to Go Shopping IAL_ABLGRO_COM IAL_HPGRO_COM IAL_UNGRO_COM Ability to Prepare Meals IAL_ABLML_COM IAL_HPML_COM IAL_UNML_COM Ability to Work IAL_ABLWRK_COM IAL_HPWRK_COM IAL_UNWRK_COM Ability to Take Medication IAL_ABLMED_COM IAL_HPMED_COM IAL_UNMED_COM Ability to Handle Money IAL_ABLMO_COM IAL_HPMO_COM IAL_UNMO_COM	Total IADL score is calculated based on these seven items. The highest score is 14 and the lowest score is 0.
Summary Performance Score	N/A	Standing Balance Measure BAL_BEST_COM Walk Time Measure	Physical mobility measures are not available in the tracking dataset.

		TUG_TIME_COM Timed Chair Raise Measure CR_AVG_TIME_COM	Calculated using a summative score from the standing balance measure, walk time measure, and timed chair raise measure. Quartiles for each measure are calculated with the highest quartile (indicating higher performance) scoring a 10 and the lowest quartile scoring a 0.
Social Resilience			
Social Support Availability	SSA_DPTNG_TRM	SSA_DPTNG_COM	
Social Participation	SPA_DFRE_TRM	SPA_DFRE_COM	
Perceived Loneliness	DEP_LONLY_TRM	DEP_LONLY_COM	
Psychological Resilience			
Psychological Distress	N/A	K10_DSCORE_MCQ	
Satisfaction with Life	SLS_DSCR_TRM	SLS_DSCR_COM	
Depression (CES-D-10) Score	DEP_CESD10_TRM	DEP_CESD10_COM	

CHAPTER FOUR

Title: Self-Reported Health and the Well-Being Paradox among Community-Dwelling Older Adults: A Cross-Sectional Study using Baseline Data from the Canadian Longitudinal Study on Aging (CLSA)

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Abstract

Background

Self-reported health is a widely used epidemiologic measure, however, the factors that predict self-reported health among community-dwelling older adults (≥65 years), especially those with multimorbidity (≥2 chronic conditions), are poorly understood. Further, it is not known why some older adults self-report their health positively despite the presence of high levels of multimorbidity, a phenomenon known as the well-being paradox. The objectives of this study were to: 1) examine the factors that moderate or mediate the relationship between multimorbidity and self-reported health; 2) identify the factors that predict high self-reported health; and 3) determine whether these same factors predict high self-reported health among those with high levels of multimorbidity to better understand the well-being paradox.

Methods

A cross-sectional analysis of baseline data from the Canadian Longitudinal Study on Aging was completed (n=21,503). Bivariate stratified analyses were used to explore whether each factor moderated or mediated the relationship between multimorbidity and self-reported health. Logistic regression was used to determine the factors that predict high self-reported health in the general population of community-dwelling older adults and those displaying the well-being paradox.

Results

None of the factors explored in this study moderated or mediated the relationship between multimorbidity and self-reported health, yet all were independently associated with self-reported health. The 'top five' factors predicting high self-reported health in the general older adult population were: lower level of multimorbidity (odds ratio [OR] 0.75, 95% confidence interval [CI] 0.74-0.76), female sex (OR 0.62, CI 0.57-0.68), higher Life Space Index score (OR 1.01, CI 1.01-1.01), higher functional resilience (OR 1.16, CI 1.14-1.19), and higher psychological resilience (OR 1.26, CI 1.23-1.29). These same ‘top five’ factors predicted high self-reported health among the subset of this population with the well-being paradox.

Conclusions

The factors that predict high self-reported health in the general population of older adults are the same for the subset of this population with the well-being paradox. A number of these factors are potentially modifiable and can be the target of future interventions to improve the self-reported health of this population.

Key words:

Self-rated health; Multimorbidity; Chronic disease; Older adult; Community; CLSA

Background

While definitions of multimorbidity vary in number (e.g., 2 or more versus 3 or more chronic conditions) and in the chronic conditions considered[1], there is consistent and strong evidence in the literature that an increasing level of multimorbidity is associated with lower self-reported health[2-6]. Self-reported health is a commonly used and reliable measure in health research because of its demonstrated association with morbidity and mortality[7,8]. Since the 1950s, hundreds of studies have demonstrated that lower self-reported health is associated with higher levels of both morbidity and mortality – especially among older adults[9]. Self-reported health captures individual subjective assessments of health[10] by asking one simple question, "In general, would you say that your health is excellent, very good, good, fair, or poor?". The response to this question is known to be influenced by knowledge of one's own health, social norms, or expectations of illness, as well as illness acceptance[11-14].

As adults age, the likelihood of developing chronic conditions such as cardiovascular disease, arthritis, and diabetes increases[15,16]. Multimorbidity ($\geq$2 chronic conditions) is highly prevalent among older adults and is associated with decreased health-related quality of life, increased use of medical and social services, and increased risk for adverse events[15,17]. Increasing longevity and an associated increase in multimorbidity among older adults has resulted in a change in the way that successful aging has been conceptualized. Traditionally, successful aging measures revolve around the absence of disease, the presence of physical and cognitive capacity, and ongoing social engagement[18]. More recently research emphasis has shifted from objective to subjective indices of health, including those that consider the presence of positive emotions such as happiness or satisfaction in aging – despite the presence of multimorbidity[19]. This is due, in part, to a subset of the older adult population, who despite having poorer health according to objective indicators, report positive levels of subjective health (e.g., self-reported health)[18]. This phenomenon is known as the well-being paradox and may be indicative of 'multimorbidity resilience' (i.e., resilience in responding to and coping with multimorbidity)[20]. Multimorbidity resilience is shaped by coping strategies and previous life experiences acquired throughout the lifecourse and related to health and illness at the individual, social, and environmental level[20].

Numerous studies have identified factors other than multimorbidity that are associated with self-reported health[5,21] including demographic (e.g., sex), health-related (e.g., performance of activities of daily living or fewer depressive symptoms), and behavioural (e.g., greater social participation) factors. However, little is known about how these factors shape self-reported health or whether the relationship between multimorbidity and self-reported health changes in the presence of these other factors. This study was designed to address these gaps by exploring the interaction of these factors with multimorbidity in predicting self-reported health and accordingly creating a model to predict high self-reported health among community-dwelling older adults and the subset of this population with the well-being paradox.

Purpose

The objectives of this study were to: 1) examine whether sociodemographic, health-related, or resilience factors moderate or mediate the relationship between multimorbidity and self-reported health; 2) identify the factors that predict self-reported health, and; 3) determine whether these same factors predict high self-reported health in those with high levels of multimorbidity to better understand the well-being paradox.

Methods

A detailed study protocol, including the methods and measures used, has been published elsewhere[22]. Therefore, we only briefly summarize these below.

Data Source

A cross-sectional analysis of baseline data from the Canadian Longitudinal Study on Aging was completed. The CLSA is a national population-based study that follows 51,338 community-dwelling individuals recruited at baseline aged 45 to 85 years for a 20-year duration[23]. Interviews were conducted in English and French. Participants were excluded from CLSA if they resided in one of Canada's three territories, lived on a federal First Nations reserve, were full-time members of the Canadian Armed Forces, lived in an institutional setting, or had a cognitive impairment precluding them from providing informed consent or providing data on their own at the time of recruitment[23]. The overall participation rate for CLSA was approximately 45% and the response rate was 10%[24].

The CLSA includes two cohorts: a tracking cohort and a comprehensive cohort. The tracking cohort includes a stratified random sample of 21,241 individuals from 10 Canadian provinces who provide data via telephone interview. The comprehensive cohort includes a stratified random sample of 30,097 individuals from the geographical area surrounding 11 data collection sites who provide questionnaire data via an in-home interview and take part in a physical assessment at a CLSA data collection site[24]. Full details of the CLSA are described in the published protocol[23].

Sample

A subset of the full CLSA sample was used for these analyses. All participants 65 years of age and older from both the CLSA baseline tracking (version 3.4) and comprehensive (version

4.0) (n=21,503) datasets were included in the analysis. Due to limitations on variables available (i.e., those variables that required in-person data collection), for some analyses, only the comprehensive participants (n=12,658) were utilized. Data sources from the CLSA datasets for each of the study objectives are displayed in Figure 1.

Measures

Self-Reported Health

Self-reported health in the CLSA is evaluated as a five-item question, with respondents reporting their health as 1=excellent, 2=very good, 3=good, 4=fair, or 5=poor. In addition to this ordinal scale, self-reported health was further dichotomized as either high self-reported health (responses of excellent and very good) or low self-reported health (responses of good, fair, and poor).

Level of Multimorbidity

The level of multimorbidity was defined in this study as the number of chronic conditions and based on a list of 20 common chronic conditions[25], 18 of which were available in the CLSA. These included: the presence of hypertension, mood disorder (anxiety or depression), chronic musculoskeletal conditions, arthritis (rheumatoid or osteoarthritis), osteoporosis, respiratory conditions (asthma or chronic obstructive pulmonary disease), cardiovascular disease (angina, myocardial infarction, or peripheral vascular disease), heart failure, stroke, stomach conditions (ulcer), colon conditions, diabetes, thyroid disorder, cancer (did not include non-melanoma skin cancer), kidney disease, chronic urinary conditions, dementia, and obesity. By measuring the level of multimorbidity based on the number of chronic conditions, gradient effects could be explored.

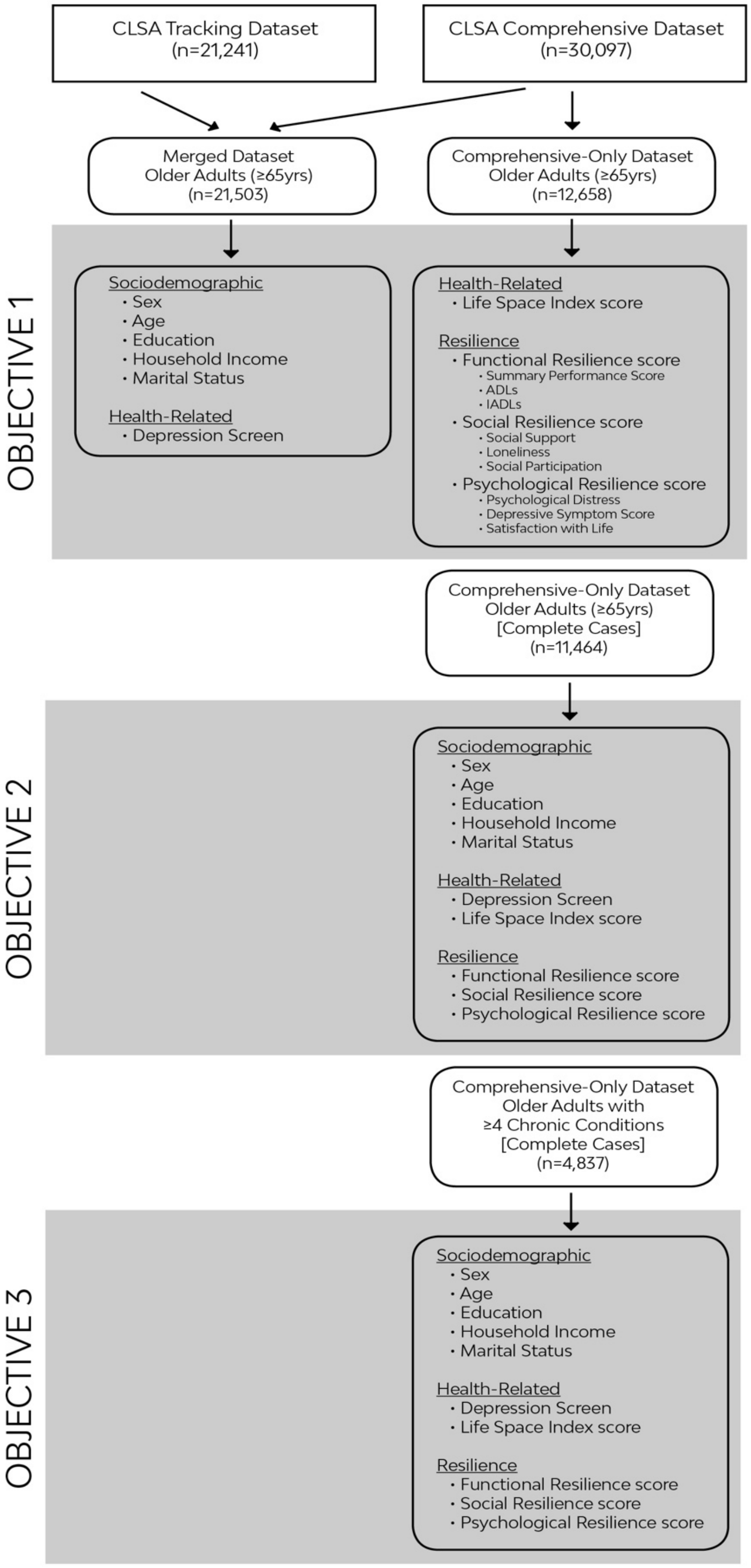

Figure 1. Data sources for each study objective.

Well-Being Paradox

Older adults were classified as having the well-being paradox if they reported high self-reported health (excellent or very good) and a high level of multimorbidity (four or more chronic conditions). Four or more chronic conditions was selected based on a clinical understanding of the burden of these conditions. This is because while some of the conditions could be described as risk factors (e.g., hypertension, obesity) or symptoms (e.g., incontinence, colon disorder)[26], those older adults with four or more chronic conditions are likely to experience greater challenges with their health than those with fewer than four conditions.

Sociodemographic and Health-Related

Independent sociodemographic variables identified from the literature[21] and available in CLSA included: sex (female or male), age (continuous variable and 65-69, 70-74, 75-79, 80+ years), marital status (single, married, or widowed, divorced, or separated), education (≤ secondary school, degree or diploma, or greater than a degree or diploma), household income (<\$20,000, \$20,000-49,999, \$50,000-99,000, \$100,000-149,999, ≥\$150,000), and current dwelling type (house, apartment/condominium, or retirement home, assisted living).

In addition to sociodemographic factors, health-related factors were examined and included a depressive symptom score, a depression screen, as well as a Life Space Index score. Depressive symptom score was obtained from the Centre for Epidemiologic Studies Depression Scale 10-item (CES-D-10) and analyzed as both continuous (i.e., reflective of the severity of depressive symptoms) and categorical (i.e., reflective of the presence of depression)[27]. The CES-D-10 contains ten questions related to feelings of depression, loneliness, hopefulness, and other related physical symptoms such as decreased sleep[27] and provides a measure of the severity of depressive symptoms. For each question, participants respond with either “all of the time”, “occasionally”, “some of the time”, and “rarely or never”. Total scores range from 0-30, with higher scores indicating higher levels of depressive symptoms. This score was also used to screen for the presence of depressive symptoms (≥10/30)[27]. CES-D-10 scores were included in the demographic and bivariate stratified analyses but were excluded from the logistic regression analyses because the multimorbidity resilience measures used in the regressions included this measure as described below.

Life-space mobility was measured using the Life Space Index[28], which was available within the CLSA comprehensive dataset only. This is a self-report of the frequency and extent of movement within and from one’s home to the neighbourhood and beyond[28]. The Life Space Index reports mobility across different locations, such as rooms in the house, yard, neighbourhood, alternative neighbourhoods, and outside of one’s city/town, frequency of going from place to place, and whether assistance was needed[28]. Scores are calculated for each level of mobility with a maximum score of 120 (e.g., going out of town without assistance)[28,29].

Multimorbidity Resilience

Multimorbidity resilience was measured using a resilience index developed by Wister and colleagues[30] using CLSA data. This index maps functional, social, and psychological factors to multimorbidity resilience with a composite score of the three subdomains, each of which is comprised of three index measures representing adversity and adaptation[30].

Functional resilience was measured using the Older Americans Resources and Services (OARS) Activity of Daily Living (ADL) Scale, the OARS Instrumental Activities of Daily Living (IADL) Scale, as well as the Summary Performance Score[31]. The OARS ADL Scale consists of 7 indicators of daily tasks such as eating and personal hygiene. Each of the 7 tasks is scored on a scale from 0 (i.e., completely unable) to 2 (i.e., completely able). Total scores range from 0 to 14, with higher scores indicating higher functional status[31]. The OARS IADL Scale, also a measure of functional ability, consists of 7 measures of instrumental activities such as taking medication and preparing meals[31]. The Summary Performance Score was calculated from individual scores of a standing balance measure, a walk time measure, and a timed chair raise measure. For each of these, a score from 1 to 4 based on statistical quartiles was assigned. If participants did not complete a task, they were assigned a 0. The overall Summary Performance Score ranged from 0 to 12 with a higher score reflecting greater physical ability[31].

Social resilience was measured using the Medical Outcomes Study (MOS) Social Support Survey, a social participation variable, and a perceived loneliness measure. The MOS Social Support Survey is a 19-item tool that measures emotional or informational support, affection support, tangible support, and positive social interaction[32]. For each of the questions, a score of 1 ("none of the time") to 5 ("all of the time") is assigned. Total scores range from 19 to 95, with higher scores indicating higher levels of social support[32]. Social participation is a measure developed by the research team at CLSA which asks participants to report how often they engaged in activities with friends or family over the past 12 months. Possible responses to this measure are "once a day", "at least once a week", "at least once a month", "at least once a year", to "never"[23]. Lastly, using the CES-D-10, perceived loneliness is measured with responses of "all of the time", "occasionally", "some of the time", and "rarely or never"[27].

Psychological resilience was measured using the CES-D-10, the Kessler Psychological Distress K10 Scale, and the Diener Satisfaction with Life Scale. The Kessler Psychological

Distress Scale is a 10-item scale that measure global distress including symptoms of anxiety[33]. Answers to these questions can range from 0 (“never”) to 3 (“most of the time”) with a total score of 30 representing the greatest distress[33]. The Diener Satisfaction with Life Scale involves 5 items that assess global satisfaction with responses ranging from 1 (“strongly disagree”) to 7 (“strongly agree”)[34]. Total scale scores range from 5 to 35, with higher score indicating higher levels of life satisfaction[34].

A total resilience score, consisting of the functional, social, and psychological sub-domain scores, provides a total scale score capturing multimorbidity resilience. Calculation of the functional, social, and psychological composite scores, along with the total resilience score, is described elsewhere[30]. The resilience variables were available for comprehensive participants only as some of the component variables were not collected in the tracking cohort. In addition to the scores for each subdomain, as well as the total resilience score, individual measures within each of the sub-domains (e.g., Satisfaction with Life, social participation, ADLs) were analyzed to explore how these items shape self-reported health. Full descriptions of the CLSA dataset and variables are available in the CLSA cohort profile[24] and in the paper by Wister and colleagues[30].

Statistical Analysis

To examine the relationship between multimorbidity and self-reported health and whether the factors moderated or mediated this relationship, bivariate stratified analyses were completed. Analyses began with examining the relationship between the level of multimorbidity and self-reported health. Stratified analyses were then performed to explore whether each factor (e.g., demographic, health, or resilience factors) modified or mediated the relationship between the level of multimorbidity and self-reported health. These analyses were guided by work on effect modification, interaction, and mediation by Corraini and colleagues[35] as well as Frazier and colleagues[36]. Two-way analysis of variance (ANOVA) were used to determine the statistical significance of the associations factor-by-factor. Two-way ANOVA models included the level of multimorbidity, the additional independent variable, and the interaction of the two in predicting self-reported health. Where statistical significance of a relationship was noted, visual inspection of the interaction plots was completed to assess whether meaningful interactions were present due to the large sample size.

For a comprehensive understanding of the factors that predict high self-reported health, a multiple, complete case logistic regression was used. The regression model included sociodemographic, health-related, and resilience factors that were independently and individually significantly associated with self-reported health. This was preceded by tests of multicollinearity to confirm that factors included in the models were not highly correlated with one another.

Tests of model fit were completed including Cragg Uhler's R^2[37] and Wald test[38]. In addition, a variable importance function was used to estimate the contribution of each independent variable in the model using the absolute value of the *t*-statistic for the model parameter. The same analytical methods described above were used to determine the predictors of high self-reported health among the subset of individuals within this population with high levels of multimorbidity (i.e., 4+ chronic conditions). Regression analyses used only the CLSA comprehensive dataset (n=12,658) because some of the factors (life space index and resilience index scores) are only available in this dataset. Due to the large sample size available for these analyses and the potential for statistically significant but not clinically significant findings, the relative effect size was calculated using Cohen's d (where $d = [\text{LogOddsRatio} \times (\sqrt{3}/\pi)]$).

Findings are reported using Cohen's classification criteria to determine small (*d*= >0.2), moderate (*d*= >0.5), or large (*d*= >0.8) effect sizes (Cohen, 1988). Analyses were completed using SAS (version 3.8) and R (version 4.0.2).

Results

Sociodemographic and Health-Related Characteristics

Of the 21,503 community-dwelling older adults (≥65 years) included in this study sample, 50% were female, 55% were between the ages of 65 and 74, 62% were married or in a common-law relationship, and 97% were white. Even though the older adults in these analyses reported an average of 3.25 chronic conditions, 58% of the sample rated their general health as high (very good or excellent). The most common chronic conditions were hypertension (51%), arthritis (39%), chronic musculoskeletal conditions (27%), diabetes (22%), and cardiovascular disease (20%). In addition, 15% of the study sample screened positive for depressive symptoms on the CES-D-10. Key demographic and health-related data are included in Table 1.

Objective 1: Factors that Moderate or Mediate the Relationship between Level of Multimorbidity and Self-Reported Health among Community-Dwelling Older Adults

Findings indicated that as the level of multimorbidity increased, self-reported health decreased. One-way ANOVA results showed that self-reported health was significantly different across levels of multimorbidity ($F(6)=751.44$, $p=<.0001$). Kruskal-Wallis results were consistent.

Characteristic	Total	
	Combined Dataset (n=21,503) or Comprehensive Dataset only (n=12,658)*	
Sex	n	Proportion
Female	10749	50.02%
Male	10742	49.98%
Total	21491	
Age		
Mean Age (SD)	73.36 (5.82)	
Median Age (Range)	73 (65 – 89)	
Marital / Partner Status	n	Proportion
Single / Always lived alone	1207	5.62%
Married / Common-law	13287	61.83%
Widowed, Divorced / Separated	6993	32.54%
Refused	4	0.02
Total	21491	
Race (not mutually exclusive)	n	Proportion
White	20832	96.88%
Other Race	816	3.79%
Refused / No answer / Don’t know	26	0.12%
Education	n	Proportion
≤ Secondary School Graduation	13186	61.35%
University Degree or College Diploma	5575	25.94%
> Degree / Diploma	2682	12.48%
Refused / Don’t Know	50	0.17%
Total	21493	
Economic Status (Household Income)	n	Proportion
< $20,000	1536	7.15%
$20,000 - $49,999	7440	34.62%
$50,000 – $99,999	7386	34.36%
$100,000 - $149,999	2148	9.99%
≥$150,000	1064	4.95%
Refused / Don’t Know	1917	8.92%
Total	21493	
Current Dwelling	n	Proportion
House	15899	73.98%
Apartment / Condo	5058	23.54%
Retirement Home / Assisted Living, Rooming / Lodging House, Other	365	1.69%
Total	21322	
Chronic Conditions	n	Proportion
Hypertension	10885	50.94%
Arthritis or Rheumatoid Arthritis	8212	38.92%
Chronic Musculoskeletal Condition	5853	27.34%
Obesity	5516	25.65%
Diabetes	4637	21.64%
Cardiovascular Disease	4288	20.15%
Heart Failure	3910	18.31%
Thyroid Disorder	3742	17.72%
Asthma or Chronic Obstructive Pulmonary Disease	3542	16.58%

Cancer	3550	16.57%
Depression or Anxiety	3360	15.69%
Osteoporosis	3115	14.63%
Urinary Incontinence	2621	12.24%
Stomach Ulcer	1985	9.28%
Irritable Bowel Disease	2123	9.92%
Stroke or Transient Ischemic Attack	1696	7.92%
Kidney Disease	876	4.10%
Dementia or Alzheimer's disease	78	0.36%
Level of Multimorbidity		
Mean Number of Chronic Conditions (SD)	3.25 (2.13)	
Median Number of Chronic Conditions (Range)	3 (0 – 15)	
Depressive Symptoms (CES-D-10)		
Mean Score (SD)	5.16 (4.40)	
Median Score (Range)	4 (0 – 30)	
Life Space Index (Mobility)*		
Mean Score (SD)	80.50 (18.41)	
Median Score (Range)	82.00 (0 – 120)	
Self-Rated (General) Health	n	Proportion
Excellent	4022	18.71%
Very Good	8445	39.30%
Good	6526	30.37%
Fair	2031	9.45%
Poor	438	2.04%
Did not complete	29	
Total	21491	
Functional Resilience*		
Mean Score (SD)	7.52 (2.45)	
Median Score (Range)	7.76 (0 – 10)	
Psychological Resilience*		
Mean Score (SD)	2.32 (1.77)	
Median Score (Range)	2.23 (0 – 6.67)	
Social Resilience*		
Mean Score (SD)	7.19 (1.87)	
Median Score (Range)	7.23 (0 – 10)	
Total Resilience*		
Mean Score (SD)	5.91 (1.13)	
Median Score (Range)	6.02 (0 – 8.89)	

Table 1. Key demographic and health factors.

Sociodemographic and Health-Related Factors

The main effects for all socio-demographic, health, and resilience factors were significant (*p*=<.0001) in the models (see Table 2). Significant interaction effects were found between multimorbidity age group (*F*(6,3)=2.41, *p*=.0007); education (*F*(6,2)=4.43, *p*=<.0001); life space index (*F*(6,3)=2.22, *p*=.0022), and self-reported health. Despite the statistical significance of these interactions, visual examination of the interaction plots did not suggest a meaningful interaction (see Supplementary File 1).

Multimorbidity Resilience Factors

Independent effects for each of the factors that comprise the functional, social, and psychological resilience scores as well as the scores themselves were identified (see Table 2). Further to these independent effects, significant interactions were found between multimorbidity, functional resilience score ($F(6,3)=1.65$, $p=.04$); IADLs ($F(6,1)=3.65$, $p=.0013$); satisfaction with life ($F(6,3)=1.72$, $p=.0289$), and self-reported health. However, visual examination of the interaction plots did not suggest a meaningful interaction between these factors.

Combined Datasets (n=21,503) or Comprehensive Dataset only (n=12,658)*					
Factor		***DF***	**Mean Square**	***F***	**Pr > *F***
Sex	Main effect	1	44.29	58.49	<.0001
	Interaction effect	6	0.62	0.82	0.55
Age Group	Main effect	3	7.69	10.16	<.0001
	Interaction effect	18	1.82	2.41	0.0007
Education	Main effect	2	71.96	96.02	<.0001
	Interaction effect	12	3.32	4.43	<.0001
Household Income	Main effect	4	51.36	69.16	<.0001
	Interaction effect	24	0.46	0.62	0.92
Marital Status	Main effect	4	3.41	4.49	<.0001
	Interaction effect	24	0.38	0.48	0.98
Depression Screen	Main effect	1	376.37	514.58	<.0001
	Interaction effect	6	0.57	0.77	0.59
Life Space Index*	Main effect	3	53.81	76.46	<.0001
	Interaction effect	18	1.56	2.22	0.0022
Functional Resilience*	Main effect	3	97.51	141.81	<.0001
	Interaction effect	18	1.13	1.65	0.0411
Summary Performance Score*	Main effect	3	97.38	140.14	<.0001
	Interaction effect	18	0.99	1.42	0.11
Activities of Daily Living*	Main effect	1	66.57	93.33	<.0001
	Interaction effect	6	1.04	1.46	0.18
Instrumental Activities of Daily Living*	Main effect	1	151.98	216.99	<.0001
	Interaction effect	6	2.55	3.65	0.0013
Social Resilience*	Main effect	3	44.51	62.63	<.0001
	Interaction effect	18	0.69	0.98	0.48
Social Support*	Main effect	3	22.96	32.14	<.0001
	Interaction effect	18	0.49	0.68	0.83
Loneliness*	Main effect	4	25.58	36.02	<.0001
	Interaction effect	22	0.59	0.83	0.68
Social Participation*	Main effect	5	21.63	30.39	<.0001
	Interaction effect	29	0.86	1.21	0.20
Psychological Resilience*	Main effect	3	142.08	208.47	<.0001
	Interaction effect	18	0.85	1.25	0.21
Psychological Distress*	Main effect	3	100.31	149.55	<.0001
	Interaction effect	18	0.64	0.95	0.51
Depressive Symptom Score*	Main effect	3	116.34	169.87	<.0001
	Interaction effect	18	0.85	1.25	0.21
Satisfaction with Life*	Main effect	3	163.96	244.94	<.0001
	Interaction effect	18	1.15	1.72	0.0289
Total Resilience*	Main effect	3	178.29	267.69	<.0001
	Interaction effect	18	0.97	1.46	0.09

Table 2. Two-Way ANOVA main effects and interaction effects.

Objective 2: Factors that Predict High Self-Reported Health Among Community-Dwelling Older Adults

All factors, except household income and marital status, were significantly associated with high self-reported health (see Table 3). Using Cohen's classification criteria, female sex (d=-0.26) and education level greater than a diploma or a degree (d=0.21) had the largest effect sizes, although these would be classified as 'small' using Cohen's thresholds. The effect sizes for the other statistically significant factors were even smaller.

Comprehensive Dataset, Complete Cases Only (n=11,464) **Higher Self-Reported Health (n=6,915); Lower Self-Reported Health (n=4,549)**				
Factors	**Notes**	**Pr > |z|**	**(OR) Point Estimate [Confidence Interval]**	***d***
Intercept		3.12e-16	0.05 [0.02-0.10]	-1.652
Number of Chronic Conditions	Continuous variable	< 2e-16	0.75 [0.74-0.76]	-0.1573
Age	Continuous variable	1.18e-07	1.02 [1.01-1.03]	0.0118
Sex*	Categorical variable Male (2) vs. Female (1)	< 2e-16	0.62 [0.57-0.68]	-0.2627
Level of Education*	Categorical variable Degree/Diploma (2) vs. ≤ High School (1)	0.002702	1.16 [1.05-1.27]	0.0808
	> Degree/Diploma (3) vs. ≤ High School (1)	8.16e-10	1.46 [1.29-1.65]	0.2095
Household Income	Categorical variable $20,000 - 49,999 (2) vs. <$20,000 (1)	0.040579	1.20 [1.01-1.43]	0.1011
	$50,000 – 99,999 (3) vs. <$20,000 (1)	0.019588	1.24 [1.04-1.49]	0.1198
	$100,000 – 149,999 (4) vs. <$20,000 (1)	0.003941	1.36 [1.10-1.68]	0.1709
	≥$150,000 (5) vs. <$20,000 (1)	0.073544	1.25 [0.98-1.59]	0.1213
Marital Status	Categorical variable Married/Common-law (2) vs. Single/always lived alone (1)	0.177297	0.88 [0.73-1.06]	-0.0716
	Widowed/Divorced/Separated (3) vs. Single/always lived alone (1)	0.583730	0.95 [0.78-1.15]	-0.0294
Life Space Index Score	Continuous variable	9.09e-16	1.01 [1.01-1.01]	0.0057
Functional Resilience Score	Continuous variable	< 2e-16	1.16 [1.14-1.19]	0.0823
Social Resilience Score	Continuous variable	0.000181	1.05 [1.02-1.07]	0.0259
Psychological Resilience Score	Continuous variable	< 2e-16	1.26 [1.23-1.29]	0.129

*Notes: CI 95%, two-sided alpha, rounded to 2 decimal places; *Where d notes small effect size*

Table 3. Logistic regression model for higher self-reported health – factors and effect.

Objective 3: Factors that Predict High Self-Reported Health among the subset of Community-Dwelling Older Adults with High Multimorbidity

Using the CLSA comprehensive dataset, 18.1% (n=2,296) of older adults with high multimorbidity had high self-reported health (i.e., the well-being paradox). In comparison, 24.2% (n=3,067) of these same older adults with high multimorbidity had low self-reported health.

Characteristics of Older Adults with the Well-Being Paradox

Older adults in the well-being paradox group had higher education ($X^2(2)=42.48$, $p=<.0001$) and household income ($X^2(5)=14.98$, $p=0.0204$), reported fewer depressive symptoms ($t(5320)=16.75$, $p=<.0001$), had a higher Life Space Index score ($t(5352)=-14.54$, $p=<.0001$), higher overall levels of resilience ($t(5361)=-21.30$, $p=<.0001$), as well as higher levels of functional, social, and psychological resilience, compared to the 'non-well-being paradox' group – defined as those with low self-reported health and high multimorbidity (see Table 4). In addition, those in the well-being paradox group (i.e., high self-reported health and high level of multimorbidity) had a lower mean number of chronic conditions compared to the non-well-being group (5.02 vs. 5.63).

Characteristic	Comprehensive Dataset (n=12,658) Older Adults with High Multimorbidity (4+) (n=5,363)				
	High Self-Reported Health (n=2,296)		Low Self-Reported Health (n=3,067)		
Sex	n	Proportion	n	Proportion	*p*
Female	1303	56.75%	1660	54.12%	0.0556
Male	993	43.25%	1407	45.88%	
Age Group					*p*
Mean Age (SD)	73.81 (5.57)		73.76 (5.77)		0.7754
Median Age (Range)	74 (65 – 86)		74 (65 – 86)		
Marital / Partner Status	n	Proportion	n	Proportion	*p*
Single / Always lived alone	134	5.84%	179	5.84%	0.9044
Married / Common-law	1401	61.07%	1853	60.50%	
Widowed, Divorced, Separated	759	33.09%	1031	33.66%	
Education**	n	Proportion	n	Proportion	*p*
≤ High School	711	30.97%	1164	37.95%	<.0001
Diploma or Degree	1114	48.52%	1445	47.11%	
> Degree/Diploma	471	20.51%	458	14.93%	
Economic Status* (Household Income)	n	Proportion	n	Proportion	*p*
< $20,000	132	5.75%	244	7.96%	0.0204
$20,000 - $49,999	717	31.26%	982	32.05%	
$50,000 – $99,999	833	36.31%	1068	34.86%	
$100,000 - $149,999	279	12.16%	313	10.22%	
≥$150,000	115	5.01%	164	5.35%	
Level of Multimorbidity					*p*
Mean Number (SD)**	5.02 (1.26)		5.63 (1.66)		<.0001
Median Number (Range)	5 (4 – 11)		5 (4 – 14)		
Depressive Symptoms (CES-D-10)**					*p*
Mean Score (SD)	4.94 (4.14)		7.12 (5.08)		<.0001
Median Score (Range)	4 (0 – 26)		6 (0 – 28)		
Life Space Index**					*p*
Mean Score (SD)	81.43 (17.57)		73.73 (20.31)		<.0001
Median Score (Range)	82 (9 – 120)		74 (6 – 120)		
Functional Resilience**					*p*
Mean Score (SD)	7.49 (2.32)		6.16 (2.87)		<.0001
Median Score (Range)	6.67 (0 – 10)		6.67 (0 – 10)		
Psychological Resilience**					*p*
Mean Score (SD)	2.62 (1.59)		1.87 (1.62)		<.0001
Median Score (Range)	2.23 (0 – 5.57)		1.1 (0 – 5.57)		
Social Resilience**					*p*
Mean Score (SD)	6.43 (1.77)		5.92 (1.94)		<.0001
Median Score (Range)	6.53 (0 – 9.17)		6.10 (0 – 9.17)		
Total Resilience**					*p*
Mean Score (SD)	6.57 (2.45)		5.08 (2.59)		<.0001
Median Score (Range)	6.67 (0 – 10)		5.53 (0 – 10)		

**Statistically significant mean differences at <.05; **<.0001 (chi-squared; independent t-tests)*

Table 4. Differences in characteristics for those with the well-being paradox.

Factors that Predict High Self-Reported Health among the Subset of Participants with High Multimorbidity. With the exception of social resilience, the factors predicting high self-reported health among the general population of community-dwelling older adults were the same as those predicting high self-reported health among older adults with high multimorbidity (see Table 5). Using Cohen's classification criteria, male compared to female sex (d = -0.28) and an education beyond a bachelor's degree compared to high school graduate or less (d = 0.22) were found to have small effects on higher self-reported health among this subset of the sample while the remaining factors had even less impact.

Goodness-of-fit diagnostics were completed for both models (see Table 6). Findings from Cragg Uhler's R^2 test highlight that both models are relatively weak. In examining the Wald test and the variable importance analysis, the similarities between the two models were apparent – i.e., level of multimorbidity, sex, Life Space Index score, functional resilience score, and psychological resilience score were the 'top five' predictors of higher self-reported health in both models.

Comprehensive Dataset: Older Adults with ≥4 Chronic Conditions, Complete Cases Only (n=4,837) **Well-Being Paradox (n=2,074); Not Well-Being Paradox (n=2,763)**				
Factors	**Notes**	**Pr > |z|**	**(OR) Point Estimate [Confidence Interval]**	***d***
Intercept		< 2e-16	0.01 [0.00-0.03]	-2.5131
Number of Chronic Conditions (4 or more)	Continuous variable	7.30e-15	0.83 [0.79-0.87]	-0.1008
Age	Continuous variable	2.07e-09	1.04 [1.02-1.05]	0.0194
Sex*	Categorical variable Male (2) vs. Female (1)	1.26e-14	0.59 [0.53-0.68]	-0.2819
Level of Education*	Categorical variable Degree/Diploma (2) vs. ≤ High School (1)	0.00999	1.19 [1.04-1.38]	0.1
	> Degree/Diploma (3) vs. ≤ High School (1)	1.20e-05	1.50 [1.25-1.79]	0.2237
Household Income	Categorical variable $20,000 - 49,999 (2) vs. <$20,000 (1)	0.15808	1.20 [0.93-1.55]	0.1014
	$50,000 – 99,999 (3) vs. <$20,000 (1)	0.07632	1.27 [0.97-1.66]	0.1319
	$100,000 – 149,999 (4) vs. <$20,000 (1)	0.00747	1.52 [1.11-2.07]	0.1912
	≥$150,000 (5) vs. <$20,000 (1)	0.34790	1.19 [0.83-1.71]	0.0954
Marital Status	Categorical variable Married/Common-law (2) vs. Single/always lived alone (1)	0.11535	0.80 [0.61-1.06]	-0.1219
	Widowed/Divorced/Separated (3) vs. Single/always lived alone (1)	0.28599	0.86 [0.65-1.14]	-0.0833
Life Space Index Score	Continuous variable	6.13e-11	1.01 [1.01-1.02]	0.0067
Functional Resilience Score	Continuous variable	< 2e-16	1.16 [1.13-1.19]	0.0819
Social Resilience Score	Continuous variable	0.05424	1.04 [0.99-1.07]	0.0197
Psychological Resilience Score	Continuous variable	< 2e-16	1.24 [1.19-1.29]	0.1187

*Notes: CI 95%, two-sided alpha, rounded to 2 decimal places; *Where d notes small effect size*

Table 5. Logistic regression model for presence of well-being paradox – factors and effect.

Diagnostic Test of Model Fit		Higher Self-Reported Health among all Older Adults (n=11,464)	Higher Self-Reported Health among Subset with Well-Being Paradox (n=4,837)
Cragg Uhler's R^2		0.25	0.18
Wald Test (*p*)	Number of Chronic Conditions	<2.22e-16	8.8692e-15
	Age	1.201e-7	2.2227e-9
	Sex	<2.22e-16	1.5198e-14
	Level of Education	6.6387e-9	5.6963e-5
	Household Income	0.077106	0.08751
	Marital Status	0.20682	0.24972
	Life Space Index Score	9.9874e-16	6.763e-11
	Functional Resilience Score	<2.22e-16	<2.22e-16
	Social Resilience Score	0.00018238	0.054303
	Psychological Resilience Score	<2.22e-16	<2.22e-16
Variable Importance (*t*)	Number of Chronic Conditions	25.18	7.78
	Age	5.29	5.99
	Sex	10.64	7.71
	Level of Education		
	Degree/Diploma (2) vs. ≤ High School (1)	2.99	2.58
	> Degree/Diploma (3) vs. ≤ High School (1)	6.14	4.38
	Household Income		
	\$20,000 - 49,999 (2) vs. <\$20,000 (1)	2.05	1.41
	\$50,000 – 99,999 (3) vs. <\$20,000 (1)	2.33	1.77
	\$100,000 – 149,999 (4) vs. <\$20,000 (1)	2.88	2.67
	≥\$150,000 (5) vs. <\$20,000 (1)	1.79	0.94
	Marital Status		
	Married/Common-law (2) vs. Single/always lived alone (1)	1.35	1.57
	Widowed/Divorced/Separated (3) vs. Single/always lived alone (1)	0.55	1.07
	Life Space Index Score	8.04	6.54
	Functional Resilience Score	14.17	10.31
	Social Resilience Score	3.74	1.92
	Psychological Resilience Score	16.46	10.43

Table 6. Goodness-of-fit diagnostics for logistic regression models.

Discussion

Study objectives were to: 1) examine whether sociodemographic, health-related, or resilience factors moderate or mediate the relationship between multimorbidity and self-reported health; 2) identify the factors that predict self-reported health, and; 3) determine whether these same factors predict high self-reported health in those with high levels of multimorbidity to better understand the well-being paradox. This study has generated several key findings.

None of the sociodemographic, health-related, and resilience factors moderated or mediated the relationship between multimorbidity and self-reported health, yet all were independently associated with self-reported health. This confirms existing evidence that has demonstrated the breadth of factors that shape how older adults perceive their health[21]. However, to our knowledge, this is the first study to explore the factors that potentially moderate or mediate the relationship between multimorbidity and self-reported health among a general population of community-dwelling older adults. These findings highlight that the burden of multimorbidity is not only a strong factor associated with self-reported health, but that the association between multimorbidity and self-reported health is seemingly not influenced by other demographic, health-related, and resilience factors.

Our work has uniquely identified five key factors that predict high self-reported health among a general population of community-dwelling older adults, as well as a subset of this population with high multimorbidity (i.e., the well-being paradox). These factors included a lower level of multimorbidity, female sex, higher Life Space Index score, and higher levels of functional and psychological resilience. While other studies have identified factors predictive of high self-reported health, including female sex[39] and physical performance (e.g., balance, chair stand test)[40,41], this is the first study to identify that the factors that predict high self-reported health among a general population of older adults is the same for the subset of the population with high multimorbidity. This finding is a unique contribution to the literature because while the well-being paradox is commonly acknowledged and identified, it is poorly described and understood. This may be because of the limited linkage between the well-being paradox as a concept and its relevance to clinical practice.

Occurring alongside increasing longevity and multimorbidity, the contradictory nature of reporting positive perceptions of health despite living with multiple chronic conditions challenges the way that health care professionals measure wellness in older age[18,19]. Evidence has shown that primary care providers often rate patient's health differently than they rate it themselves[42]. This incongruence between providers' and older adults' perceptions of health is due to the fact that physicians tend to evaluate health based solely on the presence of disease, while older adults are more likely to evaluate their health based on other factors, including their illnesses, whether or not they are feeling well[42] and the presence of happiness[43]. One interpretation of these findings is that this difference in emphasis and perceptions on multimorbidity between providers and individuals may contribute to the presence of the well-being paradox, not some innate difference in the older adults themselves. From a practice, research, and policy perspective, these findings support the growing shift toward person-centred care that emphasizes the importance of assessing individual perceptions of health.

Implications

Except for female sex, all the factors that predict high SR health are potentially modifiable. This includes the level of multimorbidity, Life Space Index score, and functional and psychological resilience. While the level of multimorbidity itself may not be modifiable, aspects of care, such as improved access to treatment, management of symptom or disease burden, and prevention of secondary disease can be achieved. This includes interventions and research that aim to address the social determinants of health[44], programs that tackle common risk factors such as alcohol or tobacco use, physical inactivity, and poor mental health[45], and approaches to enhance self-management capacity[46]. Additionally, Life Space Index as well as functional and psychological resilience are potentially modifiable. For example, the Life Space Index, a measure of community mobility, is related to modifiable factors such as social support and walking speed[47]. Previous research has demonstrated links between social support, walking speed, and important health outcomes, including known associations with walking speed and risk for falls and hospitalization[48,49]. Similarly, functional resilience, captured as a composite score of physical and functional measures (including walking speed), and psychological resilience, comprised of depression, distress, and life satisfaction scales, are all factors that can be targeted and modified[50-52]. Building on the well-documented links between higher self-reported health and positive health outcomes for older adults[10], identification of these five key drivers has the potential to inform the development of clinical interventions that target these modifiable factors.

Strengths and Limitations

A key strength of this research involves the use of a large, population-based sample. This provided an opportunity to closely examine the relationship between sociodemographic, health-related, and resilience factors. However, the use of this dataset also contributed to some notable limitations that should be considered when interpreting findings. First, this research was a cross-sectional analysis of baseline data from the CLSA. As such, results cannot be interpreted as causal, nor can temporality of the factors or directionality of associations be captured. Second, while CLSA datasets are large and aim to be representative, there are limitations regarding certain demographic factors. For example, representation of race, for example, or the exclusion of certain population groups (e.g., veterans, individuals living in Canadian territories). This limits the application of these findings to broader populations as the sample for these analyses was predominantly white, English-speaking, urban-dwelling, and middle-income. Third, while level of multimorbidity is a widely used approach to measuring disease burden, the way that chronic conditions are captured in CLSA means that an individual may have a diagnosis of a specific condition (e.g., arthritis), however, that condition may not be causing any challenge or discomfort while for another person, that same condition may be very challenging or burdensome. By using a level of multimorbidity, as opposed to using a disease burden scale (e.g., Disability Adjusted Life Years[53]), there are limitations on the application of these findings. This is particularly true for those conditions which may relapse, remit, or carry a significant burden of illness such as stroke or chronic obstructive pulmonary disease. Fourth, there are limitations associated with the design of the CLSA. This includes limitations related to how the data is collected, as well as the duration of the study. It is likely that those who are willing to participate in a study lasting up to 20 years, particularly such a comprehensive study, may be different than those in the general population. As well, these analyses dominantly drew from the comprehensive dataset, meaning that individuals living in more rural communities outside of the data collection catchment areas, would not be included. Lastly, due to the large sample size, findings should be interpreted with emphasis on the effect of the relationship (e.g., Cohen's classification criteria) and the general weakness of the models generated instead of solely the statistical significance reported.

Conclusion

Self-reported health is one of the most commonly used outcome measures in epidemiology, health research, and clinical practice[54]. Findings from this study have highlighted that while many factors are associated with self-reported health, these factors do not seem to influence the relationship between multimorbidity and self-reported health. Findings have additionally identified the factors that predict high self-reported health are the same for the general population of older adults and a subset of this population with high multimorbidity. Further, this study has identified that of these five key factors, four of them are potentially modifiable including the level of multimorbidity, the Life Space Index score, and the functional and psychological resilience scores. Findings from this work have generated several additional research opportunities. This a need to leverage longitudinal studies using data from the CLSA to explore causal relationships (e.g., further examination of the temporality of factors), to repeat these analyses in differing populations (e.g., more diverse sample, a sample that includes more rural and remote participants), as well as to compare these findings to those who have the opposite of the well-being paradox (i.e., those with few or no chronic conditions and lower self-reported health). In addition, future qualitative research is warranted to explore how these key factors predict high self-reported health among community-dwelling older adults. Moving beyond an exploratory understanding of self-reported health and the well-being paradox, our findings have advanced understanding of the factors that predict high self-reported health among community-dwelling older adults.

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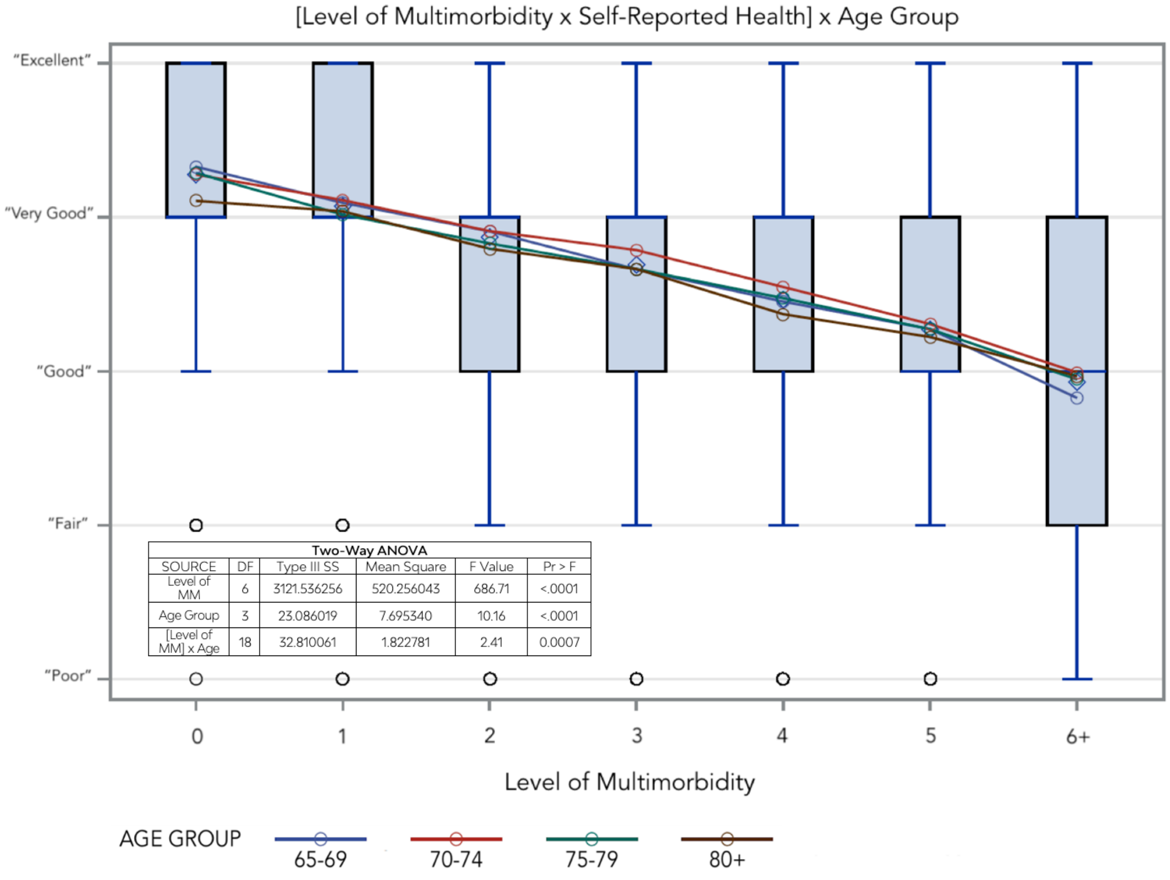
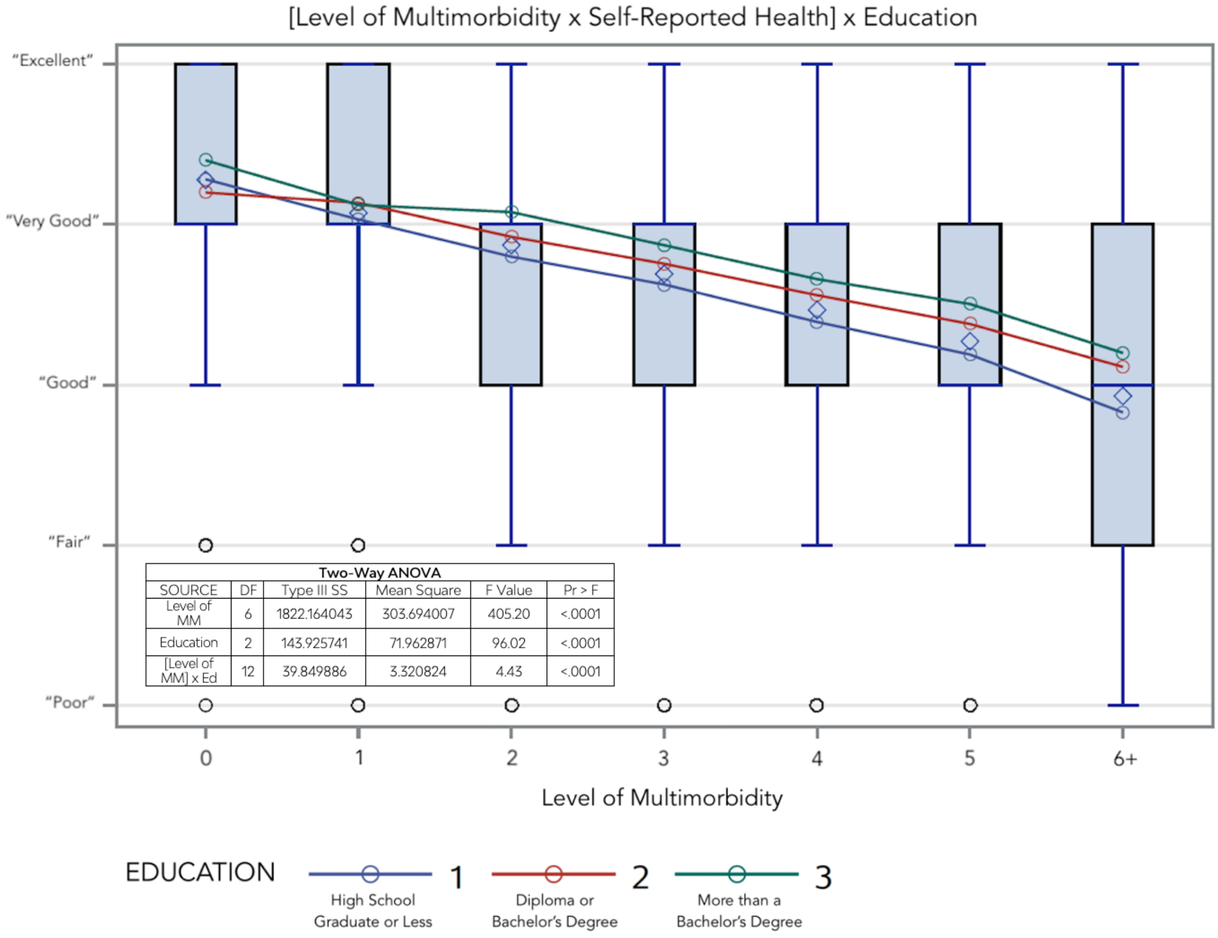
Supplementary File 1



Two-Way ANOVA					
SOURCE	DF	Type III SS	Mean Square	F Value	Pr > F
Level of MM	6	3121.536256	520.256043	686.71	<.0001
Age Group	3	23.086019	7.695340	10.16	<.0001
[Level of MM] x Age	18	32.810061	1.822781	2.41	0.0007

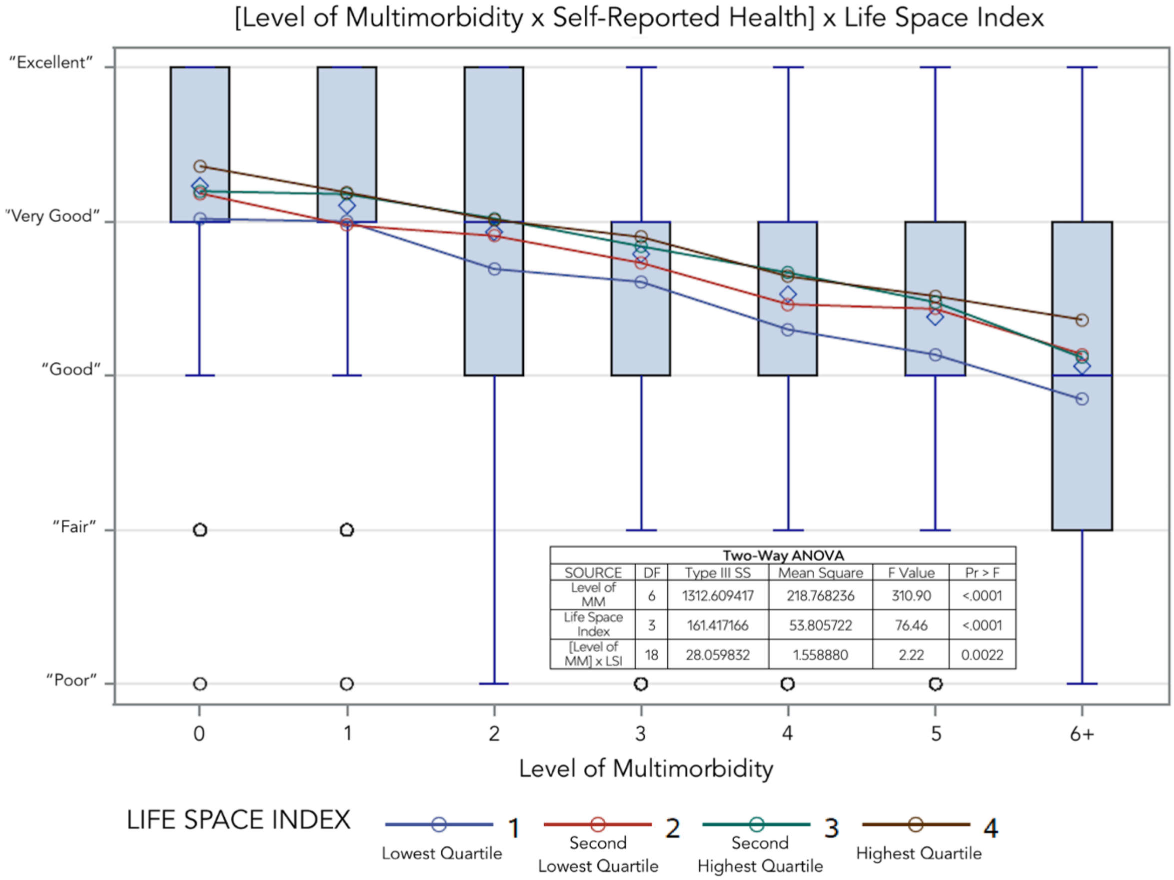
Interaction effect between self-reported health and the level of multimorbidity by age group.



Two-Way ANOVA

SOURCE	DF	Type III SS	Mean Square	F Value	Pr > F
Level of MM	6	1822.164043	303.694007	405.20	<.0001
Education	2	143.925741	71.962871	96.02	<.0001
[Level of MM] x Ed	12	39.849886	3.320824	4.43	<.0001

Interaction effect between self-reported health and the level of multimorbidity by education.



Two-Way ANOVA					
SOURCE	DF	Type III SS	Mean Square	F Value	Pr > F
Level of MM	6	1312.609417	218.768236	310.90	<.0001
Life Space Index	3	161.417166	53.805722	76.46	<.0001
[Level of MM] x LSI	18	28.059832	1.558880	2.22	0.0022

Interaction effect between self-reported health and the level of multimorbidity by life space index quartiles (where the highest quartile represents a higher score).

CHAPTER FIVE

Title: Understanding How Individual, Social, Environmental, and Resilience Factors Shape Self-Reported Health among Community-Dwelling Older Adults: A Qualitative Case Study

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Abstract

Self-reported health is a widely used measure of health with clinical and research applications. However, there is limited understanding of how individual, social, and environmental factors, including those related to multimorbidity resilience, influence self-reported health among community-dwelling older adults. Informed by the Lifecourse Model of Multimorbidity Resilience, this explanatory case study research explored older adults' perceptions of how these factors influence self-reported health. Data were generated through semi-structured telephone interviews with 15 community-dwelling older adults (≥65 years). Four key themes, specific to how these factors influence self-reported health, were identified: 1) health is a responsibility; 2) health is doing what you want to do despite health-related limitations; 3) the application and activation of personal strengths, and; 4) through comparison and learning from others. Findings from this study advance understanding of the factors that influence assessments of health and contribute key areas for future research to shape policy and practice.

Key words:

Case study; Thematic analysis; Qualitative methods; Older adults; Community-dwelling; Self-reported health; Definitions of health; Narratives of health

Introduction

Due in part to an aging population and increasing life expectancy, research interest in optimizing the health of older adults and promoting successful aging has increased in recent years. However, while older adults (≥65 years) may be living longer, they often experience health challenges – especially older adults who live with multiple chronic conditions. Older adults' ability to manage these conditions and adapt to the individual, social, and environmental challenges associated with multimorbidity (defined as 2 or more chronic conditions) in order to maintain health and wellness is essential to enhancing health-related quality of life (Tkatch et al., 2017). While there is evidence that suggests that clinical health status, often operationalized as the number of chronic conditions, is not the primary driver of how older adults perceive their health (Elder et al., 2017), there is a substantial body of evidence that has shown that as the number of chronic conditions increases, self-reported health decreases (Heller et al., 2008; Mavaddat et al., 2014; Perruccio et al., 2012; Pinquart, 2001; Schüz et al., 2011; Terner et al., 2011; Vuorisalmi et al., 2005; Zunzunegui et al., 2004).

Self-reported health is a widely used measure of health with both clinical and research applications. Typically captured as a response to the question, "In general would you rate your health as excellent, very good, good, fair, or poor?", this measure was first used in the 1950s (Tissue, 1972; Liang, 1986). Decades later, self-reported health has become more prevalent in medical and epidemiological applications because of its simplicity and reliability in predicting future morbidity and mortality (Banerjee et al., 2010; Idler & Benyamini, 1997), including among older adult populations (Schüz et al., 2011; Benyamini et al., 2003; Vuorisalmi et al., 2005).

The number of chronic conditions, or level of multimorbidity, is an important factor shaping self-reported health (Whitmore et al., 2022; Whitmore et al., 2020). This relationship is consistent: as the number of chronic conditions increases, self-reported health decreases. Many other factors have been linked to self-reported health, including individual factors such as age (Perruccio et al., 2012), or physical functioning (Zunzunegui et al., 2004), and social or environmental factors such as social connectedness (Sun et al., 2007; Nützel et al., 2014). However, how older adults describe these factors as shaping self-reported health, or the explanations of these relationships is not fully understood. Further, there is some indication in the literature that the presence of certain factors, such as those specific to resilience (Lau et al., 2018) and acquired throughout the lifecourse (Wister et al., 2016), may be important when considering how individual, social, or environmental factors shape self-reported health.

Multimorbidity resilience, described as a dynamic and adaptive process enacted in the face of illness adversity (Wister et al., 2016), has gained popularity in gerontological research. This is because resilience may serve as a potential defence from the deleterious effects of multimorbidity including symptom burden and functional decline (Rybarczyk et al., 2012). Despite there being exploratory statistical analysis that has identified factors associated with self-reported health, understanding specific to resilience, or the ways in which older adults perceive how these identified factors shape their health is limited.

For older adults, perceptions of health are linked to independence, an absence of or the ability to manage symptoms, optimism, connectedness, and energy (Song & Kong, 2015). Health is described as a priority and is focused on the older adults' intrapersonal world – including their community, existing relationships, and roles (Song & Kong, 2015). To date, some qualitative research has attempted to describe what older adults consider when they respond to questions about self-reported health. This work has advanced understanding regarding older adults' emphasis on specific health problems, physical functioning, as well as health behaviour in shaping their self-reported health (Borawski et al., 1996; Krause & Jay, 1994). From this body of evidence, it is known that older adults view health as complex and context-bound (Jylhä, 1994; Benyamini et al., 1999; Kaplan & Baron-Epel, 2003). To our knowledge, however, no qualitative research has explored how community-dwelling older adults view their health and how this understanding, including how individual, social, and environmental factors, as well as those related to multimorbidity resilience, shape their assessment of health. This gap in the literature presents an opportunity to advance understanding of how these factors shape perceptions of health, which in turn may facilitate the design of future interventions or services focused on addressing or modifying certain factors to improve health status among this population.

Objective

The purpose of this qualitative case study was to explore the influence of individual, social, and environmental factors, including those related to multimorbidity resilience, on self-reported health among community-dwelling older adults. This included a need to understand how community-dwelling older adults define their health.

Methods

The findings presented in this paper represent the qualitative component of a larger multimethod research study which is described elsewhere (Whitmore et al., 2021). Aligned with the COREQ, key reporting criteria are reported throughout this paper.

Explanatory Single Case Study

This research used a single explanatory case study design (Yin, 2014; Baxter & Jack, 2008). Case study research is an applied health research design which aims to understand a phenomenon within its real-world context (Yin, 2014).

Multimorbidity Resilience Framework

The Lifecourse Model of Multimorbidity Resilience (Wister et al., 2016) was chosen to guide data collection, analysis, and interpretation of study findings to inform understanding of the complex ways by which individual, social, and environmental factors shape self-reported health among older adults. This model broadly positions the individual at the centre of interrelated social and environmental contexts (Wister et al., 2016) (see Figure 1). The three overlapping circles represent wellness, a concept described to involve full integration between the individual, social, and environmental systems in which the person exists (Wister et al., 2016).

Following the model cyclically, the beginning stage of the multimorbidity resilience process is the onset of health-related illness adversity (Windle, 2011; Wister et al., 2016). Within the context of multimorbidity, illness adversity could include the diagnosis of a new chronic condition, receiving conflicting or discordant advice related to treatment or management of symptoms, or health complications. If deemed stressful, a disruption of "self-concept, behaviours, and worldviews" occurs (Wister et al., 2016, p. 301).

In response to this disruption, the individual activates resources to successfully overcome the adversity and stress (Wister et al., 2016). This resource activation requires motivation, energy, and access (Wister et al., 2016), and can be either internal or external to the person (Song & Kong, 2015). Internal activation is described by Wister et al. (2016) as an "expression of agency" (p. 301) in which the individual employs resources contained within the self. Conversely, external activation of resources will involve those resources external to the person. These may include social resources, such as: relationships, networks, social engagement, support, or capital, and ethnic culture; as well as environmental resources, including: the person-environment fit, aging-in-place, cultural relevance, programs and services, and policy (Wister et al., 2016).

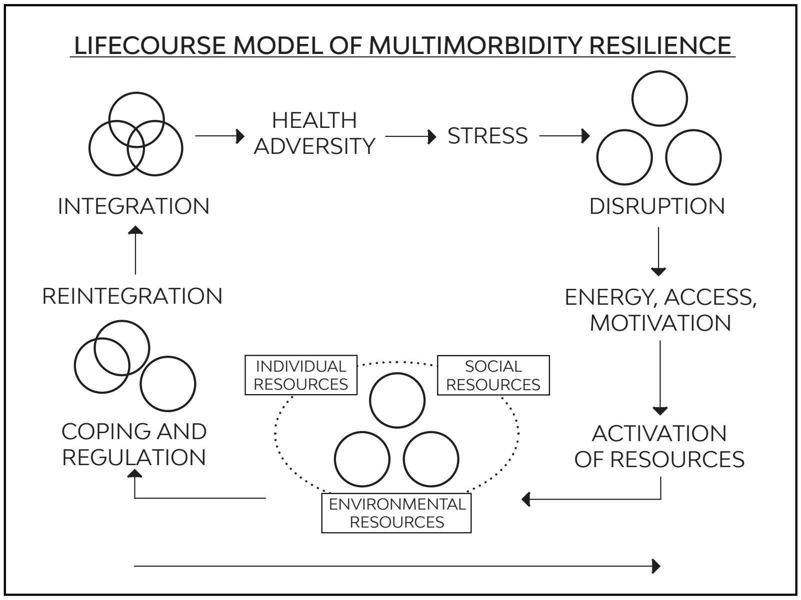

Figure 1. Adapted from Wister et al., (2016) Lifecourse Model of Multimorbidity Resilience

The resources activated at this stage of disruption may include a combination of individual, social, and environmental factors with the interaction of these resources serving as a central component of the Lifecourse Model of Multimorbidity Resilience (Wister et al., 2016). This interaction is depicted in the middle of the model and builds upon literature that explores how certain combinations of resources, (e.g., high self-efficacy and personal control) are related to the activation or promotion of other resources such as social support (Jopp & Rott, 2006).

The activation of resources engages coping and emotional regulation which in turn, contributes to a reintegration of self and positive adaptation to the illness adversity (Wister et al., 2016). The Lifecourse Model of Multimorbidity Resilience suggests that the reintegrated self may not resemble the original formation of self. This new configuration of self acknowledges that the individual may not have fully recovered from the adversity, but for the individual with a higher level of resilience, new strengths, new understanding, and a new conceptualization of functioning will occur because of positive adaptation (Wister et al., 2016).

Lastly, depicted across the bottom of the model is a lifecourse timeline (Wister et al., 2016). This timeline suggests that past experiences with illness, the cumulative advantages or disadvantages associated with the social determinants of health (O'Rand & Hamil-Luker, 2005), and the agency to effect change are embedded in the lifecourse (Wister et al., 2016). This "resilience trajectory is, therefore, the accumulation of previous lifecourse experiences and resources, coupled with nonmutable genetic and less mutable personality factors," (p. 303). It is acknowledged that further disruption for the older adult may interrupt the cyclical or unidirectional nature of the model (Wister et al., 2016). Further disruption may include an individual, because of increasing illness burden or additional adversity, remaining at a stage of the model, or reversing from one stage to a previous one (Wister et al., 2016).

The model describes a resilience process that unfolds over time and the resources involved in adapting to illness adversity. Self-reported health, though not explicitly described in the model, is an assessment of health that can take place at any point in this process. This assessment of health is likely to differ depending on where the individual is in this process of adapting, or not adapting, to illness adversity. For example, self-reported health is likely to be lower at the onset of illness adversity (e.g., a new diagnosis), and increase as resources are activated and the older adult recovers or adapts to the adversity. For the purposes of this study, self-reported health is the assessment of health at a point in time and reflects the level of adaptation achieved at that time arising from accumulated experiences across the lifecourse as well as the activation of other resources identified in the model.

Propositions

Three propositions were developed: 1) older adults would emphasize individual-level factors when describing health; 2) during times of adversity, social and environmental-level factors would be emphasized; and 3) previous experiences would influence the factors identified as shaping self-reported health. These propositions help to guide data collection and analysis (Yin, 2010, 2014) and were developed from the supporting literature, including the Lifecourse Model of Multimorbidity Resilience (Wister et al., 2016).

Case Under Study

In case study research, the case serves as the unit of analysis (Yin, 2014). For this study, the case is the described influence of individual, social, and/or environmental, including those related to multimorbidity resilience factors on older adults' self-reported health. The case is further bound by the population of interest (community-dwelling adults ≥65 years) and the study geography (southwestern Ontario).

Sampling and Recruitment

To understand the influence of various factors on self-reported health, purposive sampling strategies, including criterion and maximum variation sampling, were used to obtain the study sample. Inclusion criteria included adults: 1) ≥65 years; 2) living in the community (i.e., not in long-term care or hospital); 3) and English speaking. Maximum variation sampling was used to sample older adults with different levels of multimorbidity. This was achieved by completing screening questions prior to study recruitment.

Sample size in case study research is not explicit (Yin, 2014). Considering the complexity of the phenomenon of interest, a sample of 12 to 20 information-rich individuals (Malterud et al., 2016) were sought in order to have a large enough sample to detect commonalities and differences (Yin, 2014). Recruitment was done virtually through existing partnerships (e.g., McMaster Institute for Research on Aging e-mail listservs), social media as well as through the distribution of study information via posters at community-based organizations (e.g., local libraries, fitness facilities, and senior's centres). Study participants were encouraged to share recruitment materials with other individuals who met inclusion criteria.

Data Generation

Semi-structured interviews were completed by the first author (CW). CW is a female-identifying person, and a Registered Nurse with experience collecting and analysing qualitative data. Interviews used a pre-developed interview guide. This included questions about personal definitions of health, factors perceived to affect their self-reported health, and resilience (e.g., personal strengths or resources). This also included a brief introduction to the primary researcher and the purpose of the study. Interviews were completed over the phone, audio-recorded, and transcribed verbatim. All data were collected between May 2020 and March 2021. Sociodemographic and health data, including the number of chronic conditions, self-reported health response, the Center for Epidemiologic Studies Depression 10 item scale (CES-D-10)

(Andreson et al., 1994), and the Brief Resilience Scale (BRS) (Smith et al., 2008) were collected before beginning the interview.

Data Analysis and Interpretation

Prior to engaging in data analysis, the lead author (CW) completed a reflexive activity. Drawing upon the literature and adapted from previous thematic analysis work (Campbell et al., 2021), three questions guided this process: 1) What assumptions do you have about these data and the potential findings? 2) What demonstrates rigour in qualitative research?; and 3) What drives your data analysis and how should findings be reported? This structured reflexivity regarding the content as well as the analytic process was completed both individually via journaling as well as in research team discussions and served as a means to self-examine the ways which personal understanding and experiences may influence the research process (Berger, 2015).

Data analysis followed Yin's five iterative stages including: compiling, disassembling, reassembling, interpreting, and concluding (Yin, 2010) and was guided by Braun and Clarke's reflexive thematic analysis (Braun & Clarke, 2021). Data analysis was completed by CW with support from the co-authors.

Compiling

Interview data from participants were collected and analyzed concurrently. All interviews were transcribed by the lead author and each transcript was read and re-read for data immersion. Early patterns and 'noticings' (Braun & Clarke, 2006) helped to inform ongoing sampling decisions as well as any necessary changes to the interview guide. The use of data management software (NVivo v1.5) allowed for ongoing data manipulation, coding, and theme identification.

Disassembling

In this data reduction stage, initial codes were generated based on a review of the literature, the conceptual model, and the propositions that guided the study and served to organize the data. New codes were generated by labelling meaningful groups of data.

Reassembling, Interpreting, and Concluding

Following this disassembling, themes and sub-themes were identified from the data and reassembled data were interpreted and described below. This involved a process of identifying the meaning of, and relationship between developed codes and propositions and diagramming to make sense of the identified codes and themes (Braun & Clarke, 2006). Patterns were identified and reviewed and overlapping themes were collapsed and re-worked. This cycling between the findings and the original data and propositions helped to organize the story told by the codes and themes and contributed an overall interpretation of the findings beyond a simple description of themes present (Braun & Clarke, 2006; Campbell et al., 2021).

Ethical Considerations

The study was conducted in accordance with the Tri-Council Policy Statement, Ethical Conduct for Research Involving Humans (Canadian Institutes of Health Research et al., 2018). Institutional ethics approval was obtained from the McMaster University, Hamilton Integrated Ethics Review Board (Project #8271). Participants were informed of the objectives of the research, the risks and benefits to participating in the interview, and provided an opportunity for questions before providing informed consent. Transcripts were anonymized of all identifying information.

Findings

Sociodemographic and Health-Related Characteristics

Fifteen community-dwelling older adults participated in the study. The sociodemographic and health-related characteristics of the participants are reported in Table 1. Participants were on average 73.6 years of age and about two-thirds of them (66.7%) were women. Most of the sample identified as white (93.3%), English speaking (86.7%), and about one-half were married or living with a partner (53.3%) and in a single-dwelling house (53.3%). Participants were well-educated with 53.3% having a university degree or a college diploma. Almost all the participants were retired (93.3%) and one quarter (26.7%) reported an annual household income of greater than $70,000 per year. Despite participants reporting an average of 4.1 chronic conditions, almost two-thirds (60%) of the sample described their health as excellent or very good. Only two participants (13.3%) screened positive for depression (i.e., greater than a score of 10 on the CES-D-10). Additionally, participant's average Brief Resilience Score was 21 (range 12-26), indicating a high level of resilience.

Participant Characteristics (*n*=15)	*n* (%)	
Sex		
Female	10 (66.7%)	
Male	5 (33.3%)	
Race (not mutually exclusive)		
White	14 (93.3%)	
Not white	4 (26.7%)	
Language Spoken at Home		
English	13 (86.7%)	
French	2 (13.3%)	
Dwelling Type		
House	8 (53.3%)	
Apartment / Condominium	6 (40.0%)	
Other	1 (6.7%)	
Marital Status		
Married / Living with a Partner	8 (53.3%)	
Widowed / Divorced / Never Married	7 (46.7%)	
Living Arrangement		
Live Alone	7 (47.7%)	
Spouse or Partner	8 (53.3%)	
Household Income		
< $29,999	3 (20.0%)	
$30,000 – $49,999	6 (40.0%)	
$50,000 – $69,999	2 (13.3%)	
≥ $70,000	4 (26.7%)	
Level of Education		
Some University or College	5 (33.3%)	
University Degree or College Diploma	8 (53.3%)	
Graduate Degree or Professional Degree	2 (13.3%)	
Employment Status		
Part-Time Employment	1 (6.7%)	
Retired	14 (93.3%)	
Self-Reported Health		
Excellent	4 (26.7%)	
Very Good	5 (33.3%)	
Good	2 (13.3%)	
Fair	3 (20.0%)	
Poor	1 (6.7%)	
Depressive Status		
Positive Depression Screen (>10)	2 (13.3%)	
Negative Depression Screen	13 (86.7%)	
	Mean (Standard Deviation)	Range
Age in Years	73.6 (5.7)	66 – 85
Number of Chronic Conditions	4.1 (2.4)	0 – 9
Brief Resilience Scale score	21 (4.2)	12 – 26

Table 1. Sociodemographic and health-related characteristics of participants.

Influence of Factors on Self-Reported Health

From the completed analysis, four themes were identified. It is important to note that while described as discrete themes, significant overlap in both how the themes are presented as well as in the interpretation of the themes exists. This means that the same quote could be used to illustrate more than one theme. These four themes are summarized in Table 2.

Theme	Description
Health is a Responsibility – “What I have to do”	Health was described as a responsibility that included the need to take responsibility for maintaining their well-being, mitigating limitations or challenges, and accepting their role in managing health as they age. This responsibility extended beyond their healthcare team and reflected a preference for participation in health decisions and action.
Despite Health-Related Limitations – “I do what I want to do”	Older adults described health as influenced by being able to do what they wanted to do. This was despite health-related challenges that participants live with and spoke to a desire to participate in social and environmental aspects of their lives.
Personal Strengths – “The way you think”	Several personal strengths were identified by participants as shaping their self-reported health. These strengths contributed to an overall sense of control in how they view health and served as health resources for the older adults.
Comparison and Learning from Others – “Looking around at other people”	Older adults described interpreting their health experiences in relation to others. This included comparisons to themselves as younger adults, as well as to friends, family, and strangers. This comparison contributed to learning opportunities and served to benchmark health status.

Table 2. Summary of themes.

Health is a Personal Responsibility - “What I have to do”

Older adults described their health as a personal responsibility. This included the need to take responsibility for maintaining their well-being, mitigating limitations or challenges, and accepting their role in managing health as they age. Despite the recognition that these older adults had limited control over some factors influencing their health, such as genetics or age for example, how they thought about health and how they went about achieving health was perceived to be within their control, and thus, a responsibility.

For several participants, this responsibility was related to health maintenance. They described understanding their role in continued efforts to maintain health, such as exercising or taking medications, and offered discussion on what they felt they could not change:

> "I think a lot of it is that I have control in the fact that I can keep doing things. There's two things I cannot change, and I just have to accept them, and that's my age and my sex, both of which are negative, I guess [laughs], especially when it comes to health. I just keep doing all of the things I need to do to stay healthy and modifying them as I need to. Like, I may not feel like I can go as fast, but that doesn't stop me from going for a walk or something." – (Participant 15)

This responsibility for health maintenance extended beyond the medical providers that were trusted to help guide them. While participants acknowledged a need for healthcare providers to support their health, they still viewed health as their own responsibility:

> "I have told them all – they are not responsible for my health. I am. That has been my attitude for, well, at least the last 25, 30, or even 35 years. It's like, well, I have a personality type that when I see a problem, I take it upon myself to fix it. When I see a problem, I know it's my own and it's my sole responsibility to solve it… So, I have had

> to learn along the way that, no, I am not responsible for everything but when it comes to my health, I still feel that I am.” – (Participant 05)

> “If I cannot do something, who will? If I cannot take care of myself, who will? If I am sick, who will take care of me? I need to be independent. It’s in my own best interest. It’s my responsibility.” – (Participant 05)

Many of the participants in this study identified the need for information to maintain their health and mitigate health challenges. For one of the participants, the information received from health providers helped to address their health needs, and contributed to their sense of responsibility:

> “I can control the knowledge. Being conscious that something is wrong and not letting it go or postponing it. You can go and consult a doctor or the internet. You can try and find out what is going on. Read about it, you know? Try to help the doctor find out what’s going on… It’s my responsibility, my need to take action and do what I have to do. That could be taking my medications properly, doing exercise, eating well, sleeping well, all of that.” – (Participant 12)

Obtaining this health-related information led to “increased confidence” (Participant 06) and was viewed as necessary to “make change” (Participant 15). For another participant, they felt responsible to clearly communicate their need for information to their health providers to be able to adequately support their health:

> “Every time I have a new health provider in my network, I always say, you know, ‘I’m not a doctor and I don’t want to be a doctor, but I need you to help me so that I can help myself’.” – (Participant 05)

Participants felt that they had a personal responsibility to accept “their piece” (Participant 08) about their health experiences and problem-solve when necessary. For participants, this was described as an acceptance of previous life choices and decisions that may have impacted their current health including prior habits (e.g., smoking) and injuries (e.g., car accidents). Beyond this mere acceptance, however, they also felt responsible to problem solve health challenges stemming from these decisions.

> “Well, again, I try to stay active. That’s on me to do. And I’ve always got an idea on how to do things. They called me MacGyver at work when I was there. So, I’m always kind of improvising on something. If I don’t have an immediate solution, I can find something to make it work even when it comes to my health.” – (Participant 14)

> “If I don’t know something, I’ll research it and figure it out. For example, I like being in research studies, I’ve been in several and I’ve learned so much. I am resilient, I figure it out.” – (Participant 06)

In summary, participants described their health as a personal responsibility. This responsibility contributed to their ability to maintain their health, mitigate the challenges associated with their health limitations, and accepting their role in health. In essence, older adults in this study described health activities and decisions as acts that they needed to do or "have to do" (Participant 12) as they felt that these factors and how they influenced their health was their responsibility.

Despite Health-Related Limitations - "I do what I want to do"

Older adults in this study emphasized their desire to do what they wanted to do and the ways that this shaped their self-reported health. In these interviews, older adult participants emphasized that the presence of chronic health conditions contributed to "stress", were considered an "annoyance", and overall were described to be "impactful" when they considered their health. However, these chronic conditions were not described to be what was most influential in shaping their self-reported health. Instead, these chronic conditions contributed to health challenges experienced both by the older adults themselves as well as something observed among peers (e.g., friends or neighbours) and family. While older adults assigned different levels of importance to their physical, mental, and spiritual health, they consistently identified the importance of doing what they wanted to do, despite health-related limitations. This notion of "do[ing] the things that I want to do" was echoed across many of the interviews using this phrasing in some form. For one participant, health involved an ability to enjoy activities that they like doing:

> "I guess [health is being] able to enjoy doing my activities, which includes seeing my family, still driving, still walking, hiking, still being able to do the activities I like doing." – (Participant 13)

For another participant, health was simply doing what they wanted to:

> "All of these things contribute to my health. I've got a few problems but, you know what? I'm okay. I can do what I want to do." – (Participant 01)

Health-related limitations included challenges associated with functional decline, taking medications that were considered burdensome or expensive, or the need for support (e.g., finances, time) to manage their health issues often stemming from chronic conditions. For a few participants, having no health-related limitations was reflected in their ability to do what they wanted to do and central to their definition of good health. For those participants, the absence of broader health-related limitations provided them opportunities to continue to do what they wanted to do, despite the challenges that they might otherwise experience or observe in others. For one participant, despite the limitations cited in relation to age and the presence of chronic conditions, the things that they felt were important in life were still doable:

> "I can't expect to do something at almost 70 that I'd done at 40. That's a bit unrealistic. But I don't have to worry about many things. I can go to fitness classes, I go to an hour of fitness every day. I can keep up with my grandkids playing ball, I have great social interactions, I have skills and I can do stuff… I can still do embroidery and sewing. I sleep well and I don't particularly feel frail because I can still do the stuff I want to do. That's health to me." – (Participant 06)

For this participant, emphasis was placed on those things that they valued in relation to the physical, social, and psychological aspects of health. While several participants described health more holistically, many others focused on their physical health. As an example, when asked what "very good" health meant to one participant, they responded:

> "It means that I can get up and do the things that I want to do, that I need to do, most of the time. It means that I don't take many medications, that I don't have issues like high blood pressure or health problems or anything serious like that." – (Participant 08)

The absence of disease and required medication, viewed as threats to their health by this participant, emphasizes the focus of many of the participants on the physical domain of health to achieve activities that they desire (e.g., attending church, visiting family, running errands). In summary, older adults identified that while physical and functional limitations or challenges may be present as a result of chronic conditions or other health challenges, their ability to otherwise engage in what they "want to do" was an important factor influencing their self-reported health.

Personal Strengths - "The way you think"

Participants identified many personal strengths that shaped how they perceived their health – especially as it related to their affect and emotional state. These strengths varied from attributes such as being able to "ask for help" (Participant 09), to personality traits such as flexibility, "positivity" (Participant 14), or stubbornness, and included characteristics such as "optimism" (Participant 02) and intelligence. These personal strengths contributed to a sense of control when thinking about how they perceived their health as well as served as resources to draw upon to optimize their health.

Participants viewed personal strengths as contributing to a sense of control when rating health status. Several participants described this sense of control as a product of the "skills" that they possessed:

> "I think I am in control of most things when it comes to how I view my health. In order to be in control of something, you have to have the skills for it. I am really good at bringing people together. I'm a social butterfly. So I stay close to people who are positive so that I can continue to be positive. That is how I keep my strength, how I keep my positive view of health." – (Participant 09)

While these skills and traits differed among the participants, a consistent theme was that participants were able to apply these skills and traits to interpreting their health. For example, one participant described how their personal strengths helped them to take responsibility and control how they perceived their health:

> "I've always been very independent. I've always been very self-reliant. I have carried those things with me now and so, because of those attitudes that I have, it impacts how I lead my life and how I approach my health. It impacts how I approach maintaining my health." – (Participant 02)

Personal strengths were described as influencing the way that participants self-reported their health. For one participant, their personal strengths served to encourage them in their day-to-day life:

> "Well, my guess is that it is the brain and the way you think. I have a friend across the road, she uses a walker, and she's always moaning and groaning about her pain. Most times, if I can get out of bed and get moving, I feel fine. I'm motivated like that. That's another one of my strengths! [Laughter] I will push myself to go to church, to get groceries, but she just sits and watches television. I can't do that. So, when I think about my health, I think it's positive because, like I said, it's all in the way you think." – (Participant 04)

For another participant, their personal strengths were described as the mental state or outlook through which they perceived health and all that contributes to it. This included an ability to be optimistic, even when health challenges were present.

> "I am an optimist. I don't let things get me down. I just carry on with whatever issue it is or whatever problem crops up. I just go on." – (Participant 08)

Viewing personal strengths as resources to draw upon applied to individual, social, and environmental factors reported by participants and largely reflected skills acquired throughout participants' lives. For example, drawing upon motivation to attend church or other social gatherings or using a desire to maintain independence to perform house upkeep all required the activation of various personal strengths. These personal strengths (e.g., seeking out and surrounding yourself with positive people) further contributed to how self-reported health was shaped from an individual, social, and environmental perspective.

Many of the personal strengths described in the interviews reflected abilities and traits commonly attributed to resilience. These included older adults identifying themselves as a problem-solvers, optimists, and being committed to learning. Several of the older adult participants described themselves as being resilient:

> "I think I am resilient. I have this ability to overcome and carry on and adjust. There have been times where I have had to adjust, and overcome, to bounce back, survive. I'm a survivor and I have had many tests, especially as it comes to my health, that have confirmed in my mind that I am pretty resilient." – (Participant 11)

> "I have the fortitude to do it and keep at it or I figure it out in the long term. I am resilient and able to keep doing what I need to do and be positive about it." – (Participant 06)

Other participants alluded to the role of resilience in their health and the ways in which their previous life experiences contributed to the presence of resilience:

> "Well, I think my health was influenced by my upbringing. The types of things that you live through as a young person growing up, well, um, life, you know? It teaches us things. Sometimes it teaches us good things and other times it teaches us bad things. Everybody is dealt a certain hand and it's what you choose to do with it." – (Participant 2)

When considering how older adults report their health status, these personal strengths, whether considered to contribute to a sense of control or as a resource, helped to inform and influence their self-reported health. Despite there being a great deal of variation in the individual strengths that participants described, there was consistency in how these strengths shaped self-reported health. In summary, self-reported health was shaped by older adults' described ability to draw upon their personal strengths to adapt to health challenges.

Comparison and Learning from Others: "Looking around at other people"

Older adult participants indicated that comparing themselves to others, including friends and family or even to themselves as younger adults, influenced their self-reported health. For most participants, this comparison was described as helpful when thinking about their health as it served as a reminder of what is important, as a learning opportunity, as well as a benchmark to measure their own progress or current status.

Participants' self-reported health was described to be influenced by comparing themselves to others who they perceived to be in good health. This included comparing their current health status to their self (e.g., as a younger adult) and a recognition of the need for increased awareness regarding health as they age:

> "I think as you get older you become more aware of it. It's not something that I really thought about when I was younger. As I have aged, I have become more aware of what I need to do to maintain my health. It's changed because of that recognition." – (Participant 02)

Comparing themselves to others provided participants with the "perspective" (Participant 08) needed for rating their own health. While this comparison was described as serving a positive purpose in informing self-reported health, participants also described challenges or consequences stemming from this:

> "I am always looking around at other people. A lot of my friends, for example, they're experiencing health challenges, and I feel badly for them, but at the same time I feel grateful I don't have those particular challenges. I feel bad saying that but it's the truth. Now, they probably feel the same about my challenges, though." – (Participant 11)

> "I'm in this uke [ukulele] group and well, many of them are, I'd say, about six years older than me. I watch them, I watch them a lot. And I watch for, like, am I getting like this? And then, among the women who are in a similar age group as me, there is a quiet, well, it's not a competition, that's not the word, but we want to hold up our end. I think it's healthy even if I sometimes question why I do it. I adore these women. I depend on them. It is about learning from each other I think."
> – (Participant 10)

Several participants described this idea of learning from their friends, family, and even strangers through observation. This often took the form of watching how they handled health challenges in their life. For some, this involved observing positivity concerning health, even when it didn't necessarily make sense to them:

> "I have friends who are so friggin' positive, you know? So much so that I think, 'How can you be this positive?' They have energy and

> their health is not necessarily good but I think that makes a difference. Especially as we age, I think we notice other people. Even me, with my bad knees, I think, well, and it’s terrible to say, I am grateful that I am not in a wheelchair.” – (Participant 03)

For other participants, comparison included observing tenacity in the face of health challenges:

> “I have two close friends, and I think that they are not as healthy as me. One has diabetes and is taking a bunch of medications for that and the other one is not as healthy either, but she’s motivated to be healthy. She is starting to have physical limitations though. It is motivating to see that while it slows her down, it doesn’t stop her.” – (Participant 13)

Lastly, comparison was described as a means for participants to benchmark their own progress. This included feelings of being grateful for their health and the people that they observe, “I can associate with healthy people, I am grateful for that” (Participant 04), as well as times when they were proud of their health or quality of life:

> "I was in New York City and, well, this was 3 years ago, and we were coming up out of the subway, and I remember, I was with my daughter-in-law’s mom, and I came running up out of the subway and I ran up the stairs because I can run up the stairs. I didn’t even think to look where she was, but she was at the bottom of the stairs. I remember thinking two things. The first was how unempathetic I was – that I had just run up the stairs and it was obvious that she could not. But the other

> thing I thought was that I was so proud of myself. Like, I just ran up those stairs!" – (Participant 10)

In summary, "looking around" (Participant 11) helped to shape older adults' perspectives on health, contributed learning opportunities to guide future health decisions, and served to measure their own health status. This comparison, while not always viewed as positive by the participants, was an important means by which they assessed their health and served as a lens to understand how other factors may be shaping their health.

Discussion

The purpose of this qualitative case study was to explore the influence of individual, social, environmental, and resilience factors on self-reported health among community-dwelling older adults. Through the completion of 15 qualitative interviews, four themes were identified. These included: 1) health is a responsibility, 2) despite health-related limitations, 3) personal strengths, and, 4) comparison and learning from others. These study findings have generated several novel contributions relevant to clinical practice and policy.

Emphasis on Individual, Social, and Environmental Factors

The first two propositions of this study were related to the emphasis placed on individual, social, and environmental-level factors as shaping self-reported health by the older adult. The first proposition was that community-dwelling older adults would emphasize individual-level factors when describing what influences self-reported health. Building on this, the second proposition was that during times of adversity, social and environmental factors would be emphasized as shaping self-reported health. Supported by these findings and consistent with the literature, health and wellness among these older adults was described as a priority (Song &

Kong, 2015), a responsibility (Trentini et al., 2012), and reflected their desire to do what they wanted to do, and needed to do, even for those experiencing health-related limitations (Noghabi et al., 2013). Previous research has identified that older adults define health as something affected by genetics, their environment, health services, and lifestyle often with equal emphasis on physical, mental, social, familial, spiritual, and economic wellness (Noghabi et al., 2013). In this study, older adults emphasized their independence and the role of individual-level factors in shaping self-reported health, including their physical functioning and abilities, across all four identified themes. This included viewing health itself as a responsibility, engaging in important activities despite health limitations, applying and developing personal strengths, and comparing themselves to those around them with the intention of benchmarking their own health or progress. Independence was framed by these older adults with a clear focus on their values and goals as they related to health.

In the Lifecourse Model of Multimorbidity Resilience, health is described as an interplay between individual, social, and environmental resource systems with equal emphasis on each of these systems (Wister et al., 2016). In this study, while each of these resource systems was described, the focus on individual-level factors seemed to be to acquire or activate social, environmental, or additional individual-level factors. This was illustrated when older adults were describing health challenges and the ways in which their ability to still engage in social or environmental-level activities (e.g., visit with friends) shaped their self-reported health. Illustrative of this point, one participant, when discussing their strength in "bringing people together" went on to describe how they intentionally surrounded themselves with positive people (i.e., a social-level factor) so that they could "continue to be positive" for their health. This finding supports the literature that has identified the importance of independence for health among older adults (Bryant et al., 2001; Ebrahimi et al., 2012; From et al., 2007; Song & Kong, 2015), and the connection between this independence and ability (Song & Kong, 2015). These individual-level factors, inclusive of personal strengths, were emphasized when older adults described what influenced their self-reported health, however, this emphasis was in the context of the broader picture of their lives. In support of the first proposition, this finding demonstrates that individual-level factors are tied to not only to how older adults perceive their health, but, and in support of the second proposition, also the ways in which they go about acquiring and activating social and environmental-level factors during times of health challenge.

The Role of the Lifecourse

The third and final proposition posited that factors identified as shaping self-reported health by older adult participants would be influenced by their previous experiences. Findings identified in this study supported this proposition as it was their own identified personal strengths and individual-level factors, acquired over their lifetime that shaped how they perceived the influence of various other factors and resources. While the identification of personal strengths among community-dwelling older adults is not unique to this study (Monsen et al., 2014; Russo-Netzer & Littman-Ovadia, 2019), identifying that older adults both activate and apply personal strengths when assessing their health is a unique contribution to the literature. To date, personal strengths among older adults have been reported as strategies to cope with health challenges and have included traits such as openness, an ability to savour experiences, and possessing a positive attitude (Russo-Netzer & Littman-Ovadia, 2019). However, in this study it was identified that personal strengths extended beyond just coping. Rather, this work has described the importance older adults place upon their personal strengths, their readiness to activate and apply them in health contexts, and the ways that these strengths contribute to their resilience.

In further support of the third proposition, study participants emphasized the lifecourse throughout the interviews, but especially when discussing the presence of resilience as one of their personal strengths. Participants shared detailed stories from both their childhood and their adulthood that they felt contributed to their resilience and how they defined their health. While some participants identified that resilience may be present at birth, the majority described it as something that they developed over their lifetime. Participants emphasized the role of experiences and previous challenges as having cultivated resilience and, like their other personal strengths, resilience was something activated and applied as needed to overcome health-related challenges. This description is consistent with the literature and supports the notion that resilience can be developed over time and that life experiences can protect older adults against the negative impacts of chronic illness (Rybarczyk et al., 2012; Wild et al., 2011). As described in the literature and the Lifecourse Model of Multimorbidity Resilience, this understanding and description sets up the possibility that there may be a “resilience trajectory” (Wister et al., 2016) where previous life experiences related to overcoming illness adversity may contribute to the older adults’ ability to respond to challenges as they age (Windle et al., 2020).

Another example of the influence of the lifecourse was the finding that older adults in this study compared themselves to and learned from others. This included comparing themselves to their former self at different points in their life. Comparison to self and to others is consistent with the literature and speaks to the ability of older adults to learn, reflect, and develop as it concerns their health (Kaplan & Baron-Epel, 2003). This comparison has been described to occur in both downward (i.e., those they perceive to be worse off) and upward (i.e., those they perceive to be better off) directions (Bennett et al., 2017). In comparison to younger adults, older adults tend to consider their health within the context of age-related changes (Tan et al., 2014) including independence, capacity to manage symptoms, an ability to accept and adjust to change, and the presence of energy (Song & Kong, 2015; Henchoz et al., 2008; Noghabi et al., 2013). These findings are unique in that the emphasis on comparison, present across study findings, was not specific to upward or downward comparison, but also included inward comparison. This finding helps to contextualize the ways which older adults engage in learning not only from others, but also themselves and further supports the idea of a resilience trajectory in life.

Implications

The four themes identified in this study help explain the ways in which older adults describe individual, social, environmental, and multimorbidity resilience factors as shaping their self-reported health. These themes, while distinct, are highly interconnected and emphasize the ways in which these factors are crafted into resources (e.g., multimorbidity resilience) over the life course. This interconnectedness, accentuated by recurring concepts such as independence, control, and psychological health, demonstrates the nuance and complexity of understanding health, and more specifically, how factors shape self-reported health among this population. For example, several of the quotes included in the findings could have been used to illustrate multiple themes. This includes this included quote about personal strengths:

> “I think I am in control of most things when it comes to how I view my health. In order to be in control of something, you have to have the skills for it. I am really good at bringing people together. I’m a social butterfly. So I stay close to people who are positive so that I can continue to be positive. That is how I keep my strength, how I keep my positive view of health.” – (Participant 09)

While this quote was selected to initially illustrate the skills and traits that participants identified and the ways that they applied these skills to interpreting their health, this quote could have easily also been used to discuss control and independence (i.e., health is a responsibility) as well as learning from positive people in their life (i.e., comparison and learning from others).

For these older adults, health is not an abstract concept, but instead, one that directly links to their function, roles, strengths, and learning. Stemming from this work and in recognition of the range of strategies that older adults use to influence their health, there is a need for further research to explore how older adults describe applying and activating personal strengths during times of health challenge. This ability to accept and adjust to change, reflective of resilience and relevant to the presence of multimorbidity, offers opportunity for future research to further study the ways by which older adults engage in comparison and how this learning from comparison may inform health decision making and action. Despite widely accepted understanding of the importance and potential of strengths-based approaches, there exists opportunity to develop this area of focus. This work has direct application in practice, policy, and research and could contribute important understanding needed to develop and test interventions that build on personal strengths as well as better understand under what conditions (e.g., social or environmental influences) these strengths are most impactful.

Further, there is a need for greater understanding of the role of and the potential consequences of feeling responsible for their health. Identified as a theme in this study, health as a responsibility introduces a potentially problematic narrative for older adults – especially as the likelihood of developing chronic conditions, and thus the need for self-management, increases in older age (Suls et al., 2019; Vertrano et al., 2018). In the literature, health, and even definitions of health, are described as both socially and contextually constructed (Jylhä, 1994). Examining the strong emphasis in this work on independence and responsibility from a sociocultural lens, there is a potential that independence, privileged and valued at a societal level has shaped this emphasis of responsibility and independence in health. This is in stark contrast to other cultures where health and wellbeing, particularly for older adults, is often viewed as a family or community responsibility (Löckenhoof et al., 2010) as opposed to an individual one. While self-management approaches promote goal setting, motivation, and accountability, there may be risk in older adults overemphasizing their responsibility for maintaining health or mitigating health challenges – especially considering the prevalence and burden of multimorbidity among this population. Considering the importance of concepts like responsibility and independence that underscored findings across this study, there is a need to better understand the ways that community-dwelling older adults perceive responsibility as it relates to their health and how their independence, socialized and learned throughout the lifecourse, may shape access to service and health decision making.

Study Limitations

This study was limited by low ethnocultural and gender diversity in the study sample. Considering the highly individual nature of health there exists an opportunity to further understand how individual, social, environmental, and resilience factors influence self-reported health among a more diverse sample. This may contribute further clarity regarding certain study findings – especially those related to independence that may be highly impacted by culture or gender. A second limitation of this work relates to the alignment between the selected framework and the study objective. In using a lifecourse model that emphasizes a trajectory of health while aiming to understand a point in time measure like self-reported health, challenges regarding the linkages possible and the ability to advance the relevant literature present. This included an inability to determine where individuals were in the model regarding potential adversity or reintegration. Considering the second proposition and its emphasis on adversity, this inability to accurately link a point in time within a process-oriented model may limit study findings. Additionally, due to the SARS-COV-2 pandemic, challenges regarding study recruitment, data collection, and analysis were experienced. While data were collected via telephone interviews, it is likely that in-person data collection, or interviews not occurring during a global pandemic, could yield different results – especially considering the health-related emphasis of the study.

Conclusion

Community-dwelling older adults perceived health and the individual, social, and environmental factors, including those related to multimorbidity resilience, as shaping their assessment of health through four key themes: 1) health is a responsibility; 2) health is doing what you want to do despite health-related limitations; 3) the application and activation of personal strengths, and; 4) through comparison and learning from others. Self-reported health remains a highly predictive measure of future morbidity and mortality among this study population. Findings from this work offer additional understanding of this important measure and contribute key areas for future research to shape policy and practice.

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CHAPTER SIX

Title: Self-Reported Health among Community-Dwelling Older Adults: A Multimethod Study to Understand the Complexity and Role of Adaptation to Health Adversity

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Abstract

Objective: The objective of this study was to advance understanding of self-reported health among community-dwelling older adults.

Methods: This multimethod study combined findings from three previously completed research studies in a matrix analysis. This included a scoping review, a cross-sectional analysis, and a qualitative case study.

Results: This second-level analysis generated two meta-inferences. First, the factors that shape self-reported health are multidimensional and complex. Second, that adaptation to health adversity, resulting from experiences acquired over the lifecourse, shape how older adults perceive their health.

Discussion: Findings from this work highlight a need to use and apply self-reported health in clinical practice; a need for whole person care; and an opportunity to further study self-reported health both longitudinally and to further understand the well-being paradox.

Key words:

Self-reported health; Older adults; Health; Multimorbidity; Multimethod

Introduction

In many countries, health and social innovations have contributed to population longevity (Kowal et al., 2016). While increasing longevity is generally viewed as a positive societal outcome, one of the repercussions of global aging is the increasing prevalence of multiple chronic conditions among older adults, including those living in the community (Marengoni et al., 2011; Melis et al., 2014). The presence of multimorbidity (i.e., two or more chronic conditions) often increases the complexity of an individual's health status and can challenge the way health is perceived and assessed (Warner et al., 2012). Currently, among older adults (≥65 years), health is measured using objective health measures (e.g., diagnosed conditions or outcomes on performance tests) or subjective health measures such as self-reported health. Self-reported health captures an individual's sense of their own well-being using self-rated assessments or rankings. Subjective measures are widely used in epidemiological research because of broad availability, and in the case of self-reported health more specifically, because of its ability to predict morbidity and mortality among older adults (Banerjee et al., 2010; Benyamini et al., 1999; Idler & Benyamini, 1997; Jylhä, 2009; Knäuper & Turner, 2003).

A desire to optimize older adults' health and support successful aging has contributed to an increased research interest in the ways that older adults manage multimorbidity and adapt to health challenges (Tkatch et al., 2017). This is because objective health measures, such as the number of chronic conditions among those with multimorbidity, can provide important information about the health status of an individual (Miller et al., 2021). When comparing the level of agreement or congruence between objective and subjective health measures in older adults over time, research suggests that objective health measures tend to show a decline in health and functional status for older adults (e.g., an increase in chronic conditions as we age), while subjective indicators do not always show this same decline (Abma et al., 2021; Hong et al., 2004; Wettstein et al., 2016). Further, there exists a subgroup of older adults that, despite the presence of health challenges (e.g., multimorbidity), continue to report their self-reported health high. This incongruence is termed the well-being paradox (Rowe & Kahn, 1987). Potential factors contributing to the well-being paradox in older adults include the presence of optimism (Wettstein et al., 2016), lower levels of certain personality traits, such as neuroticism (Duberstein et al., 2003), the ability to apply life experience to health challenges (Wettstein et al., 2016; Wister et al., 2016) and the presence of resilience acquired through the lifecourse (Wister et al., 2016). Despite these potential explanations, little is known about why some community-dwelling older adults with high levels of multimorbidity paradoxically assess their health positively. This is due, in part, to a need to better understand the well-documented relationship that exists between the number of chronic conditions and self-reported health. While the literature has clearly identified that as the number of chronic conditions increases, self-reported health decreases (Whitmore et al., 2020), what is shaping this relationship, and how it is being shaped, remains poorly understood. This understanding is important as the health status of older adults, often captured as the number of chronic conditions present (Ingram et al., 2021), offers important information regarding the health and social care needs of this population.

Background

This multimethod study addresses this gap in knowledge by advancing understanding of self-reported health among community-dwelling older adults. This analysis builds on a series of three studies, of which a summary of each is described below.

Factors Associated with Self-Reported Health among Community-Dwelling Older Adults: A Scoping Review

Many studies have attempted to identify the factors associated with self-reported health across different populations. Despite this broad evidence base, there was little consensus on what factors are associated with self-reported health among community-dwelling older adults. To facilitate a synthesis of this evidence base, and to advance a better understanding of these factors, a scoping review regarding factors associated with self-reported health among community-dwelling older adults was completed (Whitmore et al., 2020).

In total, 42 factors were identified as associated with self-reported health from these studies including those specific to sociodemographic variables, physical and mental health, health-related behaviour, and emotional status (Whitmore et al., 2020). The factors most frequently identified as associated with self-reported health in this literature included: the number of chronic conditions, the presence of depressive symptoms, level of education, functional status, and social participation (Whitmore et al., 2020). While not as frequently cited in the literature, several emotional factors, including affect, health-related control beliefs, and resilience were also associated with self-reported health (Whitmore et al., 2020).

Factors that Shape and Predict High Self-Reported Health: A Cross-Sectional Study

A quantitative cross-sectional study of over 21,000 community-dwelling older adults was completed using baseline data from the Canadian Longitudinal Study on Aging (CLSA) (Raina et al., 2009) to: 1) explore the relationship between multimorbidity and self-reported health and identify the factors that moderate or mediate the relationship; 2) identify factors associated with high self-reported health, and 3) determine whether these same factors were associated with high self-reported health among those with high levels of multimorbidity to better understand the well-being paradox (Whitmore et al., 2022a). Sociodemographic, health-related, and resilience variables identified in the scoping review that were available in the CLSA datasets were included in the analysis. Sociodemographic factors included sex, age, marital status, level of education, household income, and current dwelling type. Health-related factors included depressive symptoms using the Centre for Epidemiologic Studies Depression Scale 10-item (CES-D-10) (Andreson et al., 1994) as well as a measure of community mobility using the Life Space Index (Baker et al., 2003). Resilience factors were measured using a resilience index that maps functional (i.e., activities of daily living), social (e.g., social support), and psychological (e.g., distress) resilience scores (Wister et al., 2018) .

The study found that almost all of the factors, including multimorbidity were independently associated with self-reported health. However, none of these factors moderated or mediated the relationship between multimorbidity and self-reported health (Whitmore et al., 2022a). The top five factors showing the strongest association with self-reported health in the general older adult population and those with the well-being paradox were: multimorbidity (measured by number of chronic conditions), female sex, higher Life Space Index score, higher functional resilience, and higher psychological resilience. Notably, four of these top five predictors are modifiable: number of chronic conditions, Life Space Index score, functional resilience score, and psychological resilience score.

Understanding the Influence of Factors on Shaping Perceptions of Health: A Qualitative Case Study

A qualitative explanatory case study was completed concurrently with the cross-sectional study (Whitmore et al., 2022b) to explore the perceptions of older adults regarding their health and how these factors influence it. This included a specific focus on factors related to resilience.

Adults were eligible to participate if they were: 65 years of age or older, lived in the community (i.e., not in a long-term care home or institutional setting), and spoke English. Fifteen older adults participated. Data analysis followed Yin's five iterative stages for case study research (Yin, 2010) and Braun and Clarke's reflexive thematic analysis (2021).

Four themes were identified from the findings that described how older adults perceived health and individual, social, resilience, and environmental factors as shaping their assessment of health. These included: 1) taking responsibility for health; 2) doing what you want to do despite health-related limitations; 3) applying and activating personal strengths, and; 4) learning from comparison. These themes were highly interconnected and highlighted how these factors, identified as shaping self-reported health (e.g., resilience, personal strengths) are influenced by previous experiences over the lifecourse. This included how previous challenges, such as adversity associated with living with chronic conditions, helped them to overcome future health challenges. This ability to both activate and apply resources, especially as it related to resilience, was important to older adults and how they assessed their health. Further, these findings identified the role of independence, present across all themes, and demonstrated the complexity of health and self-reported health among this population.

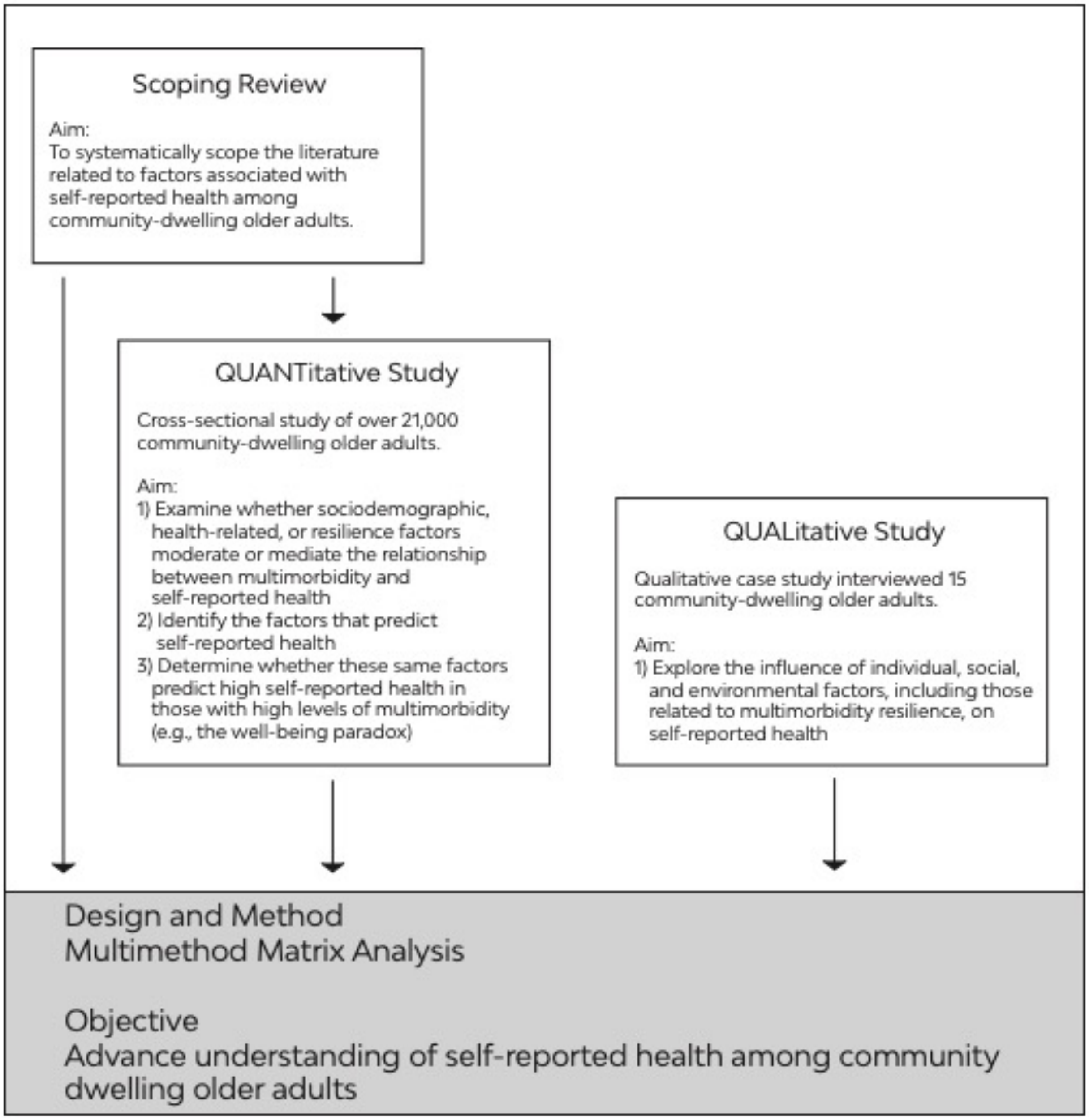
Objective

The overall purpose of these studies was to advance understanding of self-reported health among community-dwelling older adults. This included: 1) identifying the factors associated with self-reported health among this population, 2) identifying the factors that predicted high self-reported health among older adults both without and with high levels of multimorbidity (i.e., the well-being paradox), and 3) understanding how older adults perceive these factors as influencing their self-reported health. On their own, each of these findings serve to advance the literature on self-reported health among community-dwelling older adults. However, there exists an opportunity to bring these findings together to further advance our understanding of self-reported health and, from the combined findings, to pose key practice, policy, and research recommendations.

Methods

The study objective was addressed using a multimethod research design where the purpose of bringing together findings of each complete and standalone study was to compare and complement; not integrate (Plano Clark & Ivankova, 2016; Stange et al., 2006). Complementarity in this multimethod research, extending beyond triangulation, was sought to not only identify overlapping findings in the quantitative and qualitative research studies, but also to gain understanding of the expansive facets of this work. In the published protocol for this research, the design was originally described as a mixed methods study (Whitmore et al., 2021). However, as the project unfolded, an emergent design with flexibility was necessitated by the data and findings, the study context, and the evolving understanding of the phenomenon under study (Creswell & Plano Clark, 2018; Morse, 2003). For this reason, a pivot from a mixed methods study design to a multimethod study design was made.

This multimethod study used multiphase combination timing where parallel research projects occurred both sequentially (i.e., a scoping review that informed the cross-sectional study) and concurrently (i.e., co-occurring quantitative and qualitative case study) (Creswell & Plano Clark, 2018). These complete projects are depicted in Figure 1.


Scoping Review

Aim:
To systematically scope the literature related to factors associated with self-reported health among community-dwelling older adults.

QUANTitative Study

Cross-sectional study of over 21,000 community-dwelling older adults.

Aim:
1) Examine whether sociodemographic, health-related, or resilience factors moderate or mediate the relationship between multimorbidity and self-reported health
2) Identify the factors that predict self-reported health
3) Determine whether these same factors predict high self-reported health in those with high levels of multimorbidity (e.g., the well-being paradox)

QUALitative Study

Qualitative case study interviewed 15 community-dwelling older adults.

Aim:
1) Explore the influence of individual, social, and environmental factors, including those related to multimorbidity resilience, on self-reported health

Design and Method
Multimethod Matrix Analysis

Objective
Advance understanding of self-reported health among community dwelling older adults

Figure 1. Multimethod research design

Multimethod Matrix Analysis

A matrix analysis is a second-level analysis where previously analyzed quantitative and qualitative data are compared for the purposes of complementarity (Wendler, 2001). This analysis involves the identification of common concepts, present across both sets of findings, as well as those concepts that diverged or expanded upon one another organized in a visual display known as a joint display (Fetters, 2020). By presenting both quantitative and qualitative findings side-by-side in a joint display, how findings converge and expand upon one another can be easily observed. From these comparisons, summative meta-inferences are then generated (Bazeley, 2018; McCrudden et al., 2021). These meta-inferences draw upon all data, representing more than just a sum of the individual quantitative and qualitative components of study (Creswell & Plano Clark, 2018; Guetterman et al., 2015). In bringing together these findings in a cross-cutting analysis there is an opportunity to not only advance further understanding of the phenomenon of interest but also to increase the transferability of these findings to practice, policy, and research.

Multimethod Interpretation

Analysis of the findings from the three studies generated two meta-inferences: 1) the factors that shape self-reported health and the explanations for how these factors shape the measure are multidimensional and complex; 2) adaptation to health adversity, resulting from experiences acquired over the lifecourse, directly shapes how older adults perceive their health. These meta-inferences alongside findings from the completed quantitative (Whitmore et al., 2022a) and qualitative (Whitmore et al., 2022b) research studies are presented in Table 1. In the first column, the meta-inference is identified. This includes a summary statement regarding the meta-inference to position the overall discussion. In support of the meta-inference posed, findings from the quantitative and qualitative studies are presented in the second and third columns, respectively.

Meta-Inference	Supporting Data	
	Quantitative Data	Qualitative Data
The factors that shape self-reported health are complex and multidimensional. Self-reported health is influenced not only by the chronic conditions (or level of multimorbidity) present, but also how older adults are able to mobilize, respond to, and activate modifiable resources (e.g., personal strengths or resources).	As the level of multimorbidity increased, self-reported health decreased (*F*(6)=751.44, *p*=<.0001). This relationship was not moderated or mediated by any of the sociodemographic or other health-related factors. All sociodemographic (sex, age group, education level, household income, marital status) and other health-related (depression screen, Life Space Index score) factors were independently significantly associated (*p*=<.0001) with self-reported health. The top five factors identified as predictive of higher self-reported health among community-dwelling older adults were: • lower level of multimorbidity (OR 0.75, CI 0.74-0.76) • female sex (OR 0.62, CI 0.57-0.68) • higher Life Space Index score (OR 1.01, CI 1.01-1.01) • higher functional resilience (OR 1.16, CI 1.14-1.19) • higher psychological resilience (OR 1.26, CI 1.23-1.29)	Older adult participants described health as influenced by being able to do what they wanted to do despite health-related limitations (e.g., challenges from existing chronic conditions). This included a desire to participate in social and environmental aspects of their lives: *"All of these things contribute to my health. I've got a few problems but, you know what? I'm okay. I can do what I want to do." – (Participant 01)* Additionally, several personal strengths were identified by older adults as shaping their self-reported health. These strengths ultimately contributed to a sense of control in how they viewed health as well as resources to draw upon to maintain their health: *"I think I am in control of most things when it comes to how I view my health. In order to be in control of something, you have to have the skills for it. I am really good at bringing people together. I'm a social butterfly. So I stay close to people who are positive so that I can continue to be positive. That is how I keep my strength, how I keep*

Meta-Inference	Supporting Data	
	Quantitative Data	Qualitative Data
	However, model fit diagnostics suggest that a lot of variation is still unexplained (Cragg Uhler's R^2=0.25) These same key factors were the top five predictors of higher self-reported health among the subset of older adults with high levels of multimorbidity (≥4 chronic conditions) (i.e., those with the well-being paradox). Four of these key factors (level of multimorbidity, Life Space Index score, functional, and psychological resilience scores) are potentially modifiable	*my positive view of health." – (Participant 09)* Participants also described health as a responsibility with emphasis on maintaining well-being, mitigating challenges, and accepting their role in health: *"[Health is] my responsibility, my need to take action and do what I have to do. That could be taking my medications properly, doing exercise, eating well, sleeping well, all of that." – (Participant 12)*
Adaptation to health adversity, resulting from experiences acquired over the lifecourse, directly shapes how older adults perceive their health Multimorbidity resilience is developed throughout the	Independent effects (*p*=<.0001) for each of the factors that comprise the functional, social, and psychological resilience scores as well as the scores themselves with self-reported health were identified. Functional and psychological resilience were two of the top five factors predictive of high self-reported health for those with and without high levels of multimorbidity (i.e., the well-being paradox)	Older adult participants indicated that they possessed personal strengths that are commonly attributed to resilience including being "problem-solvers", "optimists", and possessing a "commitment to learning". These personal strengths were described as shaping how they perceived their health (e.g., control) and were acquired over their lifetime. The influence of the lifecourse was also present in how older adults described interpreting their health in relation to others. This included

Meta-Inference	Supporting Data	
	Quantitative Data	Qualitative Data
lifecourse and contributes to how community-dwelling older adults respond to, and live with, health adversity. This, in turn, shapes how older adults assess their health status.		comparison both to others (e.g., family, friends, strangers) and to their younger selves. This comparison supported learning, aided in the acquisition of personal strengths, and contributed to resilience: *"I am always looking around at other people. A lot of my friends, for example, they're experiencing health challenges, and I feel badly for them, but at the same time I feel grateful I don't have those particular challenges." – (Participant 11)* In addition, several older adults also described themselves as being resilient: *"I think I am resilient. I have this ability to overcome and carry on and adjust. There have been times where I have had to adjust, and overcome, to bounce back, survive." – (Participant 11)*

Table 1. Joint display
Note: The quantitative and qualitative findings presented in this table have been published elsewhere (Whitmore et al., 2022a; 2022b).

Self-Reported Health is Multidimensional and Complex

Self-reported health among community-dwelling older adults was shaped by individual health contexts as opposed to strictly the absence or presence of illness or disease. This context-dependent view of health, what shapes it, and how it is shaped, is reflected in the top five factors that predict high self-reported health as well as the emphasis on personal strengths on health. Findings from the cross-sectional study show that the level of multimorbidity was the strongest predictor of high self-reported health among the general population of community-dwelling older adults as well as those with the well-being paradox. However, in the qualitative case study, older adults did not identify their chronic conditions as shaping their perception of health. Instead, in the qualitative case study, older adults emphasized their desire to do what they wanted to do despite health limitations, the ways that they were able to mobilize their personal strengths to maintain health, and their perceived responsibility for maintaining health and mitigating health challenges. Overall, the results from the quantitative and qualitative analyses suggest that the factors that shape self-reported health are multidimensional, complex, and include more than just the level of multimorbidity. This is supported by model fit diagnostics from the completed quantitative analysis, the modifiable nature of the factors identified as predictive of high self-reported health, and by the way that older adults were able to mobilize, respond to, and activate identified resources (e.g., personal strengths or resources).

The results of the cross-sectional study show that the top five factors predictive of high self-reported health among the general population of community-dwelling older adults were the same as those with the well-being paradox. These five factors included: female sex, lower levels of multimorbidity, higher Life Space Index score, higher functional resilience score, and higher psychological resilience score. While these factors were consistent across the two models, both models left a substantial amount of variation unexplained (Cragg Uhler's R^2=0.25). This meant that while these findings confirm the extensive evidence that has described the relationship between multimorbidity and self-reported health among older adults (Banerjee et al., 2010; Idler & Benyamini, 1997; Mossey & Shapiro, 1982; Murata et al., 2006; Pinquart, 2001) along with other predictive factors, much still remains unknown about this relationship. This includes understanding what is unique about older adults with the well-being paradox compared to the general population of older adults.

Unique to the cross-sectional analysis in this multimethod study is the finding that none of the sociodemographic or health-related factors moderated or mediated the relationship between the level of multimorbidity and self-reported health among community-dwelling older adults. This is an important finding as it 1) emphasizes that the level of multimorbidity has a significant independent influence on self-reported health, and 2) highlights that while other factors previously thought of as protective (e.g., social support) or harmful (e.g., depressive symptoms) independently shape self-reported health, these factors do not influence the relationship between the level of multimorbidity and self-reported health. Combined findings from the case study and cross-sectional study suggest that self-reported health is a function of a complex appraisal that includes individual health contexts, resources, and experiences.

To date, the literature tends to simplify the multidimensionality of self-reported health and alternatively focuses on the cognitive appraisal process that occurs when forming self-reported health ratings (Idler et al., 2004; Jylhä, 2009; Knäuper & Turner, 2003). While there is some literature that describes the role of emotions (e.g., optimism) in shaping self-reported health (Warner et al., 2012; Wettstein et al., 2016), there is opportunity from this work to further explore both emotion and affect. This focus on affect is supported by findings in both the quantitative and qualitative analyses. For example, in the cross-sectional study, psychological resilience, comprised of measures of distress, depression, and life satisfaction, was one of the top five factors predictive of high self-reported health. Further, an emphasis on personal strengths (e.g., positivity) in the qualitative study was described as influencing how individual, social, and environmental resources shaped assessments of health. While these findings may not clearly explain the factors influencing self-reported health or the presence of the well-being paradox, they help to provide a more complete understanding of the complex and multidimensional nature of self-reported health among this population.

Adaptation to Health Adversity Shapes How Older Adults Perceive their Health

Bringing together the quantitative and qualitative findings offers a unique contribution to the growing literature on the lifecourse and its' role in developing multimorbidity resilience and adaptation to health adversity among community-dwelling older adults. In the literature, resilience is a global term applied to the process by which people bounce back from adversity, reintegrate, and grow from experience (Resnick, 2014). Specific to older adults, resilience is often discussed in light of the presence of chronic conditions (Wister et al., 2016). Multimorbidity resilience, as identified in this combined analysis, involves a comparison to others and/or themselves, shapes how older adults assess their health and may advance understanding of the presence of the well-being paradox among this population.

Findings from the cross-sectional study reveal that multimorbidity resilience, including functional and psychological domains, shape self-reported health. This included these factors as both independently associated with self-reported health, as well as being two of the top predictors of high self-reported health. Similarly, in the qualitative analysis, older adults described themselves as possessing personal strengths that are commonly attributed to resilience including being “problem-solvers”, “optimists”, and having a “commitment to learning”. They described personal strengths as shaping how they perceived their health and shared stories about how these strengths were acquired over their lifetime. They attributed their high self-reported health and ability to “bounce back” from health challenges related to their chronic conditions or other health adversity to this resilience.

Findings from the case study identified the importance of comparison for older adults, both to a younger version of themselves and to others. In the literature, comparison among older adults as a means of benchmarking health has been described as both an “upward” and “downward” process (Bennett et al., 2017). This means that for some older adults, they tend to compare themselves to those who they perceive to be worse off than themselves (i.e., downward comparison), as well as compare themselves to those who are more physically fit or capable (i.e., upward comparison) (Bennett et al., 2017). In addition to this upward and downward comparison process, older adult participants in the qualitative case study uniquely described an inward comparison process as they reflected on their health in the context of their younger selves. This inward comparison served to provide a new perspective and learning on health and health-related adversity and contributed an appreciation for their current health status despite health limitations. This learning and reflection was available because of previous life experiences and contributed to the development of personal strengths, and for many, characteristics or the presence of resilience. This interpretation is supported by the literature that has linked the relationship between savouring, described as the ability to attend to past experiences and use this reflection to regulate feelings, and higher levels of subjective well-being among older adults (Smith & Hollinger-Smith, 2014).

While evidence supports the role of comparison in shaping how older adults define their health (Henchoz et al., 2008), this study has uniquely identified the role of inward comparison as a process that may influence the development of multimorbidity resilience and how this contributes to self-reported health. The emphasis on inward comparison as a psychological process is supported by the cross-sectional study findings, which emphasized the role of psychological resilience (i.e., life satisfaction) as a key predictor of high self-reported health. Considering the described role of comparison in shaping self-reported health, these resources have the potential to influence the comparators available (e.g., seeking out and finding positive friends and family) and thereby influence the affect and emotions of the older adult (e.g., positive reflections of themselves, higher life satisfaction, lower distress). This comparison, influenced by the resources available, may contribute to health-related control beliefs (e.g., internal locus of control, feelings of responsibility), also known to shape self-reported health among older adults (Nützel et al., 2014; Schüz et al., 2011). While it is acknowledged that negative experiences may shape overall health perceptions (i.e., as the level of multimorbidity increases, self-reported health decreases), positive experiences, such as the birth of a grandchild, similarly influence these health-related control beliefs. These positive experiences have been demonstrated to positively influence health and health outcomes (Drury et al., 2018).

Bringing these findings together suggests that instead of multimorbidity resilience being merely a response to health challenges, multimorbidity resilience instead is ever-present and applied not only during times of health challenge but in day-to-day life. This interpretation is supported not only by the quantitative and qualitative findings, but also in the literature which speaks to resilience not as a state, but instead as an adaptive process (Macleod et al., 2016;

Resnick, 2014; Ungar, 2008; Wild et al., 2011; Windle, 2011). While this process-oriented understanding of resilience is not new, these findings offer additional understanding of how resilience is enacted and acquired among older adults and further, how this resilience may shape perceptions of health. The role of upward, downward, and inward comparison, described in the qualitative findings, and supported by the literature advances understanding of how multimorbidity resilience may be acquired, and how this adaptation can shape self-reported health among community-dwelling older adults.

Implications

The purpose of this multimethod analysis was to combine previously analyzed quantitative and qualitative data to advance understanding of self-reported health among community-dwelling older adults. This analysis generated two meta-inferences. First, the factors that shape self-reported health are multidimensional and complex, and second, that adaptation to health adversity, resulting partly from experiences acquired over the lifecourse, shapes how older adults perceive their health. From these meta-inferences, several implications for practice, policy, and research have been identified.

Practice

For nursing and interprofessional teams, there is an ongoing need to better integrate broad (e.g., social, psychological, physical, mental) aspects of health assessments into daily practice. This includes a need to ask about self-reported health in clinical practice to assess health status more comprehensively and fulsomely to guide future care planning. The findings from the multimethod analysis add to the accumulating literature on the importance of the level of multimorbidity as a factor shaping self-reported health. However, these findings highlight that self-reported health is also shaped by factors beyond multimorbidity (Whitmore et al., 2020; 2022a). In clinical practice, the number of chronic conditions often serves as a measure of the health status of an individual (Ingram et al., 2021). However, this approach leaves much unknown about the person. In 1983, Kaplan and Camacho stated, "Increased emphasis on technological medicine has tended to result in less and less attention to what people say about their health. The strong relationship between perceived health and mortality would argue for increased attention to the meaning of such reports" (pg. 303). Fast forward to present day, and Miller et al. (2021) state something similar, "… despite the increasing clinical emphasis on the computerisation of conditions, diagnoses and investigations, there is still merit in doctors, who are interested in personalised medicine, asking patients how they feel about their health" (pg 12).

A key finding of this multimethod analysis is that self-reported health is a multidimensional and complex measure of health status that is influenced by more than just the number of chronic conditions present. While cross-sectional study findings identified five key factors that predict high self-reported health, these predictive models were weak and leave much still unknown about the factors shaping self-reported health. Further, when considering the qualitative findings from this research, the interconnectedness of the themes identified illustrate the complexity of how these factors influence self-reported health. Aligned with the recommendations posed by Kaplan and Camacho (1983) and the work by Miller et al., (2021), our findings support the continued need for including self-reported health as a key health assessment question when developing health and social care plans. Our findings identify that while we may not fully understand what is shaping self-reported health, asking this simple question can contribute important information beyond clinical measures (such as multimorbidity) about the older adult.

Important information acquired by asking community-dwelling older adults about self-reported health may identify higher risk individuals (e.g., future morbidity and mortality), that might otherwise not be identified through other objective health assessments. Self-reported health, which may be sensitive to undiagnosed or sub-clinical states for the older adult as well as other important non-clinical factors shaping future health outcomes, has the potential to guide future care planning or trigger more focused testing or assessment. This could include a need for additional pain assessment, identifying sleep challenges, or underlying psychological challenges. Further, through this probing about self-reported health, additional approaches or strategies may be initiated that are rooted in identified personal strengths or life experiences.

Findings from this study have identified that personal strengths (e.g., optimism, ability to problem solve) are described as bidirectionally tied to resilience, acquired throughout the lifecourse and reflective of the experience and expertise possessed by the older adult. Further, these findings have identified that personal strengths not only help the older adult in responding to health challenges directly, but also serve to activate other resources during times of health adversity. Conversations with older adults regarding resilience are critical considering the health-related adversity inherent to aging with multimorbidity (Resnick, 2014). The development and reinforcement of personal strengths and the associated emotional actions and responses, including optimism, humour, or savouring, are necessary at the individual level. Drawing upon this finding, motivational-style interventions such as motivational interviewing by the nurse or interprofessional team member can help to build a sense of manageability regarding health challenges (Ong et al., 2013; Resnick, 2014). Findings from this study add to the growing body of literature supporting the use of strengths-based care for chronic condition management (Waterworth et al., 2019). These findings also reinforce the need for the nurse and other interprofessional team members to partner with older adults in the identification and application of personal strengths. Since community-dwelling older adults access health and social care services from all sectors (e.g., acute, primary, tertiary care) and often from multiple services, this implication is far reaching.

Policy

In addition to the recommendation for nurses and interprofessional teams to base care planning on self-reported health, is the need for whole person care to guide health and social care policy and decision making for older adults. A key finding from this study was that community-dwelling older adults have developed and are developing the expertise needed to respond and manage their individual health needs. This is consistent with nursing research that describes older adults living and managing their chronic conditions as active agents in their own health (Loeb et al., 2003). This expertise, including their personal strengths and ability to adapt to health challenges, reflects their life experiences and the presence of resilience acquired over the lifecourse. Identified in this research is a need for whole person care, defined as the patient-centred use of health and social care resources to enhance health outcomes across all domains of health (Thomas et al., 2018), that reflects this expertise.

The well-being paradox exists when older adults with a high level of multimorbidity rate high levels of self-reported health. Paradoxes such as these are dramatic and pique interest in health research, however, it is important to note that older adults do not consider this reporting behaviour to be paradoxical. While this may or may not be problematic for the older adult, this seemingly simple misalignment represents a much larger symptom of our health system and the way that health care has traditionally been delivered. This is especially true when we consider an increasingly complex older adult population where disease is often described in biological and statistical terms (Nordenfelt, 1993). From a policy and systems leadership perspective, findings from this project have highlighted the need to understand the priorities of older adults concerning their whole health and to shape policy and programs with these priorities at the forefront. This includes the collection of patient-reported outcome measures significant to the older adult (e.g., quality of life, functionality) alongside patient-reported experience measures. Aligned with the qualitative case study findings, this would include knowing what the older adult considered important so that care planning could include these things as central goals (Nordenfelt, 1993).

Often, health research positions an aging population as a burden to future economic, health, social, and infrastructure systems. While there exist pressing policy concerns within each of these domains as this demographic shift occurs, there exists a greater opportunity for policy and system leadership to focus attention on the maintenance, promotion, and improvement of health into old age to draw upon the strengths of this generation to shape future programs and services. This includes a necessary shift from a medicalized model of healthcare delivery to one that is whole person oriented. Findings from this research support the paradigmatic shift occurring in gerontological research away from biomedical influences toward those that focus on the whole person. These findings also support the further embedding of patient and caregiver partners into decision making roles and discussions to create opportunities for their experiences to be shared more broadly to shape practice, policy, and research.

Research

To advance understanding of self-reported health among community-dwelling older adults, this research has generated more questions than answers. Specific to the multimethod interpretations posed here in this study, there exists further need for both longitudinal understanding of self-reported health as well as additional qualitative understanding of the differences of those older adults with the well-being paradox. Based on the findings of this study and reflective of some of the key limitations of the work, potential future research studies are posed.

One of the identified meta-inferences of this multimethod study was that the factors that shape self-reported health are multidimensional and complex. While cross-sectional study findings identified five key factors specific to older adults that predict high self-reported health, these predictive models were weak and leave much still unknown about the factors shaping self-reported health. Further, the qualitative themes demonstrated the interconnectedness of the perceived influence of these factors. For this reason and aligned to the understanding of adaptation and resilience as a process, there is a need for further longitudinal analysis to explain self-reported health. This should include longitudinal research to provide stronger evidence of causality, which in turn could inform path analyses to investigate mechanisms underlying the causal links. With this work, there may be opportunities to develop and test innovative interventions that seek to enhance those factors identified to ultimately shape health status among community-dwelling older adults. This includes the presence of modifiable factors identified as predictive of high self-reported health (e.g., functional and psychological resilience) as well as opportunities for healthcare providers to coach older adults in the reframing of health challenges (Heggdal et al., 2018), reflect on previous experiences over their lifecourse (Waterworth et al., 2019), and from this, identify personal strengths to guide next steps (Monsen et al., 2014).

Highlighted by these findings is a need to further understand the differences between those older adults with the well-being paradox (i.e., those with a high level of multimorbidity and high self-reported health) and the general population (i.e., those without a high level of multimorbidity). While the cross-sectional study findings suggest that the same top five factors predict high self-reported health among both the general population and those with the well-being paradox, there is an opportunity to further explore differences in these groups using qualitative inquiry. For example, a study may specifically recruit a qualitative sample of those with and without the well-being paradox and have participants describe their self-reported health and the factors they perceive to be shaping it. Analysis could then compare findings between and within the two groups. Another opportunity could include having older adults with the well-being paradox specifically speak to their self-reported health with analysis then comparing between those with and without the well-being paradox. Similar to the need for additional longitudinal analysis, this qualitative inquiry could aid in the development of interventions that target factors that enhance health. This could include interventions that aim to build resilience, for example, that can be applied across the lifecourse. Considering the vast amount of information still unknown regarding self-reported health and the well-being paradox, there is a need for future research to explore concepts such as undetected disease burden and further understand the role of coping and adaptation (Brown et al., 2016; Jylhä, 2009; Mavaddat et al., 2014; Miller et al., 2021; Perruccio et al., 2012). This can be achieved through additional qualitative inquiry.

Conclusion

Bringing together findings from a scoping review, a cross-sectional analysis, and a qualitative case study, findings from this multimethod research study have advanced understanding of self-reported health among community-dwelling older adults. Findings presented in this paper have highlighted important implications for future practice, policy, and research applicable to a rapidly growing and increasingly complex population.

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