

SUCCESSFUL AGING IN THE PRESENCE OF DISABILITY

BY

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DISSERTATION

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ABSTRACT

The prominent successful aging theory by Rowe and Kahn (1997) defined successful aging as freedom from disease and disability; high cognitive and physical functioning; and active engagement with life. The inclusion of “freedom from disease and disability” in the definition of successful aging results in stigmatization and marginalization of older adults living with disabilities. Little attention has been paid to adopting a framework of successful aging specifically for this population group.

This dissertation research aimed to explore the concept of successful aging in the presence of a disability by answering the following research questions: 1) what are the key components in the successful aging framework for older adults with disability, 2) what are the relationships between the components of successful aging in the context of disability, and 3) what are the perceptions of successful aging among older adults with disability. We utilized three different approaches to answer these research questions: the literature review phase, the population analysis phase, and the individual explorations phase.

In the first approach, the state of literature, we explored successful aging through the historical overview of the concept including challenges, critiques, and limitations as well as evidence from empirical research on successful aging with disability. Using a scoping review of the literature we identified the main components and predictors of successful aging with disability and proposed a framework. Further, in the second phase, the state of the population, we explored a large population dataset to test the relationships between the components of the proposed framework. Lastly, in the third phase, the state of individuals, we interviewed older adults with a mobility disability about their perceptions of successful aging.

The proposed framework in the first phase defined successful aging as a function of disability that could possibly be impacted by social engagement and physical activity. In addition, successful aging was measured using subjective measures of well-being, health, and quality of life. We tested this framework using the National Health and Aging Trends Study dataset in 2011 and replicated our analysis in 2020. Acknowledging the specifics of 2020 due to the COVID-19 pandemic, we mainly were interested in replicating the analysis and testing the framework in two independent samples across two different times rather than comparing two distinctly different years. The exploration of the relationships between the components of the framework in the second phase revealed that disability was negatively associated with self-rated

health and subjective well-being. Social engagement and physical activity partially dampened this effect by reducing the differences in subjective well-being and self-rated health among those with and without disabilities. Overall, participation in social engagement and physical activity showed a positive impact on these outcome measures among all study participants. We estimated the population prevalence of successful aging among older adults with disabilities using our set criteria of successful aging. To our knowledge, this was the first study to provide these estimates among older Americans with disabilities.

The third qualitative phase of the dissertation revealed the important areas and perceptions of successful aging among those with mobility disabilities including the importance of accepting and adapting to life with disability; the ability to cope with health challenges and utilize available resources; as well as the importance of remaining positive and active to the best of one's abilities and capabilities. We found that the majority of older adults in our sample perceived themselves as aging successfully despite the presence of disability and despite large variability in perceptions of well-being, health, and quality of life. Qualitative exploration revealed that social engagement and physical activity were perceived as important components in the lives of older adults in our study.

The dissertation research findings expanded the knowledge about the successful aging experience in the context of disability by introducing a framework that integrated disability as an essential component and testing the framework on population and individual levels. An in-depth exploration of the perceptions of successful aging with a disability could potentially increase the awareness and understanding of how older adults perceive successful aging and how we as a society, community, researchers, family members, and care providers can support and enrich this experience. In addition, our findings could potentially enhance the relevance of interventions and policies targeted toward improving the lives and aging experiences of older populations taking into account the unique characteristics of older adults, tremendous inter- and intraindividual variability within this population, as well as current demographic changes.

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CHAPTER 1: INTRODUCTION

1.1 Problem Overview

Global aging is one of the modern phenomena that people are going to witness this century throughout the world (Dobrianski et al., 2017). Remarkable increases in life expectancy and low fertility rates have driven this process (Bloom & Cannin, 2004; Lorentzen et al., 2008). A shift in the leading cause of disease and death from communicable to non-communicable diseases also preceded this demographic change (Habib & Saha, 2010). This unprecedented demographic shift will significantly reshape the age structure of the global population by an increase in the absolute number of older adults (Busetta & Bono, 2021; Guseh, 2015). According to the projections, the proportion of people aged 60 and older is expected to grow from 11% in 2010 to nearly 22% in 2050 (Kanasi et al., 2016). It is estimated that by 2050 the number of people who are older than 65 years of age will reach 1.5 billion worldwide (Kamiya et al., 2020). The most rapid increase in aging population is occurring in developing industrial nations (Yanchik & Ries, 2004).

In the United States, older Americans make up the fastest growing demographic group (Person & Hudson, 2021). According to the Census Bureau, at the beginning of 2030 all baby boomers will be older than 65 (Vespa et al., 2020). Further, for the first time in the history older adults will outnumber children under 18 years (Vespa et al., 2020). It is projected that by 2030 every fifth person in the United States will be age 65 or older comprising a total of 71 million people (Scherer et al., 2008).

While preparing for longer lives, it is important to remember that aging usually “carries the prospect of overwhelming increases in age-related disease, frailty, and disability” (Olshansky et al., 2007, p.95). Due to natural age-related changes in our body, older adults are at higher risk of having chronic diseases and disability (Murtaugh et al., 2011). According to the data by the United Nations, more than 46% of older adults have disabilities (United Nations, n.d.). According to the Center for Disease Control and Prevention (CDC), the prevalence of any disability among older Americans is approximately in 2 out of 5 older adults (Okoro et al., 2016). Mobility disability is the most prevalent disability among older adults, accounting for about 30% of all disabilities, followed by hearing disability (31%), cognitive disability (9.5%), vision disability (6.6%), and self-care disability (5.5%) (Okoro et al., 2016). Disability rates

increase with age; therefore, it is anticipated that demographic transition will bring more older adults living with disabilities (Smith et al., 2008). As a result, a number of economical, societal, and public health challenges need to be faced in the nearest future.

The aging population affects the national economy growth and increases the burden on the budget (Lukyanets et al., 2021). The underline reasons are that older adults tend to contribute less, but require more needs compared to younger working-age people (Sudharsanan & Bloom, 2018). In addition, a growing older population will lead to workforce shortage and changes in labor needs (Bloom et al., 2015). Finally, the increasing proportion of older adults will considerably change the demand for pensions, retirement plans, and social security benefits (Bloom et al., 2015).

The growing number of older adults is expected to drive health care costs (CDC, 2003). The cost of care for a person of 65 years or older is 3 to 5 times higher than the cost for a person who is younger than 65 (CDC, 2003). The main challenge is to meet the health needs of older adults and provide care for persons with chronic conditions, health complications, and disabilities. Meeting those needs will impose greater financial, social, and human resources. In addition, the public health system will need to address such aspects as disease prevention, health improvement, and maintenance of health and functioning of older adults (CDC, 2003). Overall, the role of public health in the nearest future will be ensuring that the quality of life of older people is not compromised with increased longevity.

From an individual standpoint, living longer itself may bring many personal challenges. Normal aging changes lead to decline in physical (strength decrease, hearing and vision loss) and cognitive abilities (working memory decline, speed of processing) (Falck et al., 2019; Fausset et al., 2011; Ferucci et al., 2020; Murman, 2015). This can gradually prevent older adults from performing daily activities, being socially active and enjoying life (Gabriel & Bowling, 2004). More support and resources are required to maintain the same level of functioning and engagement could potentially come from the environment, family members, caregivers, and technology support (Fausset et al., 2011; Shulz & Eden, 2016). With age, people are more likely to rely on others, which hinders the sense of autonomy (Sanchez-Garcia et al., 2019). In addition, age-related brain changes lead to declining memory ability, both normal and pathological, which can impact the quality of life of older adults as well as their family members (Asiret & Yigit, 2018). Depression or depressive symptoms is a prominent condition, prevalence of which

increases with age and is associated with cardiovascular mortality (Kennedy, 1996; Singh & Misra, 2009; Wei et al., 2019). Older adults, due to the higher risk of losing their partners, friends and peers, are more likely to have less people from whom they can receive emotional support (Carr & Utz, 2020; Carstensen, 1992; Pinguart & Sorensen, 2001).

Despite all, the aging population brings new opportunities. Some older people continue working even after retirement. Nearly 20% of Americans aged over 65 are still in the labor force (Parker, 2014). Staying in the labor market longer can consequently influence the Gross Domestic Product (GDP), and potentially decrease the demand for health costs and care resources (Raghupathi & Raghupathi, 2020). Older adults could create new demands in socio-economy and become an increasingly important consumer group. This fact, contrary to popular belief, could lead to a completely different economic scenario (Buheji, 2021). Older adults' skills and wisdom-related knowledge could also benefit younger population (Guseh, 2015). Longevity is one of the greatest accomplishments of the past century, which should be perceived as a dividend for future generations (Olshansky & Carnes, 2019; Guseh, 2015).

The feasibility of the abovementioned opportunities depends on the overall health and quality of life of older adults. Prolonged aging should be ideally accompanied by a prolonged period of good health and well-being. Maintaining the health of older adults for as long as possible becomes an important goal on a societal and individual level (Buheji, 2021). Therefore, the aging population phenomenon should come hand in hand with the responsibility for healthy and successful aging experience.

1.2 Successful Aging Concept

Successful aging is traditionally associated with the work of Rowe and Kahn; their original model distinguished between “usual” and “successful” aging (Rowe & Kahn, 1987). Later, following the results of the MacArthur Network of Successful Aging Study, Rowe and Kahn introduced a model of successful aging with three components: 1) low probability of disease and disability, 2) high cognitive and physical functioning, and 3) active engagement with life (Rowe & Kahn, 1997). Since then the model has been reviewed, critiqued, argued, and modified numerous times. Some researchers applied a biomedical perspective, some used psychosocial and biopsychical lenses to explore the model, whereas others a combination of both (Franklin & Tate, 2009). The results of a large longitudinal study concluded that besides the

important objective criteria of successful aging such as physical health, functioning, subjective criteria including individuals' perceptions had a great potential to make the concept more comprehensive and enhanced (Strawbridge et al., 2002). In 2015, Rowe and Kahn summarized that over 100 variations of the model have been proposed since they articulated their core model of successful aging (Rowe & Kahn, 2015). Yet, there is still a lack of agreement about an optimal definition and conceptualization of successful aging.

One of the prominent problems with the model by Rowe and Kahn was that it initially neglected essential components of aging and factors that are beyond an individual's choice and control (Martin et al., 2015; Riley, 1998). One of such factors is the probability of health decline including physical and cognitive changes later in life (Christensen, 2001). Having a low probability of disease and disability as one of the requirements for successful aging made the model too restrictive and almost impossible to attain (Liffiton et al., 2012). In other words, the three required components of successful aging push the realistic standards too far for the majority of older adults and especially for those living with disabilities (Teater & Chonody, 2020). In effort to understand more, some scholars claimed that older adults should decide on their own whether they think they are aging successfully (Bowling & Dieppe, 2005; Cheng, 2014; Knight & Ricciardelli, 2003; Tate et al., 2003). Previous literature demonstrated that the meaning and criteria of success for older adults may not correspond to researcher-defined objective criteria (Cheng, 2014). Based on numerous studies, subjective successful aging goes beyond physical and cognitive functioning or absence of disease and disability and it is more about individual experiences, life satisfaction, sense of achievement, and happiness (Tate et al., 2003). The overall interest in subjective rather than objective aging has gradually increased. Earlier empirical studies initially excluded older adults with disabilities because they did not meet the criteria of successful aging. This restrictive definition creates an opportunity for "new ageism" by pointing out that disease or/and disability is "bad aging" (Martinson & Berridge, 2015). Findings from the very limited number of studies on older adults with disabilities found that successful aging is attainable among older adults with disabilities, but in a unique context (Molton & Yorkston, 2017). Knowing that 2 out of 5 older adults report having at least one disability (Okoro et al., 2016), it is reasonable to assume that at least 40% of older Americans would be aging unsuccessfully if based on researcher-defined objective criteria.

Thus, the overarching purpose of this dissertation was to explore successful aging among older adults who do not meet the objective criteria for successfully aging, specifically older adults with disabilities. We proposed to investigate how older adults with disabilities perceive their aging experience applying a modified model of successful aging. With the projected increase of older adults and the fact that at least 40% of them may have at least one disability, exploring successful aging in the presence of disability should become an essential approach.

1.3 Dissertation Objectives and Approach

The overall objective of the dissertation was to explore the concept of successful aging that integrates disability as one of the prominent components of aging process. To address this objective, the dissertation was organized in three phases. The first phase, a “State of Science”, provided a literature review on the successful aging concept through a historical overview including challenges, critiques and limitations. Phase 1 proposed a framework of successful aging in the presence of disability that was carried and applied to the rest of the phases. The second phase, a “State of Population”, explored a population-based dataset by investigating the relationship between the components of the proposed framework. The third phase, a “State of Individuals”, investigated the perceptions of older adults on successful aging.

1.4 Research Questions

To address the objective of the dissertation, we aimed to answer the following research questions:

RQ1: What are the key components in successful aging framework?

RQ2: what are the relationships between the components of successful aging in the context of disability?

RQ3: What are the perceptions on successful aging among older adults with disability?

1.5 Impact of the Dissertation

Results of this dissertation contribute to the extant literature on successful aging by providing insights into the subjective perceptions of older adults in the context of disability. This dissertation research provided both population- and individual-level insights on successful aging as well as the relationship between the components of the new framework. Exploring successful

aging and its related components and determinants in a proposed framework provides new opportunities and visions when it comes to measuring success in older ages. As the population becomes older, it is imperative that interventions and policies are formed on science that includes older adults with a range of abilities. Inclusive interventions, thus, could address the needs of older adults and promote successful aging

CHAPTER 2: STATE OF SCIENCE – PHASE 1

This phase of the dissertation aimed to explore the concept of successful aging with disability based on existing literature. We conducted a scoping literature review in order to identify the components of successful aging framework. We explored different successful aging frameworks and approaches since Rowe and Kahn's model in 1997. We further discussed the importance of subjective measures of successful aging and the role and impact of disability in successful aging experience. We also examined the role of social engagement and physical activity in the context of aging. The outcome of this phase was a framework that incorporated all the components of successful aging that we proposed to be important. This framework served as a base for the next two phases of the dissertation.

2.1. Review of Successful Aging Frameworks

The widely known Rowe and Khan model of successful aging was exposed to countless criticisms and modifications and there is still no consensus on one universal definition of the concept (Stowe & Cooney, 2015; Whitley et al., 2016). However, there is an agreement in the literature, that successful aging is a multidimensional concept with a variety of physical, social, psychological, spiritual, religious, and environmental components (Cosco et al., 2014). Research that explored successful aging took various perspectives and approaches. For example, one of the prominent models called selective optimization and compensation model (SOC) defined successful aging as a process of adaptations to the limitations that are caused by losses and deficits due to aging (Baltes & Baltes, 1990). This model emphasized the importance of including objective components, i.e. those that are defined by the researchers as well as subjective components, which are the ones that reflect the perceptions of older adults (Martin et al., 2015). Walking through the historical highlights of successful aging concept, it could be observed that definitions of successful aging have shifted towards more subjective perspective (Calasanti, 2016). Phelan and Larson (2002) argue that promoting and predicting successful aging depends on the way we define successful aging. One of the most important claims that they make is that despite the absence of a standard definition, it is essential to consider perceptions of those who are experiencing successful aging (Phelan & Larson, 2002). Thus, asking older adults about the meaning and interpretation of successful aging based on their

thoughts and experiences would allow enhancing the research in this area and potentially provide a person-centered definition (Phelan & Larson, 2002).

Numerous empirical studies found that when comparing objective and subjective measures of successful aging within a sample, there are more older adults who rate themselves as aging successfully than those who are identified as aging successfully by Rowe and Kahn's criteria (Strawbridge, et al., 2002; Von Faber Bootsma-van der Wiel, et al., 2001; Montross, et al., 2006). For instance, assessing successful aging in a longitudinal study of over 800 older adults, Strawbridge and colleagues revealed that significantly higher percentage of participants rated themselves as aging successfully compared to those who were classified aging successfully based on Rowe and Kahn's definition (50.3% and 18.8% respectively) (Strawbridge et al., 2002). One of the possible explanations is that self-assessed health and subjective perception of success are more related to successful aging experience than the actual physical health, presence of disease or disability (Ferri, et al., 2009). In addition, older adults living with disabilities, are also able to enjoy a sense of well-being and feel that they age successfully (Romo et al., 2013). Successful aging certainly involves subjective components that are not captured in the objective measurements (Romo et al., 2013). Therefore, even though the traditional framework of successful aging requires to be disability-free, it does not preclude older adults from aging successfully based on their own criteria and perceptions (Romo et al., 2013; Montross et al., 2006; Strawbridge et al., 2002; Pruchno et al., 2010).

2.2 Subjective Successful Aging

Subjective aging is referred to self-appraisal of the aging process and different related aspects of quality of life (Yeung et al., 2021). Subjective measures are argued to be more specific and comprehensive than objective ones when older adults are being asked about their perceptions on successful aging (Yeung et al., 2021). A number of studies illustrated that people's views on successful aging could also be multidimensional and include many components including physical health and functioning, mental and cognitive health, psychological well-being and life satisfaction, including happiness, social relationships, support, activities and productivity, psychological resources, including personality, personal growth, accomplishments, sense of purpose, self-acceptance, coping, positive outlook, sense of humor; spirituality, lifestyles, neighborhood and financial circumstances and security (Bergstrom & Holmes, 2000; Bowling &

Dieppe, 2005; Charbonneau-Lyons et al., 2002; Fisher, 1992, 1995; Fisher & Specht, 1999; Grundy & Bowling, 1999; Guse & Masesar, 1999; Knight & Ricciardelli, 2003; Phelan et al., 2004; Tate et al., 2003; Von Faber et al., 2001). Thus, literature demonstrates that older adults' rate themselves as aging successfully based on different components mentioned earlier that are essential to their perceptions regardless of clinical health status (Tkatch et al., 2017). It does not, however, mean that exclusively subjective measures should accurately define successful aging. Rather an integration of subjective and objective approaches could potentially provide a complete definition of successful aging (Tkatch, et al., 2017).

One of the measures that has a direct impact on successful aging is *self-perception of health* (Cernin et al., 2011). On one hand, the objective component of health evaluation may include clinical diagnosis, presence of health conditions and diseases. On the other hand, the subjective component of health totally depends on individual experiences (Clearly, 1997). Jorm and colleagues found that successfully aging individuals aged 70 and older report good or excellent self-rated health (Jorm et al., 1998). A study by Cernin and colleagues found that 63% of African American older adults who age successfully based on their perceptions report having good, very good, or excellent self-rated health (Cernin et al. 2011). Another study among older Chinese adults concluded that those who had better self-rated health and higher levels of life satisfaction were more likely to meet the criteria for successful aging (Chou & Chi, 2002). Therefore, self-rated health is an important component when exploring subjective successful aging.

Other frequently studied subjective components within the concept of successful aging are *well-being and life satisfaction* (Bowling, 2007; Strawbridge et al., 2002; Depp & Jeste, 2006). In 1961 Robert Havighurst introduced one of the first definitions of successful aging stating that successful aging is about “adding life to the years”, or “getting satisfaction from life” (Havighurst, 1961; Franklin & Tate, 2009). Decades later, a number of researchers agreed with Havighurst stating that being satisfied with life suggests successful aging experience (Fisher, 1995; Tornstam, 1997; Ryff, 1982). Within the concept of selective optimization and compensation, a way to measure success is in terms of *goal attainment* from subjective experience. Schulz and Heckhausen defined goal attainment as “realization of desired outcomes and the avoidance of undesired outcomes” (Schulz & Heckhausen, 1996). For older adults, due to a variability of age-related physical and intellectual challenges, to attain valued goals is

dependent upon their capabilities (Heckhausen et al., 2021). Focusing on only things that are important leads to narrowing and restricting the number of goals, as well as higher facilitation and better well-being (Freund & Riediger, 2006). This notion is also supported in a bio-psycho-social model of successful model, which stated that goal attainment influences subjective well-being (Kanning & Schlicht, 2008). In other words, when people feel good, they are more likely to achieve their personal goals (McGregor & Little, 1998). Therefore, older adults' realization of valued goals benefits their subjective well-being and successful aging. When successful aging is approached from the perspective of managing available resources based on the SOC model, goal attainment become important part of aging process.

2.3. Successful Aging with Disability

The widely used standardized model of disability is provided by the International Classification of Functioning, Disability and Health (ICF) that was developed by the World Health Organization to measure health and disability (WHO, 2001). The ICF states that disability includes an interaction between a range of individual behaviors, such as activities and participation in life situations with health conditions, and a range of environmental factors, such as physical, social, and attitudinal (WHO, 2001; Mitra & Shakespeare, 2019). According to the ICF model, when defining individuals with disability is extremely important to consider multiple components including a) health condition of a person, b) personal factors, and c) environmental factors, that dynamically interact with each other (WHO, 2001). Thus, a negative interaction rather than positive between these three components results in disability. There are many ways to “construct” this negative interaction depending on the condition of each component. For example, an older adult with mobility impairment (pre-existing health condition) is not able to participate in social activities (absence of involvement in life) because of the lack of universal wheelchair accessibility in the area (environmental barrier) (Mitzner et al., 2018). In another example, an older adult with mobility impairment (pre-existing health condition) in spite of using a wheelchair is still able to participate in social activities (participation in life) using assistive digital technology at home (environmental facilitator). Usually there is no differentiation between two earlier examples or distinction from the population who experience disability due to aging (Mitzner et al., 2018). However, it is important to notice that in the first example, the person's inability to participate in activities in the context of health impairment and

environmental barriers result in disability. Whereas, in the second example, despite health impairment, a person is still able to participate in activities due to the presence of environmental facilitators and which does not result in disability (Mitzner et al., 2018).

Considering above mentioned examples, it is also important to discern pre-existing impairment and age-related changes that lead to greater or lesser disability (Mitzner et al., 2018). People who incurred disability at birth or before the age of 50, are defined as people aging *with disability* (Verburgge & Yang, 2002). In contrast, people who only experience age-related changes and declines in sensory (e.g., vision, hearing), physical (e.g., strength), mobility (e.g., coordination), and/or cognitive (e.g., executive function) functions are defined as people *aging into disability* (Verburgge & Yang, 2002; Putnam, 2002; Mitzner et al., 2018).

Disability becomes more common with age (CDC, 2018). Approximately 40 % of older adults 65 years old and older have a disability (Okoro et al., 2018). Nevertheless, as mentioned earlier, studies demonstrated that older adults in spite of having disabilities, are able to enjoy a sense of well-being and as a result experience successful aging (Romo et al., 2013). Study found that even with low cognitive and physical functioning and/or disability, many older adults still viewed themselves as a) having “good” or “very good” global health (Remillard et al., 2020), and b) aging successfully by positively managing their disease or disability (Weir & Baker, 2010; Jang et al., 2004). Few studies that explored successful aging among older adults with disabilities concluded that successful aging is achievable but in a unique way (Molton & Yorkston, 2017).

If successful aging would remain to be defined based on objective criteria by Rowe and Kahn, very few would fall under the category “successful” and those with disabilities would be excluded a priori. Given the prevalence of disability in older adults and changing demographic trends, it is critical to expand the traditional concept of successful aging by optimizing it for older adults with disabilities.

2.4 The Role of Social Engagement in Successful Aging

Based on previous research, social engagement was recognized as important part of successful aging on individual and societal levels (Butler & Gleason, 1985; Rowe & Kahn, 1997). Enhancing social engagement is one of the essential responses to the growing aging population by the World Health Organization (WHO) Active Aging Initiative (WHO, 2002),

because socially engaged people in later life represent a “hallmark of aging well” (Windsor et al., 2016).

Since the introduction of the Rowe and Kahn model, social engagement was one of the understudied components of successful aging and only 13-25% of studies included social engagement when exploring successful aging (Carr & Weir, 2019). Later, the recognition of the importance of social engagement has broadened. Meta-analyses by Depp and Jeste (2006), as well as by Bowling (2007), revealed that social component was in the definition of successful aging in 27.5% and 13% of the literature respectively. Research evidence suggest that social engagement in later life is associated with improved health outcomes (Mendes de Leon et al., 2014). It is also true for broader disability literature, that social connectedness and perceived social support is associated with positive psychological functioning (Muller, et al., 2012). Social connectedness in a form of support or assistance from different sources is a core component of successful aging (Molton & Yorkston, 2017). A need to connect with others among older adults with and without disability plays a protective role across context (Schwarzbach et al., 2014). An overview of concepts by Douglas and colleagues (2017) concluded that social engagement, according to older adults’ subjective perceptions, is a valuable factor in successful aging (Douglas et al., 2017).

Multidimensionality of the Definition of Social Engagement

Literature that explores engagement with life uses variety of related terms that are being used interchangeably, for example active engagement, social participation, interpersonal relationships, productive activities, leisure activities, social activities, social integration, social networks, social support, civil engagement, community involvement, and even physical activities (Bennett, 2002; Levasseur et al., 2010; Liffiton et al., 2012; Mendes de Leon, 2005). They are all distinct, but there is a clear overlap between them (Bath & Deeg, 2005). An umbrella term that is being used for all these related terms is social engagement (Mendes de Leon, 2005). Different definitions of social engagement are listed in Table 2.1.

Table 2.1: Definitions of Social Engagement

Definition	Author
“maintaining social connections and participating in social activities”	Bassuk et al., 1999
“participation in formal and informal social groups”	Dehi Aroogh & Shahboulaghi, 2020
“encompassing concept for the various elements of active engagement in life (i.e., interactions with others and participation in activities), as it is not limited by terms such as ‘social’ and ‘productive’”	Mendes de Leon, 2005
“being actively involved in meaningful activities or interactions with others in a social context”	Gerritsen et al., 2008
“regenerative (e.g., eating), passive leisure (e.g., reading), active leisure (e.g., walking), social (e.g., visiting, travel), and instrumental activities (e.g., shopping, cleaning)”	Bath & Deeg, 2005; Mendes de Leon, 2005; Liffiton et al., 2012

Based on the listed definitions in the table, social engagement is a multidimensional concept similar to successful aging concept itself. The latter definitions indicated that social engagement is an ongoing process and is not only limited to the terms “interpersonal” and “productive” as Rowe and Kahn have earlier defined (Mendes de Leon, 2005). Nevertheless, there is still little consistency in the universal definition of social engagement within the successful aging concept. One of the attempts to incorporate many definitions and measurement tools together using a theoretical model was done by Maier and Klumb (2005). They proposed two categories of social engagement: *regenerative and discretionary activities*. Regenerative activities include eating. This is an example of activities that are psychologically necessary for survival (Maier & Klumb, 2005). Whereas discretionary activities could be either productive (e.g., shopping for groceries) or consumptive (e.g., watching TV) (Maier & Klumb, 2005). Despite the fact that this theoretical approach introduced some depth to the types of social engagement, it also made it difficult to compare results across studies (Liffiton et al., 2012).

Another attempt to clarify the concept was done by Levasseur and colleagues in a literature review from 1981 to 2009 (Levasseur, et al., 2010). The results have identified 43 definitions of social participation. Analysis of these definitions resulted in a 6-dimensional taxonomy and a definition of social participation as “a person’s involvement in activities that provide interaction with others in society or the community” (Levasseur et al., 2010, p. 2141). Despite the increased research interest in social engagement, the term still lacks one universal

definition and distinction from other related terms (Mendes de Leon, 2005). Today one of the most commonly used definitions of social engagement is that it is a term for the various components of an individual's social behavior and social structure "including interactions with others and participation in activities (Mendes de Leon, 2005). Whereas, *social participation* is defined as person's involvement in activities that provide interaction with others in society or the community (Levasseur et al., 2010).

Social Engagement in Later Life

Social engagement is extremely important for older adults and account for about 20% of the trips outside of their homes (Mollenkopf et al., 1997). Social engagement in later life is distinct from one in younger life. Older adults' life is affected by different factors (Phillipson, 1997). Age-related life changes include retirement, loss of professional identity, loss of physical mobility, cognitive and sensory abilities declines, inevitable loss of family members and friends (Alpass & Neville, 2003; Christensen et al., 2009; Davis et al., 2016; Windsor et al., 2016). Due to these age-related changes in life and health, social engagement varies as well, which leads to different approaches and strategies for its research. Social participation in older adults is characterized by less time spent in structured activities (e.g., work) and more in other types activities (e.g. volunteering). (Levasseur et al., 2010). Based on these different types, research distinguishes between *formal* (e.g. volunteering) and *informal* participation (e.g. with family and friends) (Douglas et al., 2017). The latter has been defined as participation in social activities and socialization with others (Jang et al., 2014). Formal participation assumes voluntary commitment on a regular basis (Buffel et al., 2014).

Social Network

The social aspect of aging can also consider social network size (Bennett, 2002). Increased social network size plays a protective role against the risk of mortality (Bennett, 2002). In addition, a network of family and friends is generally associated with higher life satisfaction among older adults (Tomini et al., 2016). With age social networks that tend to become smaller and, therefore, decrease social engagement (Lang & Carstensen, 1994). The structure, closeness, function, and quality of these relationships can be conceptualized using The Convoy Model of Social Relations (Antonucci et al., 2014). This model provides a way to measure relationships by

placing close and important individuals into three concentric circles (Antonucci et al., 2014). According to the model, people are surrounded by supportive others who move with them throughout the life course (Antonucci et al., 2014). Despite the decreasing size of the social network the quality of the network is changing. Hence, the emotional closeness in relationships with the closest social network increases with age (Hughes, et al., 2004). This change is explained by the Socioemotional Selectivity Theory, which reflects older adults' preference to interact with emotionally close partners or emotionally rewarding social network members over peripheral social partners (Fredrickson & Carstensen, 1990; Fung et al., 1999; Carstensen et al., 2003). However, recent findings by Huxhold and colleagues concluded that benefits of weaker ties (e.g. acquaintances or fellow club members) may have been overlooked by previous research (Huxhold et al., 2020). Authors claim that having a large number of weaker ties is associated with lower depressed affect and higher positive affect (Huxhold et al., 2020).

Due to the changes in later life (e.g., death of a parent or children, leaving home, relocation, onset of disabling condition) social engagement and social ties can be disrupted. This disruption can also be caused by fragmented family structures and increase of people living alone (Hughes et al., 2004). Some researchers suggest that gaps in social support can be relieved by applying different adaptive responses (Rook, 2009). They include substitution (e.g., formation of new relationship) and compensation (extend to which new relationship benefits well-being) strategies (Rook, 2009). Some however argue that late life events are not always associated with decreased social engagement. For instance, "retirement and bereavement, may prompt greater connectedness" by increased volunteering activities, and thus, increased social participation (Cornwell et al., 2008, p. 185).

Measuring Social Engagement

There is a lack of a standardized way to measure of social engagement (Biddle et al., 2019). Instruments to measure social engagement vary depending on the way the term is being operationalized in a research study (Dehi Aroogh & Shahboulaghi, 2020; Field & Jette, 2007). Therefore, there are a number of ways to measure social engagement, including qualitative and quantitative methods. One of the widely used instruments to measure specifically social integration, for example, among older adults is the Lubben Social Network Scale (LSNS), which was translated into many languages, used in diverse ethnic backgrounds and in different research

and clinical settings (Lubben et al., 2006). The LSNS was modified version of the Berkman-Syme Social Network Index (BSNI) that was not particularly applicable for elderly population (Lubben, 1988). The BSNI captures interaction with friends and relatives and exclusion of items that have very limited variation within elderly population (e.g., marital status, organization participation) (Lubben, 1988). The main advantage of the scale both LSNS and BSNI is possibility to collect data related to qualitative social engagement (e.g. perceived support) and quantitative (e.g. number of social ties) (Lubben et al., 2006).

Another widely used approach to quantify social engagement is utilizing self-report measures of different domains (e.g. formal and informal participation, social network) and different frequencies of participation in specific social activities (e.g. leisure activities, volunteering work, classes) (Krueger et al., 2009).

Benefits of Social Engagement

The benefits of social engagement, no matter how it is defined, have been well-documented in the literature with a reported association with health and well-being (Mendes de Leone, 2015). The relationship between social engagement and health is complex and reciprocal; social engagement prevents disability, which in turn, enables continued social engagement (Mendes de Leon et al., 2001). Social engagement is also associated with a number of outcomes such as reduced level of suicide (Durkheim, 1951); reduced mortality rate (Lennartsson & Silverstein, 2001; Mendes de Leon et al., 2003); better physiological well-being (e.g., function of the immune system) (Byrgen et al., 1996); psychological well-being (e.g., life satisfaction) (Jang et al, 2014; Berkman et al., 2000); negative association with onset and progression of disability (Mendes de Leon & Rajan, 2014); and increased probability of recovery (Zunzunegui et al., 2005).

Both receiving and giving social support and social participation (e.g., attending church, and visiting friends) are associated with reduced mortality risk (Bennett, 2002). Increased network size plays a protective role in the risk of mortality (Bennett, 2002). Reduced social engagement predicts risk for loneliness (McHugh Power et al., 2019). According to the literature, loneliness is equivalent to physical pain, which increases the risk of mortality and morbidity (Olsen et al., 1991; Penninx et al., 1997; Seeman, 2000; Shiovitz-Ezra & Ayalon, 2010).

High levels of social engagement help older adults to age successfully by maintaining well-being (Jang et al., 2004; Sharifian & Gruhn, 2019). An aging model by Trieschmann emphasized the role of productivity and meaningful social participation in successful aging (Trieschmann, 1987). An activity theory also supports the presence of a positive link between activity and life satisfaction (Lemon et al., 1972). A systematic review of the definitions of successful aging concluded that almost 50% of related studies emphasized social engagement as an important construct of successful aging (Cosco et al., 2013).

Social Engagement and Disability

Older adults with disabilities apply more effort to be involved in social activities (Jang et al., 2004). Disability limits older adults' autonomy and makes engagement outside of the home more challenging (Rosso et al., 2013). Nevertheless, older adults living with disability place a higher value on social engagement (Jang et al., 2004). Even though their active engagement is limited and less frequent compared to those of older adults without disabilities, limited engagement still helps them to feel more positive about their life and have greater life satisfaction (Jang et al., 2004; Rosso et al., 2013). One of the possible explanations is that older adults reduce their activities to those that match their capabilities, facilitating only high-quality interactions that are truly valued and enjoyed (Rosso et al., 2013; Sharifian & Gruhn, 2019).

Despite greater effort to be socially involved, social participation is still significant for health and well-being of older adults with disabilities (Jang et al., 2004). A qualitative study among older adults with disabilities found that social participation is related to fulfillment of basic psychological needs and consequently increased life satisfaction (Couture et al., 2020). In addition, the quality of social activity is more important than its quantity (Couture et al., 2010). Research suggests that older adults with disabilities are able to participate in social activities to the best of their abilities by managing their limited functioning (Jang et al., 2004). Despite the well-known fact that disability is negatively associated with life satisfaction and well-being, individuals with disabilities still able to be maintain active engagement with life and experience successful lagging (Jang et al., 2004).

2.5 The Role of Physical Activity in Successful Aging

Although physical activity cannot prevent aging process, scientific evidence suggest that physically active older adults are more likely to age successfully compared to sedentary older adults (Lin et al., 2020). Importantly, participation in physical activity contributes to different aspects of successful aging. First, physical activity prevents disability among older adults (Hardy & Grogan, 2009). Second, participation in active leisure activities such as physical activity and sports is a significant predictor of life satisfaction and predict quality of life (Mence, 2003; Cress et al., 2005). Third, physically active older adults are more likely to be socially integrated (Colston et al., 1996; Gellert et al., 2011). Overall, physical activity plays an important role in promoting healthy and successful aging (Dahany et al., 2014).

In a book by Rowe and Kahn, physical activity and exercise were identified as a crux of successful aging (Rowe and Kahn, 1998). A review of large quantitative studies revealed that higher levels of physical activity were correlated with successful aging (Depp & Jeste, 2006). The Canadian Health Survey analysis reported that physically active older adults were two times more likely to be aging successfully compared to non-active older adults (Baker et al., 2009). Later Miesner et al. (2010) extended this relationship and suggested that physically inactive older adults had two times the odds of having functional limitations and being socially disengaged (Miesner et al., 2010). It is reasonable to suggest that physical activity may be a mediator between social engagement and successful aging or as a predictor as well as a component of successful aging.

Kanning and Schlicht proposed using a bio-psycho-social model of successful aging to demonstrate the importance of physical activity (Kanning & Schlicht, 2008). They argue that engaging in physical activity relates to two components of their model. The first is the satisfaction of psychological needs and the second is the achievement of personal goals (Kanning & Schlicht, 2008). People are able to meet these needs by increasing social well-being possibly via physical activity. For instance, a person in a good physiological and cognitive shape, they claim, is able to participate in a variety of activities (i.e. satisfy his goals and values; Kanning & Schlicht, 2008). In addition, participation in physical activity leads to better social engagement via community integration (Miesner et al., 2010). Hence, physical activity can be viewed as a way to maintain social engagement as well as a precondition for successful aging (Dipietro,

2012). Similarly, people who spend less time on sedentary behavior are more likely to age successfully (Dogra & Stathokostas, 2012).

Despite the well-documented scientific benefits of physical activity and its role in successful aging, there is still little success in promoting active lifestyles (Rikli, 2005). Older Americans are considered to be the least active age group among all (Nelson et al., 2007). More than half of American adults over the age of 50 do not meet recommended levels of physical activity (Taylor, 2014). Older adults are mostly engaged in low-intensity types of activities such as walking, golf, or gardening (DiPietro, 2001). The prevalence of older adults who are physically active varies from 27% to 44% (Keadle et al., 2016; U.S. DHHS, 2020). The percentage of older adults with disability who report being physically active is even less, 14.7% according to the 2003 BRFSS survey (Motl & McAuley, 2010).

Among the most frequently mentioned barriers and challenges in the literature to participate in physical activity are poor health, pain (Cohen-Mansfield et al., 2003), fear of falling and injury (Booth et al., 2012; Garber et al., 2011; Howland et al., 1998; O'Brien Cousins, 2000), lack of energy (King et al., 2000), unsafe neighborhoods and environmental factors (Rosenberg et al., 2013; Minkler & Fadem, 2002); low self-efficacy, depression (Rosenberg et al., 2010), time constraints, boredom, lack of knowledge, and lack of motivation (Wilcox et al., 2006); social isolation and lack of social support (Shvedko et al., 2020). For older adults with disabilities, these obstacles are exacerbated by their condition or disability (Rosenberg et al., 2010). For instance, people with mobility disabilities often consider some physical activities as not safe or attainable forms of exercise for them (Brawley et al., 2003). A better understanding of needs and addressing the barriers of older adults with disabilities for physical activity is a clear necessity in the promotion of better quality of life for successful aging.

Accurate assessment of physical activity among older adults is challenging as well. In contrast to older adults, younger population are involved in formal sport and exercise, which are called intentional exercises (Davis & Fox, 2007; Haga et al., 2018). They typically are structured, planned, repetitive, and are of moderate to vigorous intensity (Lee et al., 2019). Whereas, older adults are involved in different types and amounts of physical activity (Haga et al., 2018). Healthy older adults perform more functional everyday activities (e.g., doing groceries, cleaning, gardening), which also referred to as non-exercise physical activity (NEPA)

(Ekblom et al., 2014). They are considered to be a light intensity physical activity. Some argue that due to these specificities it becomes difficult to meet required recommendations for moderate and vigorous physical activities for older adults. Thus, when measuring physical activity level among older adults it is important to account for everyday light intensity activities (Hubner & Voelcker-Rehage, 2017). For example, walking, as the most common and important activity among older adults, is very difficult to measure precisely (Tudor-Locke & Myers, 2001).

Challenges also emerge with measuring the higher rate of energy expenditures among older adults. Since older adults usually perform low-intensity activities (less intense in terms of energy expenditure) they fail to reflect the majority of activities that they perform (Eckert & Lange, 2015). Therefore, it may be more relevant to measure frequency, type, and intensity instead of energy expenditure among older adults (Stewart et al., 2001). Another important activity is sedentary behavior, which is often ignored in assessments (Eckert & Lange, 2015). Sedentary behavior is particularly prevalent with age and includes lying and sitting (Larsen et al., 2014). Subjective methods which are mainly self-reported questionnaires and diaries have been extensively investigated in the literature. Among widely used measures are the Physical Activity Scale for the Elderly (PASE) (Logan et al., 2013), Community Healthy Activities Model Program for Seniors (CHAMPS), and the International Physical Activity Questionnaire - short-form (IPAQSF), (Stewart et al., 2001; Van Holle et al., 2015; Satter et al., 2020). Objective or direct measures are commonly used to increase the accuracy of physical activity estimates and reduce bias (Grande et al., 2020). Among widely used examples of direct measures are motion sensing and monitoring devices (accelerometers, pedometers, and heart rate monitors), physiological markers (cardiorespiratory fitness, biomarkers), calorimetry (doubly labeled water), and direct observations (Prince et al., 2008; Grande et al., 2020).

People with disabilities tend to be less active compared to people without disabilities (Rimmer, et al., 2004). Despite the known benefits of physical activity for all older adults, there is very limited research on exploring the perceptions of the importance and role of physical activity in relation to successful aging among older adults with disabilities.

2.6 Proposed Framework of Successful Aging with Disability

The classic model of successful aging by Rowe and Kahn (1997) initially excluded older adults living with disabilities by making freedom from disability as one of the requirements.

However, empirical studies suggest that the presence of disability among older adults did not preclude them from aging successfully when defined in a unique and subjective way. Exploring successful aging from a different perspective that is inclusive for all older adults with a range of abilities is extremely important in light of the rapidly growing segment of older population. Therefore, this dissertation research aimed to expand the knowledge and understanding of successful aging that encompasses disability.

Figure 2.1 provides a proposed framework of successful aging that incorporated findings from the scoping literature review. Given the focus of subjective measures of successful aging, we did not include cognitive function or cognitive impairment components in the proposed framework. Our framework takes self-perception of successful aging and related components (health, well-being, quality of life, goal attainment, social engagement, and physical activity) as key concepts in defining their aging experience with disability as an essential component. In our framework successful aging is represented as a function of disability, which could potentially be influenced by social engagement and physical activity.

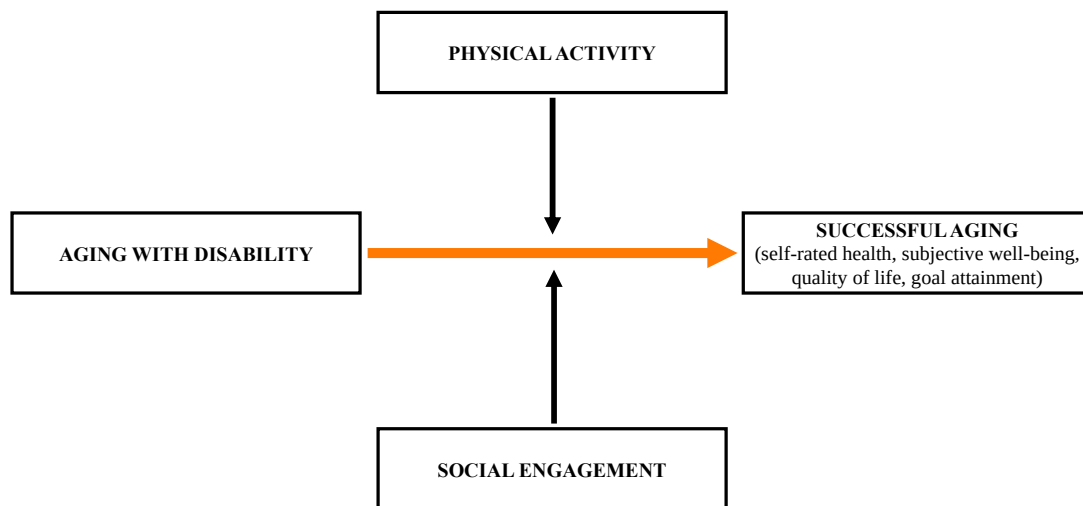


Figure 2.1 Proposed Framework of Successful Aging with Disability

CHAPTER 3: STATE OF POPULATION – PHASE 2

The objective of the second phase was to explore a national sample of older Americans applying the framework of successful aging proposed in Phase 1. Using a large dataset collected in 2011 and 2020 we examined the relationship between disability and the components of the framework as well as estimated the prevalence of successful agers among older adults with and without disability.

3.1 Overview of Phase 2

This quantitative study analyzed successful aging using large population dataset. Previous studies used different definitions to estimate the percentage of successful agers. For example, the Health Retirement Study, which operationalized successful aging using Rowe and Kahn's definition, had estimated that about 6.5% among 75-86 years old older adults and 1.7% among 85 years were aging successfully (McLaughlin et al., 2020). A longitudinal study in California compared the percentage of successful agers according using Rowe and Kahn definition to those who identified themselves as successful agers using their own perceptions. The results revealed that the percentage of the second group was much larger compared to the first group (50.3% versus 18.8%) (Strawbridge et al., 2002). Data from 2019-2020 National Health and Resilience in Veterans Study, which defined successful aging as a composite score of physical, emotional, cognitive, and psychosocial functioning, found that 79% of older veterans in this sample rated themselves as aging successfully (Pietrzak et al., 2020). To the best of our knowledge there is no study that explored successful aging among those with disabilities on a population level. Exploring successful aging among older adults with disabilities could be an important contribution to the literature, because the prevalence of disability tends to increase with advancing age.

There are several large national-level studies and datasets that could provide national health and aging information on older adults, including:

- The Panel Study of Income Dynamics and Disability and Use of Time supplement (PSID/DUST), which serves as a resource for understanding influences of childhood, early adulthood, and mid-life circumstances on later-life health outcomes and disability. It extensively addresses research on aging in the DUST supplement by including questions on well-being, life satisfaction, six classifications of disability, participation in social and physical activities.

However, the main limitation of this study supplement is that data were collected only in 2009 and 2013.

- The National Health and Nutrition Examination Survey (NHANES), which ongoingly collects extensive health behavior and health-related information about a nationally representative sample of older adults age 60 and older since 1960. The main limitation of the NHANES is that data collection on social engagement /support has stopped after 2008.

- The Health and Retirement Study (HRS), which started a large longitudinal household data collection of older adults age 50 and over in 1992. It covers questions on income, health, cognition, use of health care services, work, retirement, and family connections. One of the strengths of the survey is its extensive supplement on psychosocial and lifestyles section related to well-being, life satisfaction, purpose in life, social engagement and relationship, exercise activities, and perceptions on aging collected biennially from 2004. However, the limitation of the study is that disability supplement questions were only collected once in 2004.

- The Behavioral Risk Factor Surveillance System (BRFSS), which is an ongoing telephone survey of adults over 18 years started in 1984 about health conditions, behaviors, preventive practices, and access to health care. Although there are questions about older adults' health status, disability status, and exercise, there are no questions related to their social engagement.

- National Health and Aging Trends Study (NHATS) is a national ongoing longitudinal panel study that started in 2011 and is specifically designed to collect a broad range of health-related information about a nationally representative sample of Medicare beneficiaries ages 65 and older. The signature feature of this survey is information about the population and individual-level trends about disability and late-life functioning (Freedman & Kasper, 2019).

The NHATS survey was chosen as the preferred source to answer the phase 2 research questions because: 1) the disability data were grounded in the World Health Organization's International Classification of Functioning, Disability, and Health framework to capture key concepts in the disablement process including physical, sensory, and cognitive capacity, accommodations, the ability to carry out essential activities independently, and participation and restrictions in valued activities (WHO, 1980); 2) the dataset included questions related to social engagement, well-being, self-rated health, and limited questions on physical activity; and 3) in addition to earlier waves, the dataset in 2020 provided the most current data on older adults.

3.2 Research Objectives and Questions

The study objective was to fill in the gap in the literature by exploring successful aging in the context of disability on a population level. We also aimed to evaluate the relationship between disability groups and subjectively measured well-being and self-rated health and analyze whether this relationship is moderated by social engagement and physical exercise in the first and the last available rounds of the NHATS dataset.

The research questions for this study were as follows:

1. What is the relationship between disability status and successful aging outcomes in 2011 and 2020?
2. Is the relationship between disability status and successful aging moderated by social engagement and physical exercise in 2011 and 2020?
3. What is the estimate of successful agers when measured using subjective criteria of the framework?

3.3 Research Design and Approach

The NHATS is a longitudinal study that allows to track individual level change over time and underlying dynamics of change. However, for the purpose of the dissertation we were interested in overall levels of dependent and independent variables of interest, as well as moderator factors that influence the relationship in two separate time points. As such, we did not conduct within-individual analysis. We performed repeated cross-sectional data analysis in 2011 (Round 1) and replicated it with the data in 2020 (Round 10) to examine any changes in the variables of interest and their relationship. The data was first collected in 2011 with a first replenishment in 2015 to account for sample attrition. Therefore, due to death or non-response, data in 2020 was considerably different and smaller than in 2011. To account for this difference, we used sample weights provided by NHATS to make nationally representative parameter estimates from available data.

The purpose of choosing years was to replicate the analysis of the framework on two independent samples at two different time points. However, we acknowledged the specificity of the Round 10 in 2020 due to the COVID-19 pandemic and lockdown. The rationale for choosing this year was that it was the most recent one available and it was contemporaneous with the data collection effort in phase 3.

The data collected in NHATS did not include questions related to some variables of the proposed earlier framework. Specifically, participants in NHATS survey were not asked a direct question related to subjective successful aging assessment. Therefore, for the purpose of this study, successful aging was measured using two proxy measures: subjective well-being and self-rated health. In addition, there were no questions on goal attainment as it relates to successful aging. Thus, goal attainment component was omitted in this study. Data on physical activity were limited to only two questions related to self-reported participation in walking and vigorous activity. Although these two questions were important, it is was not possible to fully evaluate physical activity level among older adults, and therefore, for this phase “physical activity” variable in the framework was considered as “physical exercise” instead. The adapted version of the framework from Phase 1 is depicted in Figure 3.1.

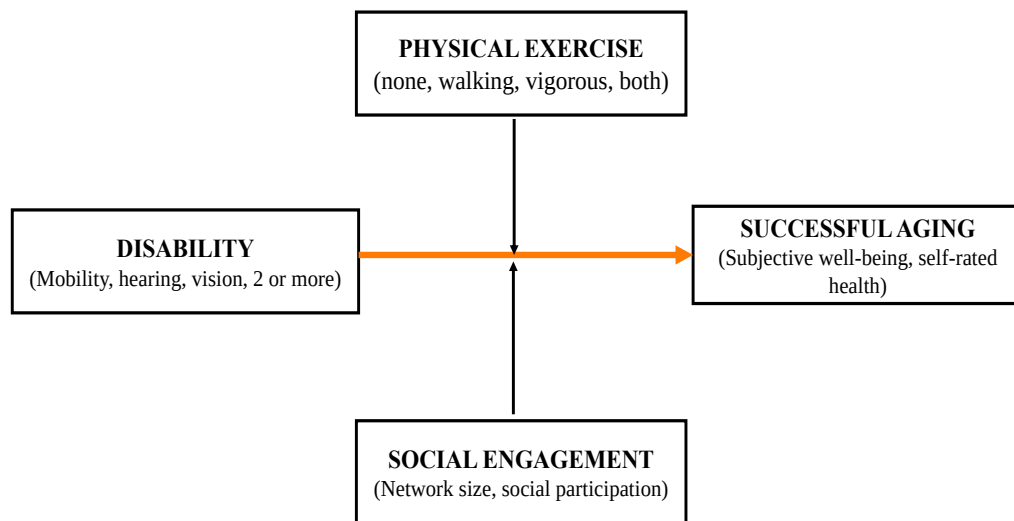


Figure 3.1 Proposed Framework of Successful Aging for Phase 2

3.4 Methods

Data Source

Data for this study were drawn from the public files of the NHATS panel survey, which was conducted via personal interviews of the nationally representative sample of Medicare beneficiaries ages 65 and older. Data used for this analysis were from the first (2011) and tenth (2020) waves, also called rounds. These two waves were chosen to allow for moderation analysis between the earliest and the most up-to-date data available. This study was IRB exempt because it is considered a secondary analysis of the publicly available data. Data were weighted

to adjust for survey nonresponse to derive population estimates. The response rate of the first wave in 2011 was 71% with a total sample of 8,245 (Kasper & Freedman, 2014). The response rate of the tenth wave in 2020 was 80.4% with a total sample of 4,389 (DeMatteis et al., 2021). Although NHATS allows for proxy respondents when participants are unable to respond on their own, for consistency across the sample I focused only on those who provided their own data as our outcome measures are based on subjectively self-reported answers.

Sample

Study analysis utilized a subsample of 6,680 community dwelling older adults in 2011 and 3,220 in 2020 (Figure 3.2). The sample for this study was limited only to community-dwelling older adults who self-reported full information on all variables for this study. Exclusion criteria were living in a residential care setting, having answers from a proxy respondent, and having missing data for any of the study variables including participation in social activities and physical exercise, well-being items, self-rated health question, and items related to determining disability status.

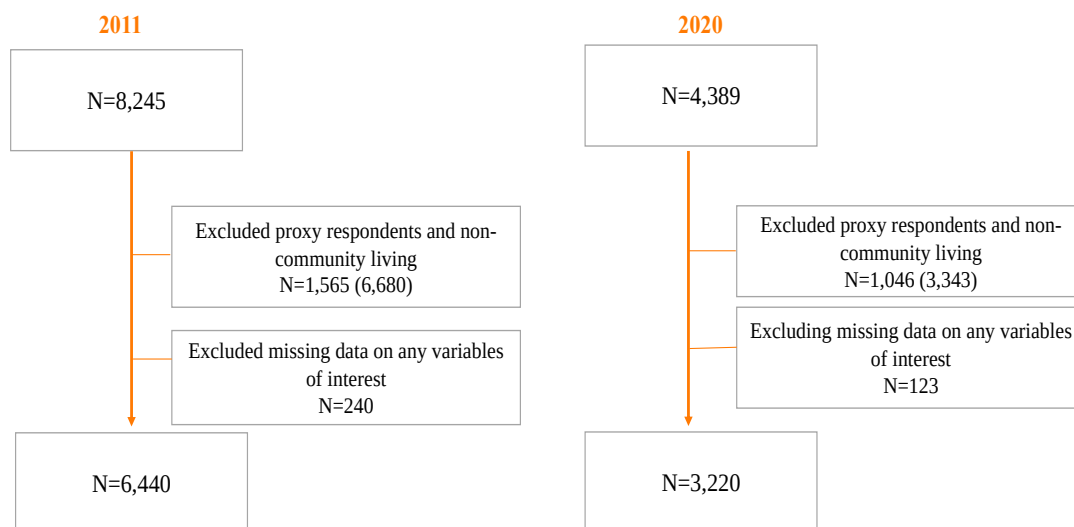


Figure 3.2 Sample Participant Flow

Measures

Disability status

Disability status included four groups: hearing, vision, mobility, multiple disability, and no disability. Hearing, vision, and mobility disabilities were assessed using several self-reported questions in NHATS. Participants were identified with a vision disability if they could not see across the street (distance vision disability) or read newspaper print (near vision disability) even with vision aids. Participants were identified as having a hearing disability if they were not able to hear well enough to use the telephone or carry a conversation in a room with a radio or TV playing even when using a hearing aid. If participants reported they are not able to walk 3 blocks or 10 stairs without the aid of a mobility device, they were classified as having mobility disability. If participants reported having more than one type of disability they were classified into the “two or more disability” group. If participants reported “no” to all of the related questions, then they were classified into the “no disability” group.

Successful Aging Variables

Subjective successful aging was the primary outcome variable and was measured via questions related to self-appraisal towards their subjective well-being and self-rated health.

Subjective well-being: Subjective well-being in NHATS was measured using 11 questions including two items reflecting frequency of feeling positive affect (feeling “cheerful”, “full of life”) and two items reflecting negative affect (feeling “bored”, “upset”) using a five-point scale (1 every day, 2 most days, 3 some days, 4 rarely, and 5 never) in the last month. The other 7 items reflecting participants’ extent of agreement or disagreement with statements about their lives using a three-point scale (1 agree a lot, 2 agree a little, 3 agree not at all). Items were reverse-coded and ranged from 1 to 41 with higher scores representing better well-being. The appropriateness of using a single well-being score for analyzing NHATS data was previously supported by a confirmatory factor analysis and tested the construct validity of the single factor construct (Kim et al., 2016). Consistent with existing literature, this 11-item questionnaire was proven to be a validated and reliable single factor measure of well-being among older adults (Kim et al., 2016).

Self-rated health: One single question was used to measure self-rated health: “Would you say that in general your health is excellent, very good, good, fair, or poor?” Answers were

reversely recoded, and higher scores represented better self-rated health. A range of scores was from 0 to 5, representing “poor” and “excellent” respectively.

Successful Aging: Using the two subjective outcome measures of the framework, we operationalized subjective successful aging as a set of the following criteria:

1. Reporting at least “3=good” or higher rating of self-rated health using a 1-to 5-point scale (1=poor and 5=excellent);
2. Having a score of 22 or higher on a subjective well-being score using a 11-to 41-point scale (scores between 11 and 21 represented fair well-being, scores between 22 and 31- good well-being, and scores between 32 and 41 very good well-being) (Bech et al., 2003; Lukaschek et al., 2017).

Social Engagement

Social engagement was measured by 1) a sum number of social activities completed in the past month and 2) a size of a social network. Social activities was measured using a series of five questions identifying whether or not a participant attended religious services, went to a support group, visited friends or family not living in the same home, participated in club meetings or group activities, or went out for enjoyment in the past month (“1” representing “yes” for participation with a total range from 0 to 5 activities). Social network size was measured by counting number of persons who the respondents talked with most often about important things in the past year (range 0 to 5 people).

Physical Exercise

Participation in physical exercise was assessed with two items in the survey. First, participants were asked whether they 1) ever spent time walking or 2) on vigorous activities in the last month (e.g. working out, swimming, running or biking, or playing a sport) (1- yes). Based on answers, participants were categorized into four groups as follows: 1) did neither walking nor vigorous activity, 2) did walking, but not vigorous activity, 3) did vigorous activity, but not walking, and 4) did both. Participation in exercise variable was then transformed into a continuous variable corresponding to 0 as “none”, 1 as “walking only”, 2 as “vigorous only”, and 3 as “walking and vigorous”.

Data Analysis

For all data analysis in 2011 and 2020, this study used analytic weights to adjust for differential nonresponse and produce national prevalence estimates. All analyses were performed using SAS® OnDemand for Academics (SAS Institute Inc., Cary, NC, USA). Descriptive statistics were conducted to describe the characteristics of participants using proc frequency procedure. Chi square tests were used to evaluate the differences between samples in 2011 and 2020. Frequency of disability groups was calculated for the entire analytic samples. We used proc surveyreg for the research questions 1 and 2, which accommodates complex sample designs and employs a generalized least squares estimator to compute regression coefficients. All survey commands included information on the strata and clusters from which the samples were drawn using “weights”, “strata”, and “clusters” commands. Given that a sub-setted data analysis was conducted (i.e. subpopulation analysis), the “domain” option was utilized. The prevalence of successful aging was calculated for the total sample including older adults with and without disability. The NHATS is administered by Johns Hopkins University and the University of Michigan and the data are publicly available.

3.5 Results

Sample Characteristics

To lay the groundwork for the replication we first explored the similarities and differences in demographics between two samples. Characteristics of the community-resident population of older adults in 2011 and 2020 are reported in Table 3.1. Over half of the participants were females in both years. The distribution of age groups between two years was different ($p < 0.00001$), which could be explained by the data replenishment in 2011 and 2015.

Table 3.1: Characteristics of the Study Sample in 2011 and 2020

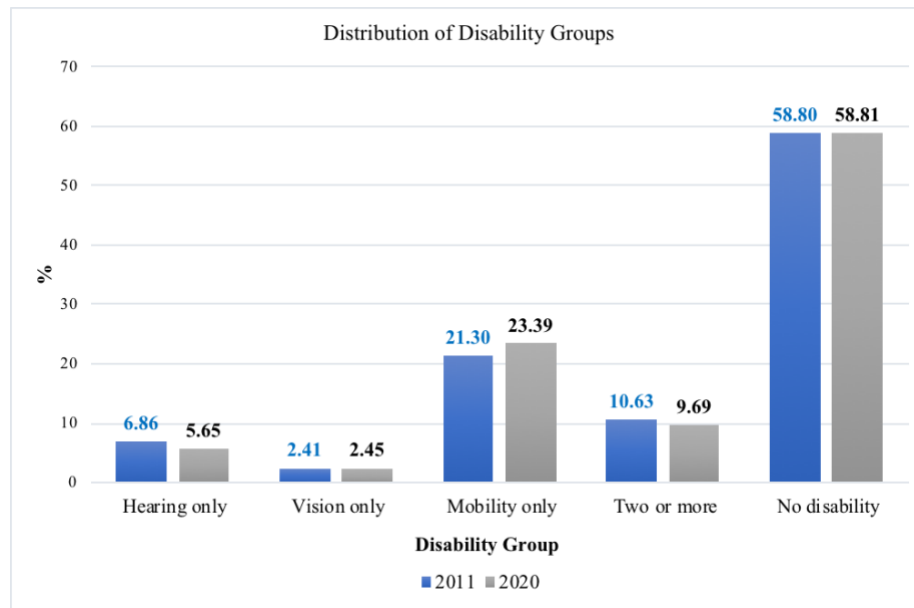
Characteristic	2011		2020		χ^2 (p value)
	N	%	N	%	
Gender					0 (0.994)
Male	2845	42.59	1424	42.60	
Female	3835	57.41	1919	57.40	
Age					564.16 (< 0.00001)
65-74	2846	42.61	625	18.70	
75-84	2692	40.30	1871	55.97	
85+	1142	17.09	847	25.33	
Race/ethnicity					10.911 (.0122)

Table 3.1 (Cont.)

Characteristic	2011		2020		χ^2 (p value)
White, non-Hispanic	4607	68.97	2402	72.74	34.765 (< .00001)
Black, non-Hispanic	1439	21.54	668	20.23	
Other, non-Hispanic	167	2.50	71	2.15	
Hispanic	391	5.85	161	4.88	
Marital status					
Married	3377	50.55	1499	45.40	34.765 (< .00001)
Separated/Divorced/ Widowed/Never married	3156	49.35	1803	54.60	

Descriptive characteristics of disability and elements of successful aging framework.

To establish the context for our model, we explored the distribution of each component of the framework. Thus, the distribution of disability groups was similar across two years ($p=0.499$). The majority of older adults fell into “no disability” in both years (Figure 3.3). The most common type of disability was mobility disability in two years accounting for 21.30% in 2011 and 23.39% in 2020. The least common type of disability was vision disability with a prevalence of 2.41% in 2011 and 2.45% in 2020.

**Figure 3.3** Disability Groups Distribution in 2011 and 2020

Among participants who reported having two or more disabilities, the most common type of disability was a combination of hearing and mobility disabilities (12.32% in 2011 and 11.18% in 2020). The presence of all three disabilities was the lowest, accounting for slightly more than 1% in both years. The distribution of multiple disabilities is depicted in Figure 3.4.

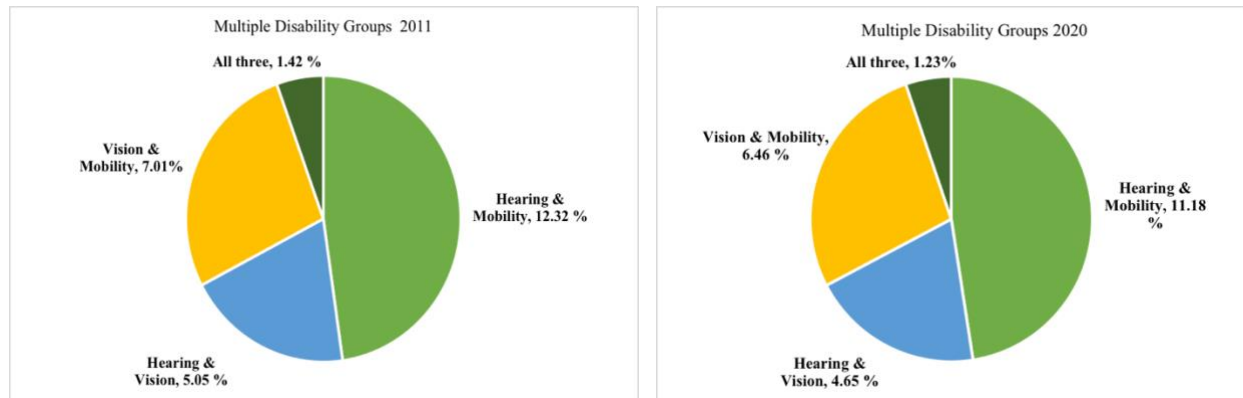


Figure 3.4 Distribution of Multiple Disabilities in 2011 (left) and 2020 (right)

Self-Rated Health

The mean score for self-rated health for the overall sample in 2011 was 3.20 and 3.27 in 2020 out of the maximum of 5.00 points. Among disability groups, older adults with two or more disabilities reported the lowest scores for self-rated health in both years, 2.38 and 2.53 respectively. The details of the distribution across the groups and years are shown in Table 3.2. The means of self-rated health between two samples were relatively the same across two years.

Table 3.2: Self-Rated Health Mean Scores

Disability Group	Mean (SD) 2011	Mean (SD) 2020	p-value
Mobility	2.54 (1.01)	2.76 (0.90)	< 0.0001
Hearing	3.34 (1.04)	3.37 (0.79)	0.72
Vision	3.24 (1.07)	3.28 (0.81)	0.77
Two or more	2.38 (1.04)	2.53 (0.97)	0.03
No disability	3.56 (0.97)	3.57 (0.85)	0.70
Overall sample	3.20 (1.11)	3.27 (0.96)	0.002

Subjective Well-Being

The maximum possible well-being score was 41.00. The mean score for the subjective well-being in 2011 was 23.80, which decreased to 22.85 in 2020. Participants who reported having

no disability had the highest mean scores for subjective well-being in 2011 and 2020 with a mean of 24.90 and 23.83 scores respectively. The lowest scores were obtained from participants who had two or more disabilities with 20.80 in 2011 and 20.39 in 2020. Overall, there was an overall decrease across all groups in the mean score in 2020 compared to 2011. The details of the distribution across the groups and years are shown in Table 3.3. There were considerable differences across two samples with relatively lowers mean scores in 2020, which we assumed could be explained by the pandemics.

Table 3.3: Subjective Well-Being Mean Scores

Disability Group	Mean (SD) 2011	Mean (SD) 2020	p-value
Mobility	22.41 (4.54)	21.64 (4.36)	0.0002
Hearing	23.85 (4.03)	22.18 (3.82)	< 0.0001
Vision	23.37 (4.50)	21.75 (4.86)	0.01
Two or more	20.80 (5.09)	20.39 (4.71)	0.23
No disability	24.90 (3.49)	23.83 (3.65)	< 0.0001
Overall sample	23.84 (4.22)	22.85 (4.16)	< 0.0001

Social Network Size

Participants' social network size was defined as a continuous variable from 0 to 5 denoting the total number of people, they could talk with most often about important things over the last year. Respondents had on average 1.91 people in their network in 2011, while in 2020 that number increased to 2.43 people (Table 3.4). Overall, there was significant differences in means between the two samples.

Table 3.4: Social Network Size Mean

Disability Group	Mean (SD) 2011	Mean (SD) 2020	p-value
Mobility	1.86 (1.25)	2.39(1.31)	< 0.0001
Hearing	1.85 (1.27)	2.27(1.41)	0.0003
Vision	1.89 (1.30)	2.43 (1.31)	< 0.0001
Two or more	1.78 (1.19)	2.24 (1.33)	< 0.0001
No disability	1.96 (1.31)	2.49 (1.36)	< 0.0001
Overall sample	1.91 (1.28)	2.43 (1.35)	< 0.0001

Looking at the overall distribution of the network size regardless of the disability groups, it could be observed that in 2011 more than 40% of older adults reported having one person in their network, which was the largest reported number across two years and across the network size. The details of the distribution across the network size groups and years are shown in Figure 3.5.

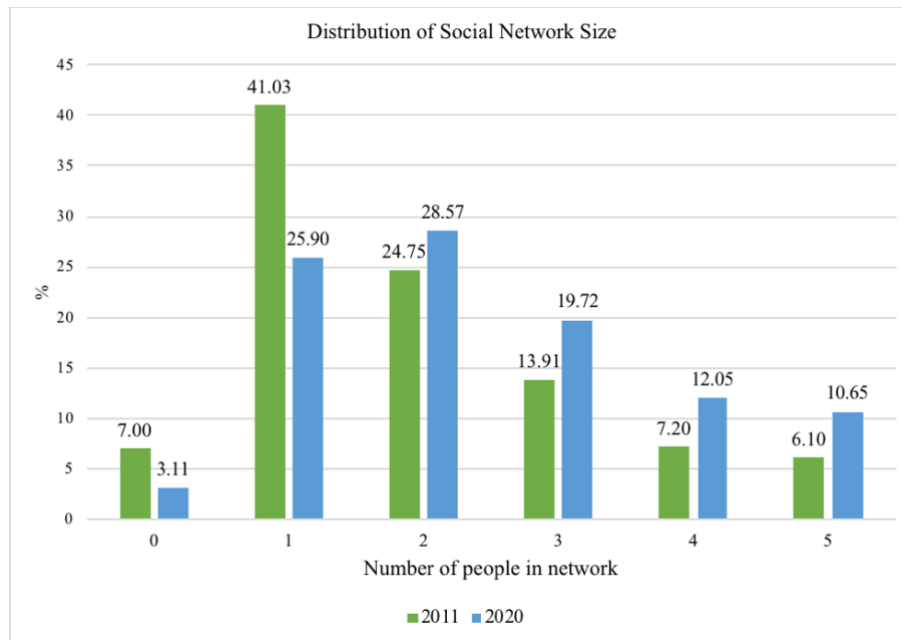


Figure 3.5: Social Network Size by Year.

Social Participation

Social participation was defined as a continuous number from 0 to 5 and referred to the participation in different activities. Based on Table 3.5, older adults participated on average in 2.83 social activities in 2011 compared to only 1.65 activities in 2020. An overall mean score in 2020 is lower across all groups compared to 2011. The mean scores across the samples were different with lower participation in social activities in 2020.

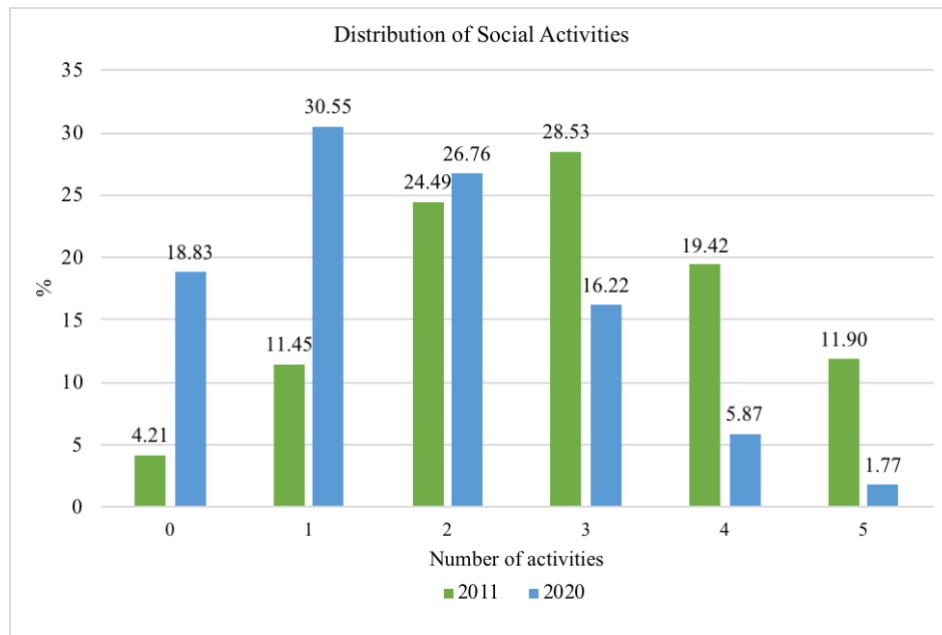
Table 3.5: Participation in Social Activities by Disability Groups

Disability Group	Mean (SD) 2011	Mean (SD) 2020	p-value
Mobility	2.34 (1.27)	1.35(1.09)	< 0.0001
Hearing	2.80 (1.24)	1.70(1.19)	< 0.0001
Vision	2.82 (1.34)	1.55(1.24)	< 0.0001

Table 3.5 (Cont.)

Two or more	2.04 (1.30)	1.18(1.08)	< 0.0001
No disability	3.14 (1.22)	1.84 (1.25)	< 0.0001
Overall sample	2.83 (1.31)	1.65 (1.22)	< 0.0001

Regardless of the disability groups, the largest percentage of participation in 2011 was accounted for one activity (30.55%). Looking at the zero-activity group, we observed an increase in the percentage of older adults in this group from 4.21% in 2011 to 18.83% in 2020. The details of the distribution across number of activities and years are shown in Figure 3.6.

**Figure 3.6** Distribution of Social Activities by Year

Physical Exercise

Physical exercise variable was treated a categorical variable denoting the “none”, “walking only”, “vigorous only”, and “both activities” groups. Among all respondents, the lowest prevalence of physical exercise is attributed to vigorous type of physical activity in both years with 8.38% in 2011 and 7.58% in 2020. The largest prevalence in 2011 was attributed to older adults who did not participate in any physical exercise (32.28%). The largest prevalence in 2020 was attributed to older adults who participated in walking only (34.84%). The details of the distribution across types of exercise and years are shown in Figure 3.7.

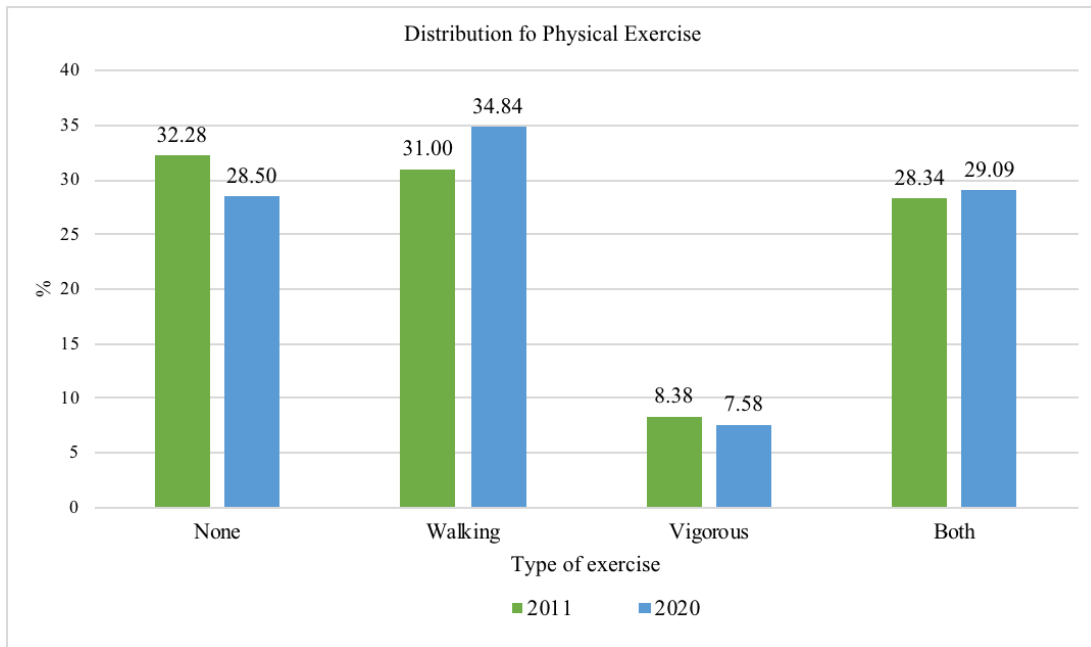


Figure 3.7 Distribution of Physical Exercise by Year.

Figure 3.8 demonstrated the prevalence of physical exercise (“walking”, “vigorous”, and “both” groups) by disability groups. Compared to 2011 older adults in 2020 reported lower levels of physical exercise across all groups. Overall, the least active group was older adults with vision disability, whereas the most active group was older adults without disabilities followed by mobility disability group.

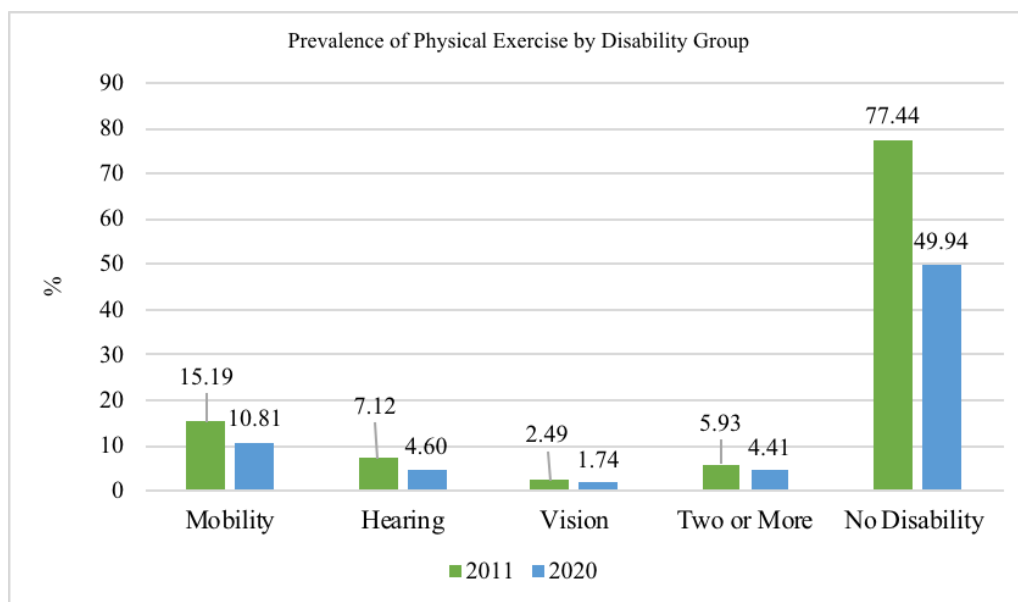


Figure 3.8 Distribution of Physical Exercise by Disability Group.

Estimates of Successful Agers

Significantly larger percentage of older adults without disability were aging successfully compared to those with disability (Figure 3.9). The prevalence of successful aging was slightly lower in 2020 which might be due to the pandemic and lockdown during 2020. The same pattern was found among older adults without disability.

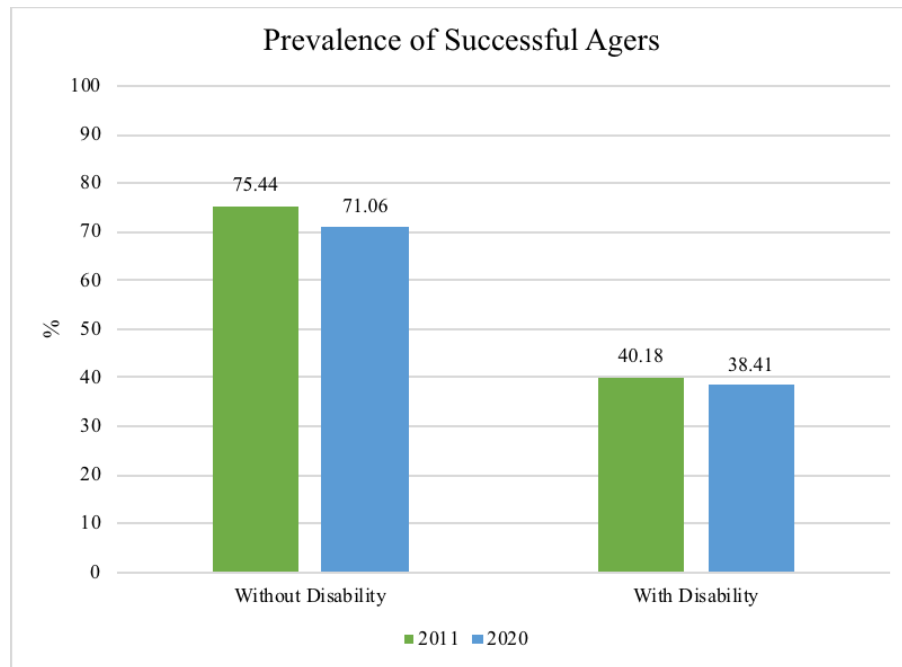


Figure 3.9 Prevalence of Successful Agers Among Older Adults with and Without Disability

Within the disability groups analysis indicated that the largest percentage of successful agers was among older adults with hearing and vision disability in 2011(Figure 3.10).

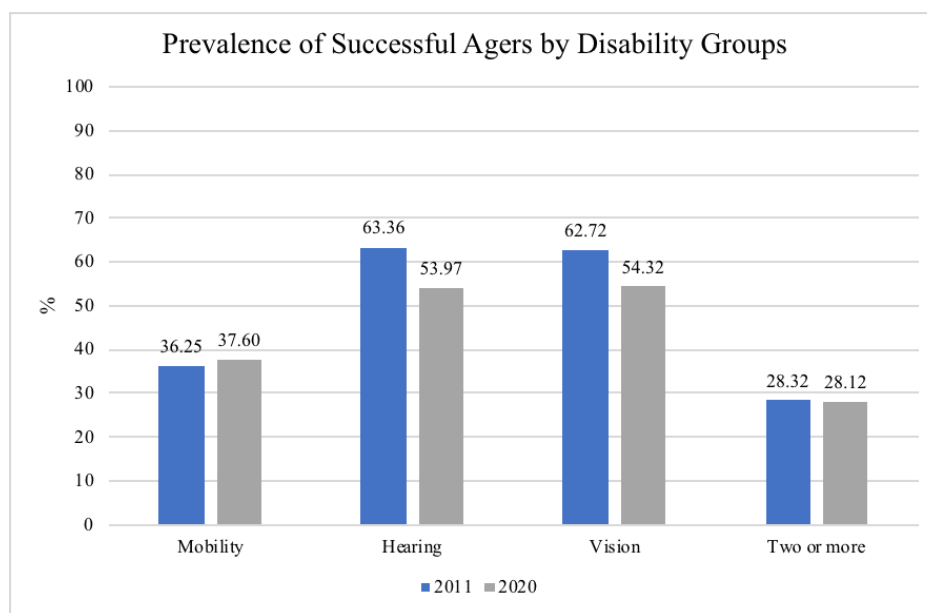


Figure 3.10 Prevalence of Successful Agers Among Different Disability Groups

An examination of the percentages meeting each criterion of successful aging suggested that there was an increase in the percentage of older adults meeting the self-rated criterion across all disability groups (Table 3.6). However, there was a drop in the percentage of older adults meeting the subjective well-being criterion in all disability groups.

Table 3.6: Percentage of Older Adults Meeting Each Individual Successful Aging Criterion

Criterion	2011		2020	
	%	n	%	n
Self-rated health				
Mobility disability	49.66	726	61.44	513
Hearing disability	79.74	370	88.36	167
Vision disability	76.92	130	87.65	71
Two or more disability	45.10	336	53.91	186
No disability	86.24	3,371	90.57	1,787
Subjective well-being				
Mobility disability	62.59	915	54.13	452
Hearing disability	75.43	350	57.67	109
Vision disability	72.78	123	56.79	46
Two or more disability	47.38	353	40.58	140
No disability	84.65	3,309	76.03	1500

Results of the Regression Analyses

Analysis 1: evaluating the relationship between disability and self-rated health and subjective well-being in 2011 and 2020



Figure 3.11 Main Regression Analysis

The first analysis evaluated the relationship between disability groups and two outcome measures, self-rated health and subjective well-being. Based on the regression, the relationship was significant for all disability groups and both outcome measures (Figure 3.11). It was largest for the two or more-disability group, followed by mobility, vision, and hearing disability in 2011 and in 2020. When compared to non-disability group, the presence of two or more disability significantly decreased the subjective well-being score in 2011 and in 2020. Similarly, having two or more disability significantly decreased self-rated health score in both years.

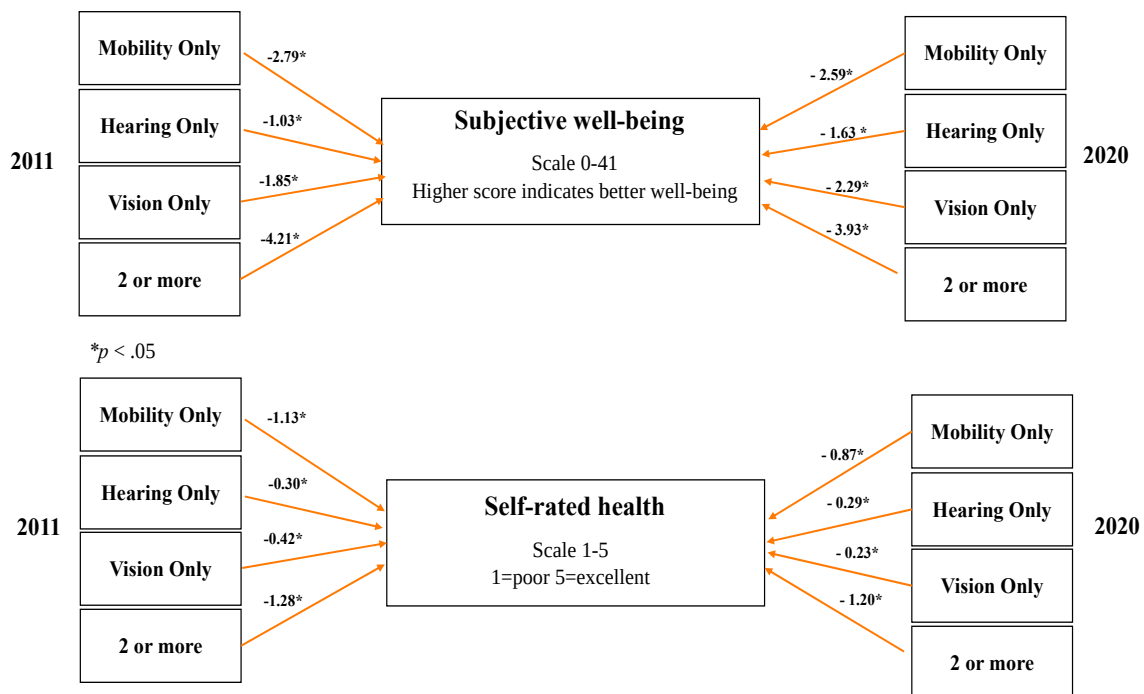


Figure 3.12 Results of the Regression Analysis 1

Analysis 2: Moderation Analysis - evaluating the moderation effect of social network size

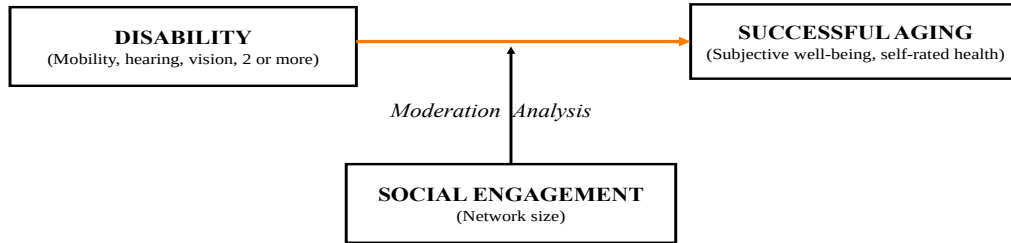


Figure 3.13 Moderation Analysis with Network Size

Disability had a negative effect on subjective well-being, and we found social network to dampen this effect by reducing the differences in subjective well-being among those with vs without disability. Thus, having at least one person in a network was associated with a better subjective well-being score in 2020 (an increase of 0.28 points, SE=0.08) and better self-rated health score in 2011 and 2020 (an increase of 0.05 points, SE= 0.01 and 0.04 points, SE= 0.01 respectively). A statistically significant moderation effect was found only for the mobility disability group on the subjective well-being score in 2011 (an increase of 0.30 points, SE=0.05). This interaction term indicated that for those with a mobility disability, social network size reduced disparities in the implication of having vs not having disability for subjective wellbeing. The relationship between disability group and self-rated health was not moderated by social network size in either year. Figure 3.12.

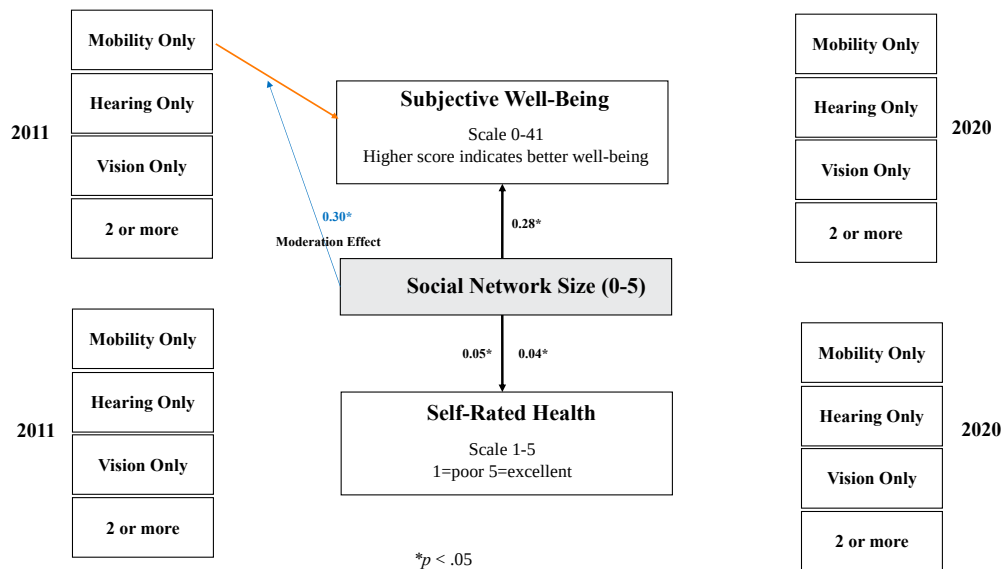


Figure 3.14 Results of Moderation Effect of Social Network Size

Analysis 3: Moderation Analysis - evaluating the moderation effect of social activity

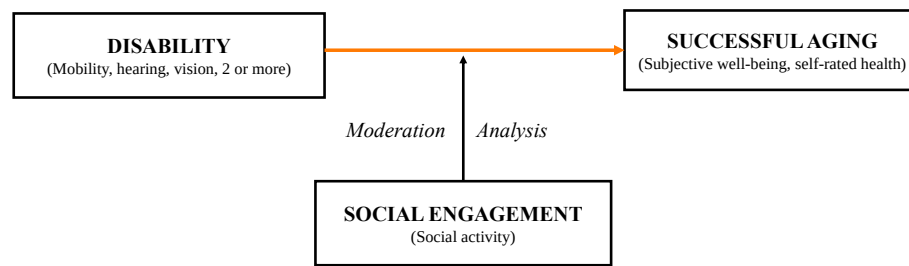


Figure 3.15 Moderation Analysis with Social Activity

Social activity was found to have a positive effect on subjective well-being ($b=0.56$, $SE = 0.04$). (Figure 3.13) The significant moderation terms showed that this effect was even stronger for those with disability, compared to those without disability. The effect of social activity on subjective well-being was .55 ($SE = 0.14$), .28 ($SE = 0.13$), and .66 ($SE = 0.18$) points stronger for the mobility, hearing, and 2 or more disability groups, compared to the no disability group, respectively. This means social activity was more important for subjective well-being for persons with disabilities than it is for person without disabilities. In 2020, the main effect was similar, but the moderation effect was only reached statistical significance for the hearing disability group ($b=0.51$, $SE=0.25$). The moderation effect of social activities on self-rated health was only significant for mobility disability group ($b=0.06$, $SE=0.02$) in 2011 and for the two or more-disability group ($b=0.14$, $SE=0.06$) in 2020.

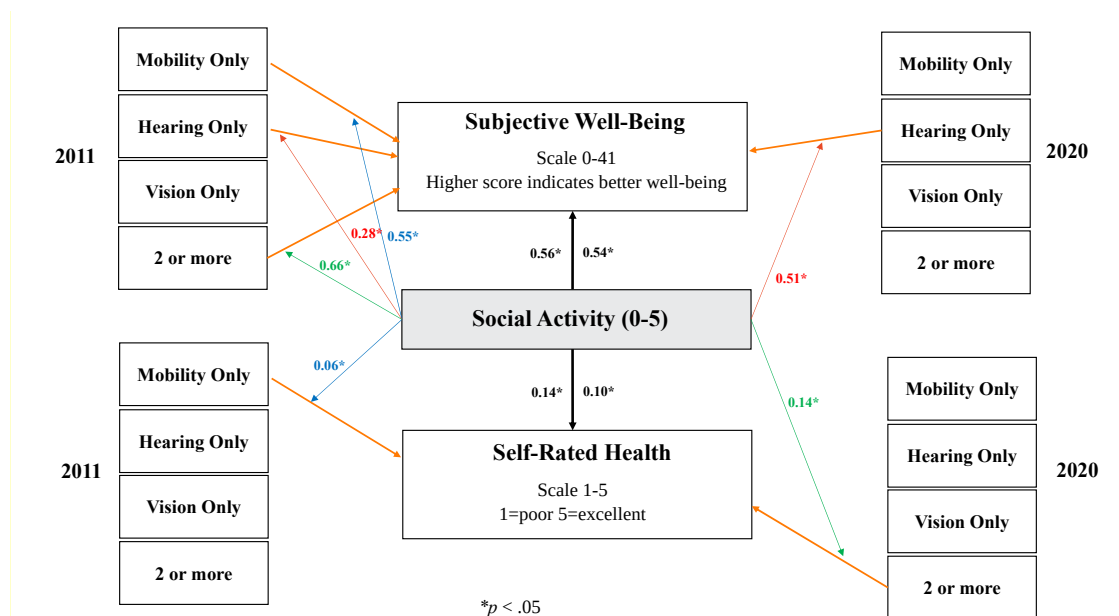


Figure 3.16 Results of Moderation Effect of Social Activity

Analysis 4: Moderation Analysis - evaluating the moderation effect of physical exercise

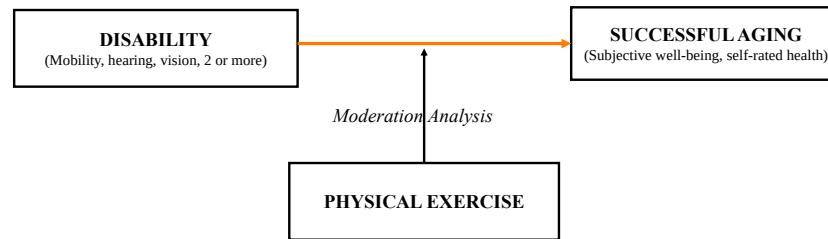


Figure 3.17 Moderation Analysis with Physical Exercise

From the first analysis we found that disability had a negative effect on self-rated health, while in the moderation analysis we found physical exercise to amplify this effect for those with 2 or more disabilities in 2011 ($b = -0.11$, $SE = 0.02$). Physical exercise was found to have a positive effect on self-rated health and subjective well-being for the whole sample in both years. In 2020 the significant interaction was for the hearing disability group ($b = -0.17$, $SE = 0.12$).

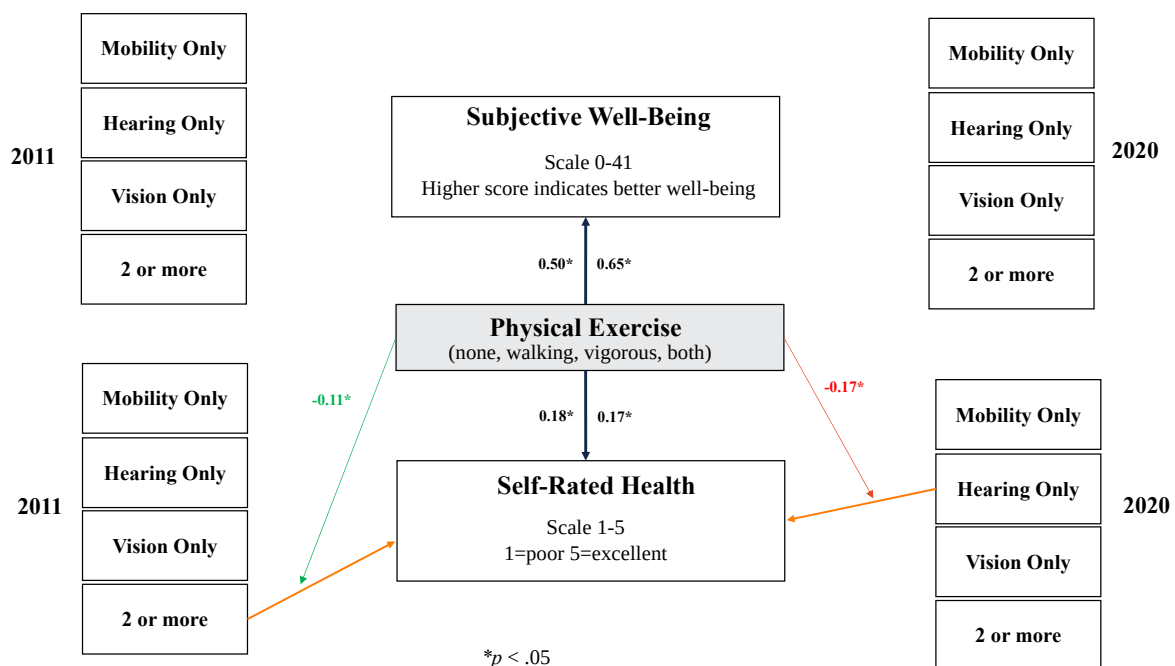


Figure 3.18 Results of Moderation Effect of Physical Exercise

3.6 Discussion

Using longitudinal data from two nationally representative cohorts of older Americans 65 or more years of age in 2011 and 2020, I examined a) the prevalence of disability in two years; b) the relationship between disability and two subjective outcome measures of successful aging:

subjective well-being and self-rated health scores; c) whether this relationship was moderated by social engagement (using social network size scale and frequency of participation in social activities) or physical exercise.

The distribution of disability groups did not change from 2011 to 2020. More than half of older adults in 2011 as well as in 2020 remained in the “no disability” group. Mobility disability remained to be the most common type of disability among older adults in both years, but the prevalence of this disability increased from 2011 to 2020.

The presence of disability was significantly associated with lower levels of subjective well-being and self-rated health. Participation in social activities, in physical exercise, and having people in a social network size accounted for a significantly higher subjective well-being and self-rated scores for all older adults regardless of the presence of disability. The moderation analysis demonstrated that these moderator variable could potentially dampen the effect of disability on self-rated health subjective well-being for some disability groups.

Older adults with two or more disabilities had the largest negative association with the subjective well-being and self-rated health, followed by mobility disability, hearing and vision disability. The NHATS subjective well-being scale used a distinct set of questions, as well as self-reported disability status, and specific analytic survey strategies, it was not possible to make comparison with the results from other similar studies. Nevertheless, our results were consistent with the previous research, that indicated that global well-being has a negative association with disability (Na & Streim, 2017). Previous studies found that older adults with poor physical health tend to have worse well-being (Fokkema et al., 2012). Disability among older adults has been associated with less positive and more negative emotions, which can undermine overall well-being (Freedman et al., 2019; Freedman et al., 2017). A population study on older Canadians revealed that people who had mobility, vision, hearing or mental disability later on in life had lower levels of well-being compared to those who were aging with disability (Uppal, 2006). The effect was the strongest for people with vision disability in later life (Uppal, 2006). The negative relationship between disability and well-being could be explained by the fact that disability causes limitations with instrumental activities, which in turn is related to lower overall well-being (Kendig et al., 2000). A review study revealed that lower competency in daily activities among older adults had a negative impact on life satisfaction and well-being (Pinquart & Sorensen, 2001).

The pattern of the effect of disability on self-rated health was similar to the one on subjective well-being. The largest negative effect on self-rated health was found among those who had two or more disability, followed by mobility disability, vision disability, and hearing disability. These findings were consistent with the existing longitudinal aging study that indicated that severe disability among older adults had a bigger negative effect on self-rated health over time (Galenkamp et al., 2013). People with disabilities were more likely to rate their health poorer compared to people without disabilities (Drum et al., 2008). However, people with disabilities may have different understandings of health or the process of health rating compared to people without disabilities (Drum et al., 2008). Overall, there is extensive research on self-rated health being a powerful predictor of morbidity, however, less is known about self-rated health in persons with disabilities (Miilunpalo et al., 1997; Drum et al., 2008). Investigating the factors and predictors of self-health assessment among older adults with disabilities would present a better picture in understanding health among this population group.

To our knowledge, this is the first study to estimate the prevalence of successful agers among older Americans with disabilities. Among older adults with disability about 40% experienced successful aging in 2011 and nearly 39% in 2020 when measured using subjective self-health and well-being criteria. It is hard to make comparison with other studies due to the absence of population estimates among this group. Among older adults without disabilities approximately 75% in 2011 and nearly 71% in 2020 were aging successfully, which is within the 50% to 92% figures identified in other studies of older adults that used subjective measures of successful aging (Montross et al., 2006; Pietrzak et al., 2014; Strawbridge et al., 2002)

We further explored whether social engagement (measured via social participation and network size) moderated the relationship between disability and well-being/self-rated health. Consistent with the literature, social engagement demonstrated a significant positive effect on well-being and self-rated health among all older adults regardless of the disability group. Consistent with prior research participation in activities positively impacts subjective well-being (Nsiah et al., 2022; Zhang & Zhang, 2014). The differences in the effect between the years could be assumed due to lower rate of participation in social activities in 2020 compared to 2011. Interestingly, that older adults in 2020 reported having a larger social network size on average compared to 2011 (1.90 people in 2011 versus 2.43 in 2020). These findings are supported by a study that compared social engagement before and during the pandemic, which revealed

extraordinary declines in face-to-face contacts and activities (Freedman et al., 2022). In other words, due to limited opportunities for participation in social activities in person, older adults increased the number of interactions with people in their network particularly using video technologies. The differences in the effects between the years could also be accounted for the overall decrease in overall well-being among older adults due to the impact of COVID-19 Pandemic (Krendl & Perry, 2021).

Despite the absence of the significant additional impact of social engagement on well-being and health specifically among all disability groups, the overall positive effect was still observed. Our findings of the overall effect were supported by many previous studies that examined the positive role of social interaction on the health and overall well-being (Holt-Lunstad et al., 2015; Kelly et al., 2017). Positive social interaction enabled older adults to keep their self-esteem intact, which in turn had a positive impact on subjective well-being (Lemon et al., 1972). This view was also supported in later studies, concluding that participation in social organizations positively influenced social identity and sense of belonging and consequently had a positive effect on subjective well-being and greater life satisfaction (Zhang & Zhang, 2014; Gimour, 2012). These findings underscore the importance of providing opportunities for social engagement and interaction to maintain good health of older adults. Having virtual modes of social engagement is especially critical during times like COVID-19 pandemic.

The absence of the significant moderation effect for all disability groups could be explained by the fact that other activities that were not captured by the NHATS survey were responsible for a relationship between disability and well-being/self-rated health. Exploration of other activities that are particularly productive and important for older adults with disabilities (e.g., gardening, swimming, volunteering) is worth studying.

Similar findings were observed in regard to the effect of physical exercise, which had a significant positive main effect on well-being and self-rated health in both years among all older adults regardless of the disability group. Previous substantial research had shown the positive effect of physical activity on physical and psychological health in aging population (Chodzko-Zajko et al., 2009). A randomized control trial among older adults showed that physical activity both aerobic and nonaerobic can have positive effect on subjective well-being (McAuley et al., 2000). A number of reviews indicated that engagement in physical activity positively influenced different aspects psychological well-being among older adults (Garcia et al., 2005; McAuley &

Rudolph 1995; Rejeski & Mihalko 2001; Runner et al., 2007). Similarly, a study on Finnish older adults showed that physical activity and muscle strength exercise had a positive effect on self-rated health (Leinonen et al., 1999). Additionally, Hooyman & Kiyak (2018) argued that physical activity with social networks members, was one of the indicators of well-being in older adults. In addition, participation in physical activity increased the odds of healthy aging and life satisfaction (Daskalopoulou et al., 2018).

When exploring the moderation effect of physical activity, we found the amplification of the disability on self-rated health and subjective well-being. Current study questions on physical exercise were limited to two self-reported questions on walking and vigorous activity only, which did not capture the nuances of the physical activity behavior among older adults with disabilities. Unfortunately, studies exploring the moderation role of physical activity in the relation to disability and well-being/self-rated health among older adults are very limited. A study on older adults with spinal cord injury, found that there was a statistically significant positive relationship between physical activity and subjective well-being among people with spinal cord injury (Ginis et al., 2010). Due to the limited availability of studies making comparison across the results is challenging.

In addition, we found that the prevalence of participation in vigorous exercise among older adults with different disabilities were the lowest across two years. This piece of information could be a valuable information for interventionists and policy makers who can target improvements in physical activity level among older adults with and without disabilities.

3.7 Study Limitations

The NHATS survey relies on self-report, which can cause recall bias. In addition, different levels of physical activity estimates generated by the NHATS may have resulted in some misclassification of the respondents in terms of their level of physical activity. Specifically, the NHATS lacks the objective ways to determine certain levels of physical activity (vigorous, moderate, etc.). In addition, NHATS did not allow us to determine and estimate some of the components of the proposed framework including quality of life and goal attainment. Social network in NHATS was measured using a traditional approach for egocentric social network data collection used in other surveys, however, it was not possible to determine a full size of social network including social network index score. Our primary variable of interest, successful

aging, was not directly measured by a question pertaining to successful aging. The estimated prevalence of successful agers was based on a single constructed factor using two subjective measures of the framework without conducting a confirmatory factor analysis. Therefore, our regression analysis results may not fully reflect the effect of disability status on successful aging. The findings of this study should be interpreted with caution due to indirect measurements of subjective successful aging. The magnitude of the practical effect observed in this study was considered to be significant, but small (0.1-0.5). In addition, the cross-sectional nature of the study was a limitation.

Despite the limitations, our study extended the existing literature on successful aging in several ways. First, we provided nationally representative estimates of disabilities, estimates of successful agers, as well as level of engagement in social and physical activities among older adults with and without disabilities. As opposed to examining successful aging among generally healthy older adults, we had an advantage of exploring the concept of successful aging in the presence of disability using subjective measures.

3.8 Conclusion

Applying the proposed framework of successful aging, this population study showed that older Americans with disabilities had significantly lower levels of well-being and self-rated health compared to those without disabilities in 2011 and 2020. This relationship was not moderated by social engagement or physical exercise in either year. In the proposed framework successful aging was operationalized as a presence of good self-rated health and well-being as well as ability to be socially and physically active in the presence disability. Based on this definition, older adults in this study were not meeting all criteria for successful aging, however this conclusion should be interpreted with caution due to the limitations mentioned above. Further exploration of the meaning of successful aging, the components of the framework, as well as whether successful aging is attainable in the presence of disability is needed.

In addition, using these self-reported measures of health and overall well-being it could be assumed that older adults with disabilities are not aging as successfully as those without disabilities. Data from this study revealed that socially engaged and physically active older adults with and without disability hold promise for increasing well-being and health, although greater research is needed to investigate the moderation effect among older adults with disabilities

across years. Importantly, much of what was found in 2011 almost remained the same in 2020 in regard to the prevalence and associations between the variables of interest based on the regression results. These findings are critical public health concerns that are likely to be imperative in efforts to maintain or improve the quality of life of the growing aging population.

Based on our operationalization of subjective successful aging, we estimated the prevalence of successful agers living with disabilities. This was the first study to provide the estimates among this population group on a population level.

To our best knowledge, this was the first study that also analyzed the association between different disability groups and subjective well-being/self-rated health along with the role of social engagement as a moderator among the older adults in the U.S. Findings of this study have public health implications for policy makers to consider the importance of social support and social engagement in promoting quality of life among the older adults with different disabilities. Future research should further examine the role of social engagement and correlates on well-being and overall health among older adults with disabilities, which the least understood group in the literature.

To strengthen the framework and further explore the concept of successful aging in the presence of disability, Phase 3 aimed to address the limitations as well as missing measures and relevant questions that were missing in this phase.

CHAPTER 4: STATE OF INDIVIDUALS - PHASE 3

The objective of the third phase was to conduct a qualitative interview study among older adults with disability to explore their perceptions on aging using a proposed framework from the Phase 1. This study provided an insight into what older adults consider health, well-being, as well as the role of social and physical activity in aging successfully. This qualitative viewpoint is an important resource in supporting health and aging of older adults living with disability.

4.1 Overview of Phase 3

Scientifically driven definitions of successful aging could impact the way that policies, practitioners, and families approach and support older population to age successfully. Scientific definitions of successful aging maybe particularly problematic for older adults with disabilities, because “success” is inherent in “disability-free” aging experience (Martin et al., 2015). Nevertheless, empirical evidence suggests that older adults with disabilities are able to age successfully when asking about their own perceptions (Romo et al., 2013). The concept of successful aging was studied across different subgroups of older adults. Unfortunately, there are very few studies that examine successful aging in the context of disability (Molton & Yorkston, 2016; Romo et al., 2013). Investigating the process of aging among older adults with disabilities is extremely important and relevant. Approximately 2 in 5 older adults in the United States have a disability (Okoro, et al. 2018). The diversity in how people age and some amount of deterioration in cognitive health and decline in functioning with age are inevitable (Scott, 2022). Therefore, freedom from disability is a problematic requirement for successful aging. Among those few studies that investigated successful aging in the presence of disability, the concept of “success” accounted for different range of accommodations, adaptations, compensations, and coping strategies (Molton & Yorkston, 2017). Given this nuanced approach to successful aging, the focus of the present study is to examine the understanding of successful aging from the perspective of older adults with disabilities. Hearing perspectives and views of people who have lived with disabilities for decades, would hopefully shape successful aging concept in different fields.

4.2 Research Questions

Research questions of this qualitative study were as follows:

- How do older adults perceive the components of the framework in the context of disability?
- What are the emerging areas of older adults' perceptions and beliefs on successful aging in the presence of mobility disability?
 - What are the strategies used by older adults to help adjust to age- or disability-related losses?
 - Is setting and achieving goals important for older adults?

4.3 Methods

Recruitment

In this study we recruited older adults with the most common type of disability in the United States, mobility disability (U.S. Census Bureau, 2014). The recruitment was done through the TechSAge (Technologies to Support Aging-in-Place for People with Long-Term Disabilities) Participant Registry, a registry of older adults with disabilities. The inclusion criteria for the sample selection included the following: 1) the respondent of age 60 and above (following the definition of older adults as adopted by the United Nations and the World Health Organization); 2) speak English; and 3) self-identify as having mobility disability for at least one decade (i.e., either through use of mobility aid or report having serious difficulty walking or climbing stairs)

We distributed the recruitment flyers via email to older adults in a registry. Participants who expressed their interest to participate in the study were contacted via email. A brief phone call was scheduled for prescreening purposes. Older adults who met the eligibility criteria, expressed interest in the study, and who was able to use personal computer and Zoom, were scheduled for an interview. Before conducting the study, approval was obtained from the University of Illinois Urbana Champaign with a waiver of the documentation of informed consent. Thus, a verbal informed consent from each participant was obtained prior to the interview. Collecting of data was continued until theoretical saturation was achieved.

Materials

The qualitative explorative design was employed to explore older adults' perception on individual aging experience.

Socio-demographic and health characteristics were adopted from the TechSAge Background Questionnaire (Remillard et al., 2020). This questionnaire collected a range of descriptive information directly relevant to the participants aging with long-term sensory and mobility disabilities including demographics, self-rated health, memory, functional limitation, and used of aids for sensory disabilities (Remillard et al., 2020).

Subjective well-being section of the interview was adopted from the NHATS population survey section on well-being. Eleven items related to the assessment of positive and negative affect, sense of control, and psychological well-being were included in the interview (Kim et al., 2016).

The quality of life part of the interview was adopted from the questionnaire for older adults with cognitive impairment (Longsdon et al., 2002). A total of nine questions were administered related to various aspects of life including physical health, energy, family, friends and others that participants had to rank based on a 4-point Likert scale (poor, fair, good, and excellent).

The questions on social engagement were adopted from the NHATS study and included 6 items related to the participation in different social activities such as visiting friends, religious services, participation in clubs/classes, going out, work, and volunteering work in the past month. Frequency of participation was measured on a scale from never (0 days), seldom (1-2 days), sometimes (3-4 days) to often (5-7 days).

The quantitative part of the interview on physical activity was adopted from The Physical Activity Scale for Individuals with Physical Disabilities (PASIPD) (Washburn et al., 2002). This questionnaire was originally modified from the Physical Activity Scale for Elderly (PASE) (Washburn et al., 1993). This section included 7 items related to the participation in different types of physical activities including sedentary, light, moderate, strenuous, muscle and strength activities as well as taking care for another person. Questions were tailored to people with mobility disability. It was easier for respondents to evaluate their physical activity engagement when options such as physical therapy, wheeling, pushing, wheelchair racing, and wheelchair

push-ups were provided. Frequency of participation was measured on a scale from never (0 days), seldom (1-2 days), sometimes (3-4 days) to often (5-7 days) over the last week.

The last part of the interview examined the perceptions and experiences of successful aging as defined by older adults with mobility disability. This qualitative part included 18 open-ended questions that were adopted from the study by Knight & Ricciardelli (2003). The questionnaire items were integrated into a semi-structured interview that probed reasoning and perceptions on goal attainment, personal fulfillment, positive and negative experiences in life, adjustments due to changes with age, and personal experience of aging. A summary of materials included in the interview is shown in Table 4.1

Table 4.1: Materials included in Phase 3

Measure	Content	Related Interview Questions
TechSAGE Background Questionnaire	Demographic, housing, transportation, occupational status, health, memory, living situation, quality of life, vision, hearing and physical mobility	“Earlier you rated your health as _____. Could you please share what were you thinking about when you answered that question?”
Subjective well-being and health	Assessment of positive and negative affect, sense of control, and psychological well-being	“When you think about your well-being, what comes up to your mind?”
Quality of life	Assessment of physical health, energy, mood, relationship with family members, spouse/partner, and friends, abilities to do chores, life as a whole	“What does quality of life mean to you? What impacts it?”
Social engagement	Participation in social activities: visiting friends, religious services, participation in clubs/classes, going out, work, and volunteering work in the past month	“For the activities that you were not able to attend, what was the reasons for not attending them?” “How important is it for you to be able to participate in these types of activities or be socially active? Why?” “Are there any other social activities that you enjoy? What do you like about them?”
Physical activity	Participation in different types of physical activities including sedentary, light, moderate, strenuous, muscle and strength activities as well as taking care for another person in the last week.	“Are there any other physical or exercises activities that your particularly enjoy? Why?” “Do you think physical activity/exercise is important to you? Why?”

Table 4.1 (Cont.)

Successful aging	Perception of own aging experience, meaning of successful aging, hinders of successful aging, best and worst thing about the age, positive and negative experiences in life, age and disability related losses, coping strategies, important thing in life, goal attainment, importance of goals and their achievement.	Full questions on the successful aging measure is provided in Appendix A.
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Procedure

Participants were interviewed individually on a scheduled date and time via Zoom between July and August 2022. All interviews were administered by one researcher using REDCap system. Interviews lasted between 45 min and 95 min and were audio/video recorded and transcribed. The researcher read and entered the answers to the REDCap system with the participant's responses. By the end of each measure, participants were asked several qualitative questions related to each section. The detailed flow of the whole interview is shown in Figure 4.1.

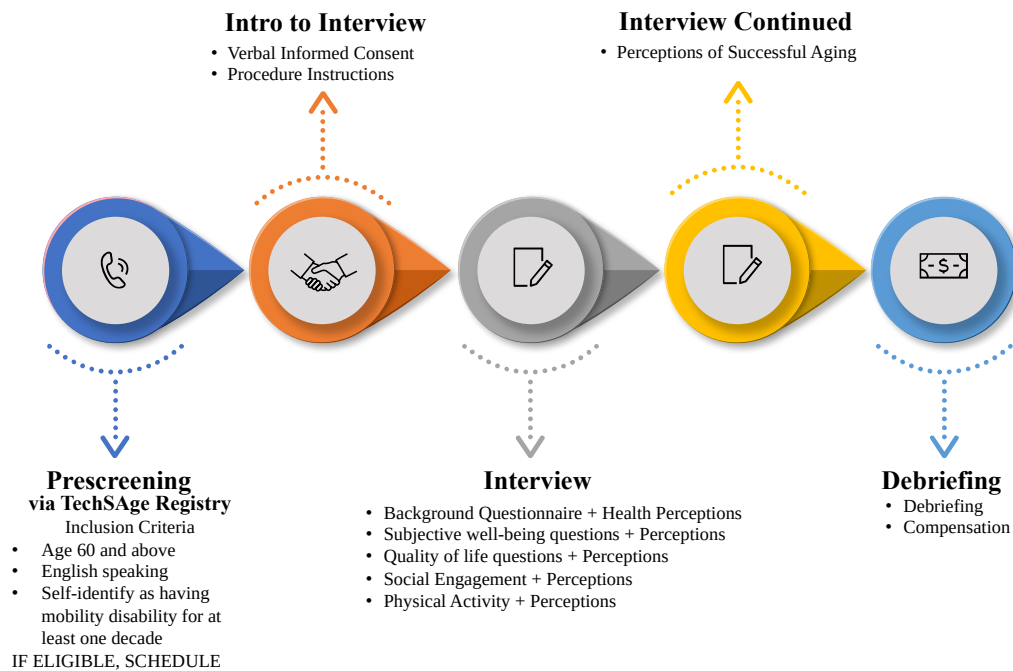


Figure 4.1. Participant Interview Flow

Participants

Twenty-five interviews (17 females, 8 males) were conducted and included in the analysis. Respondents ranged in age from 60 to 81 years with a mean age of 69.28 years living with mobility disability (Table 4.2).

Table 4.2: Participant Demographic and Descriptive Data

Characteristic	N	%
Gender		
Male	8	32
Female	17	68
Race/Ethnicity		
White, non-Hispanic	22	88
Black, non-Hispanic	3	12
Marital Status		
Married	15	60
Single/Divorced /Widowed	10	40
Education Level		
Vocational training	1	4
Some or in progress college/associate's	3	12
Bachelor's degree	11	44
Master's degree	8	32
Doctoral degree	2	8
Income		
Less than 25,000	1	4
25-49,000	4	16
50-74,000	3	12
75,000 or more	13	52
Do not wish to answer	4	16
Living Arrangement		
Alone	5	20
Spouse/partner	17	68
Roommate/friend	2	8
Other family	1	4
Occupation		
Retired	19	76
Working	6	24
Benefits		
Social Security Disability Insurance	9	36
Do not receive any	16	64
Transportation Used		
Driver of a personal car	15	60
Passenger of a personal car	22	88
Electric wheelchair	11	44
Walked	8	32
Bus, private bus, para-transit service, rideshare, subway, taxi, Segway, bike	13	52

In terms of the health characteristics of the participants, the most frequently mentioned health conditions among the study participants were multiple sclerosis (n=20) (Figure 4.1). Respondents were taking 6.28 (SD=4.22) medications on average with a range from 1 to 20 medications.

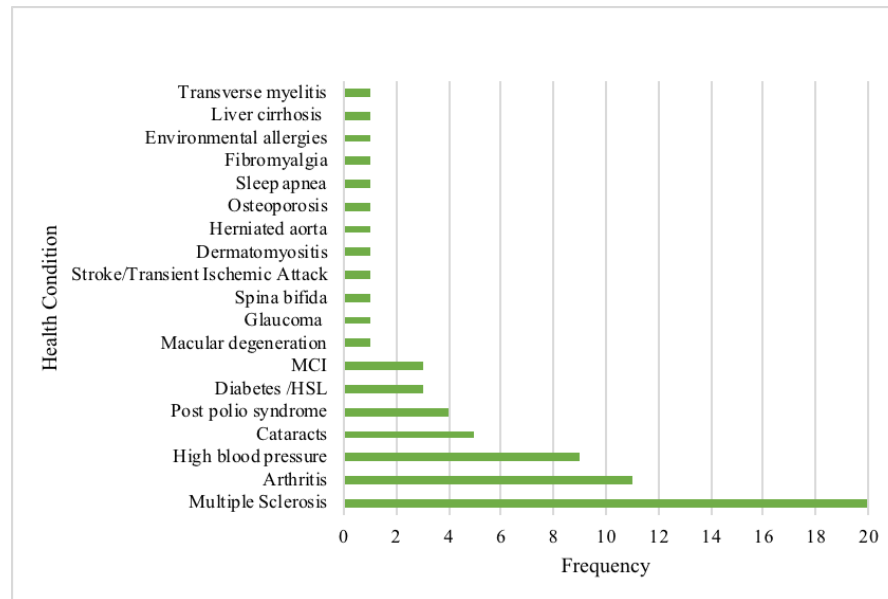


Figure 4.2 Frequency of Health Conditions Reported by Study Participants

None of the participants reported serious difficulty seeing, whereas all of them used at least one type of vision aids. Glasses being the most frequently used mobility aid (n=24). Only one participant reported having serious difficulty hearing and having used a hearing aid.

More than half (56%, n=14) replied that they had serious difficulty walking or climbing stairs, eight participants were unable to walk at all, and nineteen reported that they are unable to walk independently without using a walking aid (e.g., cane, walker, crutches) (Figure 4.3). The most frequently used mobility aid was a cane/stick (56%, n=14) (Figure 4.4).

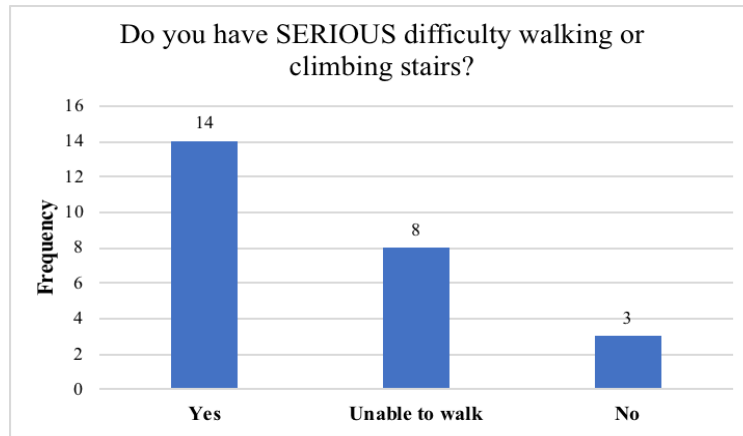


Figure 4.3 Frequency of Reported Mobility Difficulties

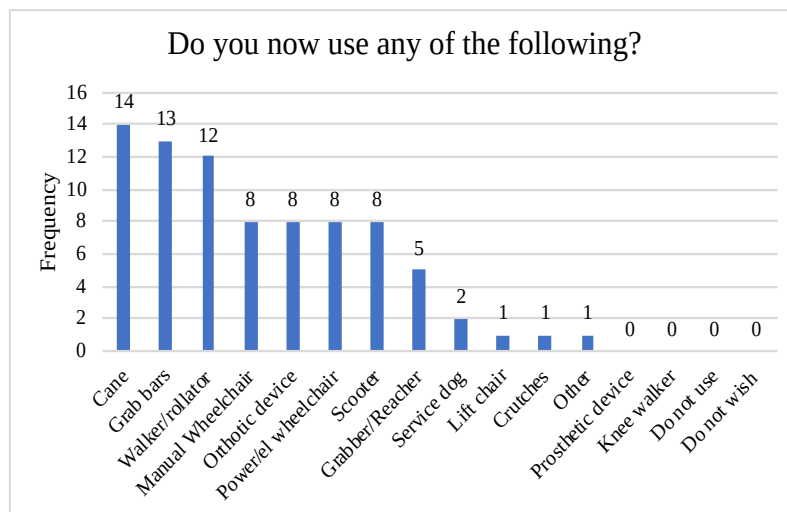


Figure 4.4 Frequency of Use of Mobility Aids

Coding of Interview Data

Items related to subjective well-being were reverse-coded and ranged from 1 to 41 with higher scores representing better well-being. The appropriateness of using a single well-being score for analyzing NHATS data was previously supported by a confirmatory factor analysis and tested the construct validity of the single factor construct (Kim et al., 2015). For the quality of life questions, a 4-point Likers-scale (poor, fair, good, excellent) was used. The answers were coded and summed up to a total ranging from 9 to 36, higher scores indicating better quality of life. For analysis purposes the responses for the social engagement part were coded as “never” = 0 and “seldom” or “sometimes” or “often” = 1 to denote a continuous variable from 0 to 6. To calculate the frequency responses were coded as “never” = 0 and “seldom” or “sometimes” or “often” = 1 to denote a continuous variable from 0 to 7. To calculate the frequency of physical

activity participation, responses were coded as “never” = 0 and “seldom” or “sometimes” or “often” = 1 to denote a continuous variable from 0 to 7.

The qualitative parts were transcribed by two researchers, who were approved by the IRB committee on the research team form. An inductive thematic analysis was used to analyze the data from the transcriptions (Braun & Clarke, 2006). Codes were developed during the process of interview analysis to come up with ideas based on our exploratory research design. The following steps were involved in the analysis process (Bengtsson, 2016).

Two researchers were conducting the analysis. First, both of them got familiarized with the data by reading through the transcribed text. Further, both researchers agreed that statements (or quotes) from the sentences of the whole response will be considered a meaningful unit of analysis. Each statement (or quote) contained insights that are important to the research objective. Each identified unit was further labeled with a code by two coders separately using excel spreadsheets. Once all data were coded independently by two researchers, inter-rated reliability was calculated as a percentage of codes that researchers agree on. Inter-rater reliability was reported for each qualitative question that is related to the research objective. An agreement level of 80% was chosen as a sufficient level of reliability. Any discrepancies in the agreement level (i.e. less than 80%) were solved via discussion until the chosen agreement level is reached. Coded material was then condensed into broader areas together by two researchers. All mentioned reasons in a single response were coded. An example of the process of analysis is given in Table 4.3.

Table 4.3: An Example of Analysis Process

Response	Meaningful Unit	Code	Area
<i>“I am in incredible shape, do a lot of physical exercise, someday I do not want to get out of bed, emotionally depressed a bit, but in a great shape compared to my friends, I do counseling, helping people... make a difference in people's lives, heavily involved in research”</i>	• Incredible shape • Physical exercise • Emotionally depressed a bit • Shape compared to friends • Helping people, make difference	• Physical health • Physical functioning • Emotional health • Comparison to others • Ways to deal with challenges	1. Physical Health 2. Functioning 3. Comparison 4. Coping strategies

4.4 Results

The first part of the results discussed the prevalence, definitions, and perceptions of different components of the framework of successful aging proposed in chapter 2 of the dissertation, including self-rated health, well-being, quality of life, social engagement and physical activity. The second part examined the perceptions and experiences of successful aging as defined by older adults with mobility disability.

Perceptions of The Components of The Framework

Self-Rated Health

The self-ratings of health were quite diverse. The most common response was fair, but when combined, there were more older adults who rated their health as good or very good. None of the study participants ranked their health as “excellent” (Figure 4.5). The mean of self-rated health score was 2.66 (S.D. = 0.86).



Figure 4.5 Distribution of Self-Rated Health Scores

Participants were further asked to share their thoughts on how they ranked their health. During the interviews it became clear that there were two opposite views, positive and negative, in assessing health. In describing their self-health, participants included different factors and components. Based on the thematic analysis, respondent's responses were classified into the following main areas: a) physical health; b) functioning; c) coping strategies; and d) comparison to other people.

a) Physical Health

Twenty respondents emphasized the importance of physical health when assessing self-rated health. This area included the following codes: health issues, complaints, pain, diagnoses, conditions, physical shape, feelings, or symptoms. For example, respondents commented:

“I do not have mortal illness, not in pain...in pretty good shape” (Male, 73).

“No real day-to-day worries or pressing issues or problems...I have multiple sclerosis, but it is mild, I feel that my health is good” (Male, 70).

“I have breathing difficulty... I sleep with a ventilator during the day...it is difficult for me to breath” (Female, 81)

b) Functioning

Fifteen respondents reported in their answers their ability or inability to perform different day to day activities or functioning overall. Functioning area included codes such as ability or inability to perform different activities, getting around, any type of physical activity, assistance in activities, and freedom. Sample responses that fell into this area were:

“It is my ability to do anything without assistance” (Male, 60).

“It is my difficulty walking” (Female, 63).

“I am unable to drive or walk” (Female, 69).

“I can pretty much do what I want to” (Female, 74).

c) Coping Strategies

Some participants highlighted the importance of coping strategies despite the presence of health issues or physical limitations. Codes such as management, different ways to manage condition, having a routine, keeping track of medications, having aids constructed this area. Examples were as follows:

“I do not have complaints... take anything prescribed...have a routine to track my medications” (Female, 61)

“I manage, I follow directions, take medication, I rest if I get worn down...” (Female, 74).

“I do counseling, I help other people” (Male, 62).

d) Comparison to Other People

Few older adults tended to make comparisons to other people when evaluating their health, such as:

“I am unable to do everything that my friends or family do” (Female 69).

“I do not have cancer or diabetes that other people are dealing with” (Female, 64).

“Generally, my health is worse than my peers” (Male, 70).

“I have great shape compared to my friends” (Male, 62).

In sum, despite the presence of mobility disability, 48% of older adults perceived their self-rated health as either being good or very good, which is called a “disability paradox” (Albbrecht & Devlieger, 1999; Krahn et al., 2009). When analyzing the perceptions of self-rated health, we observed a lot of variability in their experiences, that involved both negative and positive aspects of physical health and functioning. Therefore, a single subjective question on ranking self-rated health was not sufficient to understand the perceptions of health among study participants.

Subjective Well-Being

Based on the quantitative responses, the mean of subjective well-being score was 33.68 (S.D. =4.77) with a range from 24 to 40 points. When participants were further asked a question, *“When you think about your well-being, what comes up to your mind?”*, their responses covered different abilities to do things, as well as being independent, having family support, interaction with family, absence of pain, psychological well-being, financial resources, and mental health. All these responses comprised the following areas: a) physical and cognitive health; b) independence; c) social and relationship; d) harmonious life and contentment; e) living environment. Figure 4.6 shows the percentage of participants that mentioned particular area with an example of responses from the transcripts.

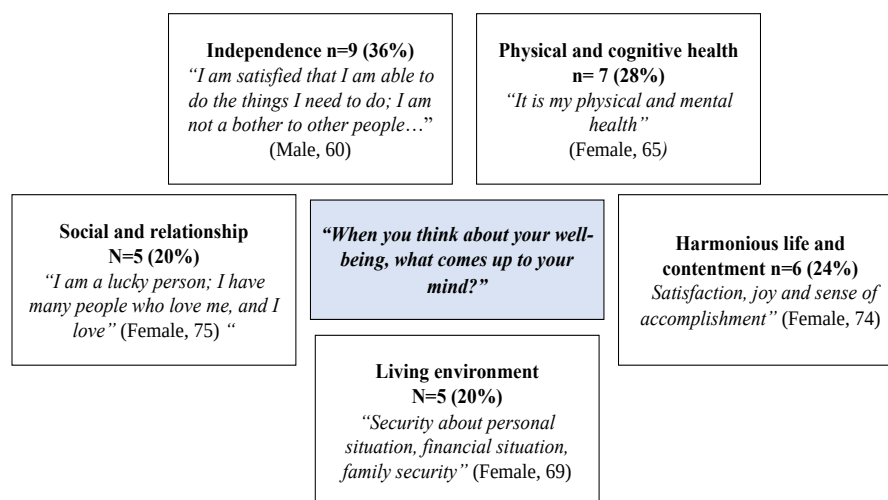


Figure 4.6 Frequency of Responses Mentioning Each Area Associated with Subjective Well-Being and Response Examples

In general, we also observed a lot of variability in the responses. However, independence was mentioned as an important component contributing to a better well-being. Within the context of mobility disability, independence for older adults meant making independent decisions and being able to do things on their own to the best of their abilities.

Quality of Life

The mean for the quality of life score was 27 (S.D. = 4.84) with a range from 19 to 35 points. The distribution of the scores for the whole sample is shown in Figure 4.7.

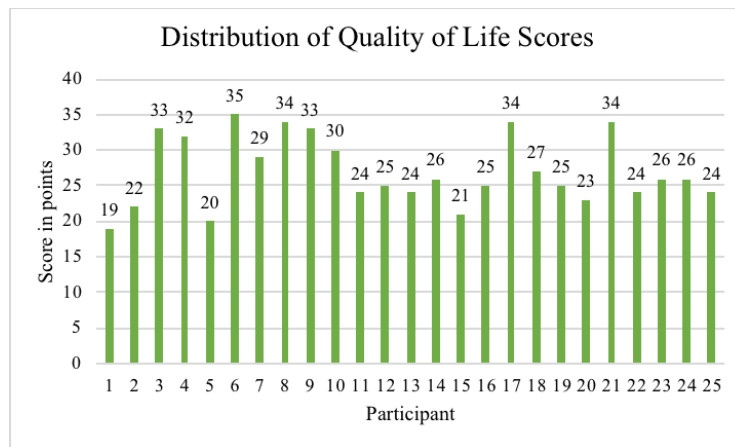


Figure 4.7 The Distribution of the Quality of Life Scores

To assess the perceptions of their quality of life, participants were asked the question: “*What does quality of life mean to you and what impacts it?*” The coding team identified three distinct areas, defined in Figure 4.8. The majority of responses were related to the ability to find ways to enjoy life and use coping strategies despite the mobility disability. Bad days and challenges happen, but what is more important is to navigate through and find joy “*to be able to enjoy and navigate through good and bad times, through roadblocks. If you navigate and get enjoyment out of the simple things*” (Female, 69). Older adults emphasized that their quality of life was closely related to their ability to do things that they want and enjoy. Having internal strength in terms of optimism, happiness, and peace helped to maintain their quality of life.

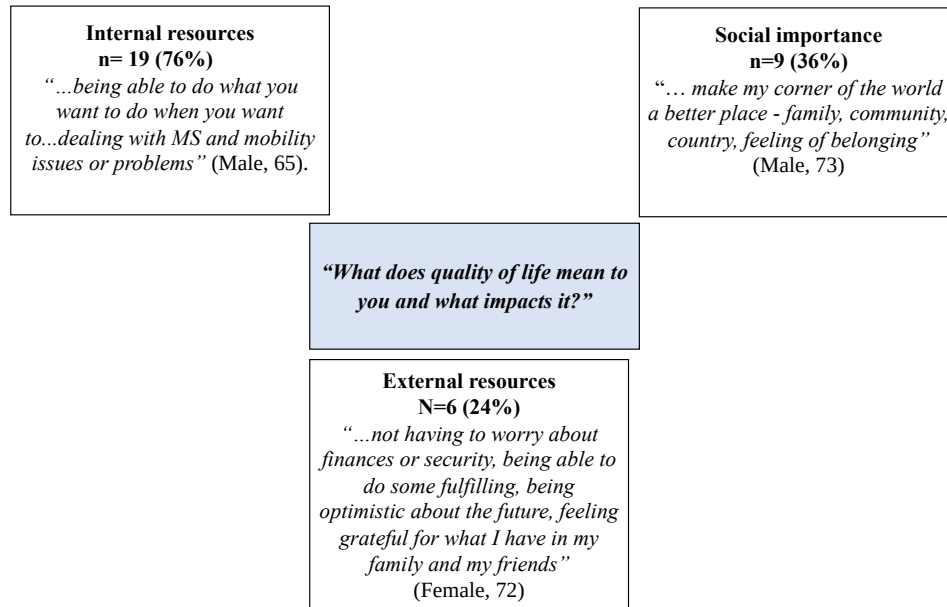


Figure 4.8 Frequency of Responses Mentioning Each Area Associated with Quality of Life and Response Examples

Besides having internal resources, older adults mentioned *social importance*, which included categories like helping others, relationships with family members, kids and grandkids, being loved and love, being surrounded by people, count on family, help community, country, feeling of belonging, and social activities: *“it is about being with people who love you, about being able to do somethings meaningful”* (Female, 74). Some participants identified quality of life somewhat similar to subjective well-being by mentioning the importance of having family or friends around, being able to help others or community, be surrounded by people.

The third area, called *external resources*, compiled external factors that impacted the quality of life including living situation, finances, securities, support systems, aids, and other amenities. This area overlapped with the qualitative responses to subjective well-being, Similarly, participant said: *“not having to worry about finances or security, being able to do some fulfilling, being optimistic about the future, feeling grateful for what I have in my family and my friends”* (Female, 72).

Overall, we observed that even though participants experienced different levels of mobility limitations and health problems, they still perceived their quality of life quite higher than expected. For them quality of life was elaborated in terms of ability to overcome obstacles and maintain quality of life that originated in person's internal resources and attitudes.

Social Activity

Older adults with mobility disability participated on average in 3.52 activities (S.D. = 1.22) with a range from 1 to 5 activities. None of the participation reported participation in all six activities (Figure 4.9).

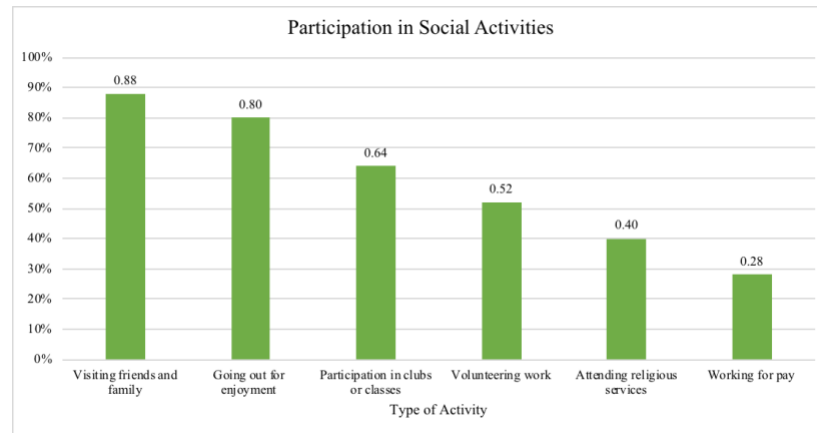


Figure 4.9 Distribution of Participation in Social Activities

For the activities that participants did not attend, we were interested in exploring the reasons for not attending them. The majority of responses (n=14, 56%) emphasized that their health issues were the main obstacles for participation: *“because of my immunocompromised health I have been afraid...due to pandemic”* (Female, 71). Nearly 30% (n=8) listed accessibility issues such as *“Physical access, being able to get in someone’s house because of stairs”* (Female, 65). And finally lack of time or resources to do some of the listed activities were supported by the following statements *“did not have time, we have other activities”* (Female, 64) or *“due to financial situation”* (Female, 75).

Despite health issues and related obstacles, almost all respondents (92%, n=23) perceived social engagement as either “important”, “very important”, “extremely important” or “a priority”. The “perceived benefits” area of social participation were grounded in three sub-areas: well-being, sense of belonging, and meaning. Participants explained that social participation brings a sense of well-being when they feel joy, happiness, positive feelings and experiences: *“It is good for your body and mind and your general well-being”* (Female, 69). Social participations also brought a sense of belonging when they were around people or community with similar interests, shared same values with friends and family. Yet participants acknowledged that helping others, sharing experiences with others made them feel that they were able to contribute to a greater community and feel meaningful in spite of their limitations. These

expressions of the importance of being part of family or a bigger community, interacting with others made them feel more socialized, happier and more active. Some also mention that otherwise they felt lonely and age much quicker.

“it is extremely important. I stay active groups on Facebook. I do write for MS website, help folks. If I do not do it, I hibernate a lot quicker” (Male, 66).

“extremely, one of the most important. My personality is to be around others, draw off their energy, I am a social creature, I like going out and being in public... learn constantly... by observing and doing” (Male, 62).

“important, because I am family oriented it is important to be with them and friends, they make the world better” (Female, 70).

About 20% (n=5) of respondents, on the other hand, emphasized the fact that they were no longer able to participate in activities or be socially active due to some barriers. Subcategories such as limited abilities, physical health, financial constraints, current pandemic, or worthiness were included in the area “perceived barriers”. Here are some of the examples:

“I would love to see my family, but I can't afford travel” (Female, 75).

“It is important because I need to continue to feel I am a part of the world, not just my home and social circle. I will continue to, but sometimes I am not feeling physically capable” (Male, 72).

“It is sort of important, I enjoy seeing people, we share values, but sometimes it not worth the effort” (Female, 74).

In sum, when analyzing the patterns of social activities, we found that even though social participation was perceived as important, many older adults would have participated more if they had physical health and resources to do so. Older adults were aware of different benefits of social activities and they were doing their best to maintain their level of participation, but the presence of mobility disability limited them from doing even more. The list of activities in the questionnaire did not capture other activities that older adults valued and participated in such as teaching, gardening, playing music, book clubs, photography, travelling, involvement in support groups online, playing games, pool, being a philatelist, being an online influencer, and cooking. Based on mentioned activities, older adults with disabilities were able to find alternatives to minimize their mobility-related barriers for participation.

Physical Activity

The quantitative analysis revealed that on average older adults participated in 4.2 activities (S.D.=1.38) with a range from 1 to 6 activities. None of the participants reported participation in all seven physical activities. The detailed distribution of participation in all activities is shown in Table 4.4.

Table 4.4: Distribution of Participation in Physical Activities

Type of Activity	N (%)
1. Stationary activities such as reading, watching TV, computer games, or doing handcrafts	25 (100%)
2. Walk, wheel, push outside your home other than specifically for exercise (getting to work/class, walking the dog, shopping, or other errands)	20 (80%)
3. Light sport or recreational activities such as bowling, golf with a cart, hunting or fishing, darts, billiards or pool, therapeutic exercise (physical or occupational therapy, stretching, use of a standing frame) or other similar activities	19 (76%)
4. Moderate sport and recreational activities such as doubles tennis, softball, golf without a cart, ballroom dancing, wheeling or pushing for pleasure or other similar activities	5 (20%)
5. Strenuous sport and recreational activities such as jogging, wheelchair racing (training), off-road pushing, swimming, aerobic dance, arm cranking, cycling (hand or leg), singles tennis, rugby, basketball, walking with crutches and braces, or other similar activities	8 (32%)
6. Exercise specifically to increase muscle strength and endurance such as lifting weights, push-ups, pull-ups, dips, or wheel-chair push-ups, etc.	18 (72%)
7. Care for another person , such as children, a dependent spouse, or another adult	10 (40%)

The purpose of the qualitative section was to explore thoughts and perceptions on the following two questions: “*Are there any other physical or exercise activities that you particularly enjoy?*” and “*Do you think physical activity/exercise is important to you and why?*” Respondents split into three groups based on their answers: a) “no other activities or cannot do any”; b) “other activities that I enjoy and do”, and c) “other activities I enjoy, but do not do”. A total of 9 participants (36%) fell into the first group. The second group was the largest group of 11 respondents (44%), who mentioned a variety of activities that they enjoy and do: training dogs, swimming, golf, garage sale, wheeling around the house, sewing, walking, gardening, sexual activity, Pilates, yoga, and physical therapy. Among those who reported that they enjoy other activities, they replied:

“a lot I enjoy but can't do because of mobility issues... tennis or golf” (Female, 72).

“bike riding, but I can't do anymore, swimming, always loved water, I find it very relaxing and wonderful exercise” (Female, 73).

“I used to do yoga, but not any more” (Male, 70).

Almost all respondents 92% (n=23) confirmed that physical activity is either important, very important, extremely important, or vital. The opponents of this view replied physical activity was not important, but it still helped managing her pain:

“I do not think it is important. I have difficulty and pain, when I do physical activity, I have not seen benefits. I enjoy Tai Chi, total connection of my body, freedom of my joints” (Female, 75).

When participants were asked to explain the reasons of the importance of physical activity, two areas emerged: a) physical activity for physical health which encompassed the mitigation of health, pain management, maintaining mobility, avoiding further deterioration of health condition, keeping brain active, developing muscle strength, and keep moving; and b) physical activity for mental cognitive health, which included the sense of happiness, ability to focus, maintaining mental health, cognition, memory, as well as emotional independence. (Figure 4.10).

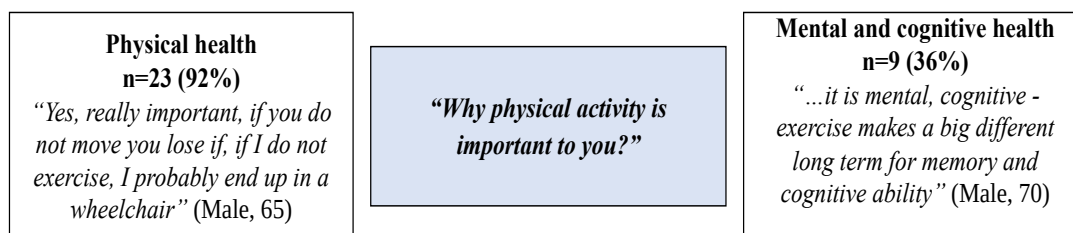


Figure 4.10 Frequency of Responses Mentioning Each Area Associated with the Importance of Physical Activity

Our respondents conveyed the importance of physical activity in their lives both physically and mentally. The majority of them reported that physical activity is fundamental to mitigate their health condition and avoid further deterioration. Some were afraid that eliminating physical activity from their lives would negatively affect their current level of health, make them weaker and more dependent. Low frequencies of participation in physical activities were consistent with the research on the general population, which meant that people with a disability usually spend more time in sedentary behavior compared to people without disabilities (Manns et

al., 2012). Reducing time spent sedentary would be the first recommendation for people with mobility disability to maintain their health (Manns et al., 2012).

Perception of Successful Aging

The last part of the interview aimed to examine the perceptions of older adults on their experience of successful aging. Participants were asked to describe their aging experience, whether they think they were aging successfully and what are some of the factors that contribute to that, what were the coping strategies that they used to adjust to age- and disability-related losses, and several questions related to their goals.

Meaning of Successful Aging

We first counted the proportion of people who perceived their aging experience as successful. Further, we conducted a thematic analysis of their explanations and thoughts related to the meaning of successful aging. Each response was broken into meaningful phrases or sometimes sentences that conveyed discrete information related to the question. Further, the phrases were categorized into bigger codes. Related codes then comprised bigger areas. For example, to the question *“What do you think it means to age successfully?”*, participant replied: *“Well, I think first thing is remaining active and curious and interested and involved and relevant in life. And if we're talking about end stage elderly, being sort of prepared for death”*. This particular response was broken into two discrete codes: 1) being active and curious; 2) being prepared for death. Upon analysis of all responses, we found that several people mentioned similar information that fell into one code. Two coders then discussed and grouped similar codes into one overarching area. For example, this particular response consequently fell under the two areas “Being Active” and “Accepting and Adapting”. The frequency of all codes mentioned in each response were then calculated for each area. Thus, seven areas emerged pertaining to the perception and subjective meaning of successful aging, that are summarized in Figure 4.11.

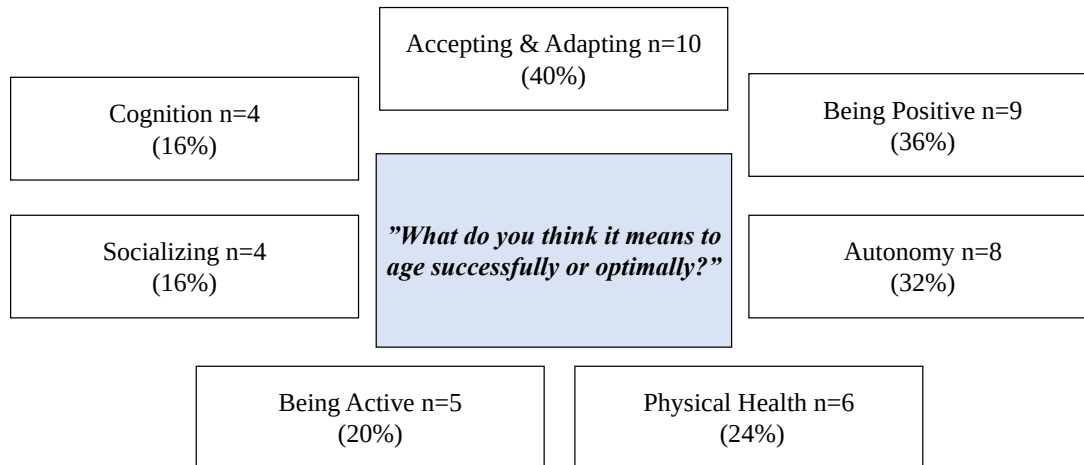


Figure 4.11 Major Areas Associated with Successful Aging and Frequency of Responses for Each Area

Area 1: Accepting & Adapting

This area embraced accepting, recognizing limitations and challenges, being prepared to give up on some things, trying to avoid restrictions caused by deficits, accepting and dealing with new reality, as well as appreciating things that are available and feasible. Participants indicated:

“Do not have any regrets about what you can't do...but appreciate what you can do. I recognize that it's different from what it used to be” (Female, 75).

“I'm not happy that ...I can do the things that I've always been able to do, but I suspect that's true for any 72-year-old You know I'm not happy that I can't hike and ride like I used to but there's nothing I can do about it, except try and do what I can” (Male, 72).

The process of accepting and adaptations could also be related to physical and mental challenges:

“not to be restricted very much by your deficits whatever they are...mental or physical deficit so” (Male, 70).

For some accepting process was seen as accepting death as inevitable part of aging:
“accepting that we are not here to stay forever. We're all headed towards death. To be able to realize, to come to terms with it” (Female, 71).

One of the participants highlighted his acceptance process by assessing his current health condition to what could have been worse:

“manage my difficulty walking but like I said, other than the MS and the arthritis and that's just osteoarthritis I really don't have diabetes I don't have high blood pressure, low pressure I don't have high cholesterol ... all my numbers are very good as far as blood work” (Female, 73).

Area 2: Being Positive

Many respondents emphasized the importance of being positive overall. A total of nine responses encompassed different aspects including being happy, content, being able to enjoy life, derive joy, positive, and self-confidence. For example, a participant described successful aging as trying to avoid being a cranky old person:

“you know what a curmudgeon is? Well, it's like a cranky old person. So as long as you can age and still be happy, not be a curmudgeon, then I think you're doing pretty good” (Female, 81).

Another participant described successful aging as still being young at heart:

“I think to be happy. Whatever the aches and pains be the main limiting factor...You know, trying to prevent your world from becoming smaller and smaller and staying young at heart” (Female, 64).

Area 3: Autonomy

This domain of successful aging reflected older adults' independence, ability to do things they want and like, as well as making decisions on their own. An individual reported:

“In general, to go about living your life, doing all the things that you like, doing and feeling good” (Female, 65).

“you know, be independent, living along, not rely on people” (Female, 65).

Participants valued the importance of autonomy despite the presence of disability. They acknowledged that physical limitations are barriers, but to remain performing things they used to do or used to like was one of the central ideas of the area. Autonomy often requires external support, which was discussed as one of the coping strategies with losses.

Area 4: Physical Health

Physical health was mentioned in six responses when defining subjective successful aging. By physical health older adults with disabilities mostly meant overall well-being, feeling well, being healthy to the best of your abilities, being involved in physical activities, and maintaining healthy habits. Following are some of the examples:

“aging successfully is maintaining your physical well-being and making sure that your food, your digestion is healthy, because any kind of strain toward sugars or fats is going to screw things up” (Female, 69).

One respondent positioned health as the vital domain of life:

“The most important thing about aging to me is keeping your health. You know, assuming that you're it because...health issues...I tell my kids all time, they can have all the wealth in the world, but the richest man is the healthiest man. It doesn't matter how much money you have you can't buy health and if your health is bad, you can't do all the things you really want to do” (Male, 65).

Area 5: Being Active

Here are some of the quotes that relate to this area: *“still be on the go”* (Female, 70), *“just being able to stay active and involved”* (Male, 66), *“I think first thing is remaining active and curious and interested and involved and relevant in life”* (Male, 73), *“keep moving”* (Female, 61), *“I am still active”* (Female, 74). Most of the participants discussed that being and staying active in any way, physically or socially, is something that helps them manage their condition and improve quality of life.

Area 6: Cognition

Although cognitive health was mentioned only four times across all interviews, participants do not underestimate the role of being cognitively healthy. One of the respondents replied that due to physical limitation he does not consider himself as aging successfully, however, he added that from the cognitive health perspective he thinks he is aging successfully: *“I contradict myself because I stressed my illness and did not account for cognition. Probably I should not put a definite “no” to my answer to aging successfully because it could “yes” from overall perspective and “no” from the point of view of mobility, health”* (Male, 70).

Other responses elaborated successful aging as *“maintaining your brain functions, not falling prey to dementia or Alzheimer”* (Female, 69) and *“keep your mind moving as well”* (Female, 61).

Area 7: Socializing

A need to be part of a society, help others, and connect with friends help them to remain positive (area 2). Four participants opined:

“be involved in helping others” (Male, 66).

“You’re able to be part of a group you derive joy, positive and self-confidence” (Female, 69).

“I am still active and visit friends” (Female, 74).

“and socializing is very important” (Female, 69).

The main finding of this section was that despite the presence of mobility disability, 80% of participants in our study (n=20) perceived themselves as aging successfully when measured by a single direct question whether they think they are aging successfully or not. Certainly, the percentage of successful agers would have been zero if we applied a definition by Rowe and Kahn, where the absence of disease is an essential requirement. Previous studies in the literature compared the proportion of objectively (following the Rowe and Kahn’s definition) versus subjectively measured successful agers (perceptions of older adults) and showed that the percentage dropped from 18.8% to 13.6% (Strawbridge et al., 2002). Our findings, nevertheless, indicated that successful aging among older adults with disability could be quite high, but it was obtainable a unique way. This unique way was reflected in participants’ responses and perceptions. The key factor of successful aging that emerged from the study was the ability to accept and adapt to the challenges and limitation due to disability. This key factor closely mapped onto the selection, optimization, and compensation model (Baltes & Baltes, 1990). Participants acknowledged their challenges because of their condition, but they highlighted the importance of shifting their perceptions from losses and disabilities to opportunities and abilities.

Among successful agers in our sample, 41% rated their health as either fair or poor. In other words, our findings suggested that subjective successful aging did not necessarily imply good health. This implies that perceptions of health, well-being and quality of life might not represent the complete aging experience especially among older adults with disabilities (Whitley et al., 2016). Therefore, in-depth exploration of the meaning of successful aging should not be overlooked among this population group

Coping Strategies with Age and Disability Related Losses

All respondents reported that losses and challenges that they experience were disability-related rather than age-related. When further prompted to share strategies that they used to adjust to life changes, the biggest area (52%) that emerged was “alternatives”, which implied compensating for losses, adjusting, and finding alternative ways to age (to exercise, to be active) with mobility disability. Here is a quote by male participant, 70 years old:

If you start overdoing it today, you'll have less of it tomorrow, because you used it today and you tend to push things a little more than you probably should, and I think that's a just much as anything, just like I'm not willing to go quietly into that long night, you know you're just not... you still think you're 35 in your head right. Maybe being a spectator to some of the things you liked. The now, you may be just watch rather than participate. (Figure 4.12).

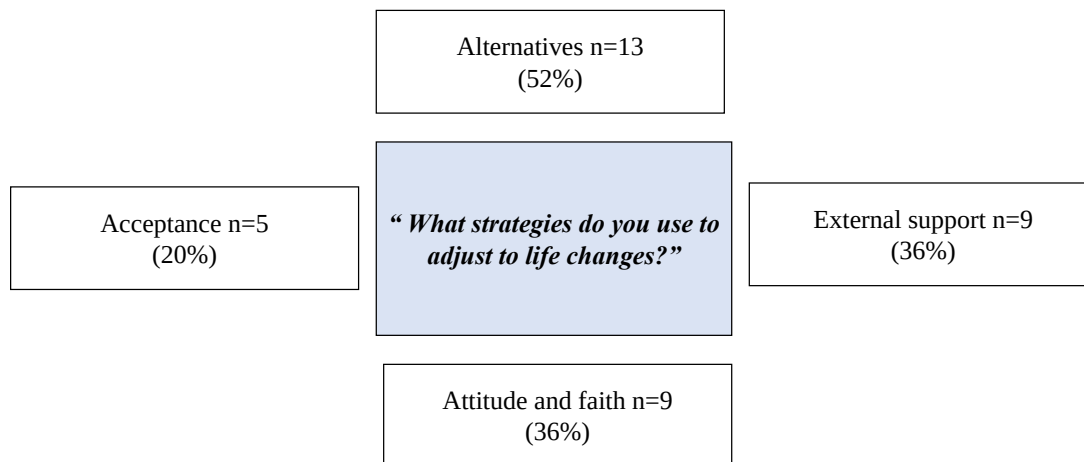


Figure 4.12 Major Areas Associated with Strategies to Adjust to Life Changes

Another participant was specific about way they share responsibilities within family members, so that everyone is still able to do their own part the best they can:

“I can't vacuum, I don't have a fluffy mop to do the floor. I can only do, as I mentioned before, paperwork, pay the bills, work on the computer. Things like that. So being able to do that part of my life has helped me greatly” (Female, 81).

Yet another participant shared that she needed to change her healthy behavior to adjust and realize the new reality:

“Go to bed earlier, don't work as hard during the day, try not to accomplish the same amount of stuff that you used to do when you were younger” (Female, 74).

The second important strategy was “acceptance” (20%, n=5), which is that choice of making decision to accept the challenges and do something about them, as well as accepting the possibility of living the life in a new way. Some were able to accept the losses but were not able to get over them completely. Others stated that acceptance is a challenge that goes through the stages of grief every day:

“something that you know, has come up with MS is grieving. You grieve for the loss of things you used to be able to do and that's still comes up periodically. So, accepting and completely getting over I guess are two different things, I mean I accept them I'm not always happy about it but” (Male, 65).

“going through the nine stages of grief before the end of breakfast” (Male, 73).

Another participant provided example of how other older adults with mobility disability are not able to accept the losses:

“I had actually had to get a new scooter and gave my old one to a friend of mine who has MS and she's still not able to mentally accept the fact that she should be using it. So, I feel grateful that you know I've accepted it” (Female, 72).

The third area accounted for about 36%(n=9) of all responses was “external support”. Older adults emphasized that they used many different mobility aids, as well help of people around them including friends, spouses, counseling, physical therapists, aids around the house, and technology. For example, one participant said that she was able to adjust to changes related to disability because of a lot of counseling, positive friends and family being supportive as long as use of aids (Female, 69):

I got this really great little scooter that weighs 30 pounds that I can lift myself and put it in out of the car and zips along at five miles an hour and I could use that for photography I use it a lot for when I want to go out and do photography so that's been an adjustment...also I've done a lot of physical therapy trying to improve my gait which hasn't been successful in that I haven't I still can't walk very well, but that's one of my adapting strategies that doesn't fix your problems. I've got a knee brace and foot brace and that sort of thing which doesn't completely fix the thing, but it makes it better makes me able to walk better than it would, without it (Female, 72).

Another participant was excited discussing how her house aid helped with day-to-day activities that she is no longer able to perform:

“You know, we have the aid that comes five days a week...does laundry, cleaning, cooking, helps me to take to bathroom, personal trainer. She is only 32. She is the happiest, and nicest. She sets up coffee for girls. She is such a happy presence. She brings positive vibes” (Female, 64).

Having right “attitude and faith” (36%, n=9) was also one of the ways to adjust to age and disability related losses. This area encompassed variety of aspects such as having positive accepting thinking, being own best advocate for making decisions, not feeling sorry for yourself,

having faith in God, keep going, fighting and striving to the best. These aspects are reflected in the following quotes:

“Well, I would say my faith in God and sort of learning, you know over time, and having the attitude that I really don't have a choice, you kind of have to adapt to continue on” (Female, 65).

“It's very appropriate for aging to allow yourself to be angry about the loss of things and allowing yourself to grieve and say yeah, I'm very angry about that, and it makes me sad” (Female, 65).

The following emotional response reflects a strong fighting attitude of man who was able to adjust to losses and limitations:

“I think I've adjusted better than I really expected...if you ask my children, they'll tell you, it's don't let the bastards win. And I just refused to you know, I get down like everybody else, but you know part of it is you know, if you get knocked down the winners in life, get back up....you just don't quit you know, some days you lose the battle which eventually if you continue your win the war” (Male, 65).

Overall, findings indicated that there were a variety of different coping strategies that older adults adopted in order to improve their aging experience with mobility disability. The main coping strategy, which was finding alternatives, overlapped with the overall area of perception of successful aging. Certainly, freedom from a mobility disability was not an option for our participants, but freedom to find alternative ways to adapt to the disability was the main driving element.

Goal Attainment

Majority of older adults (over 80%) in the sample responded that they have different goals in their lives and achieving them is important (100%). Having and achieving goals was an essential part of life for 92% (n=23) of respondents, which is supported by the following quotes:

“I feel like they're vital. They have to do with quality of life, and they have to do with self-image and self-respect right” (Male, 72).

“It is very important. I am going back to swimming. Every time I swim, I try to add 2 more lengths as my goal. To remain as independent as possible” (Female, 65)

“It is really important...I want to have more time for friends. And I’m also a Do-er, so it seems like, even though I pull back I ended up volunteering for stuff. I do not say no very well”
(Female, 70).

In sum, analyzing the types of personal goals that our participants had we found that the majority of them were related to maintaining their health and ensuring that it was not getting worse over time. They also emphasized the importance of continue doing activities that they currently enjoy including hobbies, spending time with families, and travelling. Several participants were interested in helping other people with the same disability by being part of organizations and online communities. Older adults were more focused on the avoidance of losing what has been already achieved and on maintaining their current opportunities. This goal selection was also overlapping with the Baltes’ theory of selection, optimization and compensation, where selection of goals is based on life changes and influenced by certain priorities at this age (Baltes & Baltes, 1990).

4.5 Discussion

The first research question of the study was to describe how older adults with mobility disability perceive the components of the successful aging framework proposed in phase 1. The analysis of the first component, the self-rated health, revealed four including physical health, functioning, use of coping strategies, and comparison to other people. These findings were consistent with the literature that examined subjective health among older adults with multiple chronic conditions (Mavaddat et al., 2018; Tkatch et al., 2017). Even though self-rated health was associated with physical health and functioning, nearly 50% of study participants ranked their health as good or very good. The exploration of subjective well-being asserted the influential role of independence among older adults with disabilities. In the context of disability, the perception of independence was different across the responses. Some perceived their independence as having little help from others, whereas others reported that they lost their independence because of their reliance on others. In describing the quality of life, the next component of the framework, older adults believed that quality of life was associated with the ability to navigate and remain positive and optimistic despite health challenges, as well as having good social support and utilizing available tools and aids. Despite the reported loss of ability to

do things independently, it was important for them to focus on those activities they can still perform. Social and physical activities were essential for older adults in order to remain physically and mentally healthy as well as feel personal fulfillment and purpose. Though, when examining their answers older adults with mobility disabilities experienced specific barriers in order to be more socially and physically active. These barriers reflected quite low level of participation specifically in physical activities.

The second research question of the study was to discuss the emerging areas in the perceptions and beliefs on successful aging as well as coping strategies that they used, and the role of goals in their lives. Based on the thematic analysis, seven areas of successful aging emerged in the context of mobility disability:

1. Accepting and adapting which included ability to recognize limitations and challenges and the ability to adapt and use available resources to compensate for losses
2. Being positive included the presence of positive attitude, happy mood, ability to enjoy and experience pleasure from the things that are available
3. Autonomy reflected independence in the context of disability, make decisions on their own
4. Physical health existed in a unique way reflecting overall well-being, maintaining health and healthy behavior, as well as involvement in physical activities
5. Being active and overall openness to be on the go, be curious, learn, and never stop
6. Cognition that is about being cognitively healthy and active, absence of major cognitive diseases
7. Socializing and being part of community, helping others, having positive connections with family and friends.

These areas suggested that successful aging for this population group included interrelated components that are important in the absence of physical health and full functioning. Our results are similar in some domains to other few studies conducted on older adults with physical disabilities that also suggested that physical functioning did not define successful aging (Romo et al., 2013; Molton & Yorkston, 2016). In fact, physical health and functioning were important aspects of successful aging, but participants were more focused on the ways to

minimize the impact of their limited health and functioning to the best of their abilities. Our emerged areas highlighted the importance of both individual and social aspects that overlap with psychological and psychosocial domains of successful aging.

The first area, accepting and adapting, is focused on achieving successful aging through finding alternatives which reflect Baltes and Baltes (1990) selective optimization with compensation (SOC) model. This model makes successful aging possible by maximizing gains and minimizing losses (Baltes & Carstensen, 1996). This is what the following quote by woman aged 75 reflects: *“appreciate what you can do... recognize that it’s different from what it used to be”*. These older adults shift their priorities on something they are still able to do not on things they are no longer able to do to attain life satisfaction. This approach was studied by Havighurst in 1961 and Ryff in 1989. Our study also explored coping strategies with disability-related losses, which also overlap with previously mentioned theory on selective optimization and compensation.

Within the domain of adaptation, it was important to explore ability to select and attain goals that are both important and appropriate for older adults with mobility disability. This selection goals are consistent with previous study that compared goals of older adults and younger people. Older adults are less likely to choose goals related to jobs and career compared to younger people and more likely to focus on maintenance-oriented goals (health, abilities, etc.) (Giulliani, 2015). Research suggests that the process of selecting goals greatly depends upon changes and adaptations that older adults have to make later in life (Giulliani, 2015). It is especially pertinent to older adults living with disabilities since they are more likely to select goals employing the same strategies involved in improving their aging experience, such as based on SOC-model by Baltes and Baltes. As was mentioned earlier based on the SOC-model, people tend to select those goals that are important to them by optimizing the resources they have and minimizing the losses (Ouwehand et al., 2007). Since losses may increase with age and disability, the process of goal selection becomes vital and the range of goals is limited (Baltes & Carstensen, 1996; Freund & Baltes, 1998; Ouwehand et al., 2007). Optimization by focusing on the essential things is represented in the following quotes by a women at 73, *well my goal...as far as the MS not getting any worse, so, I’m on a different drug now that’s supposed to prevent me from progressing any further as far as walking difficulty.*

Being positive was another important area. Our participants considered a positive attitude as a criterion to age successfully. According to the literature, positive thinking and feelings might generate good health (Patnaik, 2013). Our findings are also consistent with other studies on the perceptions of successful aging among older adults without disabilities that found that older adults who stay positive are more likely to age successfully (Badache et al., 2021; Rashid et al., 2012, Nur Amalina & Yarina, 2017).

Autonomy in our study was an important area for older adults with mobility disability. This area is closely interconnected with one of the coping strategies that older adults used in our study, namely, “external support”. Examples of the statements on autonomy were interrelated to the importance of making choice on your own as well, continuing doing things, and not becoming a burden to someone. Thus, autonomy often depends on help of mobility aids and assistance from other people. Frequency distribution of the use of mobility aids demonstrated that all of the study participants had to use at least one type of mobility aid with cane being the most commonly used aid. In the rehabilitation field this type of autonomy is called “assisted autonomy” (Janicki & Ansello, 2000). Assistive autonomy in case of older adults with disability is defined as “providing assistance, at the person's direction, recognizes everyone's fundamental interdependence” (Ansello & O’Neil, 2010, p. 118). Being in a wheelchair meant having mobility limitations and dependence, however ability to utilize wheelchair made participants feel that they remained active and experience a sense of autonomy.

Physical health was also an important component for successful aging. Participants did not emphasize the absence of mobility disability, rather they were aimed to maintain their current level of physical health as well as the overall feeling and well-being. These findings were similar to the multidimensional model of successful aging except the fact that successful aging is possible in the presence of medical conditions (Young et al., 2009). It is interesting that those who perceived themselves as not aging successfully, highlighted the absence of good physical health. Some participants mentioned that physical health and successful aging consequently could be achieved via physical activity. Many older adults valued the importance of physical therapy as their way of being physically active as well as swimming, biking, and doing yoga. Nevertheless, the majority of older adults in our sample were inactive which was consistent with the previous research (Rechnisk & Spellbring, 2000).

Two interrelated areas, being active and socializing, were frequently mentioned as important determinants of successful aging among our participants. This is consistent with the model by Rowe and Kahn that highlighted the importance of engagement with life as a requisite for successful aging. Despite different limitations and barriers to social participation (accessibility, financial situations, etc.), they still perceived that social activities were very important or vital to them. Literature suggests that older adults with disabilities value social engagement even more than those without disabilities (Jang et al., 2004). That might be because older adults without disabilities did not experience limitations for participation and therefore take their participation for granted (Jang et al., 2004). Social participation is one of the determinants of healthy aging for individuals with disabilities (Couture et al., 2020). This relationship could be explained by the Health Belief Model, that states that perceived life satisfaction and a sense of belonging that come with social participation influence people's actions to be involved, active, and socialized (Champion & Skinner, 2008, Couture et al., 2020). Research further suggested that participation in different activities among older adults was associated with better quality of life, increased social integration, self-esteem and self-efficacy (Baker et al., 2005; Morro-Howell et al., 2003).

According to our participants, absence of dementia and Alzheimer's, as well as ability to keep your mind and body active and moving were factors that contributed to successful aging. Some older adults with mobility disability opined that they were not aging successfully from physical perspective, but they were aging successfully cognitively. High cognitive functioning encourages and enables social interaction, which in turn impacts well-being and aging experience overall (Cho et al., 2015). Thus, cognitive functioning is important component for successful aging from researcher-defined perspective as well as from subjective opinions of older adults (Cho et al., 2015; Rowe & Kahn, 1997).

In our study, the majority of respondents highlighted the importance of physical activity. Maintaining physical activity while being in a wheelchair implied managing and maintaining function as well as preventing health decline. Many older adults recognized that physical activity became less intense with age and with disability. However, the biggest motivation was acknowledging the health benefits and prevention of further decline in their condition. Similarly, to the literature that found that physical activity was associated with higher odds of aging

successfully, our study participants mentioned that being physically active despite the mobility disability contributed to their overall well-being and successful aging experience. (Szychowska & Drygas, 2022).

4.6 Limitations and Future Directions

There are several limitations to this study. All respondents were older adults with mobility disability and in particular the majority had multiple sclerosis; their perspectives could be different from older adults with other types of disabilities. Self-report measures of social and physical activity could cause information bias in relation to the prevalence of social and physical activity levels. In addition, a relatively small sample size limited the strength of this study. More than half of the respondents indicated adequate finances (\$75k or more) and were living in quite good living conditions, which could have impacted their perceptions of aging experiences and their capacities to address health challenges compared to those from lower socio-economic status. Nevertheless, study participants provided significant insights into the perspectives of successful aging. These findings could contribute to the general body of literature as well as provide clinicians or researchers with a better understanding of what is successful aging in the context of mobility disability and what is needed to help older adults age successfully. Future research should consider expanding these insights to a bigger population of older adults with different disabilities, cultural, social, and demographic backgrounds in order to account for tremendous inter- and intraindividual variability within this population.

4.7 Conclusion

In light of the rapidly growing proportion of the older population, it is essential that interventions and policies to promote successful aging are formed on research that includes older adults with disabilities. To do so it is important to give voice to those living with disabilities. Clearly, very few of them would fall under the “successful” category according to the research-based criteria, however, our findings indicate that successful aging is still feasible using subjective evaluations. Throughout different statements presented here, respondents demonstrated that they believed they were able to attain successful aging by possessing different psychological values and coping strategies to manage disability, adapt, and overcome health challenges and physical limitations.

CHAPTER 5: GENERAL DISCUSSION

The objective of this dissertation was to explore the concept of successful aging in the presence of a disability. To accomplish this objective, we utilized three different approaches: the literature review phase, the population analysis phase, and the individual explorations phase. In the first approach, a “state of literature” we provided a literature review on successful aging through the historical overview of the concept including challenges, critiques, and limitations. In phase 2, a “state of the population” we explored a population dataset by investigating the relationship between the components of the framework in phase 1. In phase 3, a “state of individuals” we investigated perceptions of older adults on successful aging with disability. Using these three approaches we were able to learn more and aimed to answer the following research questions: 1) what are the key components in a successful aging framework, 2) what are the relationships between the components of successful aging in the context of disability, and 3) what are the perceptions on successful aging among older adults with a disability? The first research question was addressed in phase 1 based on the current literature. The second research question was primarily discussed in phases 1 and 2. The last research question was a primary focus of the last phase 3. However, all research questions were informed by all three phases and the general discussion is organized by these questions.

Throughout the literature on successful aging, we could observe an emphasis on letting older adults rate their own success at aging rather than using objective definitions of researchers (Strawbridge et al., 2002). Studies that aimed to explore these subjective measures revealed a range of measures that are associated with successful aging experiences (Montross et al., 2006; Depp & Jeste, 2006; Strawbridge et al., 2002). Findings from phase 1 indicated that higher levels of self-rated successful aging were related to the self-perception of health, well-being, quality of life, life satisfaction, and goal attainment. In addition, socially and physically active older adults were more likely to report better subjective health and higher odds of aging successfully (Bae & Kang, 2022; Gopinath et al., 2018; Luo et al., 2020; Montross et al., 2006). These key subjective components were included in the proposed framework. Research that departed from the classic Rowe and Kahn (1997) model of successful aging revealed that using merely objective measures of successful aging was not adequate and comprehensive and

excluded older adults with disabilities. Our goal was to specifically explore successful aging among older adults with disabilities using the key components.

The population data assessment in phase 2 revealed that older adults with disabilities reported significantly lower scores on self-rated health and subjective well-being compared to older adults without disabilities. Having someone to talk to, participation in social activities as well as walking, significantly increased self-rated health and subjective well-being scores for all older adults, but the moderation effect was very small and only for certain disability groups. The absence of a larger moderation effect could be explained by the fact that the survey questions on social and physical activities did not cover specific activities that were valued by older adults with disabilities. When we further explored social and physical activities in the individual analysis, we found that older adults with mobility disabilities experienced certain challenges in participation, including health-related issues and accessibility barriers. Nevertheless, over 90% of study participants reported that social and physical activities were important factors that contributed to their overall well-being and quality of life. Some of the preferred social activities, such as online work, and contributions to social media and health organizations, indeed were not listed in the population survey which could have otherwise impacted their health, well-being, and quality of life overall. Similarly, some of the valued physical activities that were mentioned in individual analysis physical therapy, swimming, and wheeling around the house were not captured in the population survey.

The investigation of aging experience in the literature review in phase 1 revealed that: 1) lay perceptions of older adults did not match with research-based criteria, 2) the prevalence of self-rated successful agers was much higher than the prevalence of successful agers who met research-defined criteria, and 3) successful aging was found to be attainable in the presence of disability, but in a unique way which involved subjective perceptions and measures of older adults rather objective measures for “success”. These findings from the literature justified the importance of investigating perceptions of the successful aging concept among people with disability. Taking this approach to a population dataset in phase 2, we estimated that between 38-40% of older adults with disabilities were aging successfully when measured using the components of the framework, self-rated health, and subjective well-being. The prevalence of successful agers among older adults with mobility disabilities in individual analysis in phase 3 was 88% when measured using a single question on self-rating of successful aging. This large

difference in the prevalence between the population and individual levels could be due to the fact that the perception of health and well-being was not the same and/or did not reflect the overall perception of successful aging. Our in-depth investigation of how older adults with mobility disabilities perceived successful aging revealed that successful aging was not merely related to physical health, functioning, and well-being. For them achieving successful aging referred to psychological acceptance, adaptation, and a positive outlook, maintaining a current level of health and autonomy, as well as social support in spite of disability-related challenges. These specific factors of successful aging could only be captured when we let people share their thoughts and perceptions, rather than asking them simply to rate their health and well-being.

Our findings on the subjective measures of successful aging in the framework were consistent with the previous literature that showed that people aging with disability report fairly high ratings of self-reported health (Remillard et al., 2020). In our population analysis of older adults with mobility disability, nearly 49% in 2011 and 61% in 2020 rated their self-rated health score as good or better, whereas in individual analysis the percentage was 48%. In-depth exploration of self-rated health in the last phase indicated that older adults acknowledged the disability-related losses, but the perceptions among those who rated health fairly high meant emphasizing the number of abilities, functioning, and autonomy that they still possessed as well as coping strategies that they used to maintain good self-rated health.

There are several limitations of this research to consider. The NHATS dataset lacked some of the important measures of the proposed framework of successful aging. For example, the NHATS survey did not include questions related to the successful aging experience, as well as the importance of goal attainment and comprehensive assessment of physical activity. This may have influenced the results of analyses and the evaluation of the components incorporated into the framework. The observed results were statistically significant but still small and modest in magnitude. In addition, a cross-sectional design of the NHATS study could not establish a causal relationship between the variables of interest. Therefore, to address these limitations, future research might benefit from utilizing and analyzing other population datasets that were specifically designed for the purpose of evaluating successful aging. The estimated prevalence of successful agers was based on a single constructed factor of successful aging using two subjective measures of the proposed framework. Future research should strongly consider

conducting a confirmatory factor analysis to evaluate the goodness of fit of this factor or any other constructed latent factors of successful aging.

The qualitative interview study included older adults with mobility disabilities only, which may not represent the opinions and perspectives of older adults with other types of disabilities. The self-report of social and physical participation may not reflect the actual activity levels. Therefore, future research should consider expanding the qualitative study to large size of older adults with a range of disabilities as well as incorporating subjective and objective measures (e.g., wearable trackers) of social and physical activities. It would be also important to explore particular types of social and physical activities that pertain to older adults with disabilities.

This research did not investigate the role of cognitive health and other important factors including cultural diversity, demographic and socio-economic variables that could influence the results of the analyses and the perceptions of successful aging. Future research should also incorporate cognitive function and to recruit older adults from different backgrounds to generalize the definition to a growing multicultural and diverse aging population.

Using three different approaches in this dissertation research we aimed to expand our knowledge about successful aging in the presence of a disability. We proposed a framework of successful aging that incorporates disability as an important component. We also included social engagement and physical activity that could impact disability and the successful aging process (Figure 5.1).

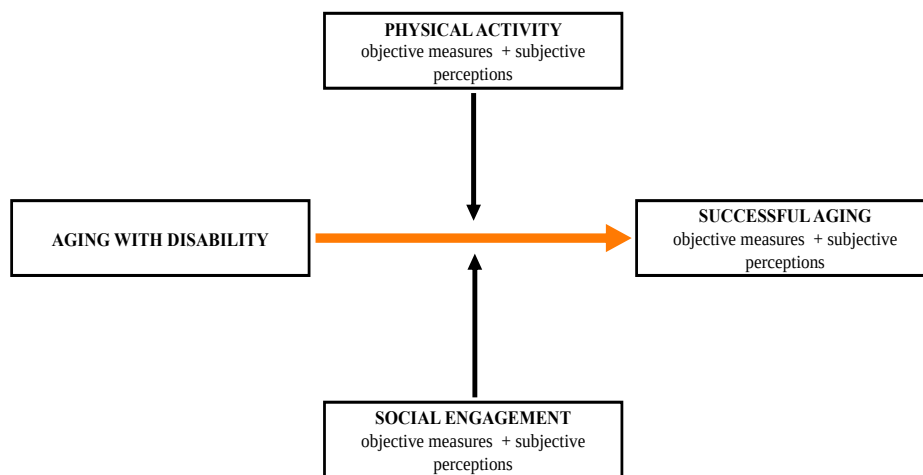


Figure 5.1 Successful Aging with Disability Framework

We tested the relationship between the components of the proposed framework on population level in phase 2 using longitudinal large dataset analysis and on individual level in phase 3 using qualitative interview study. Based on our integrated findings from these phases we learned that successful aging, if determined by objective measures, should be complemented with subjective self-measures that build upon information gained from the in-depth exploration of perceptions of older adults. Findings from the population analysis provided a big picture of the components of the framework and estimated the prevalence of successful aging in the presence of disability using our set criteria for successful aging. Perceptions of successful aging experiences shared by older adults in the qualitative study revealed that it encompasses a range of important areas and definitions of success in the context of disability. Both quantitative and qualitative findings are important contributions to the knowledge of successful aging specifically among older adults with disabilities that could expand the understanding of this concept on individual and societal levels.

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APPENDIX A: SUCCESSFUL AGING QUESTIONNAIRE

Adopted from Knight & Ricciardelli, 2003

1. Do you think you are aging successfully? Could you tell me a little bit more why you think that?
2. What do you think it means to age successfully or optimally?
3. Can you think of anyone you know who is ageing successfully?
4. What are some of the reasons that make you believe they are ageing successfully?
5. What do you think might hinder someone from ageing successfully?
6. What are the best things about being the age you are?
7. What are the worst things about being the age you are?
8. How has your perception of ageing changed, as you have grown older? Do you think you are different from others your own age in regard to ageing successfully?
9. What have been the worst events in your life and how have you dealt with them?
10. Describe the most positive experiences in your lifetime.
11. Do you find there are things you are unable to do now because of your age?
 - 11 b) Do you find there are things you are unable to do now because of your health limitations/disability?
12. Have you adjusted to these losses due to age/disability?
13. What strategies do you use to adjust to life changes that occur for you?
14. What is most important to you in your life at the moment?
15. What are you most unhappy about?
16. Do you hold many goals for yourself nowadays?
17. Can you tell me what your goals are?
18. How important is it for you to achieve these goals?
19. Is there anything else you would like to share with me related to your aging experience?

APPENDIX B: IRB APPROVAL LETTER



Office of the Vice Chancellor for Research & Innovation

Office for the Protection of Research Subjects
805 W. Pennsylvania Ave., MC-095
Urbana, IL 61801-4822

Notice of Exempt Determination:

July 12, 2022

Principal Investigator	Wendy Rogers
CC	Madina Khamzina
Protocol Title	<i>Perceptions of Successful Aging Among Older Adults</i>
Protocol Number	23217
Funding Source	National Institute on Disability, Independent Living, and Rehabilitation Research (NIDILRR)
Review Category	Exempt 2 (ii)
Determination Date	July 12, 2022
Expiration Date	July 11, 2027

This letter authorizes the use of human subjects in the above protocol. The University of Illinois at Urbana-Champaign Office for the Protection of Research Subjects (OPRS) has reviewed your application and determined the criteria for exemption have been met.

The Principal Investigator of this study is responsible for:

- Conducting research in a manner consistent with the requirements of the University and federal regulations found at 45 CFR 46.
- Requesting approval from the IRB prior to implementing major modifications.
- Notifying OPRS of any problems involving human subjects, including unanticipated events, participant complaints, or protocol deviations.
- Notifying OPRS of the completion of the study.

Changes to an **exempt** protocol are only required if substantive modifications are requested and/or the changes requested may affect the exempt status.

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

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Perceptions of Successful Aging Among Older Adults with Mobility Disability

YES

NO

If no: could you tell me why? (offer additional session if necessary, to teach Zoom)

Participant is ELIGIBLE, if he/she answers “yes” to all questions and is 60 or older years of age.

If eligible: You are eligible to participate in the study. The interview will last about 2 hours with breaks if needed.

Schedule a zoom call/have calendar available

Great! What week/date/time will work for you? _____

If not eligible: Unfortunately, you are not eligible to participate in this study. I appreciate you taking the time to answer the questions. We maintain a registry of individuals who are interested in being contacted about opportunities to participate in research studies. Would you like to be added?

If no: Okay, no problem!

If yes: Ok great! I will notify our registry coordinator and they will be in touch with more information on joining. Thank you and have a great day!

Interview Script Draft

Protocol Materials

- *REDCap link (Informed Consent + Questionnaires)*
- *Interview script on paper*
- *Note taking paper*
- *Debriefing form*
- *Compensation information*

Important

- Make sure participant is able to access the Zoom interview room. Be prepared to assist them via telephone if needed.
- Prior to getting started, ensure that the participant can clearly hear and understand you. Additionally, test their audio to ensure that you can properly hear their voice and that it is clear for the recording.
- Break the ice with small talk to reduce their anxiety and create a positive rapport.

Introduction

Hello, _____. My name is _____. First, I would like to thank you so much for talking to me today. We could not do this study without your help. Please remember that the most

important thing is that you are comfortable and willing to share your thoughts and opinions with me. If at any time you feel like you need to take a break or no longer want to continue, all you need to do is let me know and we can go from there.

- As we have talked in our previous conversation, I will have to record our conversation today. The purpose of the recording is to fully capture your thoughts and answers. Are you ok with that?

If they accept,

I am now going to begin recording our session.

(Press record)

If not, thank them for their participation.

Obtaining Consent

First, I will go through the consent form for participation with you.

Present the informed consent via Zoom

This is the consent form. Please read it carefully so you have a complete understanding about what your participation in this study involves and that you understand your rights. If you have any questions, please feel free to ask at any time.

Guide through each paragraph

I would like to reiterate that your participation is voluntary, all your responses are confidential, and you can opt out at any time.

Do you have any questions?

Please read **the last paragraph and** confirm that you agree to participate.

Verbal confirmation is sufficient based on the IRB waiver approval.

Outline and Procedure Overview

Great! We will now go over the plan for today.

In this study, I am interested in understanding your perceptions and thoughts about your aging experience and overall well-being.

I will conduct an interview that includes a mix of multiple choice as well as open-ended questions. Overall, we will go over different section including subjective well-being and health section, followed by a section on quality of life, social activity, physical activity, and successful aging sections.

The whole process will take approximately 2 hours.

Before we start, I would like to go over some guidelines for our conversation.

1. You can ask for a break anytime.
2. I am required to read directly from a script, so questions may sound formal or repetitive.
3. It is okay if your answers seem repetitive.
4. We are interested in your opinions, so there are no right or wrong answers.
5. All your answers will be kept confidential
6. If there is anything you do not want to discuss, we can skip that question.

Do you have any questions before we get started?

Questionnaires and Interview

I am going to be showing the questions and the range of possible answers on my screen. Please let me know if you have any questions or any issues viewing the questions.

Section 1: TechSage Background questionnaire

We are going to start with a background questionnaire. Do your best to answer the questions. I will be recording your answers from my side so you can just tell me what your answer is.

Make sure to take a note of the answer on self-rated health

Section 2: Subjective well-being

Now I am going to ask you some questions about your subjective well-being and health overall.

1. Previously I have asked you about your general health on a scale and your answer was_____. Could you please share what were you thinking about when you answered that question?
2. Tell me two-three words that describe your health.

For the next set of questions, I would like you to rate your frequency, in relation to different feelings:

3. During the last month, how often did you feel cheerful?	☐ Every day (7 days a week) ☐ Most days (5-6 days a week) ☐ Some days (2-4 days a week) ☐ Rarely ☐ Never ☐ Do not wish to answer
4. During the last month, how often did you feel bored?	☐ Every day (7 days a week) ☐ Most days (5-6 days a week) ☐ Some days (2-4 days a week) ☐ Rarely ☐ Never ☐ Do not wish to answer

5. During the last month, how often did you feel full of life?	☐ Every day (7 days a week) ☐ Most days (5-6 days a week) ☐ Some days (2-4 days a week) ☐ Rarely ☐ Never ☐ Do not wish to answer
6. During the last month, how often did you feel upset?	☐ Every day (7 days a week) ☐ Most days (5-6 days a week) ☐ Some days (2-4 days a week) ☐ Rarely ☐ Never ☐ Do not wish to answer

For the next questions, please tell me how much you agree or disagree with the following statements about your life:

7. My life has meaning and purpose	☐ Agree a lot ☐ Agree a little ☐ Do not agree ☐ Do not wish to answer
8. I feel confident and good about myself	☐ Agree a lot ☐ Agree a little ☐ Do not agree ☐ Do not wish to answer
9. I gave up trying to improve my life a long time ago	☐ Agree a lot ☐ Agree a little ☐ Do not agree ☐ Do not wish to answer
10. I like my living situation very much	☐ Agree a lot ☐ Agree a little ☐ Do not agree ☐ Do not wish to answer
11. Other people determine most of what I can and cannot do	☐ Agree a lot ☐ Agree a little ☐ Do not agree ☐ Do not wish to answer
12. When I really want to do something, I usually find a way to do it	☐ Agree a lot ☐ Agree a little ☐ Do not agree ☐ Do not wish to answer
13. I have an easy time adjusting to change	☐ Agree a lot ☐ Agree a little ☐ Do not agree ☐ Do not wish to answer

Now let's talk about all these questions you've just answered. They are used to measure what is called subjective well-being.

14. When you think about your well-being, what comes up to your mind?

Section 3: Quality of Life

Now let's talk about your quality of life. Please rate the different aspects of your life from "poor" to "excellent". We want to find out how you feel about your current situation in each area.

15. How do you feel about your physical health?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer
16. How do you feel about your energy level?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer
17. How has your mood been lately?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer
18. How about your living situation?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer
19. How about your family and your relationship with family members?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer
20. How do you feel about your marriage or relationship with a spouse/partner?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer ☐ N/A
21. How would you describe your current relationship with your friends?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer

22. How do you feel about your ability to do things like chores around your house or other things you need to do?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer
23. How would you describe your life as a whole?	☐ Poor ☐ Fair ☐ Good ☐ Excellent ☐ Do not wish to answer

All these questions measure quality of life. I want to hear your thoughts about quality of life in your opinion.

24. What does quality of life mean to you? What impacts it?

Section 4: Social Activity

Now let's talk about activities that you have been doing in the last month.

25. In the last month, did you ever visit in person with friends or family not living with you?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
26. In the last month, did you ever attend religious services?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
27. In the last month, did you participate in clubs, classes, or other organized activities?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
28. In the last month, did you ever go out for enjoyment? (going out to dinner, a movie, to gamble, or to hear music or see a play)	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
29. In the last month, did you ever work for pay or in business you own?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
30. In the last month, did you ever do volunteer work?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)

All these questions were related to your social activity participation. I would like to hear your perception on it.

31. For the activities that you were not able to attend, what was the reason for not attending them?
32. How important is it for you to be able to participate in this type of activities or be socially active? Why?
33. Are there any other social activities that you enjoy? What do you like about them?

Section 5: Physical Activity

This next set of questions is about your current level of physical activity and exercise. Now note that for these questions we are just focusing on **the last week**. Please remember there are no right or wrong answers. Please choose from the options provided.

34. During the past week how often did you engage in stationary activities such as reading, watching TV, computer games, or doing handcrafts?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
35. During the past week, how often did you walk, wheel, push outside your home other than specifically for exercise (getting to work/class, walking the dog, shopping, or other errands)?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
36. During the past week, how often did you engage in light sport or recreational activities such as bowling, golf with a cart, hunting or fishing, darts, billiards or pool, therapeutic exercise (physical or occupational therapy, stretching, use of a standing frame) or other similar activities?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
37. During the past week, how often did you engage in moderate sport and recreational activities such as doubles tennis, softball, golf without a cart, ballroom dancing, wheeling or pushing for pleasure or other similar activities?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
38. During the past week, how often did you engage in strenuous sport and recreational activities such as jogging, wheelchair racing (training), off-road pushing, swimming, aerobic dance, arm cranking, cycling (hand or leg), singles tennis, rugby, basketball, walking with crutches and braces, or other similar activities	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)

39. During the past week, how often did you do any exercise specifically to increase muscle strength and endurance such as lifting weights, push-ups, pull-ups, dips, or wheel-chair push-ups, etc.?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)
40. During the past week, how often did you care for another person , such as children, a dependent spouse, or another adult?	☐ Never ☐ Seldom (1-2 days) ☐ Sometimes (3-4 days) ☐ Often (5-7 days)

All these questions were related to your physical activity or exercise level. I would like to ask you couple more questions about them.

41. Are there any other physical or exercise activities that you particularly enjoy? Why?

42. Do you think physical activity/exercise is important to you? Why?

Section 6: Successful Aging

Put one question per page.

Now, let's begin the last section. Here, I would like to learn more about your personal experience of aging. If there are any questions you do not feel comfortable answering, please feel free to say "pass".

43. Do you think you are aging successfully? Could you tell me a little bit more why you think that?

44. What do you think it means to age successfully or optimally?

45. Can you think of anyone you know who is ageing successfully?

46. What are some of the reasons that make you believe they are ageing successfully?

47. What do you think might hinder someone from ageing successfully?

48. What are the best things about being the age you are?

49. What are the worst things about being the age you are?

50. How has your perception of ageing changed, as you have grown older? Do you think you are different from others your own age in regard to ageing successfully?

51. What have been the worst events in your life and how have you dealt with them?

52. Describe the most positive experiences in your lifetime.

53. Do you find there are things you are unable to do now because of your age?

53 b) Do you find there are things you are unable to do now because of your health limitations/disability?

54. Have you adjusted to these losses due to age/disability?

55. What strategies do you use to adjust to life changes that occur for you?

56. What is most important to you in your life at the moment?

57. What are you most unhappy about?

58. Do you hold many goals for yourself nowadays?

59. Can you tell me what your goals are?

60. How important is it for you to achieve these goals?

61. Is there anything else you would like to share with me related to your aging experience?

I will now stop recording our session.

Stop recording

Conclusion

We have now completed the final part of the study. Once again, thank you so much for your participation! Before we end the Zoom call, I am going to send you a copy of the debriefing form for your records. This will be sent to you via email. You should also expect an email with a compensation for generously sharing your time with me, which is in the form of a \$30 Amazon gift card code, which can be delivered also via email. Is the email you've provided earlier alright for you?

If yes: Let me verify the email address that I have. *Verify email on file*

If not: To what email should we send the e-code? _____

Thank you again for your participation and I hope you have a great day. Goodbye!

End the survey and then end the Zoom call.