

**DEVELOPING A SCALE TO EXAMINE AGING-RELATED ASSETS  
DEVELOPED THROUGH SPORT IN OLDER ADULTS**

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**A DISSERTATION SUBMITTED  
TO THE FACULTY OF GRADUATE STUDIES  
IN PARTIAL FULFILLMENT OF THE REQUIREMENTS  
FOR THE DEGREE OF  
DOCTOR OF PHILOSOPHY**

**GRADUATE PROGRAM IN KINESIOLOGY AND HEALTH SCIENCE  
YORK UNIVERSITY  
TORONTO, ONTARIO**

September 2023

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## Abstract

**Background:** Participation in sport continues to rise among older adults. Interestingly, sport is proposed as an avenue to continue development, particularly in psychosocial outcomes, across the lifespan. However, a significant limitation in this area is the lack of an appropriate measure to explore the development of psychosocial outcomes (i.e., assets) in older adults.

**Objective:** The overarching purpose of this dissertation was to create a quantitative assessment tool to measure psychosocial assets in older adults.

**Methods:** To achieve this aim, a mixed-method, sequential research design was applied, where the initial phases in the study helped inform and guide subsequent phases (i.e., development of the assessment tool). Study One included a scoping review that summarized our knowledge on sport and older adults since the first World Masters Games. This step was important in understanding how older athletes have been studied in prior research. Study Two, focused on examining the sport experiences and psychosocial development of older rowing athletes.

Responses from eight athletes were analyzed to help confirm previous findings on psychosocial assets, report any novel assets, and examine general sport experiences in rowing. The final study used information gathered from previous studies as well as knowledge in the area of psychosocial development to create a preliminary instrument, “Psychosocial Assets Scale (PAS)”, to measure psychosocial assets in older adults.

**Results:** The scoping review indicated most studies examined physiological outcomes with little exploration in areas such as psychosocial outcomes. Additionally, most studies did not report data on sociodemographic variables. Results from Study Two suggested sport experiences and psychosocial development of assets varies across individuals. In addition, findings indicated some negative sport experiences, which could alter development of assets. Lastly, the creation of

the PAS showed emergence of nine factors: wellbeing, contribution, social support, drive/challenge, integrity, health habits, supportive family relationships, perceived safety, and desire to learn/continued learning.

**Conclusion:** Collectively, this dissertation led to the creation of a preliminary scale to measure psychosocial assets in older adults. While the scale created in this dissertation requires further validation, the PAS allows researchers to advance in this area with implications for research, policy developers, sport advocates, and the broader society.

## **Dedication**

I dedicate this work to Chris. Your unwavering love and support have helped me throughout my entire academic career. You are the cornerstone of my success.

I also dedicate this work to my parents and my brother. I could not have succeeded without you.

## Acknowledgements

I recall a specific moment during my undergrad when I needed some advice (a happy accident), which led to meeting the most amazing person, Dr. Joe Baker. I have been incredibly fortunate to be supervised as both your master and PhD student. Joe, you exceed all expectations of what a student would want in a supervisor (except funny). You are supportive, encouraging, understanding, and truly want the best for your students. Thank you for encouraging me to pursue my academic goals and for the unwavering support in achieving them. Along with being the best supervisor, you are also caring, compassionate, humble, respectful and a good friend. I will always be grateful for all the opportunities you have provided me.

I would also like to thank Dr. Jessica-Fraser Thomas and Dr. Rebecca Bassett-Gunter for their support and expert feedback that helped enhance this dissertation. I look forward to staying in touch and our future run-ins at conferences and social gatherings. I also want to thank Dr. Nick Wattie, who took me on as a research assistant and encouraged me to pursue higher education. Nick, thanks a lot for initiating this never-ending journey.

I wish to thank my parents, who uprooted their entire life so that I could gain better opportunities and succeed. With the utmost gratitude, I thank you for that selfless act. Also, to your question, ‘when will you finish?’ I can finally say what you have been waiting to hear, ‘soon’.

In addition to my parents, I would also like to thank my brother, Maulik. Your guidance and continuous encouragement have helped me work harder and strive for more throughout my life. Your encouragement has finally led to our parents being proud of one of their children. However, we may never hear the word ‘sabas’.

I am also very fortunate to have some amazing lab-mates and friends, that have made this journey enjoyable, especially during the times of stress and utter chaos. Nima and Lou, thank you for your support, encouragement, as well as your critical and honest feedback on my work. Thank you for the memorable lab-sessions, lunch-meetings, and conference experiences (I will forever hold the title of ‘lightweight’). I look forward to sharing many important moments of my life with you both. I would also like to extend my thanks my other lab-mates, both past and present, for their support and mentorship: Rachael Stone, Rona-El-Bakri, Robert Ruscitti, Katie Johnston, Stu Wilson, Aaron Koenigsberg, Sandy Mosher, Victoria Larocca, and Alia Mazhar.

Thank you to all my friends who have supported me over the years, especially, Shelly, Nancy, Harika, and Suzan. Despite knowing nothing about my research question or topic, you all have played an important role in shaping the person I am today. Thank you for all the ‘tea/chai time’ where you listened and helped me navigate my struggles with writers-block and statistical analysis. I am forever grateful for your friendship.

To my new-extended family, Maria, and Mario Correia, as well as Tanya and Ulrick. Thank you for welcoming me into your home and accepting me as part of your family. You have taught me that language and cultural barriers can be easily overcome with love, respect, kindness, and ice-cream. I would also like to thank some little human beings that have been the source of much joy and laughter: Renee, Mila, Alex, Olivia, Nathan, and Nathalie.

Last, I would like to thank Chris. We both know how wonderful and at times stressful my academic journey has been. Your support throughout my masters and PhD has helped me during times of low motivation and allowed me to persevere. I cannot wait to start the next chapter of our life as husband and wife. Thank you for being the main source of my happiness.

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## **Chapter One: General Introduction**

## **Introduction**

The world is under-going a critical demographic shift toward an increasingly older society. According to the most current census report, older people between the ages 56 to 75 years (labelled as ‘baby boomers’) are the largest group of Canadians and they will remain the largest group until the year 2029, when millennials (born between 1981 and 1996) are projected to overtake them. The projected shift in age demographics is largely due to the growing number of aging adults, as well as increased immigration of millennials and Generation X (born between 1966 and 1980) within Canada. In addition, while the COVID-19 pandemic resulted in numerous deaths among older people, especially within retirement homes, it had little impact on the overall proportion of aging adults (Statistics Canada, 2021). For instance, deaths due to COVID-19 (i.e., 12,900 deaths in Canada among those 65 years and older) were significantly less than population aging (i.e., 245,000 people turned 65 years in 2020). Additionally, immigration declined during the pandemic due to border restrictions (Statistics Canada, 2021). As a result, the proportion of younger adults decreased as the older adult population continued to increase. Population projections also suggest that increasing immigration in the coming years will not significantly impact population aging given the proportion of aging Canadians (Statistics Canada, 2021).

A central concern with population aging is the rising risk of multiple chronic diseases (labelled as multimorbidity) among the vast majority of older adults, since the prevalence of most chronic diseases increases with age. Some of the most prevalent chronic diseases are hypertension, osteoporosis, osteoarthritis, diabetes, asthma, ischemic heart disease (IHD), and chronic obstructive pulmonary disease (COPD) (Public Health Agency of Canada, 2020). Approximately one third of older adults have two or more chronic disease. In addition, women (31%) spend a greater portion of their life, after the age of 65 years, in a much unhealthier state

compared to men (28%) (Public Health Agency of Canada, 2020). As a result, living longer with multimorbidity can negatively impact overall quality of life, increase use of health care resources, and lead to greater health challenges, disability, and premature death (Public Health Agency of Canada, 2018a, 2020). In addition, multimorbidity is linked with increased perceptions on loneliness (including social isolation), inadequate sleep, poor nutritional intake, and overall decreased life satisfaction (Public Health Agency of Canada, 2020; Wister et al., 2016).

However, many health conditions (e.g., hypertension) are preventable or manageable by practicing healthy behaviours such as a physically active lifestyle. An active lifestyle as a prevention strategy, along with other healthy practices (e.g., sleep, nutritious diet, avoid smoking), can be important in reducing chronic diseases, cognitive decline, sedentary time, loneliness, while also increasing overall satisfaction with life (Balboa-Castillo et al., 2011; Heo et al., 2013; Kettunen et al., 2006; McAuley et al., 2000; Patelia et al., 2018; Public Health Agency of Canada, 2020; Weir, Meisner, et al., 2010; Zhao et al., 2014). Moreover, when a large proportion of older adults practice healthy behaviours (e.g., physical activity) it can prevent the need for acute medical services and longer stay (up to 2 months) within hospitals (Rotermann, 2017). Unfortunately, for many older adults factors such as age, health conditions, socioeconomic variables can moderate an active and healthy lifestyle. For instance, as individuals age, they typically decrease their time in active leisure activities and spend more time in passive leisure activities (Arriagada, 2018). In Canada, only 44% of men and 39% of women aged 65 years and over were involved in active leisure activities, while 92% of males and 89% of females spent more time in sedentary activities (Arriagada, 2018). Furthermore, a meta-analysis suggested women are 47% more likely than men to be sedentary regardless of country of origin,

with the risk of inactivity increasing with age (Martins et al., 2021). This is alarming, considering physical activity and sedentary behaviour are strong independent predictors of ‘healthy aging’ (a multidimensional construct which is influenced by physical, mental, social wellbeing as well as other lifestyle variables) (Dogra & Stathokostas, 2012; Hsu et al., 2017; Mattle et al., 2022). According to previous studies, spending increased amounts of time in sedentary activities that are cognitively disengaging (such as watching television) increases prevalence of chronic diseases, obesity, decreased cognitive function, reduced quality of life, and mortality (Balboa-Castillo et al., 2011; Dogra & Stathokostas, 2012; Rezende et al., 2014). Socioeconomic variables such as, knowledge of physical activity, lack of accessibility, and internal motivation to be physically active can also prevent individuals from being physically active (Martins et al., 2021).

Interestingly, while the large proportion of older adults are inactive, there is group of older adults with a rising interest in sport. Moreover, the context of sport is suggested to provide health benefits that extend beyond those acquired from general physical activity such as walking or an exercise class (Baker et al., 2010; Dionigi et al., 2011). For example, sport participation is associated with eating healthy, continuous leisurely activity, lower rates of smoking and increased life satisfaction (Heo et al., 2013; Rosenbloom & Bahns, 2006; Yamakita et al., 2015). In addition to maintaining physical and cognitive function, participation in sport is related to positive psychosocial development in older persons such as helping them negotiate their aging process, continued motivation in an active lifestyle, and challenge age-related stereotypes (Baker et al., 2010; Dionigi et al., 2011, 2013b; Gayman et al., 2017; Grant, 2001). These positive psychosocial outcomes may be crucial in promoting certain adaptive behaviours necessary for maintaining an active lifestyle with a positive outlook on aging. The topic of psychosocial

development, particularly development of ‘assets’ in older adults is the principal focus of this dissertation. As a result, constructs that are relevant to this topic are defined first, followed by a literature review on older adults and sport.

## **Important Constructs**

### **Positive Youth Development**

Positive development through sport has been extensively studied in young persons (Fraser-Thomas et al., 2005; Holt, 2007; Lerner et al., 2005), but overlooked in older groups. Interestingly, the research on older persons has reported development to continue across the lifespan, thus providing a fertile ground for future work in this area. However, a fundamental issue that needs to be addressed prior to applying the construct of positive development in older persons is to operationalize it. This broad construct has taken many forms since its inception in the 1980s and there is currently no overarching definition of PYD to anchor or unify the research in this area (MacDonald & McIsaac, 2016). For instance, King et al. (2005) noted that more than 90% of literature on PYD between 1991 to 2003 did not use a set of pertinent terms associated with PYD. As a result, they concluded that a ‘rich nomological network of concepts pertinent to PYD has yet to emerge’. As a result, researchers in the field of positive youth development (PYD) have used both qualitative and quantitative methods to examine relevant outcomes. Moreover, early work on development through sport was conceptualized simply as ‘psychosocial development’ (Weiss & Bredemeier, 1983). While ‘psychosocial development’ is more refined than simply ‘development’, it remains a broad construct, and multiple definitions of this concept in relation to sport have emerged without a clear consensus (MacDonald & McIsaac, 2016). For instance, PYD within sport has been operationalized as initiative (Larson, 2000), life-skills (Gould & Carson, 2008), developmental assets (Search Institute, 2005), responsibility (Hellison,

2003), and thriving (Lerner et al., 2003; MacDonald & McIsaac, 2016). This inconsistency in conceptualizing PYD has led to the use of multiple measures (specifically in quantitative approaches) to assess similar constructs from different perspectives (MacDonald & McIsaac, 2016).

In this dissertation I have attempted to define some key constructs in the area of positive development. First, using conceptual assertions proposed by previous researchers (Holt, 2007, p. 2; Roth et al., 1998, p. 426), the term ‘positive development’ is defined as “the engagement of prosocial behaviours and avoidance of health compromising and future jeopardizing behaviours” (e.g., smoking, increase sedentary behaviour). Second, in line with proponents of PYD, in the context of this dissertation, the framework of PYD is conceptualized as a holistic approach focused on providing young people with appropriate support and developmental opportunities. As a result, PYD embodies a ‘strength-based’ conception of development rather than a ‘deficit-reduction’ approach, where individuals are regarded as resources to be developed instead of problems to be solved (Benson, 1997; Holt, 2007; Lerner et al., 2005; Scales et al., 2000).

Given the broadness of this construct, a single tool does not seem to be sufficient to measure PYD, instead a number of instruments have been used to measure various aspects, generally divided into two categories of personal development: development *experiences* and development *outcomes* (MacDonald & McIsaac, 2016). For example, measures such as the Youth Experience Survey for Sport (YES-S; Macdonald et al., 2012) are designed to determine positive and negative experiences for youth in the sport domain, whereas the Life Skills Transfer Survey (LSTS; Weiss et al., 2014) evaluates programs in teaching life skills transfer overtime (i.e., development outcome). Furthermore, in the PYD literature, the context of sport is positioned as an activity that builds on and develops evolving strengths that occur throughout the



phases of development (Holt & Neely, 2011). As such, within this context, experiences can be defined as situations that arise to facilitate positive development, whereas outcomes can be described as skills acquired from sport participation (MacDonald & McIsaac, 2016).

## **Development**

Similar to constructs discussed earlier, the term *development* has several meanings in society (e.g., individual growth, economic growth of a country or nation, environmental growth, physiological aging and more). To decrease this ambiguity, in the context of this dissertation, ‘development’ relates to personal betterment and improvement as conceptualized in the field of human motor development. More specifically, *development* is considered to be multifaceted, and in general refers to ‘the progressions and regressions that occur throughout the lifespan’ (Payne & Isaacs, 1999). Overall, the study of human development can be divided into three domains: 1) the cognitive domain which concerns human intellectual development, 2) the affective or socio-emotional domain which focuses on the social and emotional development, and 3) the motor domain which is concerned with human movement (Payne & Isaacs, 1999). While developmentalists often specialize within one of these distinct categories, it is important to recognize the constant interaction between these domains (e.g., movement is influenced by emotions and intellect). In audiences outside human motor development, the concept of development is often used synonymously with ‘growth’ and ‘maturation’. However, growth refers to the quantitative structural changes that occur with age. A notable example of growth occurs immediately after puberty (e.g., increase in height), which is independent of any simultaneous changes (Payne & Isaacs, 1999). In contrast, maturation refers to the qualitative functional changes that occur with age (e.g., neurological organization of the brain). As a result,

the umbrella term, development, comprises both growth and maturation. While these constructs are distinct, they are intertwined because as the body grows, functions improve.

In addition, human development is multifactorial because it is shaped by numerous factors that are individual (i.e., individual changes varies across people), physical (e.g., strength, flexibility), as well as environmental (e.g., supportive parents) (Payne & Isaacs, 1999). For instance, according to the bioecological model of development (Bronfenbrenner, 1986), the developing person is embedded in a series of environmental systems (i.e., microsystem, mesosystem, exosystem, macrosystem, chronosystem) that interact with one another, as well as with the individual overtime to influence development. Furthermore, given that biopsychosocial development and interactions with the environment do not cease after a certain age, the process of development continues across the lifespan. Importantly, while the concept of development is commonly interpreted as a progression or one-directional, it includes both ‘progressions and regressions’. There are several reasons for regression of development such as ceasing engagement in an activity which leads to a regression of skills, as well as the influence of disease, disability, and the long-term effects of aging.

### **Psychosocial Assets**

The final construct that is important to define within this dissertation is the notion of *psychosocial assets*. Similar to the concept of PYD, the term psychosocial assets has not been consistently defined in prior work. That said, using information from PYD as well as research from older adults in sport, in the context of this dissertation, *psychosocial assets* are defined as useful resources or attributes (innate or acquired) that operate as antecedents to personal developmental outcomes (see Figure 2). For example, sport can provide older adults opportunities to develop psychosocial assets of competence and confidence to perform in sport,

with the potential of fostering personal developmental outcomes such as falls self-efficacy, independence in completing activities of daily living (ADLs) (Stone et al., 2018), as well as a sense of control over their health (Dionigi et al., 2017). In addition, it is important to recognize that development is highly individualized and can be moderated by several factors (e.g., age, gender, race, culture, sport-related variables).

Furthermore, psychosocial assets can be broadly grouped into two categories labelled as ‘external’ and ‘internal’ assets (more information provided in the subsection ‘sport and psychosocial development’, pp 15-20). In this research project, *external assets* refer to social-environmental resources and organized within four broad categories: support, empowerment, boundaries and expectation, and constructive use of time. Whereas *internal assets* refer to personal resources and are classified within four broad categories: commitment to learning, positive values, social competencies, and positive identity (Baker et al., 2010; Benson, 1997; Benson et al., 2012; Search Institute, 2005). While research on psychosocial assets and PYD has increased tremendously in recent years, there are some important nuances regarding internal and external assets. First, our knowledge on how psychosocial assets are developed, in what context, as well as its classification (i.e., eight categories for assets) is incomplete. Second, similar to the influence of and interactions between factors related to development (e.g., biological, cognitive, psychological, social, societal), it is possible that internal and external assets influence one another. For instance, research from emerging adults suggests support, empowerment, as well as boundaries and expectations (external assets) are linked to or influence one’s positive identity (internal asset) (Dost-Gözkan et al., 2021). Moreover, it is possible that some assets have both internal and external characteristics (e.g., personal empowerment). Third, given that psychosocial assets have primarily been studied in young people, we know little about how they

apply to other relevant populations (e.g., aging adults). Furthermore, while the context of sport provides opportunities to experience positive development, it is embedded within a larger series of environmental systems (Bronfenbrenner, 1986). This further increases the complexity of sport and the development of psychosocial assets. Expanding our understanding of the potential of sport as a vehicle for continued development across the lifespan is, therefore, an important area of study. More specifically, increased focus in this area will enhance our understanding of the value of sport for psychosocial development, as well as challenge our tendency to overstate the benefits of sport when we have little knowledge on how it compares with other types of activities. In the following literature review, I summarize current knowledge on aging, sport, and psychosocial development.

## **Literature Review**

### **Stereotypes of Aging**

Aging has long been socially and culturally constructed as a time of ill health, loneliness, dependency, and disability, possibly due to the widely accepted view of old age as a medical and social problem, especially within Western cultures (Coudin & Alexopoulos, 2010; Emile et al., 2014). This view could have also encouraged a greater exploration on the relation between age and indicators of declining health (Anstey et al., 2001; Curtis et al., 2015; De Rekeneire et al., 2003; Hébert, 1997). While knowledge in this area has increased our understanding on the consequences of declining health, it may have inadvertently resulted in shaping a predominantly negative view of aging.

Stereotypes are biased assessments about a particular group, a person or idea, reflecting oversimplified expectations that people have of others according to their age, gender, physical appearance, ethnic group, race, or occupation (Danesi, 2009). In aging, these generalizations

overlook the diversity and complexity of the aging process (across age groups and genders) and instead simply position old age as undesirable (Dionigi, 2015b). As such, negative stereotypes of age are prejudices directed towards older individuals (Butler, 1969). The power and pervasiveness of these stereotypes are evident in images and characters portrayed in popular media (e.g., Abe Simpson from *The Simpsons*), which reinforce beliefs such as that physical and cognitive decline is a normal part of aging (Vickers, 2007). In addition, negative stereotypes of age affect women differently than men. Historically, women were assumed to age or become frail earlier than men, and as a result considered as less useful and less capable at dealing with the aging process (Vertinsky, 1995). As a result, in the past, women were socially constrained to accept ‘appropriate old-age behaviours’ such as inactivity, passivity and spectatorship earlier than men (Vertinsky, 1995).

In Western cultures, negative stereotypes of age also play an important role in shaping attitudes towards physical activity, particularly sport. Moreover, according to Stereotype Embodiment Theory (Levy, 2009), stereotypes are internalized at a young age and evolve across the lifespan with repeated exposure, resulting in consequences such as physical and cognitive decline. It is important to note, stereotypes of old age can also be positive (e.g., wise, wealth); however, the effects of positive stereotypes of aging are reported to be more complicated and comparatively under researched (Dionigi, 2015b). The handful of studies on implicit and explicit priming on positive stereotypes indicate improvements in short-term physical and cognitive performance, but the long-term impact of positive stereotypes are less known (Hausdorff et al., 1999; Horton et al., 2010; Levy, 1996; Stone et al., 2021). While our knowledge on stereotypes of aging is scarce and requires more attention, existing evidence suggests they play an important role in shaping attitudes on how older adults should behave and perceive their aging process.

Thus, not surprisingly, the World Health Organization (WHO) continues to emphasize the need for urgent action to combat ageism (World Health Organization, 2016, 2021). However, stereotypes of age are still pervasive within society and can pose a barrier to engagement in various forms of activity (e.g., sport; Meisner et al., 2013).

Older adults who are interested in physical activity are often discouraged from participating in activities that are considered strenuous such as sport, because they require greater exertion, and as a result are more often promoted for the young and developing body (Dionigi et al., 2013b; Partington et al., 2005). For this reason, engagement in competitive sport, is primarily seen as an activity for younger age groups. In general, younger adults are encouraged to pursue sport and their potential for athletic feats are rarely discouraged or doubted, whereas older athletes receive more mixed perspectives. For example, a recent study reviewed social media comments made by younger adults, noting that older athletes were largely mocked and their performances doubted. Moreover, while some comments emphasized they were uncomfortable to watch, others were amazed at the potential of older athletes (de Guzman et al., 2021). In general, older adults are usually encouraged to participate in ‘age appropriate’ leisure activities that are low to moderate level of intensity with longer periods of rest (Dionigi et al., 2011). For example, some common activities generally promoted to older adults are walking, gardening, weight lifting and yoga (Public Health Agency of Canada, 2018b). It is important to recognize that activities of lower intensities should not be devalued when compared to high-intensity activities such as sport, since for many older adults these can be the ideal forms of engagement. At the same time, it is essential to recognize the lack of promotion of more strenuous activities, especially when interest in sport is rising among this cohort.

### **Sport and Older Adults**

One of the most intriguing trends in recent years involves the rising number of older adults participating in competitive sport. Since the first World Masters Game (WMG) held in Toronto in 1985, the number of competitors has increased from 8,305 to 24,905 in Auckland 2017, with the next WMGs in Kansai expected to have over 50,000 competitors (International Masters Games Association, 2017, 2020). The term ‘Masters Athlete’ (MA) generally represents a group of individuals who are above the age of 35 years and involved in competitive sport (Weir, Baker, et al., 2010). This is an intriguing group to study because MAs challenge or overcome age stereotypes by initiating, resuming, or continuing participation in competitive sport (labelled as ‘late-bloomers’, ‘rekindlers’ or ‘continuers’; Dionigi, 2015a), during a time when the majority of older adults are inactive. For instance, one of the most notable and frequently discussed MA is Ed Whitlock, the first person over the age of 70 years to complete a marathon in under 3 hours (2:54 min in 2003), considered one of the greatest running feats of all time (Grierson, 2010). Ed Whitlock is an intriguing example because, while old age is socially constructed as a time of ill health, frailty, and dependency (Gard et al., 2017; Grant, 2001; Hausdorff et al., 1999), highly competitive athletes such as Whitlock push our understanding of the limits of health, function, and performance in advanced age among adults who are engaged in intensive and regular exercise.

Moreover, research with this unique population forces us to expand our conceptualization of ‘appropriate activities’ for older adults. In fact, their physiological capabilities and performance in sport have led to some researchers labelling MAs as models or exemplars of successful aging (Geard et al., 2017; Hawkins et al., 2003). Successful aging and its related terms of positive aging and optimal aging highlight the distinction between a normal aging process that may lead to decline and loss of function, and a more positive process where losses are minimal.

According to Rowe and Kahn's (1997) model of *successful aging*, individuals are considered to be aging successfully when there is an absence of disease and disability, high level of physical and cognitive function, as well as active engagement with life (i.e., interpersonal relations and productive activity).

The meaning of successful aging and whether MAs reflect this model is contentious. For instance, aging researchers have argued this model is overly simplified and overlooks health and aging as multidimensional constructs. For instance, previous studies have highlighted the need to re-evaluate how we conceptualize measures of successful aging (i.e., compensation in a task leading to classification of unsuccessful aging; Weir, Meisner, et al., 2010). While others have highlighted the difficulties in measuring the various components of health such as cognitive, psychological, and social (Geard et al., 2018). For example, would older adults with a smaller social network be classified as aging less successfully than older adults with a larger social network? Moreover, sport sociologists have highlighted that sport is a privilege that only a few can afford and as a result, socioeconomic and cultural factors play a crucial role in determining who is able to participate in sport and 'age successfully'. While the discussion on successful aging is debated, the rising number of older competitors is as an opportunity to advance our knowledge on the complexities of aging as a process, older adulthood as a stage of life, and the value of sport for promoting positive developmental and health-related outcomes.

While researchers in the past have attempted to capture the nebulous nature of health, the primary focus has generally been on physical aspects. Similar to the concept of successful aging, much of the literature on Masters sport has also focused on the physical health outcomes related with sustained involvement in regular activity (Faulkner et al., 2008; Suominen, 2011; Tanaka & Seals, 2003), since MAs typically report greater levels of physical health and functioning



compared to sedentary older adults. However, understanding the process of aging requires more than high levels of physical function and considerably less research has examined the psychosocial outcomes of sport (for a recent systematic review in this areas see Gayman et al., 2017). Ultimately, health may be best conceptualized as complex and dynamic, which requires a holistic perspective that considers psychosocial elements (among others) that impact personal health and well-being.

### **Sport and Psychosocial Development**

Over the last thirty years, the context of sport has been promoted as an avenue to facilitate positive developmental experiences, especially in youth (Fraser-Thomas et al., 2005); however, oftentimes, it has also been assumed to foster positive development automatically. It is important to note, research on sport and development has shown positive or favourable outcomes are not automatic consequences, instead sport-based programs need to produce intentional curricula to teach life skills, train coaches to deliver lessons, and ensure supportive relations within a positive learning environment (Weiss, 2013). For instance, emphasis on a ‘winning at all cost’ belief was linked with detrimental effects in young people such as, increased drop-out rate, overbearing parents, poor coaching tactics, and decrease in self-esteem (Back et al., 2022; Gould et al., 2008; Petitpas et al., 2005; Vella et al., 2015). As a result, the context of sport is now proposed to have the *potential* to enhance psychosocial development, but could also lead to negative, unfavourable, or maladaptive outcomes, especially with misguided coach and parent behaviours (Fraser-Thomas & Côté, 2009). While there are some inherent possibilities for negative experiences in sport (e.g., injury, poor coaching practices), the potential for growth and development through the opportunities sport provides are valuable.

Given the intriguing trend of increased sport involvement by older adults, the notion of continued development through sport has begun to receive some attention in recent years. In addition, the extent of research concepts from PYD frameworks are suggested as a useful starting points to understand development in older adults. According to youth sport researchers, the context of sport should be intrinsically motivating, where they can experience belongingness (or being a valued member) within a psychologically safe environment (Petitpas et al., 2005). Within the field of developmental sport psychology, PYD has been extensively studied with emerging frameworks focusing on athletes' development (Turnnidge et al., 2014), The Five Cs (Lerner et al., 2005), and the Personal Assets Framework (PAF) (Côté et al., 2016). Prior to this work, researchers mainly used the 'deficit-reduction' approach (Holt, 2007; Holt & Neely, 2011) as a strategy to prevent or reduce problems (i.e., related to health and development) in youth. For example, after identifying a deficit (e.g., substance use, delinquency) strategies and interventions were developed to eliminate these issues (Fraser-Thomas et al., 2005). In recent years, researchers and practitioners have shifted away from this paradigm towards an 'asset-building' model. With this approach, all young people are regarded as resources who have the potential for positive, successful, and healthy development (Damon, 2004; Lerner et al., 2005; Vierimaa et al., 2012). Young people are proposed to have vast potential and resiliency, which should be maximized rather than focusing on eliminating maladaptive tendencies (Benson, 1997; Benson et al., 2012). For example, Benson and colleagues (Benson et al., 1998; Leffert, et al., 1998; Scales, et al., 2000; Scales & Leffert, 1999) developed a list of core developmental processes, resources, and experiences for children and adolescents based on scientific literature and practitioner's wisdom. These 40 developmental assets are divided into two broad categories (external and internal assets), and further divided into eight sub-categories (support, empowerment, boundaries

and expectations, constructive use of time, commitment to learning, positive values, social competence, and positive identity). Within the PYD literature, external assets represent caring and compassionate adults, peers, and the community system. Whereas internal assets are defined as learned skills that can apply to other domains outside of sport (or life skills; Petitpas et al., 2005). Examinations of these assets have confirmed their role in preventing negative outcomes (e.g., Leffert et al., 1998) and promoting positive outcomes (e.g., Scales et al., 2000) in youth development.

In recent years, researchers have proposed sport participation may facilitate development of psychosocial assets in older persons (Baker et al., 2010). For example, engagement in sport may provide older adults with opportunities to challenge or further enhance their abilities and skills (internal asset), as well as experience greater support from family and friends (external asset). Furthermore, older people may believe sport participation is a constructive use of their time (external asset) that provides them with a sense of personal empowerment (internal asset) (Baker et al., 2010). While this is exciting, some researchers have raised concern about infantilizing older adults when directly employing youth development frameworks (Marson & Powell, 2014; Salari, 2016). However, previous studies and reviews that employed PYD models with older athletes report psychosocial outcomes in the context of sport are similar to youth research and unrelated to a person's age (Baker et al., 2010; Dionigi et al., 2017; Gayman et al., 2017).

Interestingly, the unique contexts of sport for older adults have also produced some notable differences in development. On the one hand, some experiences and development opportunities reported by older athletes are analogous to those reported by younger individuals participating in sport, such as their love for competition, drive to win, meaningful social

connections, enjoyment, and fitness (Cardenas et al., 2009; Dionigi et al., 2013b; Stenner et al., 2020; Weinberg et al., 2000). On the other hand, research on older athletes reveal psychosocial assets that are unique to this cohort such as: development of a positive aging identity (Baker et al., 2010; Dionigi, 2002a, 2005; Dionigi et al., 2013b), greater supportive social relationships (Dionigi, 2002a, 2006a; Dionigi et al., 2011; Gayman et al., 2017; Grant, 2001), confidence and competence (e.g., build physical competency, pride in one's capabilities (Dionigi, 2002b; Dionigi et al., 2017; Kim et al., 2020; Stone et al., 2018), contribution (e.g., serve as role models, leadership opportunities; Horton et al., 2008, 2018, 2019), as well as commitment to sport and development (e.g., functional and obligatory commitment; Dionigi et al., 2017). In addition, development of psychosocial assets may be important contributors to personal developmental outcomes. For example, social support has been found to foster sport commitment in older athletes (Brooke Kirby et al., 2013; Young & Medic, 2011). The psychosocial assets of confidence and competence may contribute to developmental outcomes such as a sense of accomplishment and control of their health (Dionigi et al., 2013a, 2017). The context of sport has also been found to provide opportunities to expand one's self-concept or identity and inspire (or role model to) others, which contribute to outcomes such as feeling valuable members of society by encouraging others to be physically active (Horton et al., 2018). While this is an emerging area of research, there is little debate on the value of psychosocial assets (e.g., social support) across the lifespan. Instead, the current discussion focuses on examining the value of sport for psychosocial development and whether other contexts could better facilitate the development of assets.

There are an infinite number of factors that can influence sport experiences and psychosocial development, and they may appear differently for older adults. For instance, unlike

young people, older adults could be managing health concerns, careers, and/or familial/domestic duties (e.g., caring for children, parents) while participating in sport. Furthermore, the complexities inherent to sociocultural factors such as gender, age, and ethnicity can alter experiences and development. Studies of older female athletes suggest that opportunities for personal and social growth may differ for older women in comparison to males as well as younger adults (Horton et al., 2018; Kirby & Kluge, 2021; Litchfield & Rylee, 2012). In addition, the unique contexts of Masters sport, such as competing within the Masters 5-year age categories (i.e., individuals of similar age range), could impact sport experiences and development. Moreover, activity-related factors such as the type and level of sport will play a key role in shaping development of psychosocial assets. For example, higher levels of competition (e.g., national, international) could offer more opportunities to travel and thereby expand one's social networks (Dionigi et al., 2011). Similarly, there is some evidence to suggest sport experiences and development can differ between individual and team sport (Andersen et al., 2019). The infinite variability within and across sports creates tremendous challenges for sport scientists to measure the nuances of psychosocial development. However, a quantitative tool that broadly measures psychosocial assets would allow researchers to capture a large proportion of the population, as well as evaluate whether psychosocial assets emerge in disproportionate levels across samples. This would be useful in highlighting differences between contexts (e.g., team vs individual, sport vs. non-sport) and whether particular environments lead to development of psychosocial assets in disproportionate levels.

Moreover, while the potential for psychosocial development across the lifespan is now recognized, research on older athletes has yet to clearly distinguish between the outcomes of sport compared to other activities (e.g., sport versus exercise). Given that many national health

strategies encourage lifelong sport participation for this cohort (Public Health Agency of Canada, 2018b; Sport for Life, 2016), exploration in this area will be valuable in determining whether sport should be promoted over other activities. For example, *The Common Vision*, a collaborative agenda for physical activity, recreation, and sport policies was recently published to advocate for increased physical activity with reduced sedentary behaviour for the whole population (Public Health Agency of Canada, 2018a). While the report mentioned sport should be advocated for all, sport related information primarily focused on younger individuals. This highlights the need for additional research on older athletes to increase our understanding on how psychosocial assets developed through sport may be relevant in older adulthood, compared to other activities.

### **Purpose and Objectives**

Engagement in sport has the potential to influence psychosocial development across the lifespan. However, our knowledge in this area is built on findings from qualitative approaches focusing primarily on Masters Athletes without comparisons to other populations or settings. While a qualitative approach provides useful information on psychosocial development and is crucial in initiating exploration within a new area, it lacks the ability to statistically validate, measure, and compare development between groups or other demographics. Moreover, while findings from qualitative methodologies can be useful in understanding complex phenomena, they are more anecdotal. To advance knowledge in this area, previous qualitative research should be used to complement and refine quantitative methods. Furthermore, a quantitative lens is imperative for determining why sport should (or should not) be promoted over other leisure activities in developing psychosocial assets among older adults. For instance, researchers who initially proposed the concept of psychosocial development in older adults (Baker et al., 2010) recommended two key questions to move forward in this area: 1) are there benefits from sport

participation that do not come from general physical activity involvement? and 2) are there negative consequences of sport participation in older adults? While several studies of older athletes have provided evidence of psychosocial development and negative experiences of sport, these key questions have not been clearly answered.

One explanation for the paucity in this area is the lack of a useful assessment tool for researchers to evaluate psychosocial assets gained through sport among older adults. To the best of my knowledge, there has yet to be an empirical study that quantitatively measures the development of psychosocial assets in older adults who are actively engaged in sport. Creating an assessment tool will be crucial for collecting information on larger scales, with more diverse samples of adults (age, level of activity, sociodemographic variance) and a greater variety of activities (in addition to competitive sport). This may provide important data for quantifying the size of these effects and their generalizability to older adults as a population. Moreover, a project built to address this gap would facilitate multiple comparisons within and across samples (i.e., competitive vs. non-competitive sport, sport vs. other activities, younger age groups vs. older age groups). This project will also help determine whether unique psychosocial assets develop when comparing facets such as type of sport (e.g., golf, soccer, running) or level of competition (e.g., local versus international), as well as between sport and other forms of physical activity (e.g., exercise; Gayman et al., 2017). Development of a quantitative tool could allow clearer depictions of sport experiences through inclusion of a broad sample of older adults (a vast array of sport and development experiences). This could enhance our understanding on the complexity of sport and its potential to influence the development of psychosocial assets. Moreover, findings from this tool could be used to inform sport programs, physical activity promotion, and policy. To this

end, this project aimed to develop and provide preliminary validation of an assessment tool that measures psychosocial assets in older adults.

### *Research Studies*

1. Examine previous sport literature (dating back 35 years) to identify foci and gaps in work on sport and older adults.
2. Explore experiences in a sport that has yet to be studied to gather information on sport experiences, as well as psychosocial assets development in this sample.
3. Using information from the first two studies, as well as previous research in the field, develop a scale of aging-related assets and conduct preliminary tests of construct and/or criterion validity.

## **General Methods**

### **Study Design**

To address the principle aims of this project, a mixed-method sequential research design was adopted, where the initial phases in the study informed and guided the subsequent phases (i.e., development of the assessment tool). Given the preponderance of qualitative research done to date, and the relative infancy of work in this area, it was imperative to apply both qualitative and quantitative methods when comparing various types of engagement. The combination of approaches provided a better understanding on the psychosocial outcomes related to sport in older adults compared to either approach alone. A sequential research design allowed personal narratives of sport to be heard in a qualitative design (open-ended questions), and interpretation of the data (close-ended questions) with minimal researcher biases in a quantitative design (Creswell & Plano Clark, 2007). In addition, information from a larger group can be collected



and generalized from the quantitative design, which is a limitation of using qualitative methods alone. Hence, these approaches complement each other to comprehensively study this topic.

### **Developmental Assets Profile (DAP)**

The assets measurement tool was built on the Developmental Assets Profile (DAP), originally created by the Search Institute in 2004 (Search Institute, 2005). The DAP is 58-items survey that is used to measure internal and external assets across eight domains: 1) support, 2) empowerment, 3) boundaries and expectations, 4) constructive use of time, 5) commitment to learning, 6) positive values, 7) social competencies and 8) positive identity. This measure is suggested to be useful in examining individual personal development (defined as developmental assets), with good reliability estimates for the eight categories (0.59 – 0.87). In youth samples, the DAP is considered to be useful in schools, mental health and family service practices, and examining youth programs (MacDonald & McIsaac, 2016). Given that elements of these eight domains have been reported by older adults in several qualitative studies on psychosocial development (e.g., commitment to learning, empowerment, positive identity; (Baker et al., 2010; Dionigi, 2002b, 2006b)), this project used the DAP as a guide to create a modified version applicable to older adults. More specifically, the wording was adjusted to make the items more relevant to older adults, and items that were irrelevant to this group (i.e., related to school and parents) were removed. In addition, information on sport experiences and psychosocial assets collected during qualitative interviews was used to inform the development of the scale.

### **Sport**

Using definitions from previous researchers, sport is defined as a leisure activity that is organized (governed by rules or structured), involves competition (winners and losers), requires

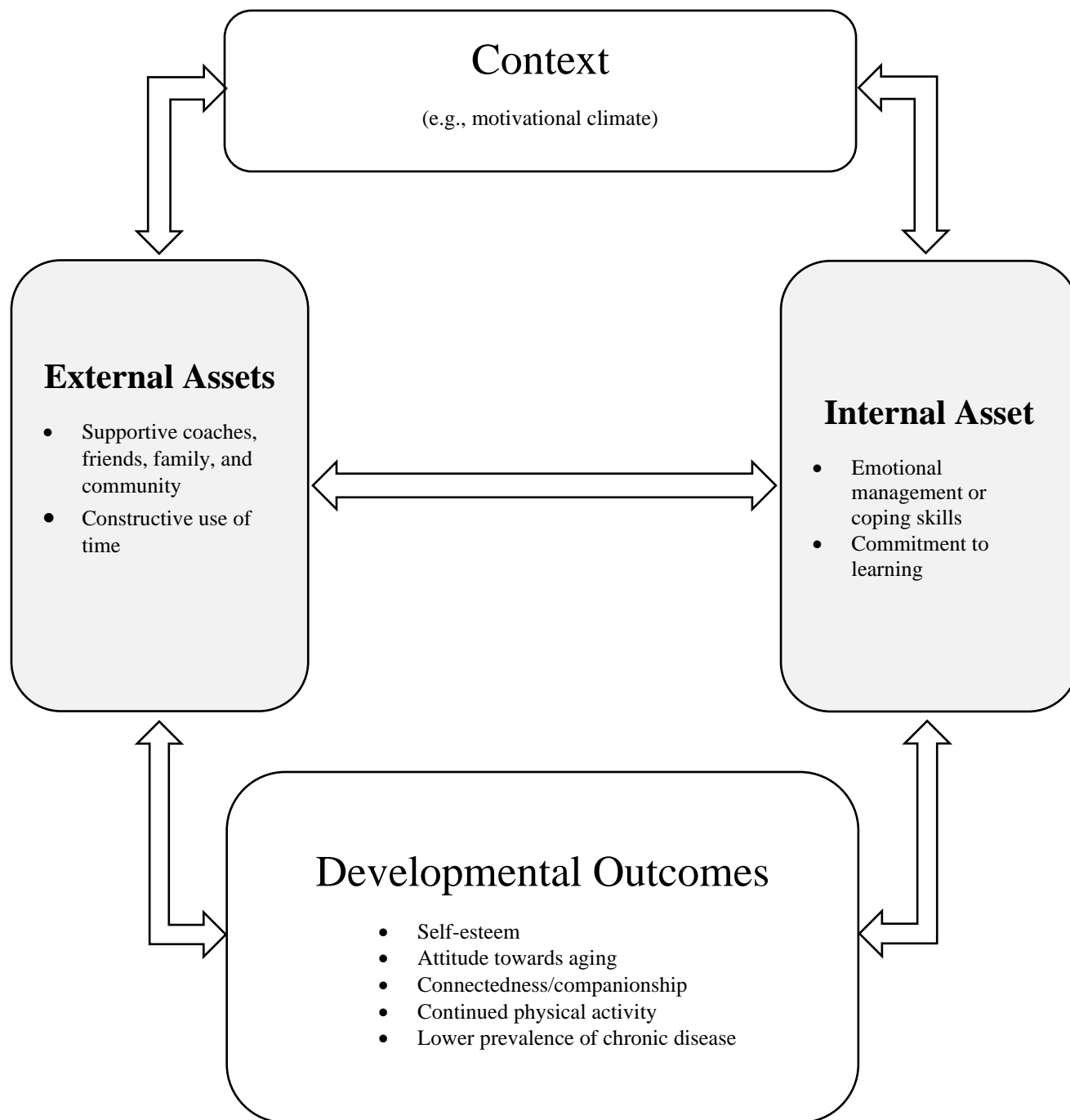
physical skill and/or exertion (not up to chance), and is well-established (Coakley 2016; Gayman et al., 2018; Stebbins, 1982, 1992; Suits, 1988).

## **Dissertation Overview**

The remaining chapters of this document describe the research program in detail. *Chapter Two* includes a scoping review on how researchers have studied older adults in sport since the first World Masters Games in 1985 (Patelia et al., 2022). This chapter provides an extensive summary of current knowledge on the types of individuals that have generally been studied (or excluded) when studying outcomes related to sport (e.g., performance, physiological health, cognitive function, psychosocial, sport participation, and sociological). In addition, this helped generate information on the types and levels of sports and how they have been studied in prior research. Results from this step were used to inform the development of the instrument (i.e., the background or demographic portion of the scale). *Chapter Three* examines the sport experiences and psychosocial development of assets in rowing athletes aged 50 and above. Responses regarding rowing experiences and the value of psychosocial assets across the lifespan are detailed in this chapter. Findings from this study helped inform the creation of the psychosocial assessment scale in study 3. *Chapter Four* includes the creation of the preliminary Psychosocial Assets Scale (PAS) and preliminary test results from a sample of older adults. To enhance the PAS, a group of experts in the field of sport and older adults were also contacted to provide their feedback. To establish the initial factor structure, this preliminary quantitative tool was tested on several older athletes recruited from many sport organizations. Lastly, *Chapter Five* includes a general discussion on the individual studies, as well as the broad practical, research, and societal implications of this dissertation.

**Figure 1**

*The constructs of psychosocial assets and personal developmental outcomes*



*Note.* Examples related to the construct are presented in bullet points. The arrows represent the dual relationship (or interrelationship) between constructs.

## References

- Andersen, M. H., Ottesen, L., & Thing, L. F. (2019). The social and psychological health outcomes of team sport participation in adults: An integrative review of research. *Scandinavian Journal of Public Health*, 47(8), 832–850.  
<https://doi.org/10.1177/1403494818791405>
- Anstey, K. J., Luszcz, M. A., Giles, L. C., & Andrews, G. R. (2001). Demographic, health, cognitive, and sensory variables as predictors of mortality in very old adults. *Psychology and Aging*, 16(1), 3–11. <https://doi.org/10.1037/0882-7974.16.1.3>
- Arriagada, P. (2018). A day in the life: How do older Canadians spend their time? *Statistics Canada*, 75, 17. <https://www150.statcan.gc.ca/n1/en/pub/75-006-x/2018001/article/54947-eng.pdf?st=RDTYNsIK>
- Back, J., Johnson, U., Svedberg, P., McCall, A., & Ivarsson, A. (2022). Drop-out from team sport among adolescents: A systematic review and meta-analysis of prospective studies. *Psychology of Sport and Exercise*, 61(November 2021), 102205.  
<https://doi.org/10.1016/j.psychsport.2022.102205>
- Baker, J., Fraser-Thomas, J., Dionigi, R., & Horton, S. (2010). Sport participation and positive development in older persons. *European Review of Aging and Physical Activity*, 7(1), 3–12.  
<https://doi.org/10.1007/s11556-009-0054-9>
- Balboa-Castillo, T., León-Muñoz, L. M., Graciani, A., Rodríguez-Artalejo, F., & Guallar-Castillón, P. (2011). Longitudinal association of physical activity and sedentary behavior during leisure time with health-related quality of life in community-dwelling older adults. *Health and Quality of Life Outcomes*, 9, 1–10. <https://doi.org/10.1186/1477-7525-9-47>
- Benson, P. L. (1997). *All kids are our kids: What communities must do to raise caring and*

*responsible children and adolescents*. Jossey-Bass.

Benson, P. L., Leffert, N., Scales, P. C., & Blyth, D. A. (2012). Beyond the “village” rhetoric:

Creating healthy communities for children and adolescents. *Applied Developmental Science*, 16(1), 3–23. <https://doi.org/10.1080/10888691.2012.642771>

Bronfenbrenner, U. (1986). Ecology of the family as a context for human development.

*Developmental Psychology*, 22(6), 723–742.

Brooke Kirby, J., Kluge, M. A., Kirby, J. B., & Kluge, M. A. (2013). Going for the gusto:

Competing for the first time at age 65. *Journal of Aging and Physical Activity*, 21(3), 290–308. <https://doi.org/10.1123/japa.21.3.290>

Butler, R. N. (1969). Age-ism: Another form of bigotry. *Gerontologist*, 9(4), 243–246.

[https://doi.org/10.1093/geront/9.4\\_Part\\_1.243](https://doi.org/10.1093/geront/9.4_Part_1.243)

Cardenas, D., Henderson, K. A., & Wilson, B. E. (2009). Experiences of participation in senior games among older adults. *Journal of Leisure Research*, 41(1), 41–56.

<https://doi.org/10.1080/00222216.2009.11950158>

Coakley, J. (2016). Positive youth development through sport: Myths, beliefs, and realities. In

*Positive youth development through sport* (pp. 22–33). Routledge.

Côté, J., Turnnidge, J., & Vierimaa, M. (2016). A personal assets approach to youth sport. In

*Routledge handbook of youth sport* (pp. 243–255). Routledge.

Coudin, G., & Alexopoulos, T. (2010). “Help me! I’m old!” How negative aging stereotypes

create dependency among older adults. *Aging and Mental Health*, 14(5), 516–523.

<https://doi.org/10.1080/13607861003713182>

Creswell, J. W., & Plano Clark, V. L. (2007). *Designing and conducting mixed methods research*. SAGE Publications.

- Curtis, E., Litwic, A., Cooper, C., & Dennison, E. (2015). Determinants of muscle and bone aging. *Journal of Cellular Physiology*, 230(11), 2618–2625.  
<https://doi.org/10.1002/jcp.25001>
- Damon, W. (2004). What is positive youth development? *Annals of the American Academy of Political and Social Science*, 591(January), 13–24.
- Danesi, M. (2009). *Dictionary of media and communications* (1st ed.). Routledge.  
<https://doi.org/10.4324/9781315705194>
- de Guzman, A. B., Mesana, J. C. B., & Roman, J. A. M. (2021). Age knows no bounds: A latent content analysis of social media comments toward older adults' engagement in sports activities. *Journal of Applied Gerontology*, 40(12), 1856–1864.  
<https://doi.org/10.1177/07334648211004687>
- De Rekeneire, N., Visser, M., Peila, R., Nevitt, M. C., Cauley, J. A., Tylavsky, F. A., Simonsick, E. M., & Harris, T. B. (2003). Is a fall just a fall: Correlates of falling in healthy older persons. The health, aging and body composition study. *Journal of the American Geriatrics Society*, 51(6), 841–846. <https://doi.org/10.1046/j.1365-2389.2003.51267.x>
- Dionigi, R. (2002a). Leisure and identity management in later life: Understanding competitive sport participation among older adults. *World Leisure Journal*, 44(3), 4–15.  
<https://doi.org/10.1080/04419057.2002.9674274>
- Dionigi, R. (2002b). Resistance and empowerment through leisure: The meaning of competitive sport participation to older adults. *Loisir et Société / Society and Leisure*, 25(2), 303–328.  
<https://doi.org/10.1080/07053436.2002.10707591>
- Dionigi, R. (2005). A leisure pursuit that 'goes against the grain': Older people and competitive sport. *Annals of Leisure Research*, 8(1), 1–22.

<https://doi.org/10.1080/11745398.2005.10600957>

Dionigi, R. (2006a). Competitive sport and aging: The need for qualitative sociological research.

*Journal of Aging and Physical Activity*, 14(4), 365–379.

<https://doi.org/10.1123/japa.14.4.365>

Dionigi, R. (2006b). Competitive sport as leisure in later life: Negotiations, discourse, and aging.

*Leisure Sciences*, 28(2), 181–196. <https://doi.org/10.1080/01490400500484081>

Dionigi, R. (2015a). Pathways to masters sport: Sharing stories from sport ‘continuers’,

‘rekindlers’ and ‘late bloomers.’ In E. Tulle & C. Phoenix (Eds.), *Physical Activity and*

*Sport in Later Life* (pp. 54–68). Palgrave Macmillan UK. [https://doi.org/10.1007/978-1-](https://doi.org/10.1007/978-1-137-42932-2_6)

[137-42932-2\\_6](https://doi.org/10.1007/978-1-137-42932-2_6)

Dionigi, R. (2015b). Stereotypes of aging: Their effects on the health of older adults. *Journal of*

*Geriatrics*, 2015, 1–9. <https://doi.org/10.1155/2015/954027>

Dionigi, R., Baker, J., & Horton, S. (2011). Older athletes’ perceived benefits of competition.

*The International Journal of Sport and Society: Annual Review*, 2(2), 17–28.

<https://doi.org/10.18848/2152-7857/cgp/v02i02/53869>

Dionigi, R., Fraser-Thomas, J., Stone, R., & Gayman, A. (2017). Psychosocial development

through masters sport: What can be gained from youth sport models? *Journal of Sports*

*Sciences*, 36(13), 1533–1541. <https://doi.org/10.1080/02640414.2017.1400147>

Dionigi, R., Horton, S., & Baker, J. (2013a). How do older masters athletes account for their

performance preservation? A qualitative analysis. *Ageing and Society*, 33(2), 297–319.

<https://doi.org/10.1017/S0144686X11001140>

Dionigi, R., Horton, S., & Baker, J. (2013b). Negotiations of the ageing process: Older adults’

stories of sports participation. *Sport, Education and Society*, 18(3), 370–387.

<https://doi.org/10.1080/13573322.2011.589832>

- Dogra, S., & Stathokostas, L. (2012). Sedentary behavior and physical activity are independent predictors of successful aging in middle-aged and older adults. *Journal of Aging Research*, 2012, 1–8. <https://doi.org/10.1155/2012/190654>
- Dost-Gözkan, A., Kozina, A., Stefenel, D., & Wiium, N. (2021). External developmental assets and positive identity among emerging adults in Norway, Romania, Slovenia, and Turkey. *Frontiers in Psychology*, 12(July). <https://doi.org/10.3389/fpsyg.2021.656972>
- Emile, M., Chalabaev, A., Stephan, Y., Corrion, K., & D'Arripe-Longueville, F. (2014). Aging stereotypes and active lifestyle: Personal correlates of stereotype internalization and relationships with level of physical activity among older adults. *Psychology of Sport & Exercise*, 15(2), 198–204.
- Faulkner, J. A., Davis, C. S., Mendias, C. L., & Brooks, S. V. (2008). The aging of elite male athletes: Age-related changes in performance and skeletal muscle structure and function. *Clinical Journal of Sport Medicine*, 18(6), 501–507.  
<https://doi.org/10.1097/JSM.0b013e3181845f1c>
- Fraser-Thomas, J., & Côté, J. (2009). Understanding adolescents' positive and negative developmental experiences in sport. *Sport Psychologist*, 23(1), 3–23.  
<https://doi.org/10.1123/tsp.23.1.3>
- Fraser-Thomas, J., Côté, J., & Deakin, J. (2005). Youth sport programs: An avenue to foster positive youth development. *Physical Education & Sport Pedagogy*, 10(1), 19–40.  
<https://doi.org/10.1080/1740898042000334890>
- Gard, M., Dionigi, R., Horton, S., Baker, J., Weir, P., & Dionigi, C. (2017). The normalization of sport for older people? *Annals of Leisure Research*, 20(3), 253–272.



<https://doi.org/10.1080/11745398.2016.1250646>

Gayman, A., Fraser-Thomas, J., Dionigi, R., Horton, S., & Baker, J. (2017). Is sport good for older adults? A systematic review of psychosocial outcomes of older adults' sport participation. *International Review of Sport and Exercise Psychology*, 10(1), 164–185.

Geard, D., Reaburn, P., Rebar, A., & Dionigi, R. (2017). Masters athletes: Exemplars of successful aging? *Journal of Aging & Physical Activity*, 25(3), 490–500.

<https://doi.org/10.1123/japa.2016-0050>

Geard, D., Rebar, A., Reaburn, P., & Dionigi, R. (2018). Testing a model of successful aging in a cohort of masters swimmers. *Journal of Aging and Physical Activity*, 26(2), 183–193.

<https://doi.org/10.1123/japa.2016-0357>

Gould, D., & Carson, S. (2008). Life skills development through sport: Current status and future directions. *International Review of Sport and Exercise Psychology*, 1(1), 58–78.

<https://doi.org/10.1080/17509840701834573>

Gould, D., Lauer, L., Rolo, C., Jannes, C., & Pennisi, N. (2008). The role of parents in tennis success: Focus group interviews with junior coaches. *Sport Psychologist*, 22(1), 18–37.

<https://doi.org/10.1123/tsp.22.1.18>

Grant, B. C. (2001). You're never too old: Beliefs about physical activity and playing sport in later life. *Ageing and Society*, 21(6), 777–798. <https://doi.org/10.1017/s0144686x01008492>

Grierson, B. (2010). The incredible flying Nonagenarian. *The New York Times*.

<https://www.nytimes.com/2010/11/28/magazine/28athletes-t.html?pagewanted=1&ref=general&src=me>

Hausdorff, J. M., Levy, B., & Wei, J. Y. (1999). The power of stereotypes on gait of older persons: Reversibility of age-related changes. *Journal of the American Geriatrics Society*,

47, S5–S5.

- Hawkins, S. A., Wiswell, R. A., & Marcell, T. J. (2003). Exercise and the master athlete - A model of successful aging? *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 58(11), M1009–M1011. <https://doi.org/10.1093/gerona/58.11.M1009>
- Hébert, R. (1997). Functional decline in old age. *Canadian Medical Association Journal*, 157(8), 1037–1045.
- Hellison, D. (2003). *Teaching responsibility through physical activity*. Champaign, IL: Human Kinetics.
- Heo, J., Culp, B., Yamada, N., & Won, Y. (2013). Promoting successful aging through competitive sports participation. *Qualitative Health Research*, 23(1), 105–113. <https://doi.org/10.1177/1049732312457247>
- Holt, N. (2007). Positive youth development through sport. In *Routledge*. Routledge Taylor & Francis Group.
- Holt, N., & Neely, K. (2011). Positive youth development through sport: A review. *Revista De Iberoamericana De Psicología Del Ejercicio Y El Deporte*, 6(2), 299–316.
- Horton, S., Baker, J., Côté, J., & Deakin, J. M. (2008). Understanding seniors' perceptions and stereotypes of aging. *Educational Gerontology*, 34(11), 997–1017. <https://doi.org/10.1080/03601270802042198>
- Horton, S., Baker, J., Pearce, W., & Deakin, J. M. (2010). Immunity to popular stereotypes of aging? seniors and stereotype threat. *Educational Gerontology*, 36(5), 353–371. <https://doi.org/10.1080/03601270903323976>
- Horton, S., Dionigi, R., Gard, M., Baker, J., & Weir, P. (2018). Don't sit back with the geraniums, get out: The complexity of older women's stories of sport participation. *Journal*

- of Amateur Sport*, 4(1), 24–51. <https://doi.org/10.17161/jas.v4i1.6627>
- Horton, S., Dionigi, R., Gard, M., Baker, J., Weir, P., & Deneau, J. (2019). “You can sit in the middle or be one of the outliers”: Older male athletes and the complexities of social comparison. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.02617>
- Hsu, W. C., Tsai, A. C., Chen, Y. C., & Wang, J. Y. (2017). Predicted factors for older Taiwanese to be healthy octogenarians: Results of an 18-year national cohort study. *Geriatrics and Gerontology International*, 17(12), 2579–2585. <https://doi.org/10.1111/ggi.13112>
- International Masters Games Association. (2017). *The world masters games 2017 post-event report*. <https://www.imga.ch/assets/Uploads/Reports/Auckland-WMG-2017-Final-Report.pdf>
- International Masters Games Association. (2020). *A brief history of the world masters games*. <https://imga.ch/2020/07/14/a-brief-history-of-the-world-masters-games/>
- Kettunen, J. A., Kujala, U. M., Kaprio, J., & Sarna, S. (2006). Health of master track and field athletes: A 16-year follow-up study. *Clinical Journal of Sport Medicine*, 16(2), 142–148.
- Kim, A. C. H., Park, S. H., Kim, S., & Fontes-Comber, A. (2020). Psychological and social outcomes of sport participation for older adults: A systematic review. *Ageing and Society*, 40(7), 1529–1549. <https://doi.org/10.1017/S0144686X19000175>
- Kirby, J. B., & Kluge, M. A. (2021). For the love of the game: An exploration of the experiences and psychosocial development of women 70 years of age and older who play volleyball. *Journal of Aging and Physical Activity*, 30(September), 1–10. <https://doi.org/10.1123/japa.2021-0100>
- Larson, R. W. (2000). Toward a psychology of positive youth development. *American*

- Psychologist*, 55(1), 170–183. <https://doi.org/10.1037/0003-066X.55.1.170>
- Lerner, R. M., Dowling, E. M., & Anderson, P. M. (2003). Positive youth development: Thriving as the basis of personhood and civil society. *Applied Developmental Science*, 7(3), 172–180. [https://doi.org/10.1207/S1532480XADS0703\\_8](https://doi.org/10.1207/S1532480XADS0703_8)
- Lerner, R. M., Lerner, J. V., Almerigi, J. B., Theokas, C., Phelps, E., Gestsdottir, S., Naudeau, S., Jelicic, H., Alberts, A., Ma, L., Smith, L. M., Bobek, D. L., Richman-Raphael, D., Simpson, I., Christiansen, E. D. D., & Von Eye, A. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth-grade adolescents: Findings from the first wave of the 4-H study of positive youth development. *Journal of Early Adolescence*, 25(1), 17–71.
- Levy, B. (1996). Improving memory in old age through implicit self-stereotyping. *Journal of Personality and Social Psychology*, 71(6), 1092–1107. <https://doi.org/10.1037/0022-3514.71.6.1092>
- Levy, B. (2009). Stereotype Embodiment. *Current Directions in Psychological Science*, 18(6), 332–336. <https://doi.org/10.1111/j.1467-8721.2009.01662.x>
- Litchfield, C., & Rylee, D. (2012). The meaning of sports participation in the lives of middle-aged and older women. *International Journal of Interdisciplinary Social Sciences*, 6(5), 21–36.
- MacDonald, D. J., Cote, J., Eys, M., and Deakin, J. (2012). Psychometric properties of the youth experience survey with young athletes. *Psychology of Sport and Exercise*, 13, 332–340.
- MacDonald, D. J., & McIsaac, T. (2016). Quantitative assessment of positive youth development in sport. In N. Holt (Ed.), *Positive Youth Development Through Sport* (pp. 83–96). Routledge.

- Marson, S. M., & Powell, R. M. (2014). Goffman and the infantilization of elderly persons: a theory in development. *Journal of Sociology & Social Welfare*, 41, 143.
- Martins, L. C. G., Lopes, M. V. de O., Diniz, C. M., & Guedes, N. G. (2021). The factors related to a sedentary lifestyle: A meta-analysis review. *Journal of Advanced Nursing*, 77(3), 1188–1205. <https://doi.org/10.1111/jan.14669>
- Mattle, M., Meyer, U., Lang, W., Mantegazza, N., Gagesch, M., Mansky, R., Kressig, R. W., Egli, A., Orav, E. J., & Bischoff-Ferrari, H. A. (2022). Prevalence of physical activity and sedentary behavior patterns in generally healthy european adults aged 70 years and older—Baseline results from the DO-HEALTH clinical trial. *Frontiers in Public Health*, 10(April), 1–10. <https://doi.org/10.3389/fpubh.2022.810725>
- McAuley, E., Blissmer, B., Marquez, D. X., Jerome, G. J., Kramer, A. F., & Katula, J. (2000). Social relations, physical activity, and well-being in older adults. *Preventive Medicine*, 31(5), 608–617. <https://doi.org/10.1006/pmed.2000.0740>
- Meisner, B. A., Weir, P. L., & Baker, J. (2013). The relationship between aging expectations and various modes of physical activity among aging adults. *Psychology of Sport & Exercise*, 14(4), 569–576.
- Partington, E., Partington, S., Fishwick, L., & Allin, L. (2005). Mid-life nuances and negotiations: Narrative maps and the social construction of mid-life in sport and physical activity. *Sport, Education and Society*, 10(1), 85–99. <https://doi.org/10.1080/135733205200098820>
- Patelia, S., Stone, R. C., El-Bakri, R., Adli, M., & Baker, J. (2018). Masters or pawns? Examining injury and chronic disease in male masters athletes and chess players compared to population norms from the Canadian community health survey. *European Review of*

- Aging and Physical Activity*, 15(1), 15.
- Payne, V. G., & Isaacs, L. D. (1999). Development, maturation, and growth. In *Human motor development: A lifespan approach* (pp. 5–19).
- Petitpas, A. J., Cornelius, A. E., Van Raalte, J. L., & Jones, T. (2005). A framework for planning youth sport programs that foster psychosocial development. *Sport Psychologist*, 19(1), 63–80. <https://doi.org/10.1123/tsp.19.1.63>
- Public Health Agency of Canada. (2018a). A common vision for increasing physical activity and reducing sedentary living in Canada: Let's get moving. In *Public Health Canada*. <https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/healthy-living/lets-get-moving/pub-eng.pdf>
- Public Health Agency of Canada. (2018b). *Physical activity tips for older adults (65 years and older)*. <https://www.canada.ca/en/public-health/services/publications/healthy-living/physical-activity-tips-older-adults-65-years-older.html>
- Public Health Agency of Canada. (2020). Aging and chronic disease: A profile of Canadian seniors. In *Cat.: HP35-137/1-2020E-PDF*.
- Rezende, L. F. M., Lopes, M. R., Rey-López, J. P., Matsudo, V. K. R., & Luiz, O. do C. (2014). Sedentary behavior and health outcomes: an overview of systematic reviews. *PloS One*, 9(8), e105620. <https://doi.org/10.1371/journal.pone.0105620>
- Rosenbloom, C., & Bahns, M. (2006). What can we learn about diet and physical activity from master athletes? *Holistic Nursing Practice*, 20(4), 161–166; quiz 167–168. <http://www.ncbi.nlm.nih.gov/pubmed/16825917>
- Rotermann, M. (2017). High use of acute care hospital services at age 50 or older (Catalogue no. 82-003-x). *Health Reports*, 28(9), 3–16.

- Roth, J., Brooks-Gunn, J., Murray, L., & Foster, W. (1998). Promoting healthy adolescents: Synthesis of youth development program evaluations. *Effective Interventions for Children in Need*, 8(4), 263–299. <https://doi.org/10.4324/9781315256900-31>
- Salari, S. M. (2016). Infantilization as Elder Mistreatment: Evidence from Five Adult Day Centers. *Journal of Elder Abuse & Neglect*, 6566(July), 53–91. <https://doi.org/10.1300/J084v17n04>
- Scales, P. C., Benson, P. L., Leffert, N., & Blyth, D. A. (2000). Contribution of developmental assets to the prediction of thriving among adolescents. *Applied Developmental Science*, 4(1), 27–46. [https://doi.org/10.1207/S1532480XADS0401\\_3](https://doi.org/10.1207/S1532480XADS0401_3)
- Search Institute. (2005). *The Developmental Assets Profile (DAP)*. <https://www.search-institute.org/surveys/choosing-a-survey/dap/>
- Sport for Life. (2016). *Durable by design: Active for life*. [https://sportforlife.ca/wp-content/uploads/2016/06/Durable-by-Design\\_Dec2\\_2016-.pdf](https://sportforlife.ca/wp-content/uploads/2016/06/Durable-by-Design_Dec2_2016-.pdf)
- Statistics Canada. (2021). *COVID-19 in Canada: A one-year update on social and economic impacts* (Issue 2021003). <https://www150.statcan.gc.ca/n1/en/pub/11-631-x/11-631-x2021001-eng.pdf?st=PbeuIZpo>
- Stenner, B. J., Buckley, J. D., & Mosewich, A. D. (2020). Reasons why older adults play sport: A systematic review. *Journal of Sport and Health Science*, 9(6), 530–541. <https://doi.org/10.1016/j.jshs.2019.11.003>
- Stone, R. C., Gage, W. H., & Baker, J. (2021). The intersecting influence of age and performance stereotypes on physical and psychological aspects of stair navigation in older adults. *Journal of Applied Gerontology*, 40(12), 1865–1875. <https://doi.org/10.1177/0733464820965340>

- Stone, R. C., Rakhamilova, Z., Gage, W. H., & Baker, J. (2018). Curling for confidence: Psychophysical benefits of curling for older adults. *Journal of Aging and Physical Activity*, 26(2), 267–275. <https://doi.org/10.1123/japa.2016-0279>
- Suominen, H. (2011). Ageing and maximal physical performance. *European Review of Aging and Physical Activity*, 8(1), 37–42. <https://doi.org/10.1007/s11556-010-0073-6>
- Tanaka, H., & Seals, D. R. (2003). Invited review: Dynamic exercise performance in masters athletes: Insight into the effects of primary human aging on physiological functional capacity. *Journal of Applied Physiology*, 95(5), 2152–2162. <https://doi.org/10.1152/japplphysiol.00320.2003>
- Turnnidge, J., Côté, J., & Hancock, D. J. (2014). Positive youth development from sport to life: explicit or implicit transfer? *Quest*, 66(2), 203–217. <https://doi.org/10.1080/00336297.2013.867275>
- Vella, S. A., Cliff, D. P., Magee, C. A., & Okely, A. D. (2015). Associations between sports participation and psychological difficulties during childhood: A two-year follow up. *Journal of Science and Medicine in Sport*, 18(3), 304–309. <https://doi.org/10.1016/j.jsams.2014.05.006>
- Vertinsky, P. A. (1995). Stereotypes of aging women and exercise: a historical perspective. *Journal of Aging & Physical Activity*, 3(3), 223–237. <http://articles.sirc.ca/search.cfm?id=379191>
- Vickers, K. (2007). Aging and the media: Yesterday, today, and tomorrow. *Californian Journal of Health Promotion*, 5(3), 100–105.
- Vierimaa, M., Erickson, K., Côté, J., & Gilbert, W. (2012). Positive Youth Development: A Measurement Framework for Sport. *International Journal of Sports Science & Coaching*,



7(3), 601–614.

- Weinberg, R., Gershon, T., McKenzie, A., Jackson, S., Anshel, M., Grove, R., & Fogarty, G. (2000). Motivation for youth participation in sport and physical activity: relationships to culture, self-reported activity levels, and gender. *International Journal of Sport Psychology*, 31, 321–346.
- Weir, P., Baker, J., & Horton, S. (2010). The emergence of masters sport: Participatory trends and historical developments. In *The Masters athlete: Understanding the role of sport and exercise in optimizing aging* (pp. 7–14). <https://doi.org/10.4324/9780203885512>
- Weir, P., Meisner, B., & Baker, J. (2010). Successful aging across the years: Does one model fit everyone? In *Journal of Health Psychology* (Vol. 15, Issue 5, pp. 680–687). <https://doi.org/10.1177/1359105309353648>
- Weiss, M. R. (2013). Old wine in a new bottle: Historical reflections on sport as a context for youth development. In N. Holt (Ed.), *Positive Youth Development Through Sport* (pp. 7–20). Routledge.
- Weiss, M. R., & Bredemeier, B. J. (1983). Developmental sport psychology: A theoretical perspective for studying children in sport. *Journal of Sport Psychology*, 5(2), 216–230.
- Weiss, M., Bolter, N., and Kipp, L. (2014). Assessing impact of physical activity-based youth development programs: Validation of the life skills transfer survey (LSTS). *Research Quarterly for Exercise and Sport*, 85, 263–278.
- Wister, A., Kendig, H., Mitchell, B., Fyffe, I., & Loh, V. (2016). Multimorbidity, health and aging in Canada and Australia: A tale of two countries. *BMC Geriatrics*, 16(1), 1–13. <https://doi.org/10.1186/s12877-016-0341-z>
- World Health Organization. (2016). Global report on ageism. In *Global Report on Psoriasis*

(Vol. 978).

[http://www.who.int/about/licensing/copyright\\_form/index.html%0Ahttp://www.who.int/about/licensing/](http://www.who.int/about/licensing/copyright_form/index.html%0Ahttp://www.who.int/about/licensing/)

World Health Organization. (2021). *Ageism is a global challenge*.

<https://www.who.int/news/item/18-03-2021-ageism-is-a-global-challenge-un>

Yamakita, M., Kanamori, S., Kondo, N., & Kondo, K. (2015). Correlates of regular participation in sports groups among Japanese older adults: JAGES cross-sectional study. *PLoS ONE*, *10*(10), 1–18. <https://doi.org/10.1371/journal.pone.0141638>

Young, B. W., & Medic, N. (2011). Examining social influences on the sport commitment of masters swimmers. *Psychology of Sport and Exercise*, *12*(2), 168–175. <https://doi.org/10.1016/j.psychsport.2010.09.004>

Zhao, E., Tranovich, M. J., & Wright, V. J. (2014). The Role of Mobility as a Protective Factor of Cognitive Functioning in Aging Adults. *Sports Health: A Multidisciplinary Approach*, *6*(1), 63–69. <https://doi.org/10.1177/1941738113477832>

## **Chapter Two: What do we Know About the Value of Sport for Older Adults? A Scoping Review**

**Patelia, S.,** Mazhar, A., & Baker, J. (2023). What Do We Know About the Value of Sport for Older Adults? A Scoping Review. *Journal of Aging and Physical Activity*, *1*, 1-16. doi: 10.1123/japa.2022-0146

\*This manuscript has been presented in the formatting that has been accepted and published in the respective journal\*

### **Abstract**

Issues relating to older adults in sport are ongoing topics of interest among sport scientists; however, our knowledge on how older athletes have been studied is incomplete, which has implications for understanding the comprehensiveness of this evidence base. This scoping review aimed to provide an overview of how sport and older adults have been studied since the first World Masters Games. Data on research topics, research methods, sport-specific information and demographic information on older athletes was collected and reviewed. Results suggest older athletes who are white, males, and competitive athletes have largely been the focus of research. In addition, results highlight an alarming number of unreported data related to the demographics of athlete samples. As a result, the well documented benefits of sport may reflect a homogenous group of older adults, limiting our overall understanding of aging and sport and the value of this research for developing evidence-informed policy.

**Keywords:** masters athletes, masters sport, older athletes, aging, development

## **Introduction**

The history of competitive sport among older adults began informally during the 19<sup>th</sup> and 20<sup>th</sup> century (Kusy & Zieliński, 2006). Over time as interest in sport grew (specifically in running and track and field events), various countries in the West began organizing formal clubs and local competitions such as the Veteran's Athletics Club of England and the Interessen – Gemeinschaft Älterer Langstreckenläufer (IGÄL) Community of Interests of Elderly Long-Distance Runners (Kusy & Zieliński, 2006). The recognition of older athletes on the world stage continued through the creation of the World Association of Veteran Athletes (WAVA) in 1976 (Kusy & Zieliński, 2006). The rising number of sport participants and the excitement of international competition led to the organization of the World Masters Games (WMG) in 1985 in Toronto, Canada. Unlike prior events held within individual countries and/or individual sports, the WMG allowed athletes from other sports (i.e., besides track and field) to compete at an international level.

The growth in the number of older athletes also increased interest in studying older adults who participate in sport, particularly those labelled as Masters Athletes (MAs). By definition, MAs are adults competing at the Masters level (defined by each sport, but generally over the age of 35). These reflect athletes who may be a) experienced, long-term competitors (i.e., continuers), b) returning to sport after an extended break (i.e., rekindler), or c) individuals who are complete novices being introduced to sport for the first time (i.e., late starters; (Dionigi, 2005, 2015a). This unique population has challenged traditional approaches to aging through their continued engagement in sport and higher than expected levels of functioning and health. Some have suggested this cohort represents a model of 'successful aging' (Hawkins et al., 2003; Rowe & Kahn, 1987). However, the popularized model of successful aging, which takes an

overly ‘medical’ approach to success (e.g., maintenance of function, lack of disease), has been criticized for excluding other dimensions of health (e.g., psychological, social, and cognitive), which older adults report as important for their aging process (Geard et al., 2017). Moreover, the concept of successful aging may overlook broader socio-cultural contexts of sport and how older adults negotiate their aging process through sport (e.g., simultaneously oppose and reinforce ageist norms by participating in competitive sport; Dionigi, 2006b; Dionigi, Horton, et al., 2011). For instance, highly active adults express opposing stereotypes of old age by maintaining their own health and function but assigning ageist stereotypes (e.g., frail, dependent) to other non-active older adults through downward comparisons (Dionigi, 2015b; Gard et al., 2017). This distinction reinforces a position that healthy aging is a personal responsibility within an individual’s control, which overlooks individual and social constraints that can prevent some individuals from investing in their health. As such, it is also important to recognize that access to sport (i.e., social and economic capital) may limit many older adults from participating, and issues that have been raised often in the literature (Dionigi, Baker, et al., 2011; Heo et al., 2013; Wheaton, 2017).

The complexities of sport engagement in later life have raised many questions around the value of sport for older adults. As a result, this population has been the focus of extensive research related to the physical, psychological, cultural, and political effects, as well as individual and societal predictors of lifelong involvement in physical activity (especially sport). For instance, previous studies have found engagement in sport to be related with a range of physical health benefits, such as improved cardiovascular health (Schmidt et al., 2015), decreased chronic diseases (Kettunen et al., 2006; Suominen, 2011), improvements in muscle and bone strength (Daly & Bass, 2006; Power et al., 2016), as well as maintaining cognitive

performance (Tseng, Gundapuneedi, et al., 2013; Tseng, Uh, et al., 2013). In addition, studies on sport performance indicate MAs can maintain and/or improve their athletic performance to higher levels than previously thought possible (Maharam et al., 1999).

Research has also supported positive relationships between sport participation and psychosocial health (Gayman et al., 2017). Engagement in sport provides the opportunity to build meaningful friends with immense camaraderie, travel to different countries, maintain fitness, develop a positive outlook on life, as well as develop confidence, competence, commitment, and maintain cognition (Dionigi, 2006b; Dionigi et al., 2013, 2017; Gayman et al., 2017). With this growing interest in older athletes, scholars have attempted to synthesize what we know using narrative and systematic reviews in specific areas of health, including physiological and performance capabilities (Borges et al., 2016; Mckendry et al., 2018; Tanaka & Seals, 2003), psychosocial development (Gayman et al., 2017) and determinants and trends of participation in sport in older adults (Stenner et al., 2020). These reviews have also ranged from summaries of research on a specific sport such as masters cycling, (Macgregor et al., 2017) to neoliberalism as applied to older athletes (Gard et al., 2017). While these reviews have contributed to our knowledge of sport and older adults within these distinctive areas, a comprehensive review of multiple disciplines (e.g., sport science, sport sociology, exercise psychology, and leisure studies) would be useful for researchers and sport advocates for establishing the foundation on which the current body of knowledge is built. Previous studies have alluded to knowledge gaps within their respective research areas. For instance, a scoping review on psychosocial outcomes in competitive older athletes suggested a disproportionate focus on certain research designs (i.e., cross-sectional compared to longitudinal design), location of data collection (i.e., greater population samples from United States) and gender (Cannella et

al., 2021). In addition, this review found most studies on psychosocial aspects used a ‘wide indiscriminate age range’ such as 50 to 101 years. As a result, researchers recommended stratifying age groups to better understand how age (i.e., where a person is in their stage of life) influences sport participation (Cannella et al., 2021). Additional reviews in this area have also reported a disproportionate exploration in research using psychosocial and sociocultural perspectives relative to areas exploring biomedical domains (Dionigi, 2006a, 2016) . Previous studies have also noted that our knowledge of older male athletes exceeds knowledge of females in sport (Horton et al., 2018; Kirby & Kluge, 2022). Generally, studies highlight samples are primarily comprised of older athletes who are males, white, able-bodied, and have the privilege to afford sport (Dionigi, 2016; Dionigi, Baker, et al., 2011; Stenner et al., 2020; Wheaton, 2017). Collectively, while these studies may provide some insight into research within specific fields, a comprehensive review on how researchers have studied older adults in sport (i.e., methods or practices) across research fields would extend our knowledge of gaps in sport and aging research as a whole.

Scoping reviews are an ideal tool to examine a body of literature in a given area to understand our existing knowledge on the topic and map its available evidence. In comparison to other types of reviews, a scoping review allows researchers to create a detailed overview on a subject that is largely unclear, by mapping information such as the focus of research, the volume of literature, and the research gaps in the particular field (Levac et al., 2010; Munn et al., 2018; Tricco et al., 2018). This type of review (compared to a systematic review or meta-analysis) allows scientists to gain a comprehensive profile of current knowledge on a topic by exploring a large range of evidence from various research fields where numerous types of study designs might be applicable, without focusing on a specific research question and assessment of research



quality (Arksey & O'Malley, 2005). From this perspective, scoping reviews are a valuable preceding step to systematic reviews that use information gathered from scoping reviews to form more precise research questions. Systematic reviews generally focus on a well-defined question where study designs are identified in advance, thereby answering questions from a relatively narrow range by assessing the quality of evidence to inform a conclusion (Arksey & O'Malley, 2005; Levac et al., 2010; Munn et al., 2018). A scoping review of the research on sport and older adults would provide an overview of the current body of evidence, indicating where researchers have focused their attention, with whom and using what study designs. In addition, this type of overarching and comprehensive review would allow researchers to reflect on the knowledge base on older athletes and identify key areas in need of attention to improve the quality of work moving forward. To this end, the aim of this scoping review was to summarize information on a) the demographics of athletes explored in prior work, b) sports investigated (e.g., level and type of sport, recruitment location), and c) the focus of research and methods used (e.g., type of study). A secondary objective was to identify gaps in the overall evidence base concerning sport and older adults since the establishment of the WMG in 1985. Ultimately, this overview would help researchers to design better studies of older adults focusing on gaps in our understanding.

## **Method**

### **Study Design**

Despite the increasing use of research synthesis approaches, scoping reviews are relatively new, and, as a result, no universal definition or procedure exists. In general, a scoping review aims to map the key concepts underpinning a research area and the main sources and types of evidence available and can be undertaken as standalone projects in their own right, especially where an area is complex or has not been reviewed comprehensively before (Mays et

al., 2004). While researchers continuously enhance the definition of what a scoping review is and what it aims to accomplish (Colquhoun et al., 2014; Daudt et al., 2013; Levac et al., 2010; Pham et al., 2014), the framework proposed by Arksey and O'Malley (2005) remains the most commonly used approach, especially for scoping reviews aimed at identifying gaps in existing research. In addition, summarized findings from a scoping review can be used to identify specific areas that require more attention via systematic reviews (Arksey & O'Malley, 2005). This approach was used to complete this scoping review and includes six stages with the sixth being optional: 1) identifying the research question, 2) identifying relevant studies, 3) study selection, 4) charting the data, 5) collecting, summarizing, and reporting the results, and 6) a consultation exercise (involving key stakeholders to inform and validate study findings). As the sixth stage is considered optional and beyond the aims of this study, it was not completed in this scoping review.

### **Identification of the Research Question**

The initial step involved examining the body of research evidence in this area. We chose 1985 as the starting point for this review since this was the year of the first WMGs, and arguably began a movement towards older athletes gaining more global exposure. Hence, the question identified for this scoping review was, *how have researchers studied older athletes and sport since the first World Masters Games in 1985?* Essentially, this scoping review aimed to provide detailed information on the type of studies that included older athletes and sport.

### **Identification of Relevant Studies**

To assess the literature in the area of sport and older adults between 1985 and March 2020, three electronic databases (SPORTDiscus, Web of Science, and PubMed) were selected to complete the review. These databases were selected to encompass both biomedical and psychosocial literature on sport and older adults. A preliminary search yielded 14,530 research

articles; however, after consulting with a librarian and refining the search using truncations of the basic stem of words and wildcard symbols, this total was reduced to 3,418 articles. The following key words were used to capture the population of interest: “older adult” OR “older athlete” OR “masters sport” OR “masters athlete” OR “senior”, OR “old age”, AND “sport” (e.g., “older adult AND sport”). The term “physical activity” was excluded as a search term to avoid overlap and further refine the studies to those focusing on sport. In general, sport is a subset of physical activity that is structured, with a common set of rules, with a defined goal (Eime et al., 2013; Khan et al., 2012) and does not include activities that are unstructured (e.g., exercise without a clear purpose) (Mahoney & Stattin, 2000). However, since the definition of sport continues to be refined and this review aimed to summarize 35 years of work, any study that used the term ‘sport’, generally met these parameters, and did not overlap with ‘physical activity’ was included in the review. In contrast, studies that combined sport and physical activity participants (e.g., ‘active group’ consisted of exercise and track and field) were excluded. The process of refinement produced 3,418 articles, as well as 53 articles from hand-searching and a grey search on Google Scholar for a total of 3,471 studies for further analysis.

### **Study Selection**

To refine the studies to fit within the parameters of this review, study titles were screened for duplicates ( $n=805$ ) and those irrelevant to the topic of sport and older adults ( $n=1606$ ). Following this procedure, abstracts were reviewed to ensure they met the inclusion criterion (see Figure 1). In the instance where the main reviewer was unsure about the inclusion or exclusion of a study, the full copy of the article was reviewed by the other authors until a collective decision was reached. Following this step, complete copies of all research articles that met the previous criterion or were difficult to discern based on titles and abstracts were reviewed in full

( $n=373$ ) and coded according to the exclusion criterion. For instance, a study was excluded if it was, a) not related to sport, b) older athletes were not the focus (e.g., study on older sport volunteers, coaches), c) study used a secondary dataset, d) combined physical activity and sport (e.g., track and field combined with walking in ‘active group’), e) age was not specified, f) the term ‘senior’ athlete referred to experience, ranking or seniority instead of age, g) not a journal article (e.g., books, conference abstracts, case-reports), h) a literature review or editorial, i) not published in English, j) could not be accessed and, k) older adults were combined with younger age groups (<35 years) and no differentiation between age groups was made (e.g., combined athletes aged 25-79 years). A distinction between age groups was required to avoid errors of reporting on broad samples that includes both young and older adults. In addition, the decision to include studies with adults aged 35 and above was because, in general, the term ‘Masters Athlete’ is broadly used to describe athletes aged 35 and above who continue competing in sport. As a result, this can encompass a broad age range which includes older athletes in sport (age 50 and above). Hence, this decision ensured that comparison-based research (i.e., sample population with old and young athletes) was not overlooked. In contrast, if the inclusion criteria were limited to aged 50 and above, many studies with older athletes (e.g., may or may not be MAs) would have been excluded from this review. This resulted in a final list of 168 articles included in this review (see Figure 1).

### **Charting the Data**

The process of screening, organizing and charting data was completed using Microsoft Excel. First, information related to the methodological information, sample characteristics, and sport-related variables was recorded exactly as it was reported within each study. For example, if a study stated applying a cross-sectional research design, to compare competitive older athletes

with younger athletes, it was recorded as ‘cross-sectional’ for research design and ‘competitive’ for level of sport. This process required scanning the content of research studies, particularly of the method and results sections. This was followed by inductively developing categories, with attention placed in how the information was reported by researchers. To organize and interpret the data, Asksey and O’Malley’s (2005) guidelines were used to chart the data into the following themes/research foci: physiological health, performance, participation, cognitive function, psychosocial and sociological. Physiological health included studies that focused on the physical health and function of older adults in sport such as cardiac function, musculoskeletal health with aging (n=71). Performance included studies that explored athletic performance such as speed, VO<sub>2</sub> max, nutrition (n=34). Participation-based studies generally explored rates of participation in sport (n=6). Studies on cognitive function examined the performance and health of the brain such as memory, cognitive decline (n=6). Psychosocial outcomes included studies that focused on the emotional, psychological and/or social contexts of the sporting environment (n=29), whereas sociological perspectives included studies that explored the broader sociocultural discourses of sport in related factors such as gender, society, culture, class, race, country and/or political context (n=22). It is important to note that while studies within the performance and physiological categories may share similarities in the measurement or evaluation tools (e.g., echocardiograms), they differed on the overall focus of the research and thereby required two distinct categories. A similar type of distinction was made between psychosocial and sociological-based research, since sociological studies explore broader sociocultural contexts (e.g., race, class, gender, culture) (Dionigi, 2006a) while psychosocial studies explored the emotional, psychological, and social context (e.g., positive development) in relation to the sporting environment (e.g., competition, coaches).

In addition to this thematic information, the data extraction and charting process included the following data: author, publication year, abstract, study design (e.g., cross-sectional, intervention, longitudinal), study sample, age (i.e., for older adults and other groups), sex and/or gender (i.e., male, female, not reported), socioeconomic factors (e.g., ethnicity, income, education), country of data collection (e.g., United States – Huntsman World Senior Games), level of sport (e.g., competitive, recreational or both), history of participation or training history, type of sport (e.g., table tennis, running) and a category for multiple sports (two or more sports).

The data collected on age was highly variable. For example, some studies only provided the mean and standard deviation of the sample population, whereas others also reported age range and proportion of sample in each age range. To chart this information, arbitrary labels associated with specific age ranges such as ‘adults’ (35-39 years), ‘middle-aged’ (40-49 years), ‘old’ (50-59 years), ‘older’ (60-69 years) and ‘oldest’ (age 70 and above) were created. Given that a person’s age or life stage is related to various contexts of sport engagement (e.g., barriers, motivators, performance, health), stratifying age ranges allowed analysis of the specific age ranges or participant pools that have been the focus of research in the past 35 years<sup>1</sup>, instead of reporting exclusively on a wide indiscriminate age range (i.e., older athletes aged 35 and above). Examining information according to age ranges has also been recommended previously (Appleby & Dieffenbach, 2016; Cannella et al., 2021). In the current review, for example, a study with participants ranging from 35-55 years was categorized within the ‘adults-old’ age group, whereas a study with participants aged between 44-75 years were placed in the ‘middle-aged to oldest’ category. These labels were created to classify the adult population ( $\geq 35$  years) and were not used to classify any younger adults  $< 35$  years who may be used as comparison

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<sup>1</sup> Each study was placed in a specific age group and does not appear or overlap within other groups.

groups within a given study. As a result, for studies with both younger adults (<35 years) and older athletes ( $\geq 35$  years) only the older athletes' data was collected, organized, and charted in detail.

Socioeconomic factors such as income and education posed a challenge to classify due to the variability in how information was reported within individual studies. As a result, classification was based on the type of information reported. For instance, studies reported years of education, highest education degree attained, or vague descriptions such as 'varied backgrounds in education' and 'highly educated'. In comparison, studies reported income in numerical data (e.g., <\$50,000, >\$100,000), provided employment status (e.g., working, retired), or ambiguous labels such as, 'relatively affluent', 'high professional status', 'varied socioeconomic status', and 'middle-class'<sup>2</sup>. When no information was provided on income, the study was charted in the 'not reported' category.

To chart the location of athlete recruitment, information on the country in which the study took place was recorded. The purpose of identifying country was to determine the proportions of athletes that have been studied from different geographic regions. When studies included participants from multiple countries, due to data collection from an international event (e.g., World Masters Games), athlete recruitment was labelled as 'multiple-countries'. This is because athletes recruited from an international sporting event taking place in a specific country would not entirely reflect populations from only that country, but instead the larger proportion of participants in a particular study. Studies that failed to report or lacked clarity on where the study was performed were charted as 'not reported'. For studies that recruited local athletes but failed to report their location, a decision on where recruitment took place was made based on

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<sup>2</sup> The ambiguous descriptors were terms used to describe participants in individual studies and were not labels created by the researchers in this scoping review.

information about ethics approval or the university of the researchers (Dascal & Teixeira, 2016; Doering et al., 2017; Leti & Bricout, 2013) . This type of decision was only made when athletes were locally recruited, and a single research affiliated university was listed.

For ethnicity, only studies that explicitly stated participants' background were recorded, all other studies with unclear or provided no information were classified as 'not reported'. Unlike the recruitment variable, the authors did not make decisions on ethnicity based on the country of recruitment or the associated university of researchers. A stringent approach was used to decrease assumptions about the ethnicity of participants. However, for studies that reported multiple ethnic backgrounds and a detailed overview of their sample, the ethnicity that reflected the majority of the sample was recorded (e.g.,  $\geq 80\%$  of participants were reported as Caucasian/white or European). As a result, categories for ethnicity were 'Iranian', 'Japanese', 'Korean', ' $\geq 80\%$  Caucasian/white or European', and 'not reported'.

Sport-related information such as type and level of sport was also recorded. Studies with two or more types of sports were categorized as 'multiple sports'. In addition, the inclusion of running (e.g., marathon, sprinting) within the multiple sports category was also recorded. For level of sport, athletes were classified based on how researchers described or labelled their participants (i.e., 'competitive', 'recreational', or 'recreational and competitive'). Athletes from individual studies were categorized as competitive only if participants were recruited from a sporting competition and/or the study identified participants as competitive athletes. Similarly, athletes were classified as recreational when the study labelled them as such or when their engagement was described as less than competitive (e.g., 'not experts', 'not professional caliber' or 'social' players'; Lobjois et al., 2006). Where studies defined participants as both recreational and competitive, recruited from local clubs or when the level of sport could be both recreational



and competitive (e.g., ‘the group consisted of several record and national champions’; (Hood & Northcote, 1999), the sample was categorized as ‘recreational and competitive’. Some researchers that used terms related to level of sport synonymously such as ‘competitively recreational’ athletes (Steinberg et al., 2001) were also placed in the ‘recreational and competitive’ group. In contrast, studies that labelled MAs as ‘high-level recreational athletes’ (Wroblewski et al., 2011), but recruited participants from Masters competitions were classified as competitive athletes. The variability in information related to participation and/or training history did not allow for an in-depth analysis. As a result, data on sporting and training history was classified as ‘reported’, ‘not reported’, or ‘partially reported’ (e.g., information provided on some of the participants and not the entire sample).

During the classification and coding process, we noted a number of studies combined descriptive information for older athletes with younger athletes (e.g., sample size, SES, active years; see Supplementary file). While these specific studies provide an unclear demographic profile of older athletes, they were not excluded because according to Arksey and O’Malley (Arksey & O’Malley, 2005), all literature relevant to an overview of the existing literature in the area of study should be included regardless of their methodological quality. When the first author was unsure about the extraction of any data, the article/issue was discussed with the other authors until consensus was reached.

## **Results**

As noted, the scoping review yielded an initial total of 3471 records with 168 articles meeting the criteria to be included in this review. The detailed findings on the studies are provided in a supplementary file. Below, we summarize the general trends of this review.

### **Methodological information**

**Focus of research from 1985-2020.** Research on sport and older adults, particularly MAs, did not receive much attention until the early 2000s (see Figure 2). Prior to this time, between 2-3 studies were published per a year, with a primary focus on physiological health and performance. The physiological health of older athletes has been consistently studied since 1986. In contrast, no study on sociological perspectives was found prior to the year 2001, and 1998 for psychosocial outcomes. However, psychosocial and sociological-based studies began to emerge with the greatest number of publications after 2012. In contrast, research focusing on cognitive health outcomes (n=6) and sport participation (n=6) yielded the lowest overall studies published. Overall, researchers focused more on studying physiological health, compared to performance related outcomes, psychosocial, sociological, sport participation, and cognitive function among older athletes.

**Study design.** The most common approach used overall was cross-sectional design (n=107, 64%) followed by qualitative (or non-empirical; n=34, 20%), intervention (n=12, 7%), longitudinal (n=11, 7%), and mixed methods (n=4, 2%). A cross-sectional approach was predominantly used within participation (n=6, 100%), cognitive (n=5, 83%), physiological (n=55, 77%), performance (n=24, 71%), and psychosocial-based (n=17, 59%) research fields (see Table 2) except for sociological-based research (n=22, 100%) where only qualitative approaches were used. In contrast, intervention-based studies (n=12, 7%) were only found in performance and physiological health outcomes in older athletes (with no participation, sociological or psychosocial studies and only one cognitive study using this design). Longitudinal approaches were also rarely used in all research fields (n=11, 7%), with 9 of the 11 studies found mostly in physiological research (n=9, 13%).

**Participant recruitment.** Out of the 168 studies included in this review, the greatest proportion of samples was recruited from the United States (n=63, 38%), followed by major international events with multiple-countries (n=26, 15%), Canada (n=13, 8%), Australia (n=10, 6%), and European countries such as United Kingdom, Finland, France, and Italy with (n=6-7, 4%). It is important to note that athletes recruited during international events such as the WMG likely include individuals from multiple countries. As a result, these samples do not entirely reflect the population from one country (see Table 2).

### **Sample characteristics**

**Age.** Overall, a greater number of studies sampled older age groups (50s, 60s, and 70s; n=115) within each field of research compared to studies that also included younger age groups (30s and 40s; n=53). Older athletes who received the greatest focus in research were generally aged 50 and above. Researchers commonly studied age groups of 60 to 70 years and above (n=43, 26%), 50 to 70 years and above (n=32, 19%), and 50 to 69 years (n=31, 18%) (see Figure 3). Younger age groups, in contrast, were more often sampled in a broader age range: 35 to 70 years and above (n=15, 9%) and 40 to 70 years and above (n=13, 8%).

**Sex and/or Gender.** More than half of the studies (n=91, 54%) included both male and female participants (see Table 1). Of the studies with both male and female athletes, 58 (64%) had more males than females. There were also more studies focusing exclusively on males (n=57, 34%) than females (n=16, 10%). In addition, 4 (2%) studies did not clearly report the sex and/or gender details of their sample (W. Allen et al., 1985; Brauer et al., 2008; Leightley & Yap, 2018; Peiffer et al., 2016). Of the research categories, physiological (n=32, 45%) and performance-based (n=19, 56%) research more often focused exclusively on male athletes, whereas research on sport participation (n=7, 100%), psychosocial outcomes (n=25, 86%), cognitive function

(n=5, 83%), and sociological perspectives (n=14, 64%) primarily included both male and female athletes in their sample. In comparison, of the 16 studies exclusively on female athletes, sociological-based research (n=6, 27%) and physiological (n=7, 10%) made up majority of the category with no female-specific research conducted on cognitive function and participation-related areas.

**Indicators of Socioeconomic status (SES).** Educational information was not reported by 79% (n=133) of the studies included in this review. In addition, three studies reported participants as ‘athletes of varied backgrounds in education’ (Grant, 2001) or ‘highly educated’ (Horton et al., 2019; Lane et al., 1987) but did not provide additional details. In comparison, studies that provided information on education indicated that athletes are more likely to have a university or college degree (n=15, 9%), graduate and/or professional degrees (such as a degree in medicine, business, or a doctorate; n=10, 6%) and approximately 8-16 years of formal education (n=5, 3%). Fewer studies (n=2, 1%) included athletes who had ‘completed high-school’ as their highest level of education.

Similarly, information on income was not provided by 79% (n=132) of the studies included in this review. For example, information on income was not reported by 100% of the studies of cognitive function (n=6), 93% of physiological (n=66), 85% of performance (n=29), 62% of psychosocial (n=18), 50% of sociological (n=11), and 33% of participation-based studies (n=2). On the other hand, studies that did provide income-based information reported it in highly variable ways. For instance, some specified individual or household income (n=6, 4%), others provided information on employment/retirement status (n=21, 13%), as well as vague or unclear descriptions such as, ‘high professional status’ (n=1, 1%; (Lane et al., 1987), varied socio-

economic status (n=1, 1%; (Grant, 2001), ‘relatively affluent’ (n=1, 1%; (Wheaton, 2017), and middle class (n=6, 4%) without providing additional details.

**Ethnicity.** Almost 70% of studies (n=118) in this review did not provide any information related to ethnicity. In the research areas of performance (n=32, 94%), cognitive (n=5, 83%), physiological (n=56, 79%), psychosocial (n=14, 48%), and sociological (n=10, 45%) studies respectively, provided no information on ethnicity. When this information was reported by studies, samples primarily consisted of Caucasian/white or European backgrounds in participation (n=4, 67%), sociological (n=12, 55%) and psychosocial-based research (n=13, 45%) and physiological-based research (n=12, 17%). Other ethnicities reported in prior work included Iranian (n=1, 1%), Japanese (n=4, 2%), and Korean (n=2, 1%).

### **Sport-related variables**

**Level of sport.** Athletes from competitive sport settings were studied the most often (n=121, 72%) compared to recreational (n=9, 5%) as well as mixed recreational and competitive groups (n=38, 23%) (see Table 3). Athletes labelled as ‘competitive’ were the most studied group across the research fields (i.e., cognitive function (n=5, 83%), performance (n=28, 82%), physiological (n=47, 66%), sociological (n=16, 73%), and psychosocial (n=23, 79%) with the exception of participation studies where samples usually included a mixed sample of both recreational and competitive athletes (n=4, 67%). No study of cognitive function examined a mixed athlete sample.

**Type of sport.** The vast number of studies included participants from various or multiple different sports (n=76, 45%). Running, which included long-distance and short distances, was the second highest studied (n=39, 23%). In addition, of the 76 studies with multiple-sports, 57 included athletes who were runners (e.g., sprinters, long-distance, road race; track and field

athletes were not included in this group) who also participated in at least one other sport. Cycling (n=7, 4%), tennis (n=6, 4%) and golf (n=5, 3%) were the next most studied sports. All other sports were reported in 4 studies or fewer ( $\leq 2\%$ ) (see Table 2).

**Participation history or training information.** Of the studies included in this review, 125 studies (74%) provided some data on sport and/or training history, while 41 studies (24%) did not provide this information. In addition, two studies provided partial or vague information on sport and/or training history (e.g., information on years of sport involvement provided for some of the participants not entire sample population). Additional classification was not possible due to the high variability of reported data.

## Discussion

In order to lay a foundation for future research exploring the role of sport for older adults, it is important to understand how sport has been studied in the past. To this end, this scoping review provides a comprehensive description on how sport engagement in older adults have been studied since the first World Masters Games (WMG) in 1985. On the one hand, the results highlight considerable growth in research overall on older athletes and sport in the past 35 years. On the other hand, it is clear sport scientists have focused their attention in some areas more than others. For instance, descriptive findings from this scoping review indicate sport scientists have consistently focused on studying physiological health outcomes since 1986 over psychosocial, sociological, performance, participation, or cognitive outcomes. This may manifest from researchers' inherent interest in discovering how aging, disease and disability can be delayed or prolonged. The physical health benefits of sport participation are clear (Devan & Seals, 2012; Patel et al., 2018; Piasecki et al., 2019; Tanaka & Seals, 2003; Wroblewski et al., 2011); however, by neglecting similar exploration in the other areas researchers may have inadvertently

affected how things are valued (or not valued) in the context of aging and sport. For instance, findings from this study support previous evidence that sport scientists have focused more on understanding the physiological health outcomes (i.e., exploring biomedical aspects) than exploring the complex socio-cultural and psychosocial experiences of sport engagement (Dionigi, 2006a, 2016; Gayman et al., 2017), participation in sport (Cardenas et al., 2009), and cognitive function (Tseng, Gundapuneedi, et al., 2013; Tseng, Uh, et al., 2013; Zhao et al., 2016). The extensive knowledge on physiological health outcomes may be due to several factors including well-defined, objective measures (e.g., VO<sub>2</sub> max), long-established research histories in these areas or simply a narrow view of the aging process (similar criticisms have been raised about the successful aging theory, see Dionigi & O’Flynn, 2007; Geard et al., 2017, 2018). As a result, variables related to physiological health may be easier to comprehend and measure, in comparison to more abstract constructs related to other dimensions of health, such as sociocultural, environmental, and cognitive determinants. Since the phenomenon of sport participation in later life is a complex social, emotional, biological, and universal process, researchers are encouraged to devote greater attention to other dimensions of health.

Descriptive findings from this scoping review also indicate the vast majority of quantitative studies used a cross-sectional approach, with other research designs, such as interventions, longitudinal and mixed methods, rarely used. In comparison, classifying qualitative (non-empirical) approaches were challenging due to the extensive and diverse detail usually provided on the types of research designs, methods, and theoretical frameworks they employed in individual studies, and this limited further analysis. In addition, it was also challenging to simplify the types of research designs (e.g., phenomenology, grounded theory or components of grounded theory, ethnography, narrative) employed, and the types of theoretical frameworks

applied to interpret the data because of the high variability in how information was presented in individual qualitative studies. This does not mean that the quality and findings of these studies are suspect, simply that descriptions related to their research methods were not easily derived to promote further analysis. As a result, researchers in this field are strongly encouraged to also explicitly state their methodology (i.e., research design and theoretical framework) to facilitate their inclusion in future research synthesis activities (e.g., scoping/systematic reviews and meta-analyses), as well as to allow future researchers to replicate and extend these study. It is important to note that our backgrounds as researchers who predominantly used quantitative approaches may have posed a limitation in further classification of qualitative studies.

Sport has become an important tool in policy agendas that promote Healthy Lifestyle/Active Aging or Active Living across the lifespan as a strategy to manage the rising health concerns related to the growing population of older adults (Dionigi & Gard, 2018; Public Health Agency of Canada, 2020; Statistics Canada, 2017, 2020). Organizations such as “Sport for Life” and “Sport for All” (Scheerder et al., 2017; Sport for Life, 2016) are examples of the mass promotion of sport across the lifespan. While sport is considered valuable for *all*, it is important to recognize that sport is not inclusive nor accessible to all (Dionigi & Gard, 2018), and, as a result, its value for many population groups is not well understood. Importantly, current policies and guiding philosophies are based primarily on skewed or missing data (e.g., comparably less information on minorities, recreational sport, females). Findings from this scoping review indicate variables such as education and income were not reported by most studies (i.e., 79%) and ethnicity was not reported by 70% of studies. The few studies with information on socioeconomic factors confirm previous findings that our knowledge of sport in later life is built largely on working or retired, affluent white, older adults (Dionigi, 2016;



Gayman et al., 2017). Interestingly, 55% of sociological-based and 45% of psychosocial-based studies were on samples largely reported as “white” or “Caucasian”. These results could be explained by the non-relevance of socioeconomic variables among researchers in physiological health and performance-based studies. An additional reason may be because SES is intertwined with many facets of sport engagement such as providing individuals with the financial resources needed to afford expenses such as club fees, competition registration, equipment, and travel (Horton et al., 2018). In fact, factors such as lower income and education levels are shown to affect the likelihood of participation in sport (Scheerder et al., 2017). It is possible these findings are because 15% of studies collected data from major sport event (e.g., WMGs) or higher income countries such as United States, Canada, Australia, and European countries, where a certain level of disposable income and time to travel to sites of competition is required. This again may reflect a meaningful disproportion in the type of individuals (i.e., white, well-educated, high income bracket) who are generally able to participate in sport (Dionigi, 2016; Stenner et al., 2020).

While collecting data from major sport events could be due to pragmatic reasons related to sample size and/or convenience, it is important to recognize that these results paint an incomplete picture of the value of sport for *all* older adults (Dionigi, 2016; Gayman et al., 2017; Stenner et al., 2020). In particular, the role of sport for older adults who identify as minorities or are within lower SES groups, which typically report greater physical inactivity generally, is not well understood (Scheerder et al., 2017). Diversifying our understanding of ‘sport engagement’ to include sport activities that are culturally significant and more accessible to certain groups may be an important next step. This recommendation is especially crucial for sociological research, which focuses on understanding the broader cultural and societal contexts of sport and aging yet generally samples individuals who are white with the means to afford sport. It is also

important to note that variability in the definition of older athletes may have impacted the results on sociodemographic variables, since some studies did not classify demographic data according to age groups (e.g., information on education for 35-81 age range; Morrison et al., 2018). Clearly reporting this data would help inform clearer conclusions about the influence of sociodemographic variables in outcomes related to older athletes. At this time, the most confident result drawn from this review is the lack of reporting on population demographics.

Findings from this study also echo a sentiment from sport scientists (Dionigi, 2010; Heuser, 2005; Horton et al., 2018; Kirby & Kluge, 2013; Liechty et al., 2017) regarding how little we know about the complexities of sport participation among older women. Only, 10% of the studies in this review explored the experiences of women in sport (with no study on other genders). Comparatively, there were three times more studies focusing exclusively on male athletes (34%). This finding is not surprising since historically men have been primarily encouraged to participate in sport. As a result, our collective knowledge on the value of sport for older adults is primarily built on the experiences and effects of older white men. While research on females is emerging, there is much to be understood, especially because older women in sport have reported unique challenges and experiences compared to males. For example, female athletes have reported experiencing a “double barrier”, that reflects the reality of being both older and female (Pfister, 2012) as well as overcoming obstacles (e.g., ‘athletic girl’) to continue participation in sport (Horton et al., 2018). Female athletes also report simultaneously experiencing unique stereotypes, such as the pressures to embody being a “good mother” or managing familial duties while putting personal sport interests aside (Horton et al., 2018; Litchfield & Dionigi, 2012; Soule, 2018), as well as sex-specific physiological effects (e.g., menopause; (Hagmar et al., 2005; Hawkins et al., 2001). All this to say, it is crucial that

researchers of sport and older athletes explore the unique constraints and effects sport may have for older women.

Furthermore, findings from this study highlight our knowledge on competitive athletes is far greater than it is for athletes at the recreational level. For instance, 72% of studies focused on competitive older athletes who were primarily recruited from a Masters competitions or were labelled as competitive athletes. In comparison only 5% of studies focused on participants at the recreational level. The increased research on competitive older athletes could be due to sport participation primarily being for those who have the capacity (e.g., physical, economic and social capital) to compete in sport (Dionigi, 2016). Moreover, economically developed countries have a long-standing an established history of most Masters sporting clubs and organizations (Dionigi & Litchfield, 2018; Hastings et al., 2005).

The relatively low exploration of recreational or non-competitive forms of sport participation demonstrates a need to expand research to these types of engagement. While there is obvious value in examining competitive athletes (e.g., informing conceptions of potential of function in older life), a complete picture on the value of sport cannot be understood until other, more common levels of sport are examined. Descriptive data highlights how little we know about older athletes who do recreational sport, especially when this is the initial step to entering competitive sport for many ‘rekindlers’ and ‘continuers’ (Dionigi, 2005, 2015a; Larson et al., 2019). More importantly, studying the benefits of recreational sport may be beneficial from a public health standpoint, since health initiatives for older adults generally promote the value of recreational-level activity instead of elite-level sport competition. Unfortunately, most of the research on the value of sport engagement in older adults for mitigating chronic diseases such as cognitive decline (Tseng, Gundapuneedi, et al., 2013; Tseng, Uh, et al., 2013; Zhao et al., 2016),

decreased bone mineral density (Nowak et al., 2010; Sanada et al., 2009), and cardiovascular changes (Douglas & O'Toole, 1992; Schmidt et al., 2015) has either, a) focused on highly competitive athletes or b) not adequately distinguished the type of sporting engagement being performed (e.g., competitive vs recreational). In addition, while sport (particularly competitive sport) has been found to provide additional benefits that go beyond regular physical activity such as developing psychosocial assets (Baker et al., 2010; Dionigi et al., 2017; Gayman et al., 2017), the lack of exploration in recreational sport makes it difficult to determine whether these benefits are exclusive to highly competitive elements or can also be gained within recreational or non-competitive sport.

Another important methodological concern was the lack of clear, concise definition of 'older adults'. As a result, classifying and summarizing data on the population of interest was challenging, and our findings suggest chronological age or stratifying age groups may not be the best way to define older adults. For instance, some studies classified older adults as 50 and above (Lane et al., 1987; Leigey et al., 2009; Marcell et al., 2003), others 55 and above (Dionigi, 2010), while others as 65 and above (Eman, 2012). While we aimed to provide a more detailed overview on age, the variability in how samples were defined did not allow for further data analysis and/or any conclusions to be drawn from the data. The only descriptive data that could confidently be reported is that researchers have mainly focused on adults aged 50 and above. This trend could be related to reasons discussed above (e.g., participants from western countries that have the means to retire and participate in sport), and has been noted in previous reviews (Cannella et al., 2021; Stenner et al., 2020). To further our understanding the relationship between age (or life stage) and sport, researchers are encouraged to explore adults who are outside of the westernized definition of 'retirement' age and managing sport alongside other

responsibilities (e.g., cultural, career, family). This would also be valuable in deepening our understanding on the factors related to sport engagement, as well as the complexity of sport experiences, across the lifespan. This could also expand our understanding on when older adults are likely to enter sport (i.e., ‘re-starters’ or ‘novice’; Dionigi, 2015a) as well as how they navigate sport engagement with other life events (e.g., child rearing, career development and maintenance, retirement). Moving forward, it is critical that demographic information related to age is collected and reported when building a study on older athletes, to improve the evidentiary foundations pertaining to sport and older adults.

### **Limitations**

While this scoping review provided a comprehensive overview of sport and older adults within the last 35 years, there were some limitations. For instance, our choice of databases may have missed studies that could have emerged within other databases (e.g., sociological). In addition, our scoping review was limited to articles published in English. As a result, knowledge on sport and older athletes (especially from non-English speaking countries) was overlooked. More importantly, exclusion of non-English research studies may have affected the demographic profile built in this review. For example, non-English studies may have more information on the experiences of minority athletes compared to Westernized experiences of sport. Hence, while it is rigorous task, future reviews are encouraged to incorporate information from other non-English studies and qualitative research for a more comprehensive understanding of older adults in sport.

### **Conclusion**

Findings from this scoping review emphasize the uncertainty in our knowledge on sport and older athletes (including MAs). Sport scientists are encouraged to use the research gaps

highlighted in this study to enhance future work. Our current knowledge on sport and older adults is overwhelmingly based on white, affluent males aged 50 and above with the privileges of experiencing competitive sport. Whereas experiences of females, minorities, and recreational sport participants are underrepresented. As a result, sport advocates, scientists and policy developers have a limited understanding on whether the value of sport is consistent across population groups. Despite this limited understanding, sports science discourse and policy still promote a 'sport participation for all' message. To enhance research in this area, future work should recruit more diverse samples (when possible) and clearly report information on methodology. This would inform a more comprehensive understanding of the value and/or complexity of sport in lives of older adults. Currently, although the picture looks promising, it is largely incomplete.

**Table 1***Demographic profile of older athletes included in this scoping review*

	Cognitive n (%)	Participation n (%)	Performance n (%)	Physiological n (%)	Psychosocial n (%)	Sociological n (%)	Total n (%)
<b>Age</b>							
Adults-old (35 to 59 years)			1 (3)	3 (4)		1 (5)	5 (3)
Adults-older (35 to 69 years)			1 (3)		1 (3)	1 (5)	3 (2)
Adults-oldest (35 to 70 years and above)			5 (15)	4 (6)	5 (17)	1 (5)	15 (9)
Middle-aged-old (40 to 59 years)			2 (6)	3 (4)			5 (3)
Middle-aged-older (40 to 69 years)			4 (12)	6 (8)	2 (7)		12 (7)
Middle-aged-oldest (40 to 70 years and above)	1 (17)		2 (6)	6 (8)	2 (7)	2 (9)	13 (8)
Old-older (50 to 69 years)	2 (33)	2 (29)	8 (24)	17 (24)	1 (3)	1 (5)	31 (18)
Old-oldest (50 to 70 years and above)		3 (57)	2 (6)	10 (14)	10 (34)	7 (32)	32 (19)
Older-oldest (60 to 70 years and above)	3 (50)	1 (14)	9 (26)	17 (24)	8 (28)	5 (23)	43 (26)
Oldest (70 and above)				5 (7)		4 (18)	9 (5)
<b>Sex</b>							
Females			2 (6)	7 (10)	1 (3)	6 (27)	16 (10)
Males	1 (17)		19 (56)	32 (45)	3 (10)	2 (9)	57 (34)
Males and Females	5 (83)	6 (100)	12 (35)	29 (41)	25 (86)	14 (64)	91 (54)
Not reported			1 (3)	3 (4)			4 (2)
<b>Education</b>							
8 -16 years of formal education	2 (33)		2 (6)	1 (1)			5 (3)
Completed Highschool				1 (1)		1 (5)	2 (1)
Graduate or Professional degree	1 (17)	1 (17)	2 (6)		5 (17)	1 (5)	10 (6)
High education levels				1 (1)		1 (5)	2 (1)
Not reported	3 (50)	2 (33)	29 (85)	65 (92)	17 (59)	17 (77)	133 (79)
University or College degree		3 (50)	1 (3)	3 (4)	7 (24)	1 (5)	15 (9)
Varied backgrounds in education						1 (5)	1 (1)
<b>Income and/or Occupation</b>							
Employment Status		3 (50)	5 (15)	2 (3)	8 (28)	3 (14)	21 (13)
High professional status				1 (1)			1 (1)
Income/earnings		1 (17)		2 (3)	3 (10)		6 (4)
Middle class						6 (27)	6 (4)
Not Reported	6 (100)	2 (33)	29 (85)	66 (93)	18 (62)	11 (50)	132 (79)
Relatively affluent						1 (5)	1 (1)
Varied socio-economic status						1 (5)	1 (1)
<b>Ethnicity</b>							
≥80% Caucasian or white	1 (17)	4 (67)	1 (3)	12 (17)	13 (45)	12 (55)	43 (26)
Iranian				1 (1)			1 (1)
Japanese		1 (17)	1 (3)	2 (3)			4 (2)
Korean					2 (7)		2 (1)
Not reported	5 (83)	1 (17)	32 (94)	56 (79)	14 (48)	10 (45)	118 (70)
<b>Total</b>	<b>6</b>	<b>6</b>	<b>34</b>	<b>71</b>	<b>29</b>	<b>22</b>	<b>168</b>

Note. Sex: n=58 out of n=91 studies with both males and females (MF) included more males than female participants.

Education: 'Varied backgrounds in education', and 'high education levels' were terms used to describe participants in individual studies and were not labels created by the researchers in this scoping review; 1 study in 'University or College degree' combined information on education of young (age 20 and above) and older adults. Income: 'Varied socio-economic status', 'high professional status', 'middle class', and 'relatively affluent' were terms used to describe participants in individual studies and were not labels created by the researchers in this scoping review.

**Table 2***Descriptive information on type of study and areas of recruitment*

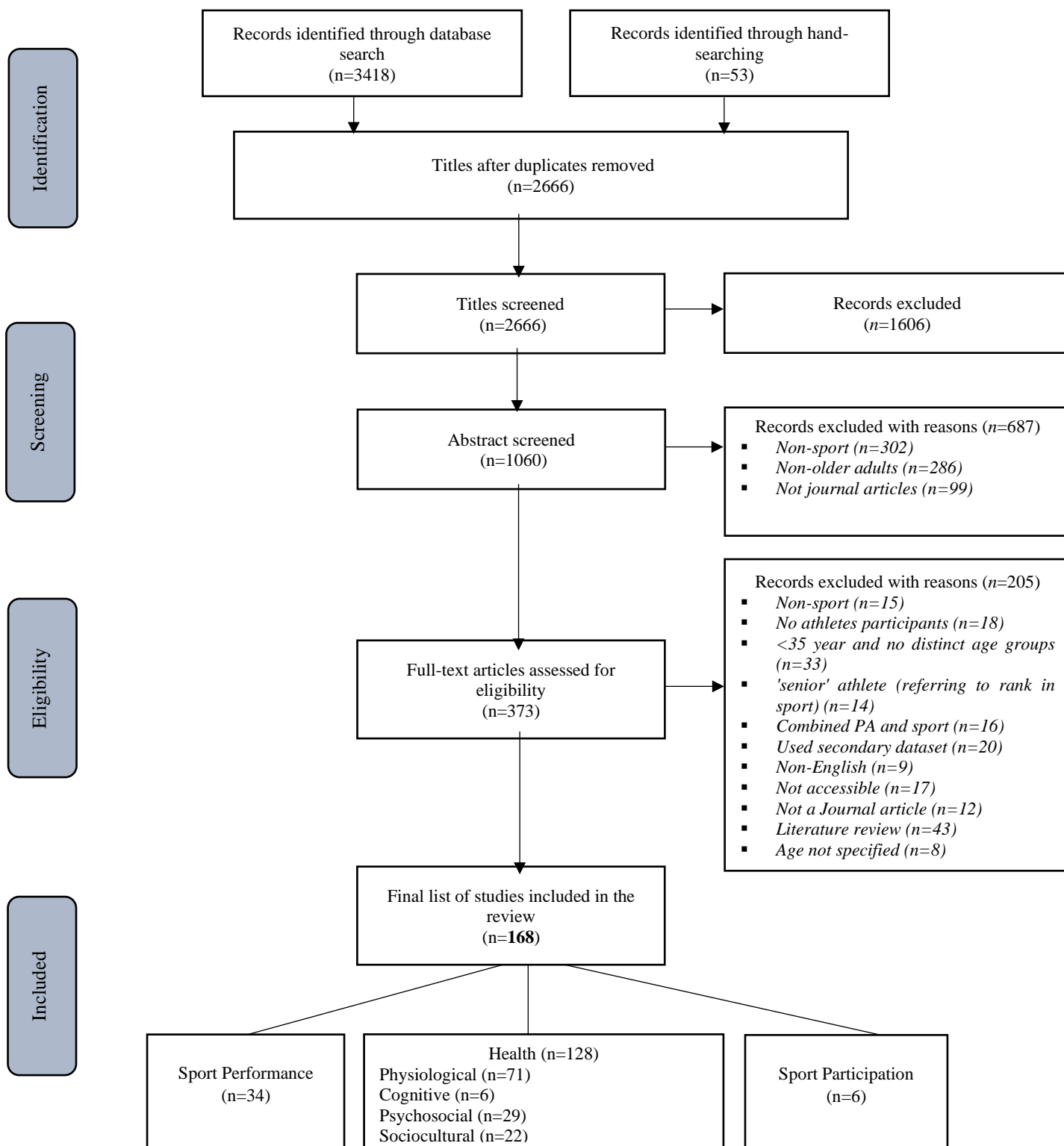
	Cognitive n (%)	Participation n (%)	Performance n (%)	Physiological n (%)	Psychosocial n (%)	Sociological n (%)	Total n (%)
<b>Type of study (method)</b>							
Cross-sectional	5 (83)	6 (100)	24 (71)	55 (77)	17 (59)		107 (64)
Intervention	1 (17)		6 (18)	5 (7)			12 (7)
Longitudinal			2 (6)	9 (13)			11 (7)
Mixed-method				1 (1)	3 (10)		4 (2)
Qualitative (Non-empirical)			2 (6)	1 (1)	9 (31)	22 (100)	34 (20)
<b>Recruitment</b>							
Australia			4 (12)	2 (3)	2 (7)	2 (9)	10 (6)
Austria			1 (3)				1 (1)
Brazil			1 (3)				1 (1)
Canada		1 (17)	2 (6)	4 (6)	6 (21)		13 (8)
Denmark				1 (1)			1 (1)
Finland			1 (3)	5 (7)	1 (3)		7 (4)
France			4 (12)	1 (1)	1 (3)		6 (4)
Germany			1 (3)				1 (1)
Greece				1 (1)			1 (1)
Iran				2 (3)			2 (1)
Italy			2 (6)	3 (4)	1 (3)		6 (4)
Japan		1 (17)	1 (3)	3 (4)			5 (3)
Korea					2 (7)		2 (1)
Multiple countries			2 (6)	5 (7)	7 (24)	12 (55)	26 (15)
Netherland				1 (1)			1 (1)
New Zealand						1 (5)	1 (1)
Portugal				1 (1)			1 (1)
Scotland			1 (3)	1 (1)		1 (5)	3 (2)
Slovakia				1 (1)			1 (1)
Spain	1 (17)			3 (4)			4 (2)
Sweden			1 (3)	2 (3)	1 (3)	1 (5)	5 (3)
United Kingdom				5 (7)		2 (9)	7 (4)
United States	5 (83)	4 (67)	13 (38)	30 (42)	8 (28)	3 (14)	63 (38)
Total	6	6	34	71	29	22	168



**Table 3***Types and levels of sports studied since the 1985 WMG*

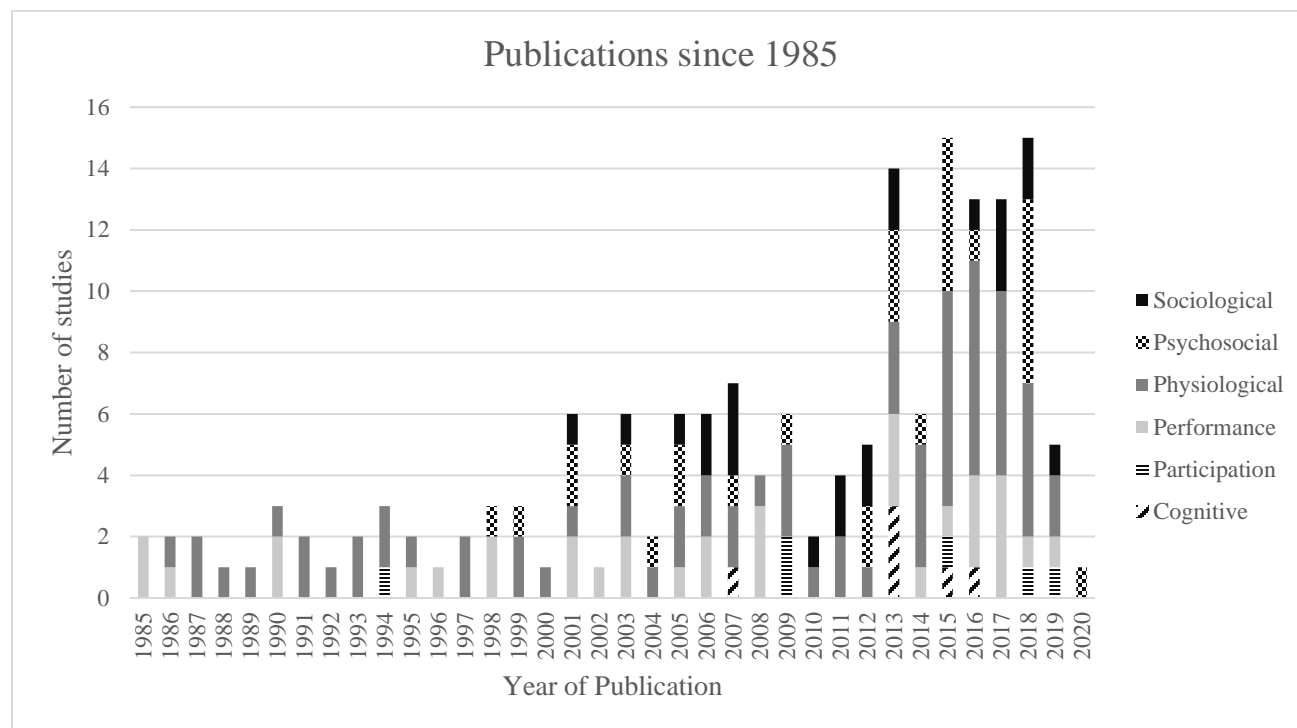
	Cognitive n (%)	Participation n (%)	Performance n (%)	Physiological n (%)	Psychosocial n (%)	Sociological n (%)	Total n (%)
<b>Type of Sport</b>							
Alpine Skiing			1 (3)				1 (1)
Basketball			1 (3)	1 (1)			2 (1)
Body Building						1 (5)	1 (1)
Curling					1 (3)		1 (1)
Cycling			3 (9)	3 (4)		1 (5)	7 (4)
Field hockey						1 (5)	1 (1)
Golf			2 (6)	2 (3)	1 (3)		5 (3)
Gymnastics					1 (3)		1 (1)
Ice speed skating				1 (1)			1 (1)
Lawn Bowling			1 (3)		1 (3)		2 (1)
Miniature golf			1 (3)				1 (1)
Multiple sports	1 (17)	5 (83)	4 (12)	33 (46)	19 (66)	14 (64)	76 (45)
Not reported	1 (17)			1 (1)			2 (1)
Orienteering					1 (3)		1 (1)
Paddle-tennis				2 (3)			2 (1)
Pickleball		1 (17)			1 (3)		2 (1)
Rowing				1 (1)			1 (1)
Running	3 (50)		13 (38)	20 (28)	1 (3)	2 (9)	39 (23)
Soccer			1 (3)	2 (3)			3 (2)
Soft-ball						1 (5)	1 (1)
Surfing						1 (5)	1 (1)
Swimming			1 (3)		1 (3)		4 (2)
Table tennis				2 (3)			2 (1)
Tennis	1 (17)		5 (15)				6 (4)
Triathlon			1 (3)	3 (4)			4 (2)
Volleyball						1 (5)	1 (1)
<b>Level of Sport</b>							
Competitive	5 (83)	2 (33)	28 (82)	47 (66)	23 (79)	16 (73)	121 (72)
Recreational	1 (17)		4 (12)	3 (4)		1 (5)	9 (5)
Recreational and Competitive		4 (67)	2 (6)	21 (30)	6 (21)	5 (23)	38 (23)
Total	6	6	34	71	29	22	168

Note. n=57 multiple sports out of n=76 included running

**Figure 1***Flow chart of the scoping review*

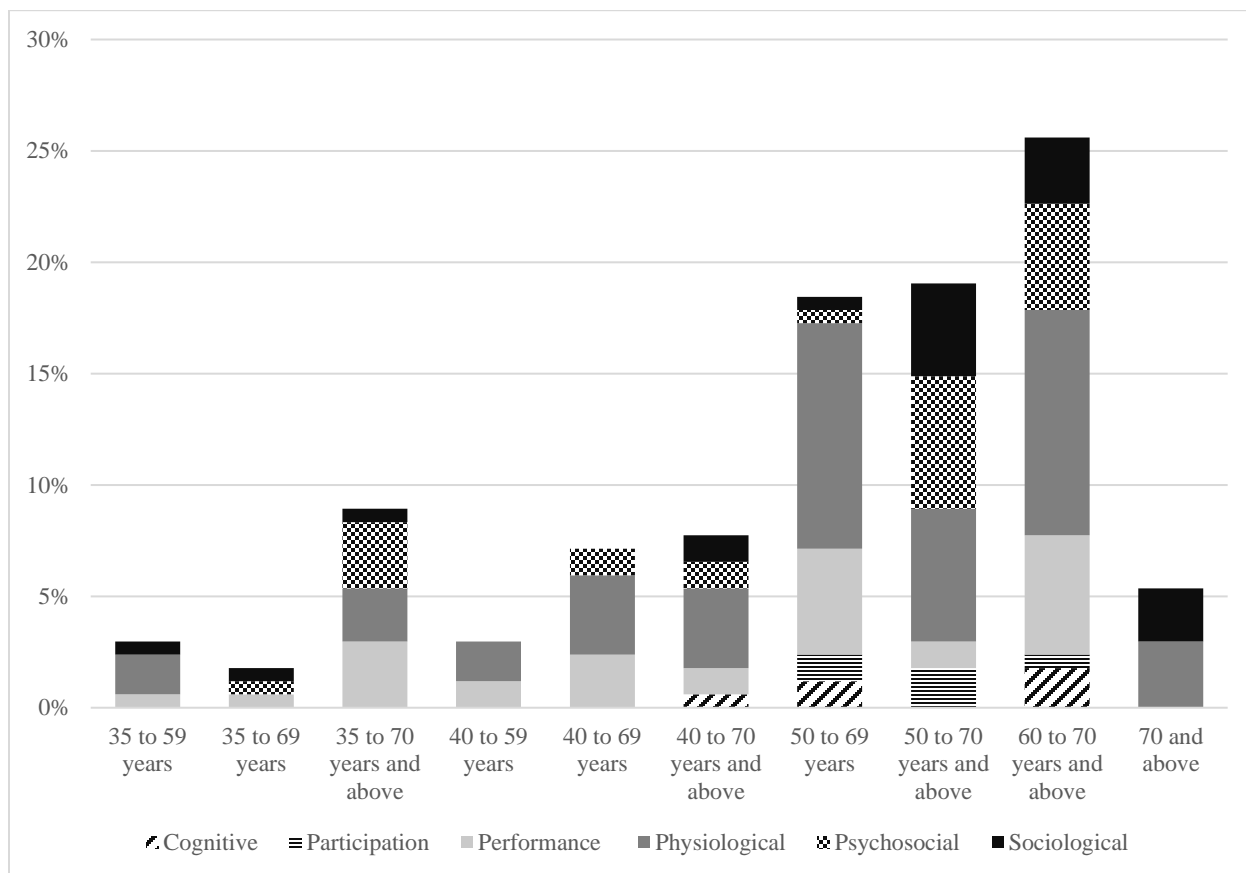
**Figure 2**

*Number of studies published across the years according to focus of research*



**Figure 3**

*Age groups studied in various field of research for the past 35 years*



## References

- Allen, W., Seals, D., Hurley, B., Ehsani, A., & Hagberg, J. (1985). Lactate threshold and distance-running performance in young and older endurance athletes. *Journal of Applied Physiology*, 58(4), 1281–1284. <https://doi.org/10.1152/jappl.1985.58.4.1281>
- Appleby, K. M., & Dieffenbach, K. (2016). Older and faster: Exploring elite masters cyclists' involvement in competitive sport. *Sport Psychologist*, 30(1), 13–23.
- Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. *International Journal of Social Research Methodology: Theory and Practice*, 8(1), 19–32. <https://doi.org/10.1080/1364557032000119616>
- Baker, J., Fraser-Thomas, J., Dionigi, R., & Horton, S. (2010). Sport participation and positive development in older persons. *European Review of Aging and Physical Activity*, 7(1), 3–12. <https://doi.org/10.1007/s11556-009-0054-9>
- Borges, N., Reaburn, P., Driller, M., & Argus, C. (2016). Age-related changes in performance and recovery kinetics in masters athletes: A narrative review. *Journal of Aging and Physical Activity*, 24(1), 149–157. <https://doi.org/10.1123/japa.2015-0021>
- Brauer, S. G., Neros, C., & Woollacott, M. (2008). Balance control in the elderly: Do masters athletes show more efficient balance responses than healthy older adults? *Aging Clinical and Experimental Research*, 20(5), 406–411. <https://doi.org/10.1007/BF03325145>
- Cannella, V., Villar, F., Serrat, R., & Tulle, E. (2021). Psychosocial aspects of participation in competitive sports among older athletes: A scoping review. *The Gerontologist*, 1–13. <https://doi.org/10.1093/geront/gnab083>
- Cardenas, D., Henderson, K. A., & Wilson, B. E. (2009). Experiences of participation in senior games among older adults. *Journal of Leisure Research*, 41(1), 41–56.

<https://doi.org/10.1080/00222216.2009.11950158>

Colquhoun, H. L., Levac, D., O'Brien, K. K., Straus, S., Tricco, A. C., Perrier, L., Kastner, M., & Moher, D. (2014). Scoping reviews: Time for clarity in definition, methods, and reporting. *Journal of Clinical Epidemiology*, 67(12), 1291–1294.

<https://doi.org/10.1016/j.jclinepi.2014.03.013>

Daly, R. M., & Bass, S. L. (2006). Lifetime sport and leisure activity participation is associated with greater bone size, quality and strength in older men. *Osteoporosis International*, 17(8), 1258–1267. <https://doi.org/10.1007/s00198-006-0114-1>

Dascal, J. B., & Teixeira, L. A. (2016). Selective maintenance of motor performance in older adults from long-lasting sport practice. *Research Quarterly for Exercise and Sport*, 87(3), 262–270. <https://doi.org/10.1080/02701367.2016.1188195>

Daudt, H. M. L., Mossel, C. Van, & Scott, S. J. (2013). Enhancing the scoping study methodology: A large, inter-professional team's experience with Arksey and O'Malley's framework. *BMC Medical Research Methodology*, 13, 48. <https://doi.org/10.1186/1471-2288-13-48>

Devan, A. E., & Seals, D. R. (2012). Vascular health in the ageing athlete. *Experimental Physiology*, 97(3), 305–310. <https://doi.org/10.1113/expphysiol.2011.058792>

Dionigi, R. (2005). A leisure pursuit that 'goes against the grain': Older people and competitive sport. *Annals of Leisure Research*, 8(1), 1–22.

<https://doi.org/10.1080/11745398.2005.10600957>

Dionigi, R. (2006a). Competitive sport and aging: The need for qualitative sociological research. *Journal of Aging and Physical Activity*, 14(4), 365–379.

<https://doi.org/10.1123/japa.14.4.365>

- Dionigi, R. (2006b). Competitive sport as leisure in later life: Negotiations, discourse, and aging. *Leisure Sciences*, 28(2), 181–196. <https://doi.org/10.1080/01490400500484081>
- Dionigi, R. (2010). Older sportswomen: Personal and cultural meanings of resistance and conformity. *International Journal of Interdisciplinary Social Sciences*, 5(4), 395–408.
- Dionigi, R. (2015a). Pathways to masters sport: Sharing stories from sport ‘continuers’, ‘rekindlers’ and ‘late bloomers.’ In E. Tulle & C. Phoenix (Eds.), *Physical Activity and Sport in Later Life* (pp. 54–68). Palgrave Macmillan UK. [https://doi.org/10.1007/978-1-137-42932-2\\_6](https://doi.org/10.1007/978-1-137-42932-2_6)
- Dionigi, R. (2015b). Stereotypes of aging: Their effects on the health of older adults. *Journal of Geriatrics*, 2015, 1–9. <https://doi.org/10.1155/2015/954027>
- Dionigi, R. (2016). The competitive older athlete: A review of psychosocial and sociological issues. *Topics in Geriatric Rehabilitation*, 32(1), 55–62. <https://doi.org/10.1097/TGR.0000000000000091>
- Dionigi, R., Baker, J., & Horton, S. (2011). Older athletes’ perceived benefits of competition. *The International Journal of Sport and Society: Annual Review*, 2(2), 17–28. <https://doi.org/10.18848/2152-7857/cgp/v02i02/53869>
- Dionigi, R., Fraser-Thomas, J., Stone, R., & Gayman, A. (2017). Psychosocial development through masters sport: What can be gained from youth sport models? *Journal of Sports Sciences*, 36(13), 1533–1541. <https://doi.org/10.1080/02640414.2017.1400147>
- Dionigi, R., & Gard, M. (2018). Sport for all ages? Weighing the evidence. In *Sport and Physical Activity Across the Lifespan: Critical Perspectives* (pp. 1–20). Palgrave Macmillan UK. <https://doi.org/10.2307/j.ctt5hjpwg.27>
- Dionigi, R., Horton, S., & Baker, J. (2013). Negotiations of the ageing process: Older adults’

stories of sports participation. *Sport, Education and Society*, 18(3), 370–387.

<https://doi.org/10.1080/13573322.2011.589832>

Dionigi, R., Horton, S., & Bellamy, J. (2011). Meanings of aging among older canadian women of varying physical activity levels. *Leisure Sciences*, 33(5), 402–419.

<https://doi.org/10.1080/01490400.2011.606779>

Dionigi, R., & Litchfield, C. (2018). The mid-life “market” and the creation of sporting sub-culture. In R. Dionigi & M. Gard (Eds.), *Sport and Physical Activity Across the Lifespan: Critical Perspectives* (pp. 285–300). Palgrave Macmillan UK.

Dionigi, R., & O’Flynn, G. (2007). Performance discourses and old age: What does it mean to be an older athlete? *Sociology of Sport Journal*, 24(4), 359–377.

<http://ezproxy.library.yorku.ca/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=sph&AN=27653346&site=ehost-live>

Doering, T. M., Reaburn, P. R., Borges, N. R., Cox, G. R., & Jenkins, D. G. (2017). The effect of higher than recommended protein feedings post-exercise on recovery following downhill running in masters triathletes. *International Journal of Sport Nutrition and Exercise Metabolism*, 27(1), 76–82. <https://doi.org/10.1123/ijsnem.2016-0079>

Douglas, P. S., & O’Toole, M. (1992). Aging and physical activity determine cardiac structure and function in the older athlete. *Journal of Applied Physiology*, 72(5), 1969–1973.

<https://doi.org/10.1152/jappl.1992.72.5.1969>

Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for adults: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 135.



<https://doi.org/10.1186/1479-5868-10-135>

Eman, J. (2012). The role of sports in making sense of the process of growing old. *Journal of Aging Studies*, 26(4), 467–475. <https://doi.org/10.1016/j.jaging.2012.06.006>

Gard, M., Dionigi, R., Horton, S., Baker, J., Weir, P., & Dionigi, C. (2017). The normalization of sport for older people? *Annals of Leisure Research*, 20(3), 253–272.

<https://doi.org/10.1080/11745398.2016.1250646>

Gayman, A., Fraser-Thomas, J., Dionigi, R., Horton, S., & Baker, J. (2017). Is sport good for older adults? A systematic review of psychosocial outcomes of older adults' sport participation. *International Review of Sport and Exercise Psychology*, 10(1), 164–185.

Geard, D., Reaburn, P., Rebar, A., & Dionigi, R. (2017). Masters athletes: Exemplars of successful aging? *Journal of Aging & Physical Activity*, 25(3), 490–500.

<https://doi.org/10.1123/japa.2016-0050>

Geard, D., Rebar, A., Reaburn, P., & Dionigi, R. (2018). Testing a model of successful aging in a cohort of masters swimmers. *Journal of Aging and Physical Activity*, 26(2), 183–193.

<https://doi.org/10.1123/japa.2016-0357>

Grant, B. C. (2001). You're never too old: Beliefs about physical activity and playing sport in later life. *Ageing and Society*, 21(6), 777–798. <https://doi.org/10.1017/s0144686x01008492>

Hagmar, M., Hirschberg, A. L., Lindholm, C., Schenck-Gustafsson, K., & Eriksson, M. J.

(2005). Athlete's heart in postmenopausal former elite endurance female athletes. *Clinical Journal of Sport Medicine*, 15(4), 257–262.

<https://doi.org/10.1097/01.jsm.0000171257.54908.e7>

Hastings, D. W., Cable, S., & Zahran, S. (2005). The globalization of a minor sport: The diffusion and commodification of masters swimming. *Sociological Spectrum*, 25(2), 133–

154. <https://doi.org/10.1080/02732170590883924>

- Hawkins, S. A., Marcell, T. J., Jaque, V., & Wiswell, R. A. (2001). A longitudinal assessment of change in VO<sub>2</sub> max and maximal heart rate in master athletes. *Medicine & Science in Sports & Exercise*, 33(10), 1744–1750. <https://doi.org/10.1097/00005768-200110000-00020>
- Hawkins, S. A., Wiswell, R. A., & Marcell, T. J. (2003). Exercise and the master athlete - A model of successful aging? *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 58(11), M1009–M1011. <https://doi.org/10.1093/gerona/58.11.M1009>
- Heo, J., Culp, B., Yamada, N., & Won, Y. (2013). Promoting successful aging through competitive sports participation: Insights from older adults. *Qualitative Health Research*, 23(1), 105–113. <https://doi.org/10.1177/1049732312457247>
- Heuser, L. (2005). We're not too old to play sports: The career of women lawn bowlers. *Leisure Studies*, 24(1), 45–60. <https://doi.org/10.1080/0201436042000250131>
- Hood, S., & Northcote, R. J. (1999). Cardiac assessment of veteran endurance athletes: A 12 year follow up study. *British Journal of Sports Medicine*, 33(4), 239–243. <https://doi.org/10.1136/bjsm.33.4.239>
- Horton, S., Dionigi, R. A., Gard, M., Baker, J., & Weir, P. (2018). Don't sit back with the geraniums, get out: The complexity of older women's stories of sport participation. *Journal of Amateur Sport*, 4(1), 24–51. <https://doi.org/10.17161/jas.v4i1.6627>
- Horton, S., Dionigi, R. A., Gard, M., Baker, J., Weir, P., & Deneau, J. (2019). "You can sit in the middle or be one of the outliers": Older male athletes and the complexities of social comparison. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.02617>
- Kettunen, J. A., Kujala, U. M., Kaprio, J., & Sarna, S. (2006). Health of master track and field athletes: A 16-year follow-up study. *Clinical Journal of Sport Medicine*, 16(2), 142–148.

- Khan, K., Thompson, A., Blair, S., Sallis, J., Powell, K., Bull, F., & Bauman, A. (2012). Sports and exercise as contributors to health of the nation. *The Lancet*, 380, 59–64.
- Kirby, J. B., & Kluge, M. A. (2013). Going for the gusto: Competing for the first time at age 65. *Journal of Aging and Physical Activity*, 21(3), 290–308.  
<https://doi.org/10.1123/japa.21.3.290>
- Kirby, J. B., & Kluge, M. A. (2022). For the love of the game: An exploration of the experiences and psychosocial development of women 70 years of age and older who play volleyball. *Journal of Aging and Physical Activity*, 30(3), 445–454.
- Kusy, K., & Zieliński, J. (2006). The history of veteran movement. In W. Parzy (Ed.), *Masters athletes social, biological and practical aspects of veterans sport* (pp. 45–50). Eugeniusz Piasecki University School of Physical Education.
- Lane, N. E., Bloch, D. A., Wood, P. D., & Fries, J. F. (1987). Aging, long-distance running, and the development of musculoskeletal disability: A controlled study. *The American Journal of Medicine*, 82(4), 772–780. [https://doi.org/10.1016/0002-9343\(87\)90014-3](https://doi.org/10.1016/0002-9343(87)90014-3)
- Larson, H. K., McHugh, T. L. F., Young, B. W., & Rodgers, W. M. (2019). Pathways from youth to masters swimming: Exploring long-term influences of youth swimming experiences. *Psychology of Sport and Exercise*, 41, 12–20.
- Leigey, D., Irrgang, J., Francis, K., Cohen, P., & Wright, V. (2009). Participation in high-impact sports predicts bone mineral density in senior olympic athletes. *Sports Health*, 1(6), 508–513. <https://doi.org/10.1177/1941738109347979>
- Leightley, D., & Yap, M. (2018). Digital analysis of sit-to-stand in masters athletes, healthy old people, and young adults using a depth sensor. *Healthcare*, 6(1), 21.  
<https://doi.org/10.3390/healthcare6010021>

- Leti, T., & Bricout, V. A. (2013). Interest of analyses of heart rate variability in the prevention of fatigue states in senior runners. *Autonomic Neuroscience: Basic and Clinical*, 173(1–2), 14–21. <https://doi.org/10.1016/j.autneu.2012.10.007>
- Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. *Implementation Science*, 5(1), 1–9. <https://doi.org/10.1186/1748-5908-5-69>
- Liechty, T., West, S., Naar, J., & Son, J. (2017). Perceptions of ageing among older women softball players. *Annals of Leisure Research*, 20(3), 295–313. <https://doi.org/10.1080/11745398.2016.1220321>
- Litchfield, C., & Dionigi, R. A. (2012). The meaning of sports participation in the lives of middle-aged and older women. *International Journal of Interdisciplinary Social Sciences*, 6(5), 21–36.
- Lobjois, R., Benguigui, N., & Bertsch, J. (2006). The effect of aging and tennis playing on coincidence-timing accuracy. *Journal of Aging and Physical Activity*, 14(1), 74–97. <https://doi.org/10.1123/japa.14.1.74>
- Macgregor, C. B., Roby, D., & Reaburn, P. R. (2017). The effect of age on perceived benefits and constraints to participation in masters cycling—literature review. *Cogent Psychology*, 4(1). <https://doi.org/10.1080/23311908.2017.1316047>
- Maharam, L. G., Bauman, P. A., Kalman, D., Skolnik, H., & Perle, S. M. (1999). Masters athletes: Factors affecting performance. *Sports Medicine*, 28(4), 273–285.
- Mahoney, J. L., & Stattin, H. (2000). Leisure activities and adolescent antisocial behavior: The role of structure and social context. *Journal of Adolescence*, 23(2), 113–127. <https://doi.org/10.1006/jado.2000.0302>
- Marcell, T. J., Hawkins, S. A., Tarpenning, K. M., Hyslop, D. M., & Wiswell, R. A. (2003).

Longitudinal analysis of lactate threshold in male and female master athletes. *Medicine and Science in Sports and Exercise*, 35(5), 810–817.

<https://doi.org/10.1249/01.MSS.0000065002.69572.6F>

Mays, N., Roberts, E., Popay, J., & Mays Roberts, E. and Popay, J., N. (2004). Synthesising research evidence. In P. Allen, P. Allen, N. Black, A. Clarke, N. Fulop, & S. Anderson (Eds.), *Studying the Organisation and Delivery of Health Services: Research Methods* (1st ed., pp. 188–220). Routledge. <https://doi.org/10.4324/9780203481981>

Mckendry, J., Breen, L., Shad, B. J., & Greig, C. A. (2018). Muscle morphology and performance in master athletes: A systematic review and meta-analyses. *Ageing Research Reviews*, 45, 62–82. <https://doi.org/10.1016/j.arr.2018.04.007>

Morrison, B. N., McKinney, J., Isserow, S., Lithwick, D., Taunton, J., Nazzari, H., De Souza, A. M., Heilbron, B., Cater, C., Macdonald, M., Hives, B. A., & Warburton, D. E. R. (2018). Assessment of cardiovascular risk and preparticipation screening protocols in masters athletes: The masters athlete screening study (MASS): A cross-sectional study. *BMJ Open Sport and Exercise Medicine*, 4(1), 1–10. <https://doi.org/10.1136/bmjsem-2018-000370>

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. *BMC Medical Research Methodology*, 18(1), 1–7. <https://doi.org/10.1186/s12874-018-0611-x>

Nowak, A., Straburzyńska-Lupa, A., Kusy, K., Zieliński, J., Felsenberg, D., Rittweger, J., Karolkiewicz, J., Straburzyńska-Migaj, E., & Pilaczyńska-Szcześniak, Ł. (2010). Bone mineral density and bone turnover in male masters athletes aged 40–64. *Aging Male*, 13(2), 133–141. <https://doi.org/10.3109/13685531003657776>

- Patelia, S., Stone, R. C., El-Bakri, R., Adli, M., & Baker, J. (2018). Masters or pawns? Examining injury and chronic disease in male masters athletes and chess players compared to population norms from the Canadian community health survey. *European Review of Aging and Physical Activity*, 15(1), 15.
- Peiffer, J., Abbiss, C. R., Sultana, F., Bernard, T., & Brisswalter, J. (2016). Comparison of the influence of age on cycling efficiency and the energy cost of running in well-trained triathletes. *European Journal of Applied Physiology*, 116(1), 195–201.  
<https://doi.org/10.1007/s00421-015-3264-z>
- Pfister, G. (2012). It is never too late to win – Sporting activities and performances of ageing women. *Sport in Society*, 15(3), 369–384. <https://doi.org/10.1080/17430437.2012.653206>
- Pham, M. T., Rajić, A., Greig, J. D., Sargeant, J. M., Papadopoulos, A., & McEwen, S. A. (2014). A scoping review of scoping reviews: Advancing the approach and enhancing the consistency. *Research Synthesis Methods*, 5(4), 371–385. <https://doi.org/10.1002/jrsm.1123>
- Piasecki, J., Ireland, A., Piasecki, M., Deere, K., Hannam, K., Tobias, J., & McPhee, J. S. (2019). Comparison of muscle function, bone mineral density and body composition of early starting and later starting older masters athletes. *Frontiers in Physiology*, 10, 1050.  
<https://doi.org/10.3389/fphys.2019.01050>
- Power, G. A., Minozzo, F. C., Spendiff, S., Filion, M.-E., Konokhova, Y., Purves-Smith, M. F., Pion, C., Aubertin-Leheudre, M., Morais, J. A., Herzog, W., Hepple, R. T., Taivassalo, T., & Rassier, D. E. (2016). Reduction in single muscle fiber rate of force development with aging is not attenuated in world class older masters athletes. *American Journal of Physiology-Cell Physiology*, 310(4), C318–C327.  
<https://doi.org/10.1152/ajpcell.00289.2015>

- Public Health Agency of Canada. (2020). Aging and chronic disease: A profile of Canadian seniors. In *Cat.: HP35-137/1-2020E-PDF*.
- Rowe, J. W., & Kahn, R. L. (1987). Human aging: Usual and successful. *Science*, 237(4811), 143–149. <https://doi.org/10.1126/science.3299702>
- Sanada, K., Miyachi, M., Tabata, I., Suzuki, K., Yamamoto, K., Kawano, H., Usui, C., & Higuchi, M. (2009). Differences in body composition and risk of lifestyle-related diseases between young and older male rowers and sedentary controls. *Journal of Sports Sciences*, 27(10), 1027–1034. <https://doi.org/10.1080/02640410903081852>
- Scheerder, J., Vandermeerschen, H., & Breedveld, K. (2017). Diversity in participation reigns, policy challenges ahead: Sport for all (ages) from a European perspective. In R. Dionigi & M. Gard (Eds.), *Sport and Physical Activity Across the Lifespan: Critical Perspectives* (pp. 45–65). Palgrave Macmillan UK. [https://doi.org/10.1057/978-1-137-48562-5\\_3](https://doi.org/10.1057/978-1-137-48562-5_3)
- Schmidt, J. F., Andersen, T. R., Andersen, L. J., Randers, M. B., Hornstrup, T., Hansen, P. R., Bangsbo, J., & Krstrup, P. (2015). Cardiovascular function is better in veteran football players than age-matched untrained elderly healthy men. *Scandinavian Journal of Medicine & Science in Sports*, 25(1), 61–69. <https://doi.org/10.1111/sms.12153>
- Soule, K. E. (2018). The role of sport in the lives of mothers of young children. In *Sport and Physical Activity Across the Lifespan: Critical Perspectives* (pp. 227–243). Palgrave Macmillan UK. [https://doi.org/10.1057/978-1-137-48562-5\\_12](https://doi.org/10.1057/978-1-137-48562-5_12)
- Sport for Life. (2016). *Durable by design: Active for life*. [https://sportforlife.ca/wp-content/uploads/2016/06/Durable-by-Design\\_Dec2\\_2016-.pdf](https://sportforlife.ca/wp-content/uploads/2016/06/Durable-by-Design_Dec2_2016-.pdf)
- Statistics Canada. (2017). Census in brief a portrait of the population aged 85 and older in 2016 in Canada. In *Census Program* (Issue 98).

- Statistics Canada. (2020). Canada's population estimates: Age and sex. In *Government of Canada*. <https://www150.statcan.gc.ca/n1/daily-quotidien/200929/dq200929b-eng.htm>
- Steinberg, G., Grieve, F., & Glass, B. (2001). Achievement goals across the lifespan. *Journal of Sport Behavior*, 24(3), 298.
- Stenner, B. J., Buckley, J. D., & Mosewich, A. D. (2020). Reasons why older adults play sport: A systematic review. *Journal of Sport and Health Science*, 9(6), 530–541. <https://doi.org/10.1016/j.jshs.2019.11.003>
- Suominen, H. (2011). Ageing and maximal physical performance. *European Review of Aging and Physical Activity*, 8(1), 37–42. <https://doi.org/10.1007/s11556-010-0073-6>
- Tanaka, H., & Seals, D. R. (2003). Invited review: Dynamic exercise performance in masters athletes: Insight into the effects of primary human aging on physiological functional capacity. *Journal of Applied Physiology*, 95(5), 2152–2162. <https://doi.org/10.1152/jappphysiol.00320.2003>
- Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., Moher, D., Peters, M. D. J., Horsley, T., Weeks, L., Hempel, S., Akl, E. A., Chang, C., McGowan, J., Stewart, L., Hartling, L., Aldcroft, A., Wilson, M. G., Garritty, C., ... Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine*, 169(7), 467–473. <https://doi.org/10.7326/M18-0850>
- Tseng, B. Y., Gundapuneedi, T., Khan, M. A., Diaz-Arrastia, R., Levine, B. D., Lu, H., Huang, H., & Zhang, R. (2013). White matter integrity in physically fit older adults. *NeuroImage*, 82, 510–516. <https://doi.org/10.1016/j.neuroimage.2013.06.011>
- Tseng, B. Y., Uh, J., Rossetti, H. C., Cullum, C. M., Diaz-Arrastia, R. F., Levine, B. D., Lu, H., & Zhang, R. (2013). Masters athletes exhibit larger regional brain volume and better



cognitive performance than sedentary older adults. *Journal of Magnetic Resonance Imaging*, 38(5), 1169–1176. <https://doi.org/10.1002/jmri.24085>

Wheaton, B. (2017). Surfing through the life-course: Silver surfers' negotiation of ageing. *Annals of Leisure Research*, 20(1), 96–116.  
<https://doi.org/10.1080/11745398.2016.1167610>

Wroblewski, A. P., Amati, F., Smiley, M. A., Goodpaster, B., & Wright, V. (2011). Chronic exercise preserves lean muscle mass in masters athletes. *Physician and Sportsmedicine*, 39(3), 172–178. <https://doi.org/10.3810/psm.2011.09.1933>

Zhao, E., Tranovich, M. J., DeAngelo, R., Kontos, A. P., & Wright, V. J. (2016). Chronic exercise preserves brain function in masters athletes when compared to sedentary counterparts. *Physician and Sportsmedicine*, 44(1), 8–13.  
<https://doi.org/10.1080/00913847.2016.1103641>

**Chapter Three: “Rowing is Underrated!” Sport Experiences and Psychosocial Development in Older Rowing Athletes**

### **Abstract**

There has been extensive research on how the context of sport can provide optimal spaces for psychosocial development in youth. In recent years, Masters sport has gained increased popularity among older adults; however, our knowledge of sport experiences and the potential for continued development is limited. For instance, rowing has grown considerably in the past 40 years, with women representing the vast majority of participants, but we know little about the experiences of rowers, as well as whether it provides opportunities for continued development of psychosocial assets. To explore these areas, eight masters rowers were interviewed using a semi-structured interview guide. A pragmatic approach was used to interpret sport experiences and thematic analysis was used to classify emerging patterns into meaningful themes. Specifically, four themes on psychosocial development emerged from the thematic analysis: connections built on a common interest, confidence in health and well-being, service to the community, and pride in their identity. In addition, participants reported some negative sport experiences such as unpleasant social interactions, building confidence through downward comparisons, and a fear of aging. The context of rowing, particularly at the competitive level, appears to facilitate development of psychosocial assets that are useful for the aging process. However, findings from this study also highlight inter-individual variability in sport experiences and its potential to alter or cause disparities in the development of psychosocial assets across sample groups.

## Introduction

In recent years, interest in, and encouragement of, sport has grown considerably among aging adults. The rising number of adult competitors in sport (Jenkin et al., 2017) and promotion of notions such as “Sport for Life” (Higgs et al., 2019) are testaments to the enthusiasm around lifelong engagement. A notable example is the growth in the number of competitors in the World Masters Games (WMGs), which rose from 8,305 in 1985 to 24,905 in the most recent games in 2017 and is expected to increase to over 50,000 at the next WMGs in Kansai (International Masters Games Association, 2017, 2020). The increased rates of sport competitors are also documented at regional and national events (Cardenas et al., 2009; Webb et al., 2017). This group, labelled Masters Athletes (MAs), has generated significant interest among researchers, health policy makers, and physical activity advocates studying the benefits of sport in later years. Generally, sport is considered as a potential avenue for older adults to increase their levels of physical activity, enhance health and decrease age-related diseases (Eime et al., 2013; Jenkin et al., 2017; Public Health Agency of Canada, 2020).

In recent years, this cohort has been encouraged to invest in their health through an active lifestyle (e.g., Canada’s Sport for Life model; Higgs et al., 2019). This shift in promotion of an active lifestyle could be influenced by the rapid growth in our aging population, caused by a range of social and demographic changes (e.g., increasing life expectancy, declining fertility rates). For instance, by the year 2050, the population of adults aged 60 and above is expected to double from 1 billion in 2020 to 2.1 billion worldwide. This shift in ‘population aging’ began in high-income countries but is now affecting low to middle-income countries to become a global phenomenon (United Nations, 2019; World Health Organization, 2021). Unfortunately, while a longer life provides additional years to participate in activities one enjoys (e.g., social gatherings,

traveling, physical activities), evidence suggests the vast majority of older people are limited by declining health more often due to rising levels of inactivity and sedentary lifestyles (Dogra et al., 2017; World Health Organization, 2021). As a result, older adults are encouraged to pursue physical activities such as sport while sedentary behaviours are strongly discouraged through healthy aging discourses in government policies, media, and sport sciences (Gard, Dionigi, Horton, et al., 2017; Public Health Agency of Canada, 2018a, 2020).

Interestingly, participation in sport, particularly at competitive levels, is suggested to provide health benefits that are above and beyond those gained from physical activities such as exercise. For instance, sport is associated with broader psychological, social, cognitive, as well as physical health benefits (Baker et al., 2010; Eime et al., 2013; Gayman et al., 2017; Geard et al., 2018). Although sport has been related to multifaced health benefits, it is promoted less for older adults compared to ‘age appropriate’ activities such as walking, gardening, weight-lifting and yoga (Public Health Agency of Canada, 2018). While activities of lower intensities should not be devalued, it may be important to recognize the value of sport participation for older adults, especially when interest in this activity is rising among this cohort. Recent comprehensive reviews have outlined the multidimensional health benefits of sport for older adults (Andersen et al., 2019; Eime et al., 2013; Gayman et al., 2017; Kim et al., 2020; Sivaramakrishnan et al., 2021). In Gayman’s et al. (2017) systematic review, for example, sport involvement was found to enhance psychosocial development of age-specific, cognitive and/or perceptual, emotional, social, and motivational factors. Specifically, involvement in sport contributes to psychosocial development such as a new aging identity, enhanced cognitive flexibility, positive and negative emotions (e.g., excitement to learn, enjoyment, comparison with others), supportive social relationships, as well as feeling in control of one’s health and body (Gayman et al., 2017).

Findings on psychosocial assets among older adults such as a positive aging identity, confidence and competence in self, empowerment, expansion of social support, as well as improvement in overall health have also been reported in previous research (Dionigi, 2002b, 2005, 2006b; Dionigi, Baker, et al., 2011; Liechty et al., 2017). In addition, sport provides opportunities for older adults to demonstrate positive role modeling and/or to challenge negative aging stereotypes (Horton et al., 2018). Moreover, knowledge on the development of ‘psychosocial assets’ has led to the creation of the model of 6Cs among older adults (Dionigi et al., 2017), based on the Personal Assets Framework (PAF) (Côté et al., 2014) as well as other positive youth development frameworks (Benson et al., 2012; Lerner et al., 2005). According to this model, sport (specifically Masters) facilitates development of personal assets such as confidence and competence, character, commitment, connection, cognition and challenge (Dionigi et al., 2017). The developmental assets frameworks define them generally as ‘building blocks’ that, when developed, have the potential to enhance significant developmental outcomes in youth (Benson et al., 2012). However, psychosocial assets have not been defined as clearly for older adults. Using the body of literature on this topic, this study defined assets as useful resources or attributes (innate or acquired) that operate as antecedents to personal developmental outcomes in older adults. In general, they are elements that assist older adults to navigate their aging experience.

The robust benefits of sport engagement across the lifespan justify the need to deepen our understanding on the value of sport for older adults, particularly on psychosocial development. While emerging evidence on this topic is encouraging, we have limited understanding of the diverse contexts of sport (e.g., type of sport) that facilitate development of psychosocial assets. In addition, factors related to the individual (e.g., age, gender, ethnicity) can influence how older

adults experience sport, which may impact elements of their development. This is similar to arguments made by ecological theorists on how numerous systems at various levels interact over time to shape the youth sport experiences and development (Bronfenbrenner, 1986; Côté et al., 2014). Given the diverse contexts in which sport can occur, it is possible that some contexts offer better spaces for development than others, which could lead to disproportional acquisition of assets across population groups.

For instance, some researchers (Andersen et al., 2019) found the contexts of team sports have the potential to provide greater positive mental and social health benefits than participation in individual sports, a result that was also supported by Eime et al. (2013). In addition, the level of sport (e.g., competitive or recreational) can lead to differences in how sport is experienced. For instance, older competitive athletes have reported opportunities to travel across countries, which provides opportunities to build large social networks compared to recreational level sport (Dionigi, Baker, et al., 2011). Furthermore, studies on older women in sport also highlight variability in sport experiences and thereby development through sport (Horton et al., 2018; Kirby & Kluge, 2021). Exploration of these distinct factors should be the next steps into determining how experiences vary across sports and their impact on development of psychosocial assets. From physical activity promotion, health, and athletic performance standpoints, determining the ideal contexts would be key to increasing sport commitment among older adults, as well as understanding how to enhance development in later life (e.g., the role of a coach in psychosocial development) (MacLellan et al., 2018; Rathwell et al., 2015; Young & Medic, 2011).

However, while advancement in this area is clearly valuable, findings from a recent scoping review of 35 years of research on older adults in sport indicated that most work has

focused on the physiological health of older athletes compared to areas such as psychosocial development (Patelia et al., 2023). In addition, while the body of literature examining older adults in sport is growing, qualitative research focused on psychosocial experiences of specific sports is relatively limited compared to quantitative and biomedical research (Horton et al., 2019). Moreover, much of our current knowledge in this area is built on the psychosocial experiences of sport in general, often using athletes from pools of multiple different sports (Dionigi, 2006; Dionigi et al., 2011b, 2013, 2018; Grant, 2001; Horton et al., 2018, 2019). While findings on sport (particularly Masters sport) in general have provided valuable information on the continued development of older adults, they also raise questions about how much of this development is due to the type of sport versus the result of each individual's normal developmental trajectory. Given that the various contexts of sport (e.g., type of sport) allow for multifaceted experiences and development opportunities, it would be useful to examine experiences from a specific sport that is yet to be examined.

Interestingly, one sport that has been largely ignored in this research field is rowing, despite its popularity at the Masters level, particularly amongst females (Schweinbenz, 2010; Toepell et al., 2004; Wigglesworth, 2013). Rowing is historically rooted as a club-based sport with a large sporting community, dating back to the eighteenth century (Wigglesworth, 2013). In addition, rowers are classified as 'Masters' at the age of 27 with opportunities to participate as an individual (e.g., single scull) or part of a larger team (e.g., double scull, quadruple scull and sweep boats up to 8 rowers). Unfortunately, traditional rowing held prejudice views against individuals of middle-class and/or women since rowing was constructed as a sport exclusively for gentlemen to emulate 'Christ-like' behaviour (Wigglesworth, 2013). However, in recent years, participation in Masters rowing has grown considerably, particularly by older women



(Toepell et al., 2004). Among the 11,776 rowers in Canada, for example, 59.2% are females (Rowing Canada, 2020). The growing popularity in rowing (from youth to older adults) should be viewed as an opportunity to examine sport experiences and identify the potential for psychosocial development across the lifespan.

Surprisingly, we have no information older adults' experiences of rowing and psychosocial development using a qualitative approach. Previous research on older rowing athletes has focused on injuries (Thornton et al., 2017; Wilson et al., 2021), female barriers of participation (Schweinbenz, 2010; Toepell et al., 2004), autoethnographic reflections on rowing (Caudwell, 2011) and a survey-based study on rowing experiences and perceptions of age, gender and health (Toepell et al., 2004). Given the social and community-focused atmosphere of rowing, and the varying opportunities for participation and competition, this sport may be a unique context for exploring the psychosocial benefits of sport participation in older athletes. This type of work may be valuable in supporting and/or building on previous findings on sport experiences and psychosocial development (such as the 6Cs; Dionigi et al., 2017), as well as identifying unique relationships specific to this sport.

## **Methods**

### **Pragmatic Theory, Sport, and Psychosocial Development**

One limitation in research on the development of psychosocial assets through sport participation in older life relates to the variability in the research approaches (i.e., guided theoretical frameworks) used to examine psychosocial development. Qualitative studies either vary highly in the type of frameworks applied to analyze the data or lack a specific theoretical framework to guide their study altogether (Eime et al., 2013; Gayman et al., 2017; Sivaramakrishnan et al., 2021). While variability in theoretical frameworks allows for analysis

from numerous perspectives to understand psychosocial development, it also creates challenges in confirming findings across studies. As a result, interpretation of qualitative data in textual form can vary depending on the researcher's epistemological stance, knowledge, and experience in qualitative approaches.

In the current study we apply a pragmatic lens, in a sport that is yet to be explored, to confirm and extend previous findings on psychosocial development in older adults. Epistemologically, a pragmatist approach allows researchers to focus on the 'practical understandings' of concrete, real world issues (Patton, 2005 p. 153), instead of fixating on metaphysical debates about the nature of truth and reality (Kelly & Cordeiro, 2020; Weaver, 2018). Pragmatism allows researchers to examine knowledge in terms of their practical functioning (or 'action') by moving beyond objectivist conceptualizations. In addition, pragmatism supports the notion of multiple truths where reality can be negotiated, debated, or interpreted in context, which is widely supported by interpretivist theoretical frameworks (Kelly & Cordeiro, 2020). As a result, researchers can apply whatever tools are best suited to understand this knowledge. This type of ontology coincides with how sport experiences and development can be continuously negotiated and debated. However, applying a pragmatic approach allows researchers to use the multitude of knowledge on psychosocial development through sport (such as building on the work from PYD) to improve practical functioning in the real world (i.e., navigating their aging process), instead of focusing on the objectivist conceptualizations related to sport and development (Weaver, 2018). This does not mean metaphysical debates on sport and development are not valued, but instead a pragmatic approach allows us to examine these constructs from a different lens. Moreover, it allows sport scientist to strengthen arguments about the development of psychosocial assets by confirming findings from

previous research using more interpretivist or objectivist conceptualizations to understand their data.

The pragmatic approach and its principles resonated with this study to evaluate how the context of rowing shapes sport experiences, particularly participants' ideas and beliefs on psychosocial development. Findings from this study will help us gain a better understanding of the unique experiences of rowing and the development opportunities that could have practical implications (e.g., informing tools/guidelines/strategies to enhance sport commitment, performance, and participation). In addition, applying a pragmatic perspective may provide a richer and more realistic view of human behaviour than those used by rationalist and structuralist accounts (Kelly & Cordeiro, 2020). This study will add to our knowledge on lifelong development and psychosocial assets in older athletes in particular. To this end, this study focused on examining the types of psychosocial assets developed through rowing in older adults aged 50 and above.

### **Participants**

Older adults between the ages of 55 to 62 years ( $M = 59$ ) who regularly participated and competed in rowing were included in this study. Athletes residing in the United Kingdom responded to a recruitment post on social media (i.e., Twitter), which led to a snowball sampling approach to participation in this study. Participants were recruited until no new participants responded to the recruitment post and emails. This resulted in a total of eight participants (6 females, 2 males) included in the study. It is important to note, interviews occurred during the primary stages of the COVID-19 pandemic and as a result, it inadvertently affected the process of recruitment (e.g., interest in participation). All eight athletes stressed the importance of physical activity throughout their life; however, a majority of participants entered rowing later in

life (i.e., ‘late-starters’). Moreover, all participants reported taking part in some form of regional, national, and international rowing competitions. In addition, the sample included European athletes, highly educated, and mainly retired. A detailed overview on the participants’ demographic information is provided in Table 1.

### **Interview Procedure**

Recruitment occurred between April to June 2020. Participants were interviewed individually using video communication platforms such as Zoom and Skype. Interviews were conducted in a semi-structured format to provide the interviewer with flexibility in probing and exploring participants’ responses in greater depth, as well as including new questions that were not originally anticipated during the development of the interview guide. Prior to conducting the interviews, the researchers met on several occasions to develop the interview guide. In addition, the interview guide was pilot tested on several older adults (not included in this study) to ensure sport and development related questions were interpreted as intended by the researchers. The guide included questions such as: why do you participate in rowing? What do you love about rowing? What do you hate about rowing? Can you describe your experience in sport(s) that is/are important to you? Do you think involvement in rowing has contributed to your psychological development? Do you think involvement in rowing has contributed to your social development? How important are these benefits to your development as you get older?

Interviews with athletes generally lasted between 60 and 80 minutes. All interviews were recorded and transcribed verbatim. To increase the validity of responses, following the completion of interviews, each participant’s transcript was emailed back to them to provide an opportunity to remove, add and revise any content. Six participants revised some of their responses (i.e., clarified colloquial language and expanded on some responses), while two

participants were satisfied with their responses and did not modify any content. Each participant provided written consent to take part and the study design was approved by the Office of Research Ethics at York University (STU 2020-018).

## **Analysis**

A pragmatic approach recognizes that people can have multiple experiences of the same phenomena (i.e., individual variability) and there is not one way to ‘do’ sport (or a universal truth). Instead of fixating on metaphysical debates, this approach orients the inquiry towards problem solving, by focusing on participant experiences to ensure the research has practical relevance, such as adding to the knowledge of development through sport. As a result, athletes’ shared beliefs about sport were examined by recognizing the emergence of and patterns within themes, using reflexive thematic analysis (Braun & Clarke, 2006, 2021).

Responses were first read multiple times in detail to familiarize with the data. This step also involved continuously and rigorously reflecting on responses as well as writing familiarization notes. Transcripts were then read line-by-line to systematically code the data by identifying specific segments of information (or open coding) that contain ‘meaning units’ through inductive analysis (Braun & Clarke, 2021; Gale et al., 2013), to understand the unique experiences and development opportunities of rowing. In addition, inductive analysis allowed identification of emerging themes that may be specific to rowing and may not have been reported in previous studies. Interview transcripts were also constantly compared to identify similar meaning units and reduce overlap. This step was followed by the creation of initial themes (i.e., patterns of shared meaning or united by a central concept; Braun & Clarke, 2021) generated from meaning units. Once this process was complete, themes were refined into higher level categories until no new themes or categories emerged (Thomas, 2006). Deductive analysis was also applied

at this time to ensure important themes reported in previous research were identified in the data as well as help organize sub-themes within higher level themes.

## **Results and Discussion**

Participants in this study discussed the value of rowing and its opportunities for continued psychosocial development. Findings from the thematic analysis corroborated several assets that were previously reported such as supportive social relationships or connection, confidence in health and well-being, as well as positive aging identity (Dionigi, 2002a, 2006b; Dionigi, Baker, et al., 2011; Dionigi et al., 2017; Gayman et al., 2017; Heo et al., 2013; Litchfield & Dionigi, 2012), while also highlighting the inter-individual variability in sport experiences and development between older athletes. That suggests diversity across samples (factors such as gender, and level of sport) likely influences one's sport experiences, thereby contributing to differences in psychosocial development (i.e., disproportional levels of psychosocial assets). For example, some individuals may gain more social connections, whereas others develop a stronger sense of identity. Further exploration will be required to understand how various sport contexts impact assets development. More specifically, responses suggest rowing (particularly competitive) provided opportunities to develop and/or enhance in several areas as reflected in the following higher order themes: 1) connections built on a common interest, 2) confidence in health and well-being, 3) service to the community, and 4) pride in their identity.

### **Connections Built on a Common Interest**

All participants indicated rowing (especially competitive) provided opportunities to expand their social connections as a result of their shared interest or a common purpose. Athletes discussed how rowing was an avenue to build a diverse network of socially supportive

relationships, specifically through a) greater social interactions, and b) a community that extends to family members. A common purpose was described as something that is more than an interest in rowing, it includes shared views, interests, experiencing similar life stages, and athletic goals.

### ***Greater Social Interactions***

Athletes described how much more they enjoyed rowing when their squad members also viewed sport in similar ways. For example, bonds formed among rowers often continued after the competition and produced feelings of being a part of a larger community (Lyons & Dionigi, 2007) that transcended the context of sport. For instance, Oliver explained, “You meet so many different people through rowing and through the organization. You get to go to foreign places or different cities and you’re meeting other crews and their families, so the social network is amazing.”

Other participants felt greater social interactions led them to build meaningful bonds and experience a sense of camaraderie with individuals who shared a ‘common interest’ or ‘goal’ (Lyons & Dionigi, 2007) in competitive rowing. Nathalie explained:

It's not just the camaraderie. It's sort of like the common purpose, I think, as much as anything else. There is the social side, but there's sort of like this focus that everyone is focused on the same thing.

Interestingly, some participants felt this type of development may be exclusive to competitive sport, because competition provided greater opportunities to travel and interact with different people (Dionigi, Baker, et al., 2011), whereas non-competitive activities (e.g., exercise) would not offer the same experiences to travel and expand social networks. For instance, when asked whether non-competitive activities such as exercise would offer similar opportunities Sarah explained,

No, because you wouldn't have the competitive side of it, so you wouldn't therefore go to the competitions to meet all the different people. In my opinion, if you're exercising, what's the one that's the big one at the moment – the peloton! They've got the bike and they've got the video. Well, they've got the feedback on themselves, but they don't know anybody. They're not going anywhere. They're not seeing, in real life, what's happening. As a result, the competitive element of sport could be unique in providing more opportunities (greater frequency) to expand one's social networks because of regional, national, and international competitions, in comparison to non-competitive activities. This is not to say that a smaller social group is inferior to larger social networks, but that differences in level of sport will impact experiences and social connections in sport (Dionigi, Baker, et al., 2011). In addition, older adults who are primarily motivated by competition and performance may gravitate towards individuals with shared interests and disregard rowers (inadvertently) who seek rowing for other reasons.

### ***Community that Extends to Family Members***

Connections built on the shared interest of rowing were not limited to the athlete; they expanded to include family members. Alex explained: “Even my wife is very committed as well, she runs the boat club kitchen and cooks for everybody after training. We all eat together and have a drink. It's a major part of my social life as well.” Similarly, Nathalie indicated, “We've got a number of friends, I mean, also my husband as well. He's sort of like, come on board, and he knows my friends and things like that. I think we've developed a very wide social circle”. These responses suggest competitive rowing provides opportunities to increase social interactions for family members and allow them to become part of the larger sporting community (Choi et al., 2022; Dionigi et al., 2012). Moreover, all participants expressed greater commitment to rowing



because of spousal and/or children's support. Unlike previous work, participants did not express any family constraints to sport participation in old age (Choi et al., 2022; Dionigi et al., 2012; Young & Medic, 2011). For example, in comparison to Masters swimmers (Scanlan et al., 1993; Young & Medic, 2011), rowers did not express feelings of obligatory commitment to avoid disappointing their spouse or children (i.e., social constraint). Instead, participants explained how enjoyment in rowing and inclusion of their family (a form of social support) within the larger sporting community reflected functional commitment to rowing, rather than obligatory commitment (Young & Medic, 2011). In addition, given the complex nature of support (i.e., rewards and costs in social relationships that need to be negotiated) (Dionigi et al., 2012; Liang et al., 2001), it is possible the sample of rowers in this study had simply successfully negotiated (or balanced) family contexts to maintain sport involvement.

While there were many positive experiences, rowers also discussed some negative social interactions produced by their level of sport, gender and/or exclusive friendship circles. For example, Sarah, explained the negative connotations associated with the term 'recreational' athletes, as a way to socially rank and/or exclude individuals from social groups.

I think there is still a lot of snobbery with masters rowers, and particularly those of us who enter our sport late. Many of the elite end are people who have come through highly competitive system, and still carry a lot of those attitudes with them. They've been rowing for a very long time, and they sneer a little and that's where you get that sense of 'Oh, you're just a recreational rower' as being a derogatory term.

This may parallel behaviours reported in youth sport such as formation of 'cliques' as a result of high cohesion (Hardy et al., 2005). For instance, some rowers discussed how small social circles led to negative experiences of social exclusion. Emily said "I have been in boats where people

are very catty, vindictive and that's not pleasant. They've tended to select their friends rather than anything else.” Furthermore, other female athletes indicated how additional factors such as age and gender had a cumulative effect on social interactions,

It’s an all-boys club and it's prevalent. That is how most of it works. The fact that I've only been doing it seven years, the fact that I'm a girl, the fact that I'm a lot older and I've got some other ideas. That's scary to them! [Julia]

Collectively, responses on social connections (both positive and negative) highlight the existence of inter-individual differences in rowing experiences, which would produce variability (or disproportionate levels) in how one develops psychosocial assets (Dionigi et al., 2017). For example, some rowers suggested developing many deep, meaningful connections with athletes, while other rowers expressed developing other assets (i.e., confidence) more than social connections. As a result, social connections can vary depending on level of sport (i.e., competitive), as well as factors such as gender (Horton et al., 2018; Kirby & Kluge, 2021).

### **Confidence in Health and Well-Being**

Participants also discussed ways in which rowing allowed them to gain confidence in their health and overall well-being through a) an increased sense of control, b) improved coping mechanisms and c) redefined attitudes towards aging.

#### ***Sense of Control***

All athletes discussed how rowing allowed them to ‘feel good’ by delaying age-related health concerns and invest in themselves (Dionigi et al., 2017). For instance, Hazel indicated how she enjoyed the effort required to take control of her health, “When I'm finished, I feel like I've invested in myself, it's kind of an investment in my future health, in a way.” Other responses suggested similar experiences of building confidence through rowing. Diana, for example,

indicated “It makes me feel good. It makes me feel happy.” and Alex compared his life prior to rowing, noting “I’m less sluggish. I used to have more aches and pains than I do now. I used to be out of breath when I walked any distance. Yeah, I think I’m fitter at 60 than I was at 50 and it spills over every part of my life.”

However, while participants felt a sense of control over their health, it was often through downward comparisons (Horton et al., 2019; Wills, 1981). For instance, athletes compared how their investment into health gave them more confidence in their appearance compared to non-active individuals, younger adults, or their younger selves. Emily describes how she felt compared to non-active individuals, “it’s just feeling better about myself. This sounds awful but you look around and you say, really? How can you let yourself get looking like that when you’re a lot younger?” As a result, while engagement in rowing might facilitate the development of confidence through physiological improvements in health and well-being, oftentimes it was at the expense of downward comparisons with ‘others’ who are perceived as unhealthy or inactive (Dionigi, Horton, et al., 2011; Horton et al., 2019). Such attitudes could be a result of individuals holding themselves to a higher standard, where perceived societal expectations of an active lifestyle are salient, and sport is depicted as a personal moral responsibility for economic efficiency (Dionigi, 2017; Gard, Dionigi, & Dionigi, 2017; Gard, Dionigi, Horton, et al., 2017).

### ***Coping Mechanism***

Participants also discussed how engagement in rowing allowed them to cope with and resolve problems within (e.g., dealing with failure) and outside of sport. For instance, Diana explained how competitive rowing has helped her deal with failure, “I think it's also quite good for dealing with failure, in that you don't always win and what do you do if you don't win?” Similar notions on resolving issues through sport were stated by other rowers. Emily said,

It [rowing] just takes your mind off everything... puts things into perspective because if something dreadful happens and you're trying to cope with it, you go for a paddle and I guess the subconscious works on it, so when you come home you figured out how to deal with the problem. So, it enables my mind to completely switch off from problems and then also enables me to subconsciously resolve them.

Interestingly, the context of rowing, especially experiences with nature and the outdoors, provided a unique space to focus on sport and develop coping mechanisms for one's wellbeing. For example, Nathalie said, "rowing is so good because you're on rivers and lakes and things like that. You sort of see, 'oh look there's the birds, there's the fog and there's the sun'." Interactions with natural environments (e.g., hiking, gardening) have been suggested to act as therapeutic landscapes that foster wellbeing by increasing feelings of relaxation and joy (Doughty et al., 2022; Hofmann et al., 2018). Since experiences with nature were discussed in tandem with rowing, it could be argued that rowing facilitates the development of unique coping mechanisms for one's health and well-being. That is, in addition to the physiological benefits of physical activity (e.g., endorphins), interactions with nature through rowing may provide greater opportunities to develop coping mechanisms to manage health and well-being.

### ***Redefining Attitudes Towards Aging***

A third sub-theme centered around redefining one's aging attitudes and outlook on life. According to older athletes, rowing allowed them to look forward to each day. For instance, Emily stated, "it's just positive. I get up and look forward to my day. I have friends of a similar age who say it's just another day. Well, no, it's not. It's another opportunity!" Athletes were excited to plan each day, looked forward to their next life stages. Similar findings have been

presented in previous studies, which directly contradict the stereotypical views of aging and beliefs of physical activity in later years (Grant, 2001).

While independency to practice sport was crucial in redefining attitudes towards aging, it is important to recognize that this privilege may not be available to all older adults (Dionigi & Gard, 2018). Our sample group consisted of individuals who were retired and had the flexibility to restructure their routine around rowing. As Diana explained,

I love the fact that my husband and I can have a day where we just say, ‘Oh, let's not do anything around the house today. Let's go off. Go and have a picnic. Relax for the day.’ I love that. And I like the idea that I can sort of choose what I do. So, we're in a very lucky position in the we can do as much or as little as you want to just enjoy it.

Furthermore, athletes indicated how positive attitudes towards aging were developed because of improvements in physical fitness (Dionigi et al., 2017; Dionigi & O’Flynn, 2007). Alex noted, “I suppose my outlook on aging was subconsciously to gradually slow down by being unfit, being overweight and now I think I have a better outlook.” Some also enthusiastically looked forward to continuing their participation in rowing until the very end. Emily said, “I think that’s a [heart attack] brilliant way to go. Especially if you cross the finish line. Because you’re doing what you love.” Other athletes looked forward to having a place in sport regardless of age and/or disability. Sarah suggested,

Rowing has the ability to continue my sport for as long as I want to, and still find an outlet... goals, that there will always be goals. I can go into the Indoor Rowing Championships if I become disabled through age, I can still enter into a rowing competition. If I'm 90, I still want to get out there on the water. There might not be

anybody for me to race against. Maybe, who knows? But if I wanted to, there would be a competition somewhere I could enter.

Sarah's response provides insight on how some rowing athletes developed adaptive attitudes towards aging (Gayman et al., 2017), regardless of concerns such as an injury or disability. These types of responses emphasize how valuable a positive aging identity could be in developing an optimistic outlook on life. For example, previous studies on young, elite athletes have found that most young people have a negative outlook on old age and largely view aging as a time of inevitable decline in health. Additionally, young athletes viewed old age as a time for reflection on their athletic accomplishments and not as a time when they will possess a purpose in society (Phoenix & Sparkes, 2008; Phoenix et al., 2005). Given how early on negative attitudes emerge and continue to adulthood (e.g., Flamion et al., 2020), narratives from older rowers in this study offer an alternative perspective to aging, one that is more positive, adaptive and involves lifelong engagement in sport. It is also important to note, attitudes towards aging varied among the athletes, where some displayed overwhelmingly positive attitudes while others negotiated their aging process with both negative and positive aging discourses. This variability further points to the influence of inter-individual experiences within each sport.

Interestingly, similar to previous studies (Dionigi & O'Flynn, 2007) while older athletes reported on positive attitudes towards aging, they also feared decline and dependency. For instance, some provided active aging discourses intertwined with a fear of decline due to injury, which would ultimately impact their performance, independency, and ability to continue rowing. Hazel noted,

My biggest fear about aging is physical decline. As long as I can run and row it's great, it doesn't matter that I'm getting slower. But getting injured is a worry. If I feel a little niggle, I do not do what I had to do.

These responses suggest rowing provides an avenue to negotiate aging attitudes, whereby older adults avoid and simultaneously reinforce negative attitudes (Dionigi, 2006b; Dionigi et al., 2013; Dionigi & O'Flynn, 2007). On the other hand, the responses highlight these athletes' love for sport and the genuine fear of being unable to continue rowing.

### **Service to the Community**

A third theme that emerged during discussions with rowers centered on providing service or contribution back to the sport community. Specifically, athletes spoke about the opportunities to give back to sport as leaders and role models.

### ***Leadership***

Similar to previous research (Dionigi et al., 2017), athletes in this study remarked on how rowing offered opportunities to enhance one's leadership skills through important roles (official and unofficial). For example, Alex said, "I like the guys I row with, and I think if I didn't organize them, it wouldn't happen a lot of the time. This gives me a sense of leadership. When we get out in a race, I think this race wouldn't be happening if I hadn't made it happen." Similarly, Oliver experienced a sense of leadership through his role as team captain. For other athletes, such as Nathalie, Sarah and Julia, rowing led to opportunities to coach novice rowers, whereas Hazel discussed how rowing provided opportunities to develop or enhance one's leadership skills through unofficial roles such as organizing an event to guide visually impaired runners:

It [rowing] gives you an opportunity to show leadership. You don't have to be a captain of the club or nothing. You can in the case of rowing, I don't have an official position, but I can still on a sort of temporary basis organize something and if I dare to put it out there and enough people respond well then, I'm organizing... And other people then look to me to sort of lead the group, make decisions, organize things.

### ***Role Models***

Another subtheme of service related to how involvement in rowing led older athletes to inspire others and be inspired in return. This finding is supported by previous findings on how older athletes feel pride in being role models (Brooke Kirby et al., 2013; Horton et al., 2008, 2019; Liechty et al., 2017; Lyons & Dionigi, 2007). For example, Alex, said, “In my group there is a guy who’s 80 and 3 other guys who are in their 70s, and I think that’s what I want to be like in 15 years time”. Similarly, Oliver explained, how “you look at a guy who is older and think, ‘wow! He is much older than me and still doing it.’” In addition to being inspired by other older athletes, rowers spoke about becoming role models to others. Moreover, Diana indicated how the theme of becoming a role model was intertwined with other factors such as gender,

It bothers me a lot that girls are not doing enough sport as they're growing up. I think as a sports woman in my 50s now, I'd like to think that I could be a mentor or somebody that younger women who are in sport or the young girl could look up to and say, ‘Oh, yes, she did this at that age. So, I could do this now.

This response suggests the theme of role modelling is more complex than simply motivating others to play sport and is intertwined with individual factors such as cultural background, gender, and ethnicity (Horton et al., 2018). However, more research is required to examine how inter-individual variability can influence experiences of role modelling within various contexts



of sport. The value from contributing to their sporting community through leadership roles and/or as role models was a unique finding in our study of rowers and may reflect a crucial asset for managing older adults' aging process by redefining their value in society, especially during a time when their ability to perform and be useful is often doubted (Dionigi, 2015; Grant, 2001).

## **Pride in their Identity**

### ***Competitive Athlete***

Finally, participants expressed how rowing provided opportunities to develop an identity they can be proud of. Rowers repeatedly defined themselves as a competitive athlete and as someone who challenges societal norms. While older adults reported redefining themselves through sport, they also emphasized that their identity as a 'competitive athlete' did not replace other roles such as a mother or father, but instead it became an integral part of who they are and how they choose to spend their time. For example, Nathalie noted,

It's [rowing] so much part of my life now that it's my ordinary sort of life as a sort of wife and mother, so interwoven with my life that I can't really see the boundaries between it anymore. You know, I am all these things at the same time. I'm sort of a coach, mother, a competitive sculler, wife, dog owner. But for me, a competitive athlete is probably how I see myself now.

Elements of competition seem to play a key role in defining one's athletic identity and how it can continue after the event (Dionigi, 2002a, 2005; Heo et al., 2013). In addition, responses also indicate that the process of redefining one's identity is complex and can vary depending on how invested individuals are in rowing. For instance, individuals who enjoy their sport, are more likely to put more effort in their performance and commitment to the sport (Scanlan et al., 1993, 2013, 2016). However, more research is needed to clearly understand the role of competition in

relation to identity development, especially compared to non-competitive activities (e.g., recreational).

### ***Challenging Societal Norms***

Participants noted that rowing offered opportunities to set goals and continue challenging oneself. As such, athletes indicated developing an identity that challenges norms within sport as well as ageist ideals outside of sport. Our results on challenging age stereotypes corroborate previous findings (Dionigi, 2002a; Dionigi et al., 2013; Liechty et al., 2017). Most participants emphasized the thrill of competition was not fueled by winning medals (although some did emphasize the thrill of winning as a key motivator) and competing against others, instead it involved self-improvement. For instance, Hazel said, “I’m mainly competing with myself. I’m trying to row better. You know, working hard or get a better time around the familiar course. And I’m less concerned with winning or beating other people.” However, for other older adults, the thrill of winning was a driving force to continue participation in rowing, as well as confirmation of an identity as a ‘winner’, one that challenges ageist norms. This finding is in line with previous research on the variability in older athletes who enjoy competing to win, while others focus on achieving personal best (Dionigi, 2002a, 2002b, 2005). Alex described the relationship between competition and challenging age-related norms as:

We set targets and work hard to achieve those targets. And I’ve got a couple of medals that I’ve won, and I think they’re a testament to that I have stuck through it. Before I showed the medals to my friends and family they thought ‘he’ll never stick that out, it’s too hard’. I think they were thinking if I had ever gotten to a sport, I would buy a set of

golf clubs. But it's something that's actually so vigorous and took everybody by surprise.

Interestingly, female athletes explained competitive sport allowed them to identify as someone who challenges age as well as gender stereotypes. This helps support findings on the concept of a 'double-barrier' that women experience when competing in a sport as a result of being both female and older (Horton et al., 2018; Pfister, 2012). For instance, Diana said, "I don't think of myself as a 57-year-old woman still and, sometimes people say things like, usually people who don't exercise, "Should you be doing that now?" and that makes my blood boil." This was a unique finding because competitive rowing helped redefine older adults as both 'competitive athletes' and as individuals who challenge age and gender norms. However, it is important to note that our study focused exclusively on the experiences of rowing athletes and identity development could vary with engagement in other types of sport.

### **Future Directions and Implications**

By applying a pragmatic approach to analyze the data, findings from this study confirm previously reported experiences of sport and advance our knowledge of the specific benefits that are unique to rowing. More importantly, findings from this study highlight inter-individual variability in psychosocial development across sample groups and sports. While the sample was generally homogenous (e.g., white, affluent), there were more female participants than males, and, as a result, the experiences of female athletes were dominant in this study. In addition, the variability in sport experiences and psychosocial development from this sample suggest the potential for inter-individual variability will be greater or more evident in a heterogenous sample. In addition, psychosocial assets could be inter-related and thereby influence development in unique ways (e.g., meaningful connections could influence one's commitment to sport,

inspiration to become role models, and give back to the sport). Moreover, given the variability in sport histories between athletes, it is impossible to discern whether assets were developed through rowing, in another sport prior to rowing, or outside of sport altogether. To further our understanding of the nuances of psychosocial experiences and development, it is crucial that we explore groups and sports that have yet to receive attention. By expanding our knowledge of the variability of psychosocial development across sample groups and sport, we will be able to better advise sport programs focusing on facilitating asset development in older adults (Walsh et al., 2019). Moreover, from a public health standpoint, psychosocial development through sport has the potential to enhance the overall quality of life of older adults by delaying numerous health conditions and equipping older adults with assets that can act as protective mechanisms when challenges arise in their aging process.

It is important to note, assets discussed by older rowers may be specific to rowing or sports that are similar to rowing. Future explorations are needed to examine such distinctions. In addition, the homogeneity in the sample population may have led to similarities in experiences and development through sport. Future work should explore sport experiences in a more heterogeneous sample since factors such as gender, race, and culture may influence sport experiences and thereby impact development through sport. Finally, although results from this study help confirm previous findings on psychosocial assets in older adults, it is difficult to know whether they developed these assets through rowing, or whether they already possessed them prior to entering sport. Moreover, it is difficult to draw any conclusions on the long-term stability of these assets (e.g., will they last forever once they are developed or are they highly variable across different contexts?). Future research is encouraged to explore these relationships to deepen our understanding of the value of developing psychosocial assets in older adults.

**Table 1***Participant demographics*

Participant	Age	Sex, Ethnicity	Employment Status and Education Level	Marital Status	Children	Sport History (Main sport)	Other sport	Additional roles in sport
Emily	62	F, White	Retired Teacher	Married	Yes	Rekindler - Reintroduced 20 years later (began in 2000) Competitive	No	
Alex	60	M, White	Retired Solicitor (continues part-time work)	Married	Yes	Late-starter - 10 years of participation Competitive	No	Organizing training practices and registering the team in competitions
Nathalie	61	F, White	Retired Draftsman Ph.D. Graduate	Married	Yes	Later-starter- 8 years of participation Competitive	No	Coaching novice rowers
Oliver	57	M, White	Merchant navy (previous) School Site manager (full-time) Researcher in education (previous)	Married	Yes	Continuer - 25 years of participation Competitive	No	Team captain
Sarah	61	F, White	Teacher (previous) Senior management in academia (full-time)	Married	Yes	Later-starter - 11 years of participation Competitive	No	Coaching novice rowers
Diana	57	F, White	Nurse (previous) Genetic counsellor (retired) Catering business (part-time)	Married	Yes	Later-starter- Began in 2018 (rowing) Competitive	Running	
Julia	57	F, White	Personal Business Self-employed – working (part-time)	Married	Yes	Later-starter - Rowing (began 7 years ago) Competitive	Running	Coaching novice rowers
Hazel	55	F, White	Marketing consultant and company director (part-time)	Married	Yes	Rekindler - Rowing (began 30 years ago) Competitive	Running	Organizing running events for visually impaired individuals

## References

- Andersen, M. H., Ottesen, L., & Thing, L. F. (2019). The social and psychological health outcomes of team sport participation in adults: An integrative review of research. *Scandinavian Journal of Public Health*, 47(8), 832–850.  
<https://doi.org/10.1177/1403494818791405>
- Baker, J., Fraser-Thomas, J., Dionigi, R., & Horton, S. (2010). Sport participation and positive development in older persons. *European Review of Aging and Physical Activity*, 7(1), 3–12.  
<https://doi.org/10.1007/s11556-009-0054-9>
- Benson, P. L., Leffert, N., Scales, P. C., & Blyth, D. A. (2012). Beyond the “village” rhetoric: Creating healthy communities for children and adolescents. *Applied Developmental Science*, 16(1), 3–23. <https://doi.org/10.1080/10888691.2012.642771>
- Bronfenbrenner, U. (1986). Ecology of the family as a context for human development. *Developmental Psychology*, 22(6), 723–742.
- Brooke Kirby, J., Kluge, M. A., Kirby, J. B., & Kluge, M. A. (2013). Going for the gusto: Competing for the first time at age 65. *Journal of Aging and Physical Activity*, 21(3), 290–308. <https://doi.org/10.1123/japa.21.3.290>
- Cardenas, D., Henderson, K. A., & Wilson, B. E. (2009). Physical activity and senior games participation: Benefits, constraints, and behaviors. In *Journal of Aging and Physical Activity* (Vol. 17, Issue 2, pp. 135–153). <https://doi.org/10.1123/japa.17.2.135>
- Choi, W., Liechty, T., Naar, J. J., West, S. T., Wong, J. D., & Son, J. S. (2022). “We’re a family and that gives me joy”: Exploring interpersonal relationships in older women’s softball using socio-emotional selectivity theory. *Leisure Sciences*, 44(2), 183–200.  
<https://doi.org/10.1080/01490400.2018.1499056>

- Côté, J., Turnnidge, J., & Evans, M. (2014). The dynamic process of development through sport. *Kinesiology Slovenica*, 20(3), 14–26.
- Dionigi, R. (2002a). Leisure and identity management in later life: Understanding competitive sport participation among older adults. *World Leisure Journal*, 44(3), 4–15.  
<https://doi.org/10.1080/04419057.2002.9674274>
- Dionigi, R. (2002b). Resistance and empowerment through leisure: The meaning of competitive sport participation to older adults. *Loisir et Société / Society and Leisure*, 25(2), 303–328.  
<https://doi.org/10.1080/07053436.2002.10707591>
- Dionigi, R. (2005). A leisure pursuit that ‘goes against the grain’: Older people and competitive sport. *Annals of Leisure Research*, 8(1), 1–22.  
<https://doi.org/10.1080/11745398.2005.10600957>
- Dionigi, R. (2006a). Competitive sport and aging: The need for qualitative sociological research. *Journal of Aging and Physical Activity*, 14(4), 365–379.  
<https://doi.org/10.1123/japa.14.4.365>
- Dionigi, R. (2006b). Competitive sport as leisure in later life: Negotiations, discourse, and aging. *Leisure Sciences*, 28(2), 181–196. <https://doi.org/10.1080/01490400500484081>
- Dionigi, R. (2015). Stereotypes of aging: Their effects on the health of older adults. *Journal of Geriatrics*, 2015, 1–9. <https://doi.org/10.1155/2015/954027>
- Dionigi, R. (2017). I would rather die than live sedentary: Is the demonization of passive leisure creating a future generation of older people who will not accept inactivity? *Topics in Geriatric Rehabilitation*, 33(3), 156–161. <https://doi.org/10.1097/TGR.0000000000000151>
- Dionigi, R., Baker, J., & Horton, S. (2011). Older athletes’ perceived benefits of competition. *The International Journal of Sport and Society: Annual Review*, 2(2), 17–28.

<https://doi.org/10.18848/2152-7857/cgp/v02i02/53869>

Dionigi, R., Fraser-Thomas, J., & Logan, J. (2012). The nature of family influences on sport participation in Masters athletes. *Annals of Leisure Research*, 15(4), 366–388.

<https://doi.org/10.1080/11745398.2012.744274>

Dionigi, R., Fraser-Thomas, J., Stone, R., & Gayman, A. (2017). Psychosocial development through masters sport: What can be gained from youth sport models? *Journal of Sports Sciences*, 36(13), 1533–1541. <https://doi.org/10.1080/02640414.2017.1400147>

Dionigi, R., & Gard, M. (2018). Sport for all ages? Weighing the evidence. In *Sport and Physical Activity Across the Lifespan: Critical Perspectives* (pp. 1–20). Palgrave Macmillan UK. <https://doi.org/10.2307/j.ctt5hjpwg.27>

Dionigi, R., Horton, S., & Baker, J. (2013). Negotiations of the ageing process: Older adults' stories of sports participation. *Sport, Education and Society*, 18(3), 370–387. <https://doi.org/10.1080/13573322.2011.589832>

Dionigi, R., Horton, S., & Bellamy, J. (2011). Meanings of aging among older canadian women of varying physical activity levels. *Leisure Sciences*, 33(5), 402–419. <https://doi.org/10.1080/01490400.2011.606779>

Dionigi, R., & O'Flynn, G. (2007). Performance discourses and old age: What does it mean to be an older athlete? *Sociology of Sport Journal*, 24(4), 359–377.

Dogra, S., Clarke, J. M., & Copeland, J. L. (2017). Prolonged sedentary time and physical fitness among Canadian men and women aged 60 to 69. *Health Reports*, 28(2), 3–9.

Doughty, K., Hu, H., & Smit, J. (2022). Therapeutic landscapes during the COVID-19 pandemic: increased and intensified interactions with nature. *Social and Cultural Geography*, 00(00), 1–19. <https://doi.org/10.1080/14649365.2022.2052168>



- Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for adults: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 135.  
<https://doi.org/10.1186/1479-5868-10-135>
- Flamion, A., Missotten, P., Jennotte, L., Hody, N., & Adam, S. (2020). Old age-related stereotypes of preschool children. *Frontiers in Psychology*, 11(April), 1–13.  
<https://doi.org/10.3389/fpsyg.2020.00807>
- Gard, M., Dionigi, R., & Dionigi, C. (2017). From a lucky few to the reluctant many: Interrogating the politics of sport for all. *Sport and Physical Activity Across the Lifespan: Critical Perspectives*, 67–89. [https://doi.org/10.1057/978-1-137-48562-5\\_4](https://doi.org/10.1057/978-1-137-48562-5_4)
- Gard, M., Dionigi, R., Horton, S., Baker, J., Weir, P., & Dionigi, C. (2017). The normalization of sport for older people? *Annals of Leisure Research*, 20(3), 253–272.  
<https://doi.org/10.1080/11745398.2016.1250646>
- Gayman, A., Fraser-Thomas, J., Dionigi, R., Horton, S., & Baker, J. (2017). Is sport good for older adults? A systematic review of psychosocial outcomes of older adults' sport participation. *International Review of Sport and Exercise Psychology*, 10(1), 164–185.
- Geard, D., Rebar, A., Reaburn, P., & Dionigi, R. (2018). Testing a model of successful aging in a cohort of masters swimmers. *Journal of Aging and Physical Activity*, 26(2), 183–193.  
<https://doi.org/10.1123/japa.2016-0357>
- Grant, B. C. (2001). You're never too old: Beliefs about physical activity and playing sport in later life. *Ageing and Society*, 21(6), 777–798. <https://doi.org/10.1017/s0144686x01008492>
- Hardy, J., Eys, M. A., & Carron, A. V. (2005). Exploring the potential disadvantages of high

cohesion in sports teams. *Small Group Research*, 36(2), 166–187.

<https://doi.org/10.1177/1046496404266715>

Heo, J., Culp, B., Yamada, N., & Won, Y. (2013). Promoting successful aging through competitive sports participation. *Qualitative Health Research*, 23(1), 105–113.

<https://doi.org/10.1177/1049732312457247>

Higgs, C., Way, R., Harber, V., Jurbala, P., & Balyi, I. (2019). *Sport for life: Long-term development in sport and physical activity*. Sport for Life Society.

<https://sportforlife.ca/portfolio-view/long-term-development-in-sport-and-physical-activity-3-0/>

Hofmann, M., Young, C., Binz, T. M., Baumgartner, M. R., & Bauer, N. (2018). Contact to nature benefits health: Mixed effectiveness of different mechanisms. *International Journal of Environmental Research and Public Health*, 15(1).

<https://doi.org/10.3390/ijerph15010031>

Horton, S., Baker, J., Côté, J., & Deakin, J. M. (2008). Understanding seniors' perceptions and stereotypes of aging. *Educational Gerontology*, 34(11), 997–1017.

<https://doi.org/10.1080/03601270802042198>

Horton, S., Dionigi, R., Gard, M., Baker, J., & Weir, P. (2018). Don't sit back with the geraniums, get out: The complexity of older women's stories of sport participation. *Journal of Amateur Sport*, 4(1), 24–51. <https://doi.org/10.17161/jas.v4i1.6627>

Horton, S., Dionigi, R., Gard, M., Baker, J., Weir, P., & Deneau, J. (2019). “You can sit in the middle or be one of the outliers”: Older male athletes and the complexities of social comparison. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.02617>

International Masters Games Association. (2017). *The world masters games 2017 post-event*

report. <https://www.imga.ch/assets/Uploads/Reports/Auckland-WMG-2017-Final-Report.pdf>

International Masters Games Association. (2020). *A brief history of the world masters games*.

<https://imga.ch/2020/07/14/a-brief-history-of-the-world-masters-games/>

Jenkin, C. R., Eime, R. M., Westerbeek, H., O'Sullivan, G., & Van Uffelen, J. G. Z. (2017).

Sport and ageing: A systematic review of the determinants and trends of participation in sport for older adults. *BMC Public Health*, 17(1). <https://doi.org/10.1186/s12889-017-4970-8>

Kelly, L. M., & Cordeiro, M. (2020). Three principles of pragmatism for research on organizational processes. *Methodological Innovations*, 13(2).

<https://doi.org/10.1177/2059799120937242>

Kim, A. C. H., Park, S. H., Kim, S., & Fontes-Comber, A. (2020). Psychological and social outcomes of sport participation for older adults: A systematic review. *Ageing and Society*, 40(7), 1529–1549. <https://doi.org/10.1017/S0144686X19000175>

Kirby, J. B., & Kluge, M. A. (2021). For the love of the game: An exploration of the experiences and psychosocial development of women 70 years of age and older who play volleyball. *Journal of Aging and Physical Activity*, 30(September), 1–10.

<https://doi.org/10.1123/japa.2021-0100>

Lerner, R. M., Lerner, J. V., Almerigi, J. B., Theokas, C., Phelps, E., Gestsdottir, S., Naudeau, S., Jelicic, H., Alberts, A., Ma, L., Smith, L. M., Bobek, D. L., Richman-Raphael, D., Simpson, I., Christiansen, E. D. D., & Von Eye, A. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth-grade adolescents: Findings from the first wave of the 4-H study of positive youth

- development. *Journal of Early Adolescence*, 25(1), 17–71.
- Liang, J., Krause, N. M., & Bennett, J. M. (2001). Social exchange and well-being: Is giving better than receiving? *Psychology and Aging*, 16(3), 511–523.  
<https://doi.org/10.1037//0882-7974.16.3.511>
- Liechty, T., West, S., Naar, J., & Son, J. (2017). Perceptions of ageing among older women softball players. *Annals of Leisure Research*, 20(3), 295–313.  
<https://doi.org/10.1080/11745398.2016.1220321>
- Litchfield, C., & Dionigi, R. A. (2012). The meaning of sports participation in the lives of middle-aged and older women. *International Journal of Interdisciplinary Social Sciences*, 6(5), 21–36.
- Lyons, K., & Dionigi, R. (2007). Transcending emotional community: A qualitative examination of older adults and masters' sports participation. *Leisure Sciences*, 29(4), 375–389.  
<https://doi.org/10.1080/01490400701394881>
- MacLellan, J., Callary, B., & Young, B. W. (2018). Same coach, different approach? How masters and youth athletes perceive learning opportunities in training. *International Journal of Sports Science and Coaching*, 13(2), 167–178.  
<https://doi.org/10.1177/1747954117727202>
- Patelia, S., Mazhar, A., & Baker, J. (2023). What do we know about the value of sport for older adults? A scoping review. *Journal of Aging and Physical Activity*, 1–16.
- Pfister, G. (2012). It is never too late to win – Sporting activities and performances of ageing women. *Sport in Society*, 15(3), 369–384. <https://doi.org/10.1080/17430437.2012.653206>
- Phoenix, Cassandra, & Sparkes, A. (2008). Athletic bodies and aging in context: The narrative construction of experienced and anticipated selves in time. *Journal of Aging Studies*, 22(3),

211–221. <https://doi.org/10.1016/j.jaging.2007.04.001>

Phoenix, Cassie, Faulkner, G., & Sparkes, A. (2005). Athletic identity and self-ageing: the dilemma of exclusivity. *Psychology of Sport and Exercise*, 6(3), 335–347.

<https://doi.org/10.1016/j.psychsport.2003.11.004>

Public Health Agency of Canada. (2018a). A common vision for increasing physical activity and reducing sedentary living in Canada: Let's get moving. In *Public Health Canada*.

<https://www.canada.ca/content/dam/phac-aspc/documents/services/publications/healthy-living/lets-get-moving/pub-eng.pdf>

Public Health Agency of Canada. (2018b). *Physical activity tips for older adults (65 years and older)*. [https://www.canada.ca/en/public-health/services/publications/healthy-](https://www.canada.ca/en/public-health/services/publications/healthy-living/physical-activity-tips-older-adults-65-years-older.html)

[living/physical-activity-tips-older-adults-65-years-older.html](https://www.canada.ca/en/public-health/services/publications/healthy-living/physical-activity-tips-older-adults-65-years-older.html)

Public Health Agency of Canada. (2020). Aging and chronic disease: A profile of Canadian seniors. In *Cat.: HP35-137/1-2020E-PDF*.

Rathwell, S., Callary, B., & Young, B. W. (2015). Exploring the context of coached masters swim programs: A narrative approach. *International Journal of Aquatic Research and Education*, 9(1), 70–88. <https://doi.org/10.1123/ijare.2014-0068>

Rowing Canada. (2020). *2020 Annual report*.

[https://rowingcanada.org/uploads/2021/01/RowingCanada\\_2020AnnualReport\\_EN\\_FINAL\\_small.pdf](https://rowingcanada.org/uploads/2021/01/RowingCanada_2020AnnualReport_EN_FINAL_small.pdf)

Scanlan, T. K., Carpenter, P. J., Simons, J. P., Schmidt, G. W., & Keeler, B. (1993). An introduction to the sport commitment model. *Journal of Sport and Exercise Psychology*, 15(1), 1–15.

Scanlan, T. K., Carpenter, P. J., Simons, J. P., Schmidt, G. W., & Keeler, B. (2016). The sport

- commitment model: Measurement development for the youth-sport domain. *Journal of Sport and Exercise Psychology*, 15(1), 16–38. <https://doi.org/10.1123/jsep.15.1.16>
- Scanlan, T. K., Russell, D. G., Scanlan, L. A., Klunchoo, T. J., & Chow, G. M. (2013). Project on elite athlete commitment (PEAK): IV. identification of new candidate commitment sources in the sport commitment model. *Journal of Sport and Exercise Psychology*, 35(5), 525–535. <https://doi.org/10.1123/jsep.35.5.525>
- Sivaramakrishnan, H., Gucciardi, D. F., McDonald, M. D., Quested, E., Thøgersen-Ntoumani, C., Cheval, B., & Ntoumanis, N. (2021). Psychosocial outcomes of sport participation for middle-aged and older adults: a systematic review and meta-analysis. *International Review of Sport and Exercise Psychology*, 0(0), 1–22. <https://doi.org/10.1080/1750984X.2021.2004611>
- Toepell, A. R., Guilmette, A. M., & Brooks, S. (2004). Women in masters rowing: Exploring healthy aging. *Women's Health and Urban Life: An International and Interdisciplinary Journal*, 3(1), 74–95. <https://hdl.handle.net/1807/1058>
- United Nations. (2019). World Population Ageing 2019. In *Department of Economic and Social Affairs*. [http://link.springer.com/chapter/10.1007/978-94-007-5204-7\\_6](http://link.springer.com/chapter/10.1007/978-94-007-5204-7_6)
- Walsh, D. W., Green, B. C., Holahan, C., Cance, J. D., & Lee, D. (2019). Healthy aging? An evaluation of sport participation as a resource for older adults in retirement. *Journal of Leisure Research*, 50(1), 56–80. <https://doi.org/10.1080/00222216.2018.1554092>
- Webb, E., Stratas, A., & Karlis, G. (2017). I am not too old to play - The past, present and future of 50 and over organized sport leagues. *Physical Culture and Sport, Studies and Research*, 74(1), 12–18. <https://doi.org/10.1515/pcssr-2017-0011>
- Wigglesworth, N. (2013). The social history of english rowing. In *Angewandte Chemie*

- International Edition*, 6(11), 951–952. Routledge. <https://doi.org/10.4324/9781315035581>
- Wills, T. A. (1981). Downward comparison principles in social psychology. *Psychological Bulletin*, 90(2), 245–271. <https://doi.org/10.1037/0033-2909.90.2.245>
- World Health Organization. (2021). *Ageing and health*. <https://www.who.int/news-room/fact-sheets/detail/ageing-and-health>
- Young, B. W., & Medic, N. (2011). Examining social influences on the sport commitment of masters swimmers. *Psychology of Sport and Exercise*, 12(2), 168–175. <https://doi.org/10.1016/j.psychsport.2010.09.004>

## **Chapter Four: Measuring Psychosocial Assets in Older Adults: Conceptualization and Preliminary Assessment**



### **Abstract**

Sport has been proposed as a unique context that provides opportunities to develop important psychosocial assets that are valuable in later years. Emerging research in this area has been promising; however, it has generally focused on qualitative explorations, which, while useful, have limitations for comparing across contexts within sport (e.g., level and type of sport) as well as across other settings (e.g., sport versus exercise). Given the rising number of older athletes, this study aimed to conceptualize and develop a scale to measure psychosocial assets in older adults. To achieve this aim, the Psychosocial Assets Scale (PAS) was created. Several items from existing scales (e.g., Developmental Assets Profile) were included where appropriate. In addition, new items were added based on research in this area. The PAS was reviewed by a group of experts in the field and tested for face validity with a sample of older adults. After this preliminary development phase, the scale was tested on a sample of older athletes (n=437). Results from an exploratory factor analysis (EFA) with oblique rotation revealed nine factors related to general wellbeing, contribution, social support, drive/challenge, integrity, health habits, supportive family relationships, perceived safety, and desire to learn/continued learning. This analysis reflects an important initial step in creating a valid and reliable tool to measure assets in older adults.

## **Introduction**

Childhood and adolescence are predominantly recognized as a time to maximize physical, cognitive, psychological, and social development. During these life stages, individuals are encouraged to accumulate knowledge and acquire skills that would prepare them for the future. The concept of Positive Youth Development (PYD), for example, emphasizes young people as resources to be developed instead of focusing on deficits or problems to be managed (Damon, 2004; Holt & Neely, 2011; Vierimaa et al., 2012). However, in later stages of life, old age or aging begins to be negatively stereotyped, especially in Western cultures. A prevailing misconception is that at a certain age (such as 65) older adults will suddenly decline in their development and performance, and as a result must retire from their occupations and/or activities (e.g., sport).

Since the early nineteenth century, sport has been used as a vehicle for growth and character development among young people for political, cultural, and religious aspirations (Gard et al., 2017; Jirásek, 2020), whereas the same type of activity, especially at the competitive level, has been generally stereotyped as risky and/or overly strenuous for the aging adults (Dionigi, 2006; Grant, 2001). Importantly, the drastic decline in physical activity levels with increasing age and increased prevalence of multiple chronic diseases in many older adults highlight the profound health implications of describing old age simply as a time of decay and decline (Public Health Agency of Canada, 2020). In addition, assuming development is limited (or mostly limited) to the period up to and including adolescence inhibits a deeper understanding on continued growth and development across the lifespan.

Interestingly, the last three decades have provided researchers with a unique opportunity to study older adults who avidly train and compete in sport. Despite the stereotype of sport as an

activity for youth, there is a growing number of older adults who are interested in participating and competing in sport. For instance, the popularity of Masters sports has increased considerably (almost four-fold) since the first World Masters Games (WMG) in 1985 in Toronto, Canada which hosted 8,305 competitors (Weir et al., 2010). At the New Zealand 2017 WMGs 24,905 athletes representing 106 countries competed in 28 sports (International Masters Games Association, 2017), while the next WMGs in 2025 in Taipei is expected to have approximately 40,000 older athletes (International Olympic Committee, 2020). Unlike other international sporting events, age is the qualifier for participation and generally, individuals aged 35 and above who continue training and competing in organized sport (particularly Masters sport) beyond the typical age of peak performance are labelled as Masters Athletes (MAs) (Baker, Fraser-Thomas, et al., 2010; Baker, Horton, et al., 2010; Weir et al., 2010). In addition, organizations such as Sport for Life now avidly promote slogans such as ‘durable by design’ which encourage lifelong engagement in sport and physical activity to become more durable and age successfully (Sport for Life, 2016). Moreover, as part of their global action plan to increase levels of physical activity, the World Health Organization recognizes sport as important for providing social, cultural, and economic benefits to communities and nations (World Health Organization, 2018). As a result, this cohort provides a unique opportunity to study the value of sport and continued development in later life.

### **Development of Assets through Sport in Older Adults**

Sport offers numerous physical, psychological, cognitive, and social health benefits. However, we know very little about the value of sport (especially at the competitive level) on the overall health and functioning of older adults, perhaps because this is a relatively new area of research (Dionigi et al., 2011). In addition, most research on older adults has focused on low to

moderate level activities such as walking, dancing, and fitness class, which perpetuates the stereotype that activities best suited for older adults are less strenuous (Dionigi et al., 2011). Perhaps as a result, many older athletes report negotiating negative attitudes such as, ‘at your age you shouldn’t be doing this’ (Grant, 2001).

Conversely, other scholars have described this group as the ideal model of optimal or successful aging, since MAs initiate, resume or continue participation in sport during a stage in the lifespan when a majority of older adults are physically inactive (Geard et al., 2017; Hawkins et al., 2003). Placing older athletes (particularly competitive) on a pedestal of human potential has led to increased interest in studying the health and performance of older adults in sport. That said, the area of physiological health has received the most attention; for instance, findings from a recent scoping review (Patelia et al., 2022) indicated that physiological health of older athletes has been consistently studied since 1986 (42% of studies included in the review), whereas only 17% of studies focused on psychosocial outcomes of sport. Until recently, the development of psychosocial assets has been exclusively associated with young people, perhaps because the period before the transition to adulthood has been seen as more critical for long-term development. However, over the last decade, researchers studying the field of development have adopted lifespan perspectives, which assume that development is not completed at adulthood, instead extending across the entire life course (Baltes et al., 1999). As a result, later life is now promoted as a period of active involvement, so that individuals can continue development in physical, psychological, and social health dimensions.

According to the framework of PYD, psychosocial assets are described as building blocks that can be developed or enhanced through a structured and organized context, such as sport (Benson et al., 2012; Damon, 2004; Fraser-Thomas et al., 2005). Benson and colleagues

(2012) identified 40 ‘developmental assets’ that are broadly divided into two categories (internal and external assets), and further divided into eight subcategories (support, empowerment, boundaries and expectations, constructive use of time, commitment to learning, positive values, social competence, and positive identity). Development of assets is considered crucial during middle and high-school years because for young people, this is a “watershed decade, fraught with transitions, choices, opportunities, and dangers” (Benson, 2006, p. 24). However, a similar comparison can be made for adult and older adulthood, since individuals face significant changes in their life (e.g., career development, marriage, parenthood, health challenges, retirement, and loss of loved ones or death) during these life stages (Liechty et al., 2017). Hence, the framework of developmental assets which generally focuses on “establishing benchmarks for positive child and adolescent development” (Benson, 2006, p. 23) can be expanded to include adulthood. This would require a refinement of our conceptualization of development so that aging is not simply considered as a period of decay, but instead a unique and dynamic developmental stage of life.

Prior to examining psychosocial development in adults, it is important to define the term ‘psychosocial assets’ for this cohort. Using information from PYD frameworks as well as research from older adults in sport, we defined *psychosocial assets* as useful resources or attributes (innate or acquired) that operate as antecedents to personal developmental outcomes. For example, the context of sport can provide older adults opportunities to develop psychosocial assets such as competence and confidence to perform in sport, with the potential of fostering personal developmental outcomes such as falls self-efficacy, independence in completing activities of daily living (ADLs; Stone et al., 2018) as well as a sense of control over their health (Dionigi et al., 2017).

Given the extensive knowledge on development in youth, and scarcity of knowledge on older adults in sport, models from youth development provide a reasonable starting point to examine psychosocial development in older adults. However, it is important to recognize that while older adults may be similar to younger adults on their reasons to participate in sport (e.g., improving their fitness, opportunities of social interaction, experiencing competition and seeking challenges) (Stenner et al., 2020), there are key differences between these cohorts (e.g., health, balancing career and sport, familial duties). Moreover, it is crucial to avoid infantilizing adults when applying youth models directly to older adults (Salari, 2016). Fortunately, studies that have employed PYD models on older athletes have reported similar outcomes in the context of sport to those reported in youth research (Baker, Fraser-Thomas, et al., 2010; Dionigi et al., 2017; Gayman et al., 2017).

In addition, while youth models such as Benson's framework of 40 Developmental Assets (Benson et al., 2012), the 'Five Cs of PYD' (Lerner et al., 2005), and the Personal Assets Framework (Côté et al., 2014, 2016; Fraser-Thomas et al., 2005) provide a starting point to study development in older cohorts, the nuances between age groups reveal assets that are novel to older adults and experienced differently later in life. For instance, older athletes, report developing assets such as commitment, cognitive and challenge (Dionigi et al., 2017). Further, they report using downward comparisons to bolster one's own motivation (Horton et al., 2019), which are not reported in youth sport research. Moreover, numerous qualitative studies have noted the relationship between sport and the development or enhancement of assets such as supportive personal relationships, positive aging identity/outlook on life, challenging or negotiating age stereotypes, as well as confidence and competence (Baker, Fraser-Thomas, et al., 2010; Dionigi, 2006; Dionigi et al., 2011, 2013, 2017; Gayman et al., 2017; Kirby & Kluge,

2013, 2021). In addition, engagement in sport is related to enhanced life satisfaction and quality of life due to increased social interactions (Eime et al., 2013). Hence, psychosocial assets may be valuable for mitigating developmental outcomes such as chronic diseases, as well as feelings of isolation and dependency in old age. Ultimately, current research in aging and sport reinforces that psychosocial development continues across the lifespan, and, moreover, unique developmental assets have the potential to influence one's aging process. Furthermore, the existing research suggests that certain context may provide better opportunities to develop psychosocial assets to thrive in old age.

Unfortunately, while research in this area is promising, the study of development in older adults has been generally limited to qualitative investigations, and while these approaches are valuable for what they contribute to our understanding of this phenomenon, they lack the ability to statistically measure and validate, or to best compare development between groups (e.g., differences between exercise versus sport engagement, competition level, type of sport). A recent literature review concluded that team sport is related to enhanced psychosocial health outcomes more than individual sport participation (Andersen et al., 2019). However, a quantitative tool would be required to test and support this finding. In addition, exploration on psychosocial development in older athletes has focused on competitive MAs, who are considered a privileged group that have the time, ability, health, and disposable income to train and travel to the international events (Dionigi & O'Flynn, 2007), which is not reflective of the majority of the older population. A quantitative scale would be similarly useful for sampling a large and diverse group of older adults in sport. Such a scale would have the potential for determining whether there were significant differences in the types of assets developed in competitive versus recreational athletes, for example, or whether one's gender, age, and ethnicity impacts the

development of certain types of assets. Finally, a quantitative lens is useful for determining the value and/or cost of promoting sport over other leisure activities in developing psychosocial assets among older adults. Ultimately, an assets scale has the potential to inform sport development programs, health policy, and message framing for older adults. To this end, the aim of this study was to design a psychosocial assets scale that would help measure development of assets in older adults.

## **Methods**

### **Designing the Psychosocial Assets Scale**

The Development Assets Profile (DAP) was created in 2005 by the Search Institute to measure psychosocial development in youth and adapted to measure psychosocial assets in older adults. The DAP has been widely used to measure internal and external assets in youth across eight domains: 1) support, 2) empowerment, 3) boundaries and expectations, 4) constructive use of time, 5) commitment to learning, 6) positive values, 7) social competencies and 8) positive identity. This measure was seen as a useful starting point for examining individual personal development (or defined as developmental assets), with good reliability estimates (0.59 – 0.87) for the eight categories. In youth samples, the DAP is considered to be useful in schools, mental health and family service practices, and examining youth programs (MacDonald & McIsaac, 2016). Many of these eight domains have also been reported by older adults in sport (e.g., commitment to learning, empowerment, positive identity; Baker, Fraser-Thomas, et al., 2010; Dionigi, 2002, 2006). With this prior work in mind, this study used the DAP as a guide to build a psychosocial assessment tool that can be applied to older adults. While other quantitative measures exist, such as Life Skills Transfer Survey (LSTS; Weiss et al., 2014), Prosocial and Antisocial Behaviour in Sport Scale (PABSS; Kavussanu and Boardley, 2009), Youth



Experience Survey 2.0 (YES 2.0; Hansen and Larson, 2005) and Youth Experience Survey for Sport (YES-S; MacDonald et al., 2012), the DAP was chosen as the initial step in scale development because it specifically focused on measuring ‘assets’.

The process of designing a tool to measure psychosocial assets in older adults began in September 2020. Ethics approval for the study was granted by the Office of Research Ethics at York University (STU 2021-035). The first step in the scale design involved a thorough examination of the 58-items in the DAP to identify those that were only relevant for youth samples. For instance, items such as “I have a school that gives students clear rules” or “parent(s) who urge me to do well in school”, are related to a specific stage of life in youth that had little relevance for most older adults. A total of 6 items were deemed as irrelevant and subsequently removed at this stage. The remaining items were then revised to reflect experiences and development of older adults. For instance, “I feel safe in school” was revised to “I feel safe in my clubs and/or community”, or “I have a family that provides me with clear rules” was revised to “I have people that provide me constructive or quality instruction”. The importance of a community as well as the value of constructive feedback has been expressed by older athletes in previous studies (Callary et al., 2015; Lyons & Dionigi, 2007). In addition, new items were created based on previous research in the area, as well as findings from Patelia et al. (2023; Chapter Two of this dissertation) and asset development through rowing (Chapter Three of this dissertation). A detailed summary of the items is included in Appendix C.

To assess the items created for the scale in this initial step, a group of experts in the field of sport and older adults were contacted to provide their feedback. This ‘expert group’ (N= 3) reviewed the drafted scale several times to revise, remove, and add new items that were relevant to older adults. This process was lengthy because experts were from various research

backgrounds such as coaching MAs, sport and aging experiences, experiences of female athletes, and psychosocial development. As such, revision, inclusion, and exclusion of each item was discussed in detail from diverse perspectives. Moreover, experts provided feedback at their convenience which extended this element of the process. The revised scale was pilot tested on a group of older adults to ensure the language used to describe each item was interpreted in the manner as intended by the research team. After ~5 months of continued revisions, the expert group and lead researchers were satisfied with a preliminary version of the Psychosocial Assets Scale that included a list of 71 potential items submitted for further assessment.

### **Participants**

Sporting organizations and recreational clubs such as Athletics Canada, Canadian Masters Association, Swimming Canada Masters, World Masters Hockey, as well as other local sport clubs within Ontario, were contacted by email to complete the Psychosocial Assets Scale on Google Forms over a recruitment period from May 2021 to February 2022. A total of 481 participants completed the survey. The sample was largely comprised of males, aged 60-69 years, who were married, identified as white, worked full-time, completed higher education, and resided in Canada. In addition, a large proportion of the sample included field hockey athletes, followed by athletes participating in two or more sports (i.e., labelled as multiple sports), running and rowing. A detailed summary of the demographic profile of the sample is provided in Table 1.

### **Data Analyses**

The primary step in the analysis involved reviewing the dataset for missing information or outliers. For example, cases were removed if date of birth was not clearly reported (i.e., age could not be calculated;  $n=6$ ) or if participants reported no sporting activity (i.e., since this sample focused on sport participants;  $n=12$ ). In addition, to try to control for the influence of age

in this sample, the analysis was limited to older athletes aged 50 and above (i.e., athletes aged 49 and younger were removed;  $n=26$ ).

An exploratory factor analyses (EFA) with oblique rotation was performed using SPSS version 28 on 71 items on a sample of 437 older adults aged 50 and above. Oblique rotation was selected because it allows analysis of wide range of factor intercorrelations (i.e., between factors and items), whereas an orthogonal rotation would have assumed all factors to be uncorrelated with each other. Our rationale for selecting oblique rotation was further confirmed through the correlation between factors in the component correlation matrix (i.e.,  $r \geq 0.32$ ; see Appendix C). In addition, based on the recommendations by Stevens (2002) and Field (2009), a factor loading of  $r > 0.30$  was considered to be significant for a sample size of  $\sim 400$  participants.

## Results

The initial analysis with all 71 variables indicated the Kaiser-Meyer-Olkin's (KMO) measure of adequacy = 0.934 ("superb"; Hutcheson, 1999) and Bartlett's test of sphericity ( $X^2(2485) = 17555.2, p < 0.0001$ ) met the requirements to perform an EFA. Fourteen factors with eigenvalues greater than 1 were extracted, explaining 63.5% of the variance. However, the scree plot indicated inflexions that would justify retaining between 7 and 10 factors (see Figure 1). The reproduced matrix indicated that 281 residuals (11%) with absolute values greater than 0.05, which is less than 50%, suggesting there were no grounds for concern (Field, 2009). However, the determinant suggested a possible issue with multicollinearity ( $2.967^{-19}$ ). As a result, the correlation matrix was examined to remove any items with correlations that were greater than  $r=0.80$ . Two items were highly correlated with  $r > 0.80$  squared multiple correlations (SMCs) indicating they could be measuring very similar attributes<sup>3</sup>(see Appendix C). Following the

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<sup>3</sup> Item 62: I have good neighbors who care about me ( $r=0.82$ ).  
Item 68: I have neighbours who help watch out for me ( $r=0.82$ ).

guidelines by Tabachnick and Fidell (2019), one of the two items (item 68) was removed based on lower factor loadings (compared to the correlated item) and conceptual reasonings (wording that related more closely to the underlying factor). While removal of one of these items did not have a strong effect on the determinant ( $1.20^{-18}$ ), it resulted in 14 factors with better defined variables and higher factor loadings. To reach parsimony, additional variables (or items) were removed if they did not load on any factors ( $r < 0.30$ ), only a single variable defined a factor, multiple unrelated factors (labelled as a complex factor), and/or a variable shared little or no relationship with other variables that define the underlying factor. A complex variable that measured two unrelated factors was avoided because they make interpretation of factors more ambiguous (Tabachnick & Fidell, 2019). This process of eliminating variables continued until factors were determined to be well defined, with at least 3 factor loadings where  $r > 0.30$ . In addition, the correlation matrix was reassessed for multicollinearity ( $r > 0.80$ ) after the most parsimonious factor structure had been determined. While three variables were correlated (see Appendix C), they did not produce correlations high enough ( $r > 0.80$ ) to justify removal from the final factor structure.

Nine factors, explaining 65.5% of the variance, were retained through this process. Factors were extracted based on eigenvalues (greater than Kaiser's criterion of 1), point of inflexion on the scree plot (see Figure 1) and conceptual reasonings. The KMO (0.923) measure verified the sampling adequacy of the analysis and the Bartlett's test of sphericity  $X^2(820) = 9320.7$ ,  $p < 0.0001$ , indicated significant correlations between items. While the determinant improved ( $2.49^{-10}$ ) compared to the initial analysis, it was still  $< 0.00001$ . In addition, retaining important factors and variables was deemed more valuable than increasing the determinant value, at least at this preliminary phase of scale development. The reproduced matrix indicated

that 99 residuals (12%) with absolute values greater than 0.05, suggesting there was no grounds for concern (Field, 2009). Nine factors were extracted from a sample of older athletes aged 50 and above (see Table 4). In addition, six factors were found to be related: 1) social support and service, 2) integrity and perceived safety, and 3), general well-being and perceived safety.

### **Discussion**

The continued interest in sport is an opportunity to study its value in human development across the ages. Previous studies on older adults have found sport to facilitate development of specific psychosocial assets that are invaluable determinants for overall health and well-being. For instance, assets such as increased social support or connections, empowerment, resisting negative age stereotypes, confidence, and competence (Baker, Fraser-Thomas, et al., 2010; Dionigi, 2006; Dionigi et al., 2017; Gayman et al., 2017; Grant, 2001; Liechty et al., 2017) are important resources to mitigate loneliness, cope with life changes and/or stressful situations (e.g., loss of a spouse, health challenges), increase commitment, mitigate debilitating health conditions, and develop a positive outlook towards aging (Choi et al., 2022; Eime et al., 2013; Patel et al., 2018; Stone et al., 2018; Toepoel, 2013; Young & Medic, 2011).

While many of these assets are undeniably valuable from a health and development perspective, the *contexts* in which they are developed, as well as the processes of *how* they are developed are important questions that need to be explored prior to promoting sport as a vehicle for positive development for all older adults. It is possible that certain contexts could better facilitate development of specific types of assets more than others, in some individuals. However, our knowledge on the specific sport contexts required to facilitate the greatest development of psychosocial assets is still contested among experts in this field. For example, some suggest team-based settings provide more opportunities to develop psychosocial assets

such as expanded social networks and supportive relationships during old age compared to other individual-based settings (Andersen et al., 2019; Choi et al., 2022; Eime et al., 2013). However, a recent meta-analysis on broad range of psychosocial outcomes (including social support) reported that the type of sport (e.g., team or individual sport) and the context of participation (e.g., recreation or competitive) were not significant moderators (Sivaramakrishnan et al., 2021). To better understand these (and other) nuances, this study aimed to design a quantitative tool that can measure psychosocial assets across broad samples of older adults. This study lays the foundation for testing and refining a psychosocial assessment scale for older adults. Overall, the most parsimonious and interpretable solution resulted in a nine-factor model (see Tables 3 and 4). While these results are notable, it is important that the findings from this study are considered as an initial or preliminary step towards the creation of a valid and reliable tool to measure psychosocial assets in this population. This may be important since 30 items (i.e., 14 revised items, 9 directly from the DAP, and 7 new items) from the original 71 items were removed in the EFA (see Appendix C).

The first notable finding that emerged from the development and preliminary testing of the PAS was the importance of social support for older adults. The value of supportive social relationships is discussed extensively in literature on older adults in sport. There is an extensive body of knowledge which endorses sport as an avenue to expand one's social network and support, experience camaraderie, and belongingness (Brooke Kirby et al., 2013; Choi et al., 2022), through opportunities such as travel and competition (Dionigi et al., 2011), social gatherings, as well as becoming a part of a community (Dionigi et al., 2017; Lyons & Dionigi, 2007). As such, it is not surprising that items related to social support (factor 1) resulted in high factor loadings and Cronbach's alpha. However, the distinction between factors related to

general social support and support specifically from family members (factor 6) was surprising and a unique finding from this study. Interestingly, our results suggest ‘supportive family relationships’ may be an important external asset distinct from other elements of social support (e.g., friends, neighbours, other community members). Intriguingly, a recent study found a bidirectional relationship between family relations and sport commitment. Specifically, softball was considered as a medium which facilitated family connections (e.g., attending games with children or grandchildren, reconnecting with family members), whereas support from family members played a key role in motivation or discouragement to play sport (Choi et al., 2022). Previous studies on family support also note the potential role reversal where older adults transition from supportive caretakers of their family to becoming athletic role models to their children or grandchildren (Brooke Kirby et al., 2013; Choi et al., 2022; Jenkin et al., 2016). As a result, familial support could be an important factor for commitment and adherence to sport among older adults (Jenkin et al., 2016; Young & Medic, 2011), with the potential to impact youth sport participation (e.g., introducing grandchildren to sport).

An important distinction between older and younger athletes is that the role of family changes as one enters stages of life (e.g., marriage, parenthood, retirement, and becoming grandparents). For instance, older adults may consider their spouse and children as the primary supporters within the family (Dionigi et al., 2012; Roper et al., 2003), whereas younger adults may get more support from their parents and older siblings (Côté, 1999; Nelson & Strachan, 2017). The shifting role of different family members across athlete development (Fraser-Thomas et al., 2008) highlights the potential value of ‘family support’ as a unique asset for development, including in older athletes where the type and amount of support may evolve but continue to be an important predictor of developmental or behavioural outcomes. The direction of this

relationship may not always be positive. For many older adults, sport involvement can lead to conflict among family members, particularly among older female athletes who may be stepping out of traditional family roles where sport was discouraged (Choi et al., 2022; Dionigi et al., 2012; Horton et al., 2018; Liechty et al., 2017; Young et al., 2015).

Collectively, the different factors for family support versus general social support suggest there is value in unpacking the nuances of ‘social support’ to better determine the types (or quality) of support best related to engagement and commitment in sport (Young & Medic, 2011). Moreover, it may be useful to examine the benefits for individuals giving and receiving social support. The current scale only includes items related to having or receiving social support, with no item measuring the importance of *providing* social support (Liang et al., 2001). Given the complex nature of social support (i.e., negotiation of social support and constraints), a factor that measures both of these facets may better capture the nuances of how social support affects sport involvement (Dionigi et al., 2012).

Another factor that emerged from this EFA and could be important in older adults was integrity (factor 2). Integrity was the second most important factor with significantly high loadings. This factor included many items that have generally been mentioned under the theme of ‘character’ in previous work. According to the Five C’s model of PYD (Lerner et al., 2005), character reflects respect for societal and cultural rules, possession of standards for correct behaviours, a sense of right and wrong (morality) and integrity. However, there is still much debate on how and whether participation in sport can facilitate development of assets such as ‘character’ in young people (Coakley, 2016). For instance, both prosocial (e.g., sportsmanship and fair play) and antisocial behaviours (e.g., hazing) are reported in youth sport (Fields et al., 2010; Hodge & Lonsdale, 2011; Kavussanu et al., 2009). In addition, researchers within youth



sport have taken steps to decrease the overlap between similar constructs such as character, caring and compassion (Jones et al., 2011) by collapsing the three constructs within ‘character’. Moreover, factors such as gender, ethnicity and culture are interlocking systems that influence sport experiences (Litchfield & Rylee, 2012; Scranton et al., 2005; Soule, 2018) and likely play a role in shaping one’s character development. In comparison to youth sport, there is a lack of research on what ‘character’ means generally and with respect to older adults. To avoid similar foreseeable challenges, we decided to classify it based on what was reflected in the items.

According to the items in this factor (i.e., I apologize for my mistakes; I show my support and appreciation to my family and/or friends; I take the time to congratulate the winner after I lose a challenge or activity; I am sensitive to the needs and feelings of others; I take responsibility for what I do; I tell the truth when it is not easy) this factor describes elements of integrity, which is defined in the Oxford English Dictionary as the quality of being honest and having strong moral principles (e.g., taking responsibility for one’s actions and apologizing for mistakes). However, this theme has not emerged in research on older adults and suggests some novelty in the PAS as a research tool. In addition, integrity (factor 2) was negatively correlated with perceived safety (factor 8). The relationship between these two factors was surprising and difficult to explain. Future research could explore the stability of this relationship in other samples to see whether this relationship remains stable upon replication.

A third interesting finding highlighted in our initial analysis of the psychosocial assets scale related to providing a service or contribution (factor 3). According to the PYD literature, contribution has both behavioural (action) as well as ideological (belief contribution/service is a moral and civic duty) components and is generally defined as steps taken by individuals to benefit their own well-being, as well as that of their family, community, and society (Deal &

Camiré, 2016; Lerner et al., 2003, 2005). Lerner's 5Cs PYD model (2005) suggests that when young people have successfully developed the 5Cs (i.e., confidence, competence, connection, character, caring and compassion), there is emergence of a sixth C (i.e., contribution).

Interestingly, the benefits and reasons (or motivation) for contribution appear to manifest differently in older adults compared to young people. For example, young people may contribute to society through activities such as caring for elderly, volunteering within community organizations, mentoring younger peers, and social activism (Deal & Camiré, 2016). They may be encouraged to contribute to expand their social capital (e.g., fostering connections with the community), gain career-related experience (e.g., resume building), personal development, display their competence (e.g., peer mentoring), and altruistic reasons (e.g., belief that it is important to help others) (Deal & Camiré, 2016; Kay & Bradbury, 2009). In comparison, most older athletes are retired and financially stable, which allows them to volunteer for longer time periods (Jenkin et al., 2016). Older athletes also report an innate desire 'to give back', 'share their knowledge' (i.e., personal knowledge and athletic skills used to coach others), continue tradition or history of volunteering within family, and to increase social connections as reasons to contribute within sport or their larger community (Hamm-Kerwin et al., 2009; Lyons & Dionigi, 2007; Misener et al., 2010).

Many older adults report contributing back to sport has allowed them to build stronger social connections, especially with their family members (Jenkin et al., 2016; Lyons & Dionigi, 2007). Interestingly, findings from our preliminary assets scale indicated that the factors for contribution and social support were related (factor 1 and factor 3). This correlation between factors highlights the bidirectional relationship between these constructs. For instance, social support (external asset) received from others could influence desire to also contribute (internal

asset) back to the community. This could explain the relationship between being inspired by others and then later aspiring to serve as role models for others who are new to the sport, as well as for younger generations including their children and grandchildren (Brooke Kirby et al., 2013; Choi et al., 2022; Horton et al., 2008).

Findings from this study also indicated ‘general well-being’ (factor 5) was important for older adults. However, this factor includes items that could measure more specific assets such as confidence and competence (Dionigi et al., 2018), as well as one’s self concept or ‘identity’ which is considered to be diverse, fragmented and culturally specific (Horton et al., 2018). This factor was not classified as ‘identity’, ‘confidence’, or ‘competence’ because of the variability in items (i.e., confidence, competence, identity, empowerment, social expectations; Dionigi, 2002b, 2002a, 2006; Dionigi et al., 2017; Dionigi & O’Flynn, 2007; Grant, 2001; Kim et al., 2020; Roper et al., 2003). For instance, confidence and competence have been related to themes such as a sense of accomplishment (I feel a sense of accomplishment), pride in one’s capabilities (I feel good about myself) and control of one’s health (I feel in control of my life and future), whereas items such as ‘I feel a sense of purpose in my life’ and ‘I feel good about my future’ could reflect how one perceives themselves, their self-concept or identity. In addition, feeling valued and appreciated by others also emerged as an important item in this factor. It is possible that items within this factor could be measuring other important assets such as identity or confidence and competence that may require new items to better measure these individual assets. Given the variability in items, the researchers thought it is best to classify this factor was as ‘general well-being’, until future studies can confirm the importance of this general factor in a new sample. In addition, general well-being was correlated with perceived safety (factor 8). It is possible that perceived safety in one’s environmental and accessibility (e.g., increased crime,

facilities, improper sidewalks) pose challenges to physical activity and thereby influence general well-being. On the other hand, this correlation between factors may be highlighting the underlying multicollinearity between factors and/or items.

Similar to the ambiguity in the general well-being factor, there were several additional factors that emphasize the need for future work. For instance, the factor on continued learning (factor 5), healthy habits (factors 7) and drive (factor 9), could be important for older adults but at this stage it is difficult to discuss how relevant they are for all older adults. Especially when these factors produced low sum of squared loadings and/or reliability scores, with less meaningful and interpretable items in comparison to the other factors discussed earlier. This is not to say these factors are not important for older adults, but rather the preliminary stage of this study limits us from making conclusions on their value for older adults. For instance, the factor on ‘drive’ which includes items such as, ‘I enjoy competing with myself’, ‘I enjoy setting goals’, ‘I am driven to continuously better myself’ and, ‘I structure my time to meet my daily goals’, seems to be sport-specific and may not apply to all older adults. Hence, more work is needed to understand the value of these factors for older adults.

### **Future Directions**

Results from this study provide an initial scale for assessing psychological assets in older athletes. Considerable further work will be necessary to extend and enhance the scale for other populations. While this is a rigorous task, we believe it is warranted given the immense potential in measuring development of psychosocial assets across broad and diverse samples (e.g., sport vs non-sport and/or different ages, genders, and ethnicities). This would allow us to better understand the role of environmental and behavioural factors in promoting the development of assets that are important for positive outcomes related to sport performance, as well as function,

health, and other relevant components of the aging process. It is also possible that the scale could be improved by decreasing the number of items that measure a given factor (or ensuring all factors are measured with the same number of items). Moreover, to test the validity of the current factor structure we recommend using a second independent sample. While we did our best to assess this preliminary scale on a diverse sample (i.e., demographic profile, level of sport and type of sport), ultimately, we were unsuccessful in recruiting a heterogeneous sample. Hence, to advance our capabilities of measuring psychosocial assets in older adults, it is imperative that the factor structure of the current scale be tested on more diverse samples. This step could lead to inclusion of items and/or emergence of factors that may have been overlooked in our sample. It may also help establish factors or psychosocial assets that are relevant to all older adults. While we see these initial analyses of the PAS as preliminary, there is immense value in creating a valid and reliable tool that measures development of assets across the lifespan.

### **Limitations**

While this study had strengths, there are some notable limitations. For instance, while there is value in measuring assets, the scale simply measures the correlation between sport and the presence of assets. As a result, there is uncertainty in whether participation in sport leads to (or causes) the development of psychosocial assets or whether these characteristics were there at the start of the journey (Coakley, 2016). It is also unclear whether psychosocial assets acquired during younger stages of life are retained in old age. In addition, although the study consisted of a large sample size, a larger proportion of the sample included field hockey athletes. It is possible that the types of assets developed will vary across different sports. In addition, the sample population was comprised of predominantly males who were white, married, competitive athletes, highly educated, worked full-time, resided in Canada, and were aged between 60 to 69

years. This continues to be a sampling limitation in much of the work in this area (Gayman et al., 2017; Patelia et al., 2023) and the results from the current assets scale may differ if tested in a more diverse sample.

### **Conclusion**

Studying the development of psychosocial assets is a promising area for future research to enhance the health and performance of older adults. Moving forward, it would be valuable to examine the nuances of asset development (e.g., the proportion of assets developed in specific contexts compared to others). To this end, this study is the first step towards creating a valid and reliable tool, and the results from this study should be considered preliminary. Findings from an exploratory factor analysis resulted in nine factors, which require further evaluation. Given that participation in sport among older adults is rising, this is an opportunity to measure the value of sport in this population, as well as understand whether non-sport activities could also facilitate similar asset development. While considerable work is needed, this scale has the potential to expand current knowledge on the types of assets that are valuable for the aging process, as well as to identify the specific settings (e.g., type of sport) that lead to the most desirable psychosocial assets. This may have important implications for health, development, and performance of older adults.

**Table 1***Demographic information of sample population (n=437)*

	n	%
Age		
50-59 years	124	28.4%
60-69 years	200	45.8%
70-79 years	93	21.3%
80 years and above	20	4.6%
Gender		
Male	274	62.7%
Female	162	37.1%
Do not wish to identify	1	0.2%
Marital Status		
Single, never married	21	4.8%
Widowed	18	4.1%
Divorced, Separated	37	8.5%
Married or domestic partnership	361	82.6%
Ethnicity		
Black (African, Caribbean, and Other)	4	0.9%
White (Caucasian or European)	402	92.0%
Hispanic or Latino/Latina (Mexican, Central American, and others)	2	0.5%
Southeast Asian (Chinese, Japanese, Korean and others)	6	1.4%
South Asian (Indian, Bangladeshi, Nepali, Tamil, Afghan, and others)	10	2.3%
Mixed	13	3.0%
Education		
Did not complete high school	4	0.9%
High-school graduate	31	7.1%
Completed trade or apprenticeship certificate or diploma	30	6.9%
University and/or College Graduate	177	40.5%
Higher Education (Professional Degrees, Doctoral)	195	44.6%
Employment		
Unemployed but looking for work	7	1.6%
Less than part-time worker	2	0.5%
Part-time worker	32	7.3%
Full-time worker	177	40.5%
Partially retired	52	11.9%
Completely retired	167	38.2%
Country of Residence		
Australia	63	14.4%
Canada	209	47.8%
France	4	0.9%
Germany	5	1.1%

Italy	2	0.5%
Jamaica	1	0.2%
Netherlands	5	1.1%
New Zealand	1	0.2%
South Africa	1	0.2%
Switzerland	2	0.5%
United Kingdom	127	29.1%
United States	17	3.9%
Sport		
Badminton	1	0.2%
Basketball	2	0.5%
Curling	3	0.7%
Cycling	16	3.7%
Decathlon	1	0.2%
Field hockey	196	44.9%
Golf	10	2.3%
Lawn bowling	6	1.4%
Multiple sports	66	15.1%
Power lifting	1	0.2%
Race walking	2	0.5%
Rowing	46	10.5%
Running	66	15.1%
Soccer	6	1.4%
Swimming	7	1.6%
Tennis	4	0.9%
Triathlon	3	0.7%
Volleyball	1	0.2%

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**Table 2***Items Excluded and Reasons for Removal in EFA*

<b>Item Number</b>	<b>Item</b>	<b>Rational for Removing Item</b>
68	I have neighbours who help watch out for me	SMC = 0.82; Factor loading = 0.849; Initial analysis of correlation matrix indicated an SMC >0.80. Also, this item had a lower factor loading compared to its correlated item #62
15	I try to overcome my challenges	Did not load on any factors ( $r < 0.30$ )
53	I am eager to travel to new places	Did not load on any factors ( $r < 0.30$ )
48	I am involved in creative things such as music, theater, or art	Does not related to the other variables (item 59 and 58) in the factor which are focused on social support
62	I have good neighbours who care about me	Complex variable that loaded 'fairly' on two factors. Did not relate to the other variables (item 27, 28, and 20) in the factor which are focused on an internal asset
5	I enjoy reading	Item did not relate to the other variable (Item 8; I feel a sense of independence) in the factor
45	I am given important roles and responsibilities in my club and/or community	Complex variable that loaded on two factors. Did not relate to the other variables (factor on taking part in leisure activity and another factor on social support)
18	I plan ahead and make informed choices	Complex variable that loaded on two factors. Did not relate to the other variables within the factors (perceived safety and integrity)
63	I have a community that cares about its people and/or encourages them	Complex variable that loaded on two factors (service and social support). Other variables in the factor were on internal assets.
11	I express my feelings in when I need to	Complex variable that loaded on two factors (perceived safety and a mix of variables).
46	I am eager to do well in my leisure activities	Complex variable that loaded on multiple factors focused on habits, drive, and leisure activity
30	I spend time working on my weaknesses	Item loosely related to the other variables on in the factor (continuing to learn). Item also loaded on the factor related to drive. Complex variable that measures two factors (i.e., drive and continued learning) with 'fair' factor loadings.
39	I maintain an identity that I am proud of	Factor Loading: 0.32, 0.38 and 0.32; Complex variable that measures three factors (i.e., general wellbeing, integrity, and values) with 'fair' factor loadings.
40	I challenge common negative stereotypes related to me	Did not load on any factors ( $r < 0.30$ )
43	I am involved in a club, or other leisure group	Variable is not related to the other variables in the factor (i.e., leadership and solve conflicts between people)
27	I feel like a leader	Variable is not related to the other variables in the factor (i.e., resolving conflicts, trying things that might be good)
54	I have meaningful friendships with other people	Factor Loading: 0.32, 0.41, and 0.32; Complex variable that measures three factors (i.e., general wellbeing, integrity, and values) with 'fair' factor loadings.
35	I enjoy meeting people from different cultures and background	Factor Loading: 0.46 and 0.34; Complex variable that measures two factors (i.e., learning and integrity) with 'fair' factor loadings.
24	I accept people who are different from me	Factor Loading: 0.35 and 0.34; Complex variable that measures two factors (i.e., integrity and perceived safety) with 'fair' factor loadings.
57	I have respect for others	Factor loading: 0.36 and 0.49; Complex variable that measures two factors (i.e., integrity and perceived safety) with 'fair' factor loadings.
1	I stand up for what I believe in	Factor loading: 0.35 and 0.36; Variable does not relate the factors (i.e., general well being and continued learning).
50	I am spending quality time with my family and/or friends	Factor is centered around family and this item includes both family and/or friends.
13	I seek advice from my family and/or friends	Factor is centered around family and this item includes both family and/or friends.
61	I have family and/or friends who try to help me succeed	Factor is centered around general social support and this item includes both family and/or friends. Since there is a factor that is centered on family, this item was removed.

14	I deal with my frustrations in positive ways	Item did not relate to the other variables in the factor on general well being
8	I feel a sense of independence	Item did not relate to the other variables in the factor on general well being
20	I help resolve conflicts between other people	Item did not relate to the other variables in the factor on providing service or contribution
56	I have good health habits	Item loaded on two factors (i.e., drive and health habits). Items that measure health habits are more specific. Complex variable that measures two factors (i.e., integrity and perceived safety) with 'fair' factor loadings.
16	I think it's important to help other people	Variable is focused on personal belief in helping others, while the other variables are focused on actionable steps in helping others/contribution.
58	I have friends who set good examples for me	Factor loading: 0.35 and 0.58; Complex variable that measures two factors (i.e., social support and perceived safety) with 'fair' factor loadings.

**Table 3**

*Factor Loadings, Communalities ( $h^2$ ), Sum of Squared Loadings and Cronbach's  $\alpha$  from EFA on the Psychosocial Assets Scale ( $n=437$ )*

Item	<i>F1</i>	<i>F2</i>	<i>F3</i>	<i>F4</i>	<i>F5</i>	<i>F6</i>	<i>F7</i>	<i>F8</i>	<i>F9</i>	$h^2$
I have people who help me set goals and progress in them.	0.80									0.73
I have people who provide me constructive or quality instruction.	0.79									0.67
I have support from people other than my family.	0.75									0.68
I have friends who challenge me.	0.73									0.63
I have people who urge me to develop and achieve.	0.72									0.67
I have friends who talk with me about things.	0.70									0.63
I have people who are good role models for me.	0.63									0.61
I apologize for my mistakes.		0.82								0.65
I show my support and appreciation to my family and/or friends.		0.72								0.64
I take the time to congratulate the winner after I lose a challenge or activity.		0.65								0.55
I am sensitive to the needs and feelings of others.		0.58								0.49
I take responsibility for what I do.		0.55								0.55
I tell the truth even when it is not easy.		0.45								0.46
I am serving others in my community.			0.87							0.76
I am helping to make my community a better place.			0.87							0.81
I take part in activities to help my community.			0.84							0.78
I stay engaged with my community			0.83							0.71
I am trying to help solve social problems.			0.65							0.60
I help others.			0.55							0.57
I enjoy learning.				0.83						0.74
I actively try to learn new things.				0.79						0.79
I try things that might be good for me.				0.46						0.55
I feel in control of my life and future					0.82					0.72
I feel good about myself.					0.79					0.72
I feel good about my future.					0.75					0.67
I have a sense of purpose in my life.					0.61					0.64
I feel a sense of accomplishment.					0.56					0.64
I feel valued and appreciated by others.					0.49					0.55
I am included in family decisions.						0.84				0.77
I am included in family tasks.						0.81				0.72
I have a family that gives me love and support.						0.70				0.64
I resist or moderate my use of tobacco, alcohol, and other drugs.							0.84			0.67
I avoid the pressure to partake in things that are unhealthy for me.							0.74			0.56
I resist certain influences that could affect me.							0.57			0.52
I have a safe neighborhood and/or community.								0.80		0.74
I feel safe in my clubs and/or community.								0.69		0.68
I feel safe and secure at home.								0.68		0.72
I enjoy competing with myself.									0.72	0.65
I enjoy setting new goals.									0.70	0.75
I am driven to continuously better myself.									0.63	0.64
I structure my time to meet all my daily goals.									0.62	0.59
<b>Rotated Sum of Squared Loadings</b>	<b>6.9</b>	<b>5.83</b>	<b>6.14</b>	<b>3.61</b>	<b>6.43</b>	<b>4.2</b>	<b>3.37</b>	<b>4.52</b>	<b>4.44</b>	
<b>Cronbach's Alpha (<math>\alpha</math>)</b>	<b>0.90</b>	<b>0.81</b>	<b>0.90</b>	<b>0.77</b>	<b>0.88</b>	<b>0.79</b>	<b>0.62</b>	<b>0.79</b>	<b>0.78</b>	

*F*<sub>1</sub> – Social Support; *F*<sub>2</sub> – Integrity; *F*<sub>3</sub> – Contribution/Service; *F*<sub>4</sub> – Continued Learning; *F*<sub>5</sub> – General Well-being; *F*<sub>6</sub> – Family Support; *F*<sub>7</sub> – Healthy Habits; *F*<sub>8</sub> – Perceived Safety; *F*<sub>9</sub> – Drive

**Table 4**

*Potential underlying factors and descriptions extracted through the Psychosocial Assets Scale (n=437)*

Asset Type	Description
<u>External Assets</u>	
Perceived Safety	Feels safe at home, recreational clubs, neighbourhood and/or community.
Social Support	Presence of support from people other than family such as friends, role models and members of the larger community
Supportive Family Relationships	Presence of support from family members and feeling secure in one's role within the family
<u>Internal Assets</u>	
Contribution/Service	Feels it is important to serve or contribute to the society in the form of volunteering, community engagement and helping others
Continued Learning	Open to learning, new experiences, and self-improvement
Drive	Enjoys the thrill of competition and is motivated in improving self through goal setting
General Wellbeing	General satisfaction in aspects of health, purpose in life and future
Health Habits	Resisting and/or moderating health behaviours such as alcohol and/or other drugs
Integrity	The quality of being honest and having strong moral principles such as taking responsibility for one's actions and apologizing for one's mistakes.

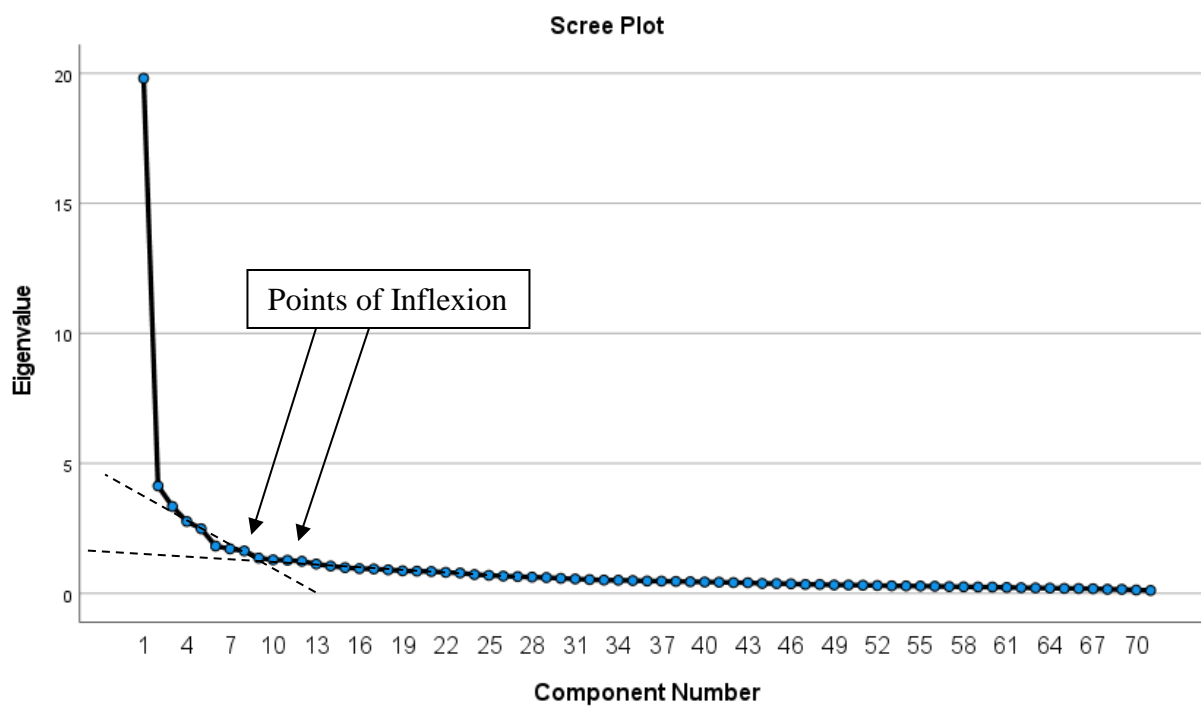
**Table 5***Correlation among Extracted Factors after Oblique Rotation*

Factor	1	2	3	4	5	6	7	8	9
1	1.00								
2	0.21	1.00							
3	<b>0.32</b>	0.26	1.00						
4	0.17	0.28	0.16	1.00					
5	-0.30	-0.27	-0.27	-0.16	1.00				
6	0.26	0.28	0.22	0.10	-0.26	1.00			
7	0.09	0.31	0.17	0.16	-0.22	0.17	1.00		
8	0.24	<b>0.32</b>	0.13	0.17	<b>-0.32</b>	0.22	0.24	1.00	
9	-0.28	-0.20	-0.20	-0.25	0.29	-0.18	-0.14	-0.16	1.00

$F_1$  – Social Support;  $F_2$  – Integrity;  $F_3$  – Contribution/Service;  $F_4$  – Continued Learning;  $F_5$  – General Well-being;  $F_6$  – Family Support;  $F_7$  – Healthy Habits;  $F_8$  – Perceived Safety;  $F_9$  – Drive

**Figure 1**

*Scree plot of the point of inflexion to determine the number of factors retained based on 71 variables*



## References

- Andersen, M. H., Ottesen, L., & Thing, L. F. (2019). The social and psychological health outcomes of team sport participation in adults: An integrative review of research. *Scandinavian Journal of Public Health*, 47(8), 832–850.  
<https://doi.org/10.1177/1403494818791405>
- Baker, J., Fraser-Thomas, J., Dionigi, R., & Horton, S. (2010). Sport participation and positive development in older persons. *European Review of Aging and Physical Activity*, 7(1), 3–12.  
<https://doi.org/10.1007/s11556-009-0054-9>
- Baker, J., Horton, S., & Weir, P. (2010). Preface. In *The masters athlete: Understanding the role of sport and exercise in optimizing aging* (pp. 1–3). Routledge.  
<https://doi.org/10.4204/EPTCS.307>
- Baltes, P. B., Staudinger, U. M., & Lindenberger, U. (1999). Lifespan psychology: Theory and application to intellectual functioning. *Annual Review of Psychology*, 50, 471–507.
- Benson, P. L., Leffert, N., Scales, P. C., & Blyth, D. A. (2012). Beyond the “village” rhetoric: Creating healthy communities for children and adolescents. *Applied Developmental Science*, 16(1), 3–23. <https://doi.org/10.1080/10888691.2012.642771>
- Brooke Kirby, J., Kluge, M. A., Kirby, J. B., & Kluge, M. A. (2013). Going for the gusto: Competing for the first time at age 65. *Journal of Aging and Physical Activity*, 21(3), 290–308. <https://doi.org/10.1123/japa.21.3.290>
- Callary, B., Rathwell, S., & Young, B. (2015). Masters Swimmers’ Experiences With Coaches: What They Want, What They Need, What They Get. *SAGE Open*, 5(2).  
<https://doi.org/10.1177/2158244015588960>
- Choi, W., Liechty, T., Naar, J. J., West, S. T., Wong, J. D., & Son, J. S. (2022). “We’re a family

- and that gives me joy”: Exploring interpersonal relationships in older women’s softball using socio-emotional selectivity theory. *Leisure Sciences*, 44(2), 183–200.  
<https://doi.org/10.1080/01490400.2018.1499056>
- Coakley, J. (2016). Positive youth development through sport: Myths, beliefs, and realities. In *Positive Youth Development Through Sport* (Second, pp. 21–33). Routledge.
- Côté, J. (1999). The influence of the family in the development of talent in sport. *Sport Psychologist*, 13(4), 395–417. <https://doi.org/10.1123/tsp.13.4.395>
- Côté, J., Turnnidge, J., & Evans, M. (2014). The dynamic process of development through sport. *Kinesiology Slovenica*, 20(3), 14–26.
- Côté, J., Turnnidge, J., & Vierimaa, M. (2016). A personal assets approach to youth sport. In *Routledge handbook of youth sport* (pp. 243–255). Routledge.
- Damon, W. (2004). What is positive youth development? *Annals of the American Academy of Political and Social Science*, 591(January), 13–24.
- Deal, C. J., & Camiré, M. (2016). An examination of university student-athletes’ motivations to contribute. *Journal of College and Character*, 17(2), 116–129.  
<https://doi.org/10.1080/2194587x.2016.1159227>
- Dionigi, R. (2002a). Leisure and identity management in later life: Understanding competitive sport participation among older adults. *World Leisure Journal*, 44(3), 4–15.  
<https://doi.org/10.1080/04419057.2002.9674274>
- Dionigi, R. (2002b). Resistance and empowerment through leisure: The meaning of competitive sport participation to older adults. *Society and Leisure*, 25(2), 303–328.
- Dionigi, R. (2006). Competitive sport as leisure in later life: Negotiations, discourse, and aging. *Leisure Sciences*, 28(2), 181–196. <https://doi.org/10.1080/01490400500484081>



- Dionigi, R., Baker, J., & Horton, S. (2011). Older athletes' perceived benefits of competition. *The International Journal of Sport and Society: Annual Review*, 2(2), 17–28.  
<https://doi.org/10.18848/2152-7857/cgp/v02i02/53869>
- Dionigi, R., Fraser-Thomas, J., & Logan, J. (2012). The nature of family influences on sport participation in Masters athletes. *Annals of Leisure Research*, 15(4), 366–388.  
<https://doi.org/10.1080/11745398.2012.744274>
- Dionigi, R., Fraser-Thomas, J., Stone, R., & Gayman, A. (2017). Psychosocial development through masters sport: What can be gained from youth sport models? *Journal of Sports Sciences*, 36(13), 1533–1541. <https://doi.org/10.1080/02640414.2017.1400147>
- Dionigi, R., & Gard, M. (2018). Sport for all ages? Weighing the evidence. In *Sport and Physical Activity Across the Lifespan: Critical Perspectives* (pp. 1–20). Palgrave Macmillan UK. <https://doi.org/10.2307/j.ctt5hjpwg.27>
- Dionigi, R., Horton, S., & Baker, J. (2013). Negotiations of the ageing process: Older adults' stories of sports participation. *Sport, Education and Society*, 18(3), 370–387.  
<https://doi.org/10.1080/13573322.2011.589832>
- Dionigi, R., & O'Flynn, G. (2007). Performance discourses and old age: What does it mean to be an older athlete? *Sociology of Sport Journal*, 24(4), 359–377.
- Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for adults: Informing development of a conceptual model of health through sport. *International Journal of Behavioral Nutrition and Physical Activity*, 10(1), 135.  
<https://doi.org/10.1186/1479-5868-10-135>
- Field, A. (2009). Exploratory factor analysis. In *Discovering statistics using IBM SPSS statistics*

- (3rd ed., pp. 627–685). SAGE Publications, Ltd.
- Fields, S., Collins, C., & Comstock, R. (2010). Violence in youth sport: Hazing, brawling and foul play. *British Journal of Sports Medicine*, 44(1), 32–37.
- Fraser-Thomas, J., Côté, J., & Deakin, J. (2005). Youth sport programs: An avenue to foster positive youth development. *Physical Education & Sport Pedagogy*, 10(1), 19–40.  
<https://doi.org/10.1080/1740898042000334890>
- Fraser-Thomas, J., Côté, J., & Deakin, J. (2008). Understanding dropout and prolonged engagement in adolescent competitive sport. *Psychology of Sport and Exercise*, 9(5), 645–662. <https://doi.org/10.1016/j.psychsport.2007.08.003>
- Gard, M., Dionigi, R., & Dionigi, C. (2017). From a lucky few to the reluctant many: Interrogating the politics of sport for all. *Sport and Physical Activity Across the Lifespan: Critical Perspectives*, 67–89.  
[https://doi.org/10.1057/978-1-137-48562-5\\_4](https://doi.org/10.1057/978-1-137-48562-5_4)
- Gayman, A., Fraser-Thomas, J., Dionigi, R., Horton, S., & Baker, J. (2017). Is sport good for older adults? A systematic review of psychosocial outcomes of older adults' sport participation. *International Review of Sport and Exercise Psychology*, 10(1), 164–185.
- Geard, D., Reaburn, P., Rebar, A., & Dionigi, R. (2017). Masters athletes: Exemplars of successful aging? *Journal of Aging & Physical Activity*, 25(3), 490–500.  
<https://doi.org/10.1123/japa.2016-0050>
- Grant, B. C. (2001). You're never too old: Beliefs about physical activity and playing sport in later life. *Ageing and Society*, 21(6), 777–798. <https://doi.org/10.1017/s0144686x01008492>
- Hamm-Kerwin, S., Misener, K., & Doherty, A. (2009). Getting in the game: An investigation of volunteering in sport among older adults. *Leisure/Loisir: Journal of the Canadian Association for Leisure Studies*, 33(2), 659–685.

<https://doi.org/10.1080/14927713.2009.9651457>

- Hawkins, S. A., Wiswell, R. A., & Marcell, T. J. (2003). Exercise and the master athlete - A model of successful aging? *The Journals of Gerontology Series A: Biological Sciences and Medical Sciences*, 58(11), M1009–M1011. <https://doi.org/10.1093/gerona/58.11.M1009>
- Hodge, K., & Lonsdale, C. (2011). Prosocial and antisocial behaviour in sport: The role of coaching style, autonomous vs. controlled motivation, and moral disengagement. *Journal of Sport and Exercise Psychology*, 33(4), 527–547.
- Holt, N., & Neely, K. (2011). Positive youth development through sport: A review. *Revista De Iberoamericana De Psicología Del Ejercicio Y El Deporte*, 6(2), 299–316.
- Horton, S., Baker, J., Côté, J., & Deakin, J. M. (2008). Understanding seniors' perceptions and stereotypes of aging. *Educational Gerontology*, 34(11), 997–1017.
- <https://doi.org/10.1080/03601270802042198>
- Horton, S., Dionigi, R., Gard, M., Baker, J., & Weir, P. (2018). Don't sit back with the geraniums, get out: The complexity of older women's stories of sport participation. *Journal of Amateur Sport*, 4(1), 24–51. <https://doi.org/10.17161/jas.v4i1.6627>
- Horton, S., Dionigi, R., Gard, M., Baker, J., Weir, P., & Deneau, J. (2019). "You can sit in the middle or be one of the outliers": Older male athletes and the complexities of social comparison. *Frontiers in Psychology*, 10. <https://doi.org/10.3389/fpsyg.2019.02617>
- Hutcheson, G. D. (1999). Factor Analysis. In *The Multivariate Social Scientist* (Vol. 19, Issue 4, pp. 218–253). SAGE Publications, Ltd. <https://doi.org/10.4135/9780857028075.d148>
- International Masters Games Association. (2017). *The world masters games 2017 post-event report*. <https://www.imga.ch/assets/Uploads/Reports/Auckland-WMG-2017-Final-Report.pdf>

- International Olympic Committee. (2020). *2025 New Taipei & New Taipei city world masters games welcome you: Sports program released*. International Masters Games Association. <https://imga.ch/2022/06/27/taekwondo-aquatics-judo-and-karate-among-sports-to-make-2025-world-masters-games-programme/>
- Jenkin, C. R., Eime, R. M., Westerbeek, H., O'Sullivan, G., & van Uffelen, J. G. Z. (2016). Are they 'worth their weight in gold'? Sport for older adults: Benefits and barriers of their participation for sporting organisations. *International Journal of Sport Policy*, 8(4), 663–680. <https://doi.org/10.1080/19406940.2016.1220410>
- Jirásek, I. (2020). Sport and religion: Muscular christianity and the young men's christian association – Ideology, activity and expansion (Great Britain, the United States and Poland, 1857-1939). *The International Journal of the History of Sport*, 37(16), 1746–1748. <https://doi.org/10.1080/09523367.2020.1824489>
- Kavussanu, M., Stamp, R., Slade, G., & Ring, C. (2009). Observed prosocial and antisocial behaviours in male and female soccer players. *Journal of Applied Sport Psychology*, 21(1), 62–76.
- Kay, T., & Bradbury, S. (2009). Youth sport volunteering: Developing social capital? *Sport, Education and Society*, 14(1), 121–140. <https://doi.org/10.1080/13573320802615288>
- Kim, A. C. H., Park, S. H., Kim, S., & Fontes-Comber, A. (2020). Psychological and social outcomes of sport participation for older adults: A systematic review. *Ageing and Society*, 40(7), 1529–1549. <https://doi.org/10.1017/S0144686X19000175>
- Kirby, J. B., & Kluge, M. A. (2013). Going for the gusto: Competing for the first time at age 65. *Journal of Aging and Physical Activity*, 21(3), 290–308. <https://doi.org/10.1123/japa.21.3.290>

- Kirby, J. B., & Kluge, M. A. (2021). For the love of the game: An exploration of the experiences and psychosocial development of women 70 years of age and older who play volleyball. *Journal of Aging and Physical Activity*, 30(September), 1–10.  
<https://doi.org/10.1123/japa.2021-0100>
- Lerner, R. M., Dowling, E. M., & Anderson, P. M. (2003). Positive youth development: Thriving as the basis of personhood and civil society. *Applied Developmental Science*, 7(3), 172–180.  
[https://doi.org/10.1207/S1532480XADS0703\\_8](https://doi.org/10.1207/S1532480XADS0703_8)
- Lerner, R. M., Lerner, J. V., Almerigi, J. B., Theokas, C., Phelps, E., Gestsdottir, S., Naudeau, S., Jelicic, H., Alberts, A., Ma, L., Smith, L. M., Bobek, D. L., Richman-Raphael, D., Simpson, I., Christiansen, E. D. D., & Von Eye, A. (2005). Positive youth development, participation in community youth development programs, and community contributions of fifth-grade adolescents: Findings from the first wave of the 4-H study of positive youth development. *Journal of Early Adolescence*, 25(1), 17–71.
- Liang, J., Krause, N. M., & Bennett, J. M. (2001). Social exchange and well-being: Is giving better than receiving? *Psychology and Aging*, 16(3), 511–523.  
<https://doi.org/10.1037//0882-7974.16.3.511>
- Liechty, T., West, S., Naar, J., & Son, J. (2017). Perceptions of ageing among older women softball players. *Annals of Leisure Research*, 20(3), 295–313.  
<https://doi.org/10.1080/11745398.2016.1220321>
- Litchfield, C., & Dionigi, R. (2012). The meaning of sport participation in the lives of middle-aged and older women. *International Journal of Interdisciplinary Social Sciences*, 6(5), 21–36.
- Lyons, K., & Dionigi, R. (2007). Transcending emotional community: A qualitative examination

of older adults and masters' sports participation. *Leisure Sciences*, 29(4), 375–389.

<https://doi.org/10.1080/01490400701394881>

MacDonald, D. J., & McIsaac, T. (2016). Quantitative assessment of positive youth development in sport. In N. Holt (Ed.), *Positive Youth Development Through Sport* (pp. 83–96). Routledge.

Misener, K., Doherty, A., & Hamm-Kerwin, S. (2010). Learning from the experiences of older adult volunteers in sport: A serious leisure perspective. *Journal of Leisure Research*, 42(2), 267–289. <https://doi.org/10.1080/00222216.2010.11950205>

Nelson, K., & Strachan, L. (2017). Friend, foe, or both? A retrospective exploration of sibling relationships in elite youth sport. *International Journal of Sports Science and Coaching*, 12(2), 207–218. <https://doi.org/10.1177/1747954117694923>

Patelia, S., Mazhar, A., & Baker, J. (2023). What do we know about the value of sport for older adults? A scoping review. *Journal of Aging and Physical Activity*, 1–16.

Patelia, S., Stone, R. C., El-Bakri, R., Adli, M., & Baker, J. (2018). Masters or pawns? Examining injury and chronic disease in male masters athletes and chess players compared to population norms from the Canadian community health survey. *European Review of Aging and Physical Activity*, 15(1), 15.

Public Health Agency of Canada. (2020). Aging and chronic disease: A profile of Canadian seniors. In *Cat.: HP35-137/1-2020E-PDF*.

Roper, E. A., Molnar, D. J., & Wrisberg, C. A. (2003). No “old fool”: 88 Years old and still running. *Journal of Aging and Physical Activity*, 11(3), 370–387.

<https://doi.org/10.1123/japa.11.3.370>

Salari, S. M. (2016). Infantilization as Elder Mistreatment: Evidence from Five Adult Day

Centers. *Journal of Elder Abuse & Neglect*, 6566(July), 53–91.

<https://doi.org/10.1300/J084v17n04>

Scruton, S., Caudwell, J., & Holland, S. (2005). Bend it like Patel: Centring ‘race’, ethnicity and gender in feminist analysis of women’s football in England. *International Review for Sociology of Sport*, 40(1), 71–88.

Sivaramakrishnan, H., Gucciardi, D. F., McDonald, M. D., Quested, E., Thogersen-Ntoumani, C., Cheval, B., & Ntoumanis, N. (2021). Psychosocial outcomes of sport participation for middle-aged and older adults: a systematic review and meta-analysis. *International Review of Sport and Exercise Psychology*, 0(0), 1–22.

<https://doi.org/10.1080/1750984X.2021.2004611>

Soule, K. (2018). The role of sport in the lives of mothers of young children. In: Dionigi, R., Gard, M.(eds) *Sport and physical activity across the lifespan: Critical perspectives*. Palgrave Macmillian, London.

Sport for Life. (2016). *Durable by design: Active for life*. [https://sportforlife.ca/wp-content/uploads/2016/06/Durable-by-Design\\_Dec2\\_2016-.pdf](https://sportforlife.ca/wp-content/uploads/2016/06/Durable-by-Design_Dec2_2016-.pdf)

Stenner, B. J., Buckley, J. D., & Mosewich, A. D. (2020). Reasons why older adults play sport: A systematic review. *Journal of Sport and Health Science*, 9(6), 530–541.

<https://doi.org/10.1016/j.jshs.2019.11.003>

Stevens, J. P. (2002). *Applied multivariate statistics for social sciences* (4th ed.). Roulledge.

Stone, R. C., Rakhamilova, Z., Gage, W. H., & Baker, J. (2018). Curling for confidence: Psychophysical benefits of curling for older adults. *Journal of Aging and Physical Activity*, 26(2), 267–275. <https://doi.org/10.1123/japa.2016-0279>

Tabachnick, B. G., & Fidell, L. S. (2019). Principal components and factor analysis. In *Using*

*multivariate statistics* (7th ed., pp. 476–527). Pearson.

Toepoel, V. (2013). Ageing, leisure, and social connectedness: How could leisure help reduce social isolation of older people? *Social Indicators Research*, 113(1), 355–372.

<https://doi.org/10.1007/s11205-012-0097-6>

Vierimaa, M., Erickson, K., Côté, J., & Gilbert, W. (2012). Positive Youth Development: A Measurement Framework for Sport. *International Journal of Sports Science & Coaching*, 7(3), 601–614.

Weir, P., Baker, J., & Horton, S. (2010). The emergence of masters sport: Participatory trends and historical developments. In *The Masters athlete: Understanding the role of sport and exercise in optimizing aging* (pp. 7–14). <https://doi.org/10.4324/9780203885512>

World Health Organization. (2018). *Global action plan on physical activity 2018–2030: More active people for a healthier world*.

Young, B. W., de Jong, G. C., & Medic, N. (2015). Examining relationships between passion types, conflict and negative outcomes in masters athletes. *International Journal of Sport and Exercise Psychology*, 13(2), 132–149. <https://doi.org/10.1080/1612197X.2014.932822>

Young, B. W., & Medic, N. (2011). Examining social influences on the sport commitment of masters swimmers. *Psychology of Sport and Exercise*, 12(2), 168–175.



## **Chapter Five: General Discussion**

Sport is often presented as a ‘panacea’ for mitigating various health and age-related challenges, including continued development of older adults. While the evidence on psychosocial development through sport for younger people is robust, our knowledge on the value of sport for older adults is limited (Baker et al., 2023). In addition, we do not yet understand the nuances of development across the contexts of sport (type and level of sport). As a result, the overarching purpose of this dissertation was to design an instrument to measure psychosocial assets in older adults. To this end, the studies in this dissertation act as connected segments in the development of the Psychosocial Assets Scale (PAS). In Chapter 4, a multistep model guided the creation of the PAS. It is important to note, the PAS is not intended to assess *how* assets are developed (i.e., the process of development), simply to measure the presence of specific assets in older adults. However, this tool has the potential to identify the *contexts* that better facilitate development (a future goal through cross-comparisons across samples) of specific types of assets more than others. Earlier chapters in the dissertation informed the creation of this scale and supported its relevance as a research tool. For instance, Chapter Two involved a scoping review on our current understanding of older adults in sport (Patelia et al., 2023), specifically on *how older adults have been studied in sport* since the first World Masters Games. This primary step was crucial in providing a comprehensive overview of our knowledge on sport and older adults. Chapter Three explored the sport experiences and psychosocial development of older rowing athletes. Findings from this study added to the current understanding of psychosocial development by analyzing sport experiences from a novel setting. In congruence with knowledge gained from the scoping review (Chapter Two), the qualitative study on rowers (Chapter Three), and previous literature on this topic, a group of experts from this field helped guide the creation of the PAS (Chapter Four). As a result, the three studies in

this dissertation collectively facilitated the creation of a quantitative tool to measure psychosocial assets in older adults.

## **Key Findings**

### **Chapter Two**

For many scientists, the context of sport is a unique setting to explore a range of development opportunities and outcomes (Dionigi et al., 2011; Holt et al., 2016) that extend beyond regular involvement in physical activity (Baker et al., 2010). However, a lack of analysis on the value of sport, as well as a comparison of sport with other settings, limits progression in this area. Prior to tackling these questions, we need an overview of our knowledge on sport and older adults (i.e., ‘what do we know?’). Hence, the initial study in this dissertation examined the value of sport for older adults by summarizing the general trends from 168 peer-reviewed studies since the first World Masters Games. Findings from the scoping review indicated that most studies focused on the physiological health of older athletes, whereas far fewer studies considered the topics of psychosocial, sociological, performance, participation, and cognitive outcomes. These findings substantiate previous research in this field that suggested researchers have primarily focused on the physical health of older adults in sport. To enhance our current understanding of the value of sport, it is therefore crucial to expand our scope of inquiry on older athletes. Further, findings from this review suggested the foundation of research on sport and older athletes is largely built on a homogenous sample. We know little about the experiences and impact of sport on females, minorities, and those in low income and/or education brackets. Additionally, our knowledge of sport and older athletes is founded on a homogenous group of older adults who are men, white, highly educated, within high-income brackets, with the means to retire and participate in competitive level sport. Results highlight the uncertainty in our

knowledge of sport and older adults, and for this reason, we do not have a clear understanding of its value for *all* older adults, or for all dimensions of health and wellbeing. Findings from this comprehensive review informed the ‘demographic background’ section of the PAS. In addition, findings encouraged a robust discussion when designing items (e.g., consideration of how sport experiences and development may differ for women and minority groups).

### **Chapter Three**

The second step in the creation of PAS was to examine a sport that had not been previously explored in this field of research. This step aimed to confirm previously reported psychosocial assets, as well as to explore novel sport experiences and assets related to older athletes. Previous research in this area has generally focused on the psychosocial experiences of sport in general, often using athletes from pools of multiple different sports (Dionigi, 2006; Dionigi et al., 2011b, 2013, 2018; Grant, 2001; Horton et al., 2018, 2019). Hence, this study aimed to examine the sport experiences and psychosocial development of older athletes in rowing, a sport that has been exclusively studied in prior work. The results highlighted the complexities of psychosocial development due to the impact of inter-individual variability (e.g., gender) on sport experiences which can also impact asset development. While the thematic analysis indicated congruency on psychosocial assets such as connections built on a common interest, confidence in health and well-being, service to the community, and identity development, it also alluded to disparities in the value of specific assets among older adults. For instance, for some rowers, particularly female rowers, an identity that challenged age and gender stereotypes was important, whereas other athletes valued development of meaningful connections. Overall, findings from Study Two support previously reported assets such as supportive social relationships or connection, confidence in health and well-being, as well as

positive aging identity (Dionigi, 2002, 2006; Dionigi et al., 2011, 2017; Gayman et al., 2017; Heo et al., 2013; Litchfield & Dionigi, 2012). Furthermore, findings unique to the sport of rowing emerged, such as opportunities to develop assets for family members of athletes (e.g., increased social connections) as well as an increased desire to serve one's community among rowing athletes.

In addition to the benefits of rowing, athletes reported some negative experiences that could influence the development of some assets, reinforcing criticisms on sport as fundamentally positive (Coakley, 2011). However, as previous researchers noted, the benefits of sport participation later in life are not absolute and hence it is necessary that we understand the potential adverse effects of sport in later life (Gayman et al., 2017). While participants expressed some negative experiences, the positive outcomes of rowing were seen as more valuable, ultimately driving their participation in sport. Together, rowing provides a space for continued growth and development as well as living a purposeful life during a time that is often associated with decline and disability.

## **Chapter Four**

Although research in this area is promising, the study of psychosocial development in older adults (particularly development of assets) has generally been limited to qualitative investigations. Similar to other instruments (e.g., the Developmental Assets Profile; Search Institute, 2005) that measure developmental outcomes in youth, a quantitative measure may be useful for assessing psychosocial development across a broad sample of older adults. The final study involved generating and testing the preliminary version of the Psychosocial Assets Scale (PAS) through an exploratory factor analysis. Overall, the most parsimonious and interpretable solution resulted in a nine-factor model explaining 65.5% of the variance: general wellbeing,

contribution/service, social support, drive/challenge, integrity, health habits, supportive family relationships, perceived safety, and desire to learn/continued learning. In addition, several unique findings emerged from this study such as the positive correlations between social support and service as well as general well-being and perceived safety. Another peculiar finding was the negative relationship between integrity and perceived safety which was difficult to explain. These findings position the current version of the PAS as the initial step towards establishing a valid and reliable tool for measuring psychosocial assets in this population. A possible next step could be invariance (or equivalence) testing on the PAS, similar to Motz et al.'s, (2023) efforts in validating the Adult-Oriented Sport Coaching Survey (AOSCS-A). Invariance testing would allow us to examine whether the constructs (or items) in the PAS consistently measure a construct (or differs in meaning) across sub-groups within a population. For instance, to confidently state the PAS measures development across sample groups within sport, we must first test for consistency (or invariance) in how constructs are understood and interpreted between sub-groups such as sex (i.e., male vs. female), sport type (i.e., individual vs. team), level of sport (i.e., competition vs. recreation) among others.

### **Limitations**

While there were many strengths of this dissertation, some limitations should be considered for further research. For instance, studies included in this dissertation produced knowledge based on a fairly homogenous or 'Western' sample of older adults. For instance, in Chapter Two, only studies published in English were included in scoping review, which limited our scope of inquiry. Additionally, in Chapter Three the sample rowing group was white, of European backgrounds, retired, highly educated, and competitive athletes. Similarly, the sample group in Chapter Four consisted of individuals who were mainly from Canada, white, male, and

competitive athletes. As a result, while this dissertation aimed to enhance our understanding on the value of sport for psychosocial development, it was from overly westernized lens.

Furthermore, in Chapter Four data was collected in English through online surveys which impacts our understanding of development as well as creation of PAS.

Although this is a limitation of the current research program, it reflects the broad issues with much of the research in this field. There are several reasons for the prevalence of homogenous sample groups in sport research. First, sport (especially competitive) may not be accessible for many older adults due to financial barriers. As a result, data collected from competitions, sport organizations and/or clubs (Chapter Three and Four) often reflect those individuals who have the means to afford sport. This perpetuates use of biased or skewed data to build policies and programs that may only benefit smaller segments of the overall population, overlooking a large proportion of older adults. Unfortunately, it may take several years and major societal and economic changes (i.e., wealth distribution) for sport to reflect more diverse populations. However, until then immense effort is required to study more diverse samples through research collaborations with experts from other cultures, women, and minority groups. This is crucial if we want to enhance accessibility and inclusion of diverse populations within sport. In addition, data collection in other languages could expand our understanding of sport and psychosocial development. Specifically, researchers should consider translating the scale in other languages to increase generalizability of the results.

In addition, studies included in this dissertation faced difficulties in conceptualizing ‘old age’. Typically, in Western culture a person is considered as an ‘older adult’ when they begin retirement (i.e., age 65); however, the same cannot be applied to all older adults because of the variability in the determinants of retirement across population groups (e.g., culture, genders, and

socioeconomic class). Moreover, the variability in health and function, age to qualify for a sport/competition (e.g., Master sport), and individuals' perceptions of 'old' create challenges in conceptualizing a universal definition of older adults. However, if we aim to measure development of psychosocial assets in older adults, a clear definition of 'older adulthood' is pertinent moving forward. Another limitation of this dissertation is related to the process of creating the PAS. Even with the extensive steps taken to design the instrument (e.g., feedback from an expert group, pilot testing the scale), key items that could be important in measuring specific assets may have been missed. However, this is the first quantitative instrument to measure psychosocial assets in older adults, and thus more work is needed to refine the scale such as invariance testing (see Motz et al., 2023). Furthermore, the scale needs additional testing to allow generalizability to other sports and sample groups, because the scale was created based on data collected from a sample of older athletes (mostly from field hockey) aged 50 and above. The type of activity and the meanings associated to these activities often vary from one stage of life to the next (Gayman et al., 2017). Hence, further testing in other sport, non-sport, and/or cohorts is needed prior to generalizing the results from this dissertation to all adults across the lifespan.

## **Implications and Future Directions**

### **Practical Implications**

From a practical standpoint, this dissertation led to the creation of a preliminary instrument to measure psychosocial assets in older adults. At the moment, the development of psychosocial assets through sport has largely been the focus of youth researchers. This could be because development is typically believed to be important during younger stages of life (Coakley, 2016), whereas adult to older adulthood is generally viewed as a time when



development is less important. However, several studies have reported on the multifaceted benefits (including development of assets) of sport for older adults, as explored in the beginning of this dissertation (Dionigi et al., 2013, 2017; Gayman et al., 2017; Heo et al., 2013; Horton et al., 2018). Since sport (particularly competitive) has been suggested to provide unique benefits that are above and beyond those gained from general physical activity such as walking or exercise (Baker et al., 2010), the PAS has the potential to compare various forms of activities, levels of participation (e.g., competitive, recreational), as well as across age groups and/or life stages (a future goal). Measuring development of assets across various contexts will provide greater understanding on the value of sport for older adults.

Furthermore, the PAS could be a valuable tool for coaches (particularly at the Masters level) to better understand the performance needs and goals of their older athletes. Overall findings on coaching older athletes allude to the complexity and heterogeneity of coaching preferences (Callary et al., 2018). For instance, older athletes vary considerably in their personal motives, preferences in how they want to be coached (i.e., addressed, feedback), skill level, competitiveness, and more (Rathwell et al., 2015). This heterogeneity in MAs, requires coaches to adapt their practices and cater it to the individual needs of athletes. As a result, the PAS has the potential to be a tool for coaches to reflect on their coaching style and create an environment that better supports the developmental goals of their athletes.

### **Research Implications**

In addition to practical implications, findings from this dissertation have implications for enhancing our understanding on sport and psychosocial development across the lifespan. By creating an instrument that measures development of psychosocial assets, this dissertation provides researchers in this field the opportunity to gather data on larger samples of adults and

across more diverse and expansive contexts (within sport). The opportunity to study a broad sample is crucial for moving research forward in this area, since many researchers recognize development as a complex and dynamic process influenced by several factors (Baker et al., 2023). Moreover, much of our knowledge on sport and older adults is based on a homogenous sample, as noted in Chapter Two. A validated PAS could be used to further examine the role of sport in facilitating development of assets specifically, as well as in what proportion, in which context (e.g., type and level of sport) and for whom (e.g., older adults differ in age, gender, SES, level of activity and investment, years of involvement, and more). Ultimately, this scale may allow researchers greater opportunities to study psychosocial development in an older population through a quantitative lens. Until now, the discussion on development of assets particularly for older adults has been primarily supported by evidence from qualitative research. However, findings from this dissertation open the door for a more diverse and nuanced discussion that is built on both qualitative and quantitative research. Moreover, the PAS encourages researchers to design additional assessment tools to help examine various avenues of psychosocial development, which would be useful in progressing our knowledge in this area.

To allow for more consistency in this field of research, this dissertation attempted to build on the conceptualization of ‘psychosocial assets’. This was an important step since constructs related to positive development such as psychosocial assets and developmental outcomes have emerged from the discipline of PYD and therefore have been largely conceptualized in relation to young people and their developmental needs (Benson, 1997; Benson et al., 2012; Bronfenbrenner, 1986; Lerner et al., 2012). While PYD frameworks have served as a useful starting point, research on psychosocial development in older adults highlight that certain assets and developmental outcomes are novel to, or experienced differently in, old

age (Dionigi et al., 2017). Therefore, to understand how sport serves as a platform for development of assets, a clear definition of psychosocial assets that can be applied to diverse samples (instead of just in youth) would be more relevant in examining development across the lifespan. Given the emerging interest in studying this population, a universal definition of psychosocial assets would lead to more consistency and expand the scope of research in this area.

### **Societal Implications**

Lastly, from a broad lens, the findings from this dissertation have societal implications that may be useful in improving accessibility to sport. For instance, it is evident that accessibility to sport reflects a more nuanced social issue than simply a lack of promotion of sport (compared to other activities) to ‘solve the problem of aging’ (Dionigi, 2017; Gard et al., 2017). For some adults, there are numerous inequities and obstacles (societal, economic, cultural) that need to be addressed to increase sport participation. Additionally, there are individuals with the means to participate and could be persuaded and/or interested in sport but are unaware of the diverse benefits of sport (Young & Callary, 2017). Furthermore, some researchers argue lack of promotion on the benefits or rewards of sport should be classified as a problem of inaccessibility (Young & Callary, 2017). For instance, physical activity advocates and organizations may inadvertently create obstacles (i.e., lack of knowledge on the opportunities of sport) that limit many middle-aged to older adults who could be interested in sport. Findings from Chapter Three, for example, could be used inform rowing clubs/competitions promotional messages to recruit new participants. In addition, the PAS could be used to evaluate the development of assets in a diverse population. As a result, data gathered from the PAS could inform promotional strategies that specifically target older adults who have been overlooked (e.g., women, ethnic minorities) in

the past. Furthermore, promotion of psychosocial assets in general could allow sport to be more appealing to individuals who value the development of psychosocial assets more than, or in addition to, physical health outcomes. For this reason, actively studying psychosocial development across sample groups is crucial in informing physical activity advocates, sport organizations (e.g., club, leagues) and policy developers on tailoring programs or promotional strategies to increase sport engagement.

At the same time, caution must be practiced by sport advocates, policy developers and sport scientists when promoting sport as a better alternative or superior to other types of leisure activities (e.g., exercise, music). As highlighted in Chapter Two, our knowledge on sport in comparison to other activities, as well as the diverse experiences/opportunities within sport is incomplete and this should be further examined prior to promoting sport as valuable for all adults.

### **Conclusion**

While aging is often viewed as a period of consistent and inevitable decline, findings from this dissertation encourage viewing old age as a unique stage of development, with key developmental priorities that facilitate individual's movement through this period of life. In comparison to regular physical activity (e.g., exercise), sport has been advocated as a potential avenue to develop psychosocial assets in older adults. However, the lack of a quantitative scale has limited the extent to which researchers and sport advocates have been able to measure the types (or proportion) of assets gained through sport, as well as the specific contexts required to develop psychosocial assets. To bridge this research gap, this dissertation aimed to lay the foundation of creating a quantitative tool to measure psychosocial assets in older adults. While the current scale is preliminary and needs continued validation (and possibly extension), the

Psychosocial Assets Scale has practical implications for sport advocates, researchers, sport organizations, and policy developers. In addition, findings from this dissertation emphasize the need for a quantitative scale in capturing the nuances of sport and differences in development across a broad sample of older adults. Moreover, this dissertation is a call to future researchers to continue work on health and development measures in older adults, particularly as they relate to enhancing our understanding on the value of sport for older adults.

## References

- Baker, J., Fraser-Thomas, J., Dionigi, R., & Horton, S. (2010). Sport participation and positive development in older persons. *European Review of Aging and Physical Activity*, 7(1), 3–12. <https://doi.org/10.1007/s11556-009-0054-9>
- Baker, J., Gayman, A., & Johnston, K. (2023). Lifespan models of athlete development: What have we learned from previous attempts? *Frontiers in Sports and Active Living*, 5, 1–6. <https://doi.org/10.3389/fspor.2023.1179767>
- Callary, B., Rathwell, S., & Young, B. W. (2018). Coach Education and Learning Sources for Coaches of Masters Swimmers. *International Sport Coaching Journal*, 5(1), 47–59. <https://doi.org/10.1123/iscj.2017-0056>
- Coakley, J. (2011). Youth sports: What counts as “positive development?” *Journal of Sport and Social Issues*, 35(3), 306–324. <https://doi.org/10.1177/0193723511417311>
- Coakley, J. (2016). Positive youth development through sport: Myths, beliefs, and realities. In *Positive Youth Development Through Sport* (Second, pp. 21–33). Routledge.
- de Grey, A. D. N. J. (2020). The coming of age of AGE. *GeroScience*, 42(6), 1449–1450. <https://doi.org/10.1007/s11357-020-00307-9>
- Dionigi, R. (2002). Leisure and identity management in later life: Understanding competitive sport participation among older adults. *World Leisure Journal*, 44(3), 4–15. <https://doi.org/10.1080/04419057.2002.9674274>
- Dionigi, R. (2006). Competitive sport as leisure in later life: Negotiations, discourse, and aging. *Leisure Sciences*, 28(2), 181–196. <https://doi.org/10.1080/01490400500484081>
- Dionigi, R. (2015). Stereotypes of aging: Their effects on the health of older adults. *Journal of Geriatrics*, 2015, 1–9. <https://doi.org/10.1155/2015/954027>

- Dionigi, R. (2017). I would rather die than live sedentary: Is the demonization of passive leisure creating a future generation of older people who will not accept inactivity? *Topics in Geriatric Rehabilitation, 33*(3), 156–161. <https://doi.org/10.1097/TGR.0000000000000151>
- Dionigi, R., Baker, J., & Horton, S. (2011). Older athletes' perceived benefits of competition. *The International Journal of Sport and Society: Annual Review, 2*(2), 17–28. <https://doi.org/10.18848/2152-7857/cgp/v02i02/53869>
- Dionigi, R., Fraser-Thomas, J., & Logan, J. (2012). The nature of family influences on sport participation in Masters athletes. *Annals of Leisure Research, 15*(4), 366–388. <https://doi.org/10.1080/11745398.2012.744274>
- Dionigi, R., Fraser-Thomas, J., Stone, R., & Gayman, A. (2017). Psychosocial development through masters sport: What can be gained from youth sport models? *Journal of Sports Sciences, 36*(13), 1533–1541. <https://doi.org/10.1080/02640414.2017.1400147>
- Dionigi, R., Horton, S., & Baker, J. (2013). Negotiations of the ageing process: Older adults' stories of sports participation. *Sport, Education and Society, 18*(3), 370–387. <https://doi.org/10.1080/13573322.2011.589832>
- Gard, M., Dionigi, R., & Dionigi, C. (2017). From a lucky few to the reluctant many: Interrogating the politics of sport for all. *Sport and Physical Activity Across the Lifespan: Critical Perspectives, 67–89*. [https://doi.org/10.1057/978-1-137-48562-5\\_4](https://doi.org/10.1057/978-1-137-48562-5_4)
- Gayman, A., Fraser-Thomas, J., Dionigi, R., Horton, S., & Baker, J. (2017). Is sport good for older adults? A systematic review of psychosocial outcomes of older adults' sport participation. *International Review of Sport and Exercise Psychology, 10*(1), 164–185.
- Heo, J., Culp, B., Yamada, N., & Won, Y. (2013). Promoting successful aging through competitive sports participation. *Qualitative Health Research, 23*(1), 105–113.

<https://doi.org/10.1177/1049732312457247>

Holt, N. L., Deal, C. J., & Smyth, C. L. (2016). Future directions for positive youth development through sport. *Positive Youth Development through Sport: Second Edition*, 229–240.

<https://doi.org/10.4324/9781315709499-19>

Horton, S., Dionigi, R., Gard, M., Baker, J., & Weir, P. (2018). Don't sit back with the geraniums, get out: The complexity of older women's stories of sport participation. *Journal of Amateur Sport*, 4(1), 24–51. <https://doi.org/10.17161/jas.v4i1.6627>

Litchfield, C., & Dionigi, R. A. (2012). The meaning of sports participation in the lives of middle-aged and older women. *International Journal of Interdisciplinary Social Sciences*, 6(5), 21–36.

Motz, D., Rathwell, S., Callary, B., & Young, B. W. (2023). Invariance testing of the adult-oriented sport coaching survey across masters athletes' age, gender, competition level and sport. *Measurement in Physical Education and Exercise Science*, 1-14.

<https://doi.org/10.1080/1091367X.2023.2203137>

Rathwell, S., Callary, B., & Young, B. W. (2015). Exploring the context of coached masters swim programs: A narrative approach. *International Journal of Aquatic Research and Education*, 9(1), 70–88. <https://doi.org/10.1123/ijare.2014-0068>

Search Institute. (2005). *The Developmental Assets Profile (DAP)*. <https://www.search-institute.org/surveys/choosing-a-survey/dap/>

Weir, P., Baker, J., & Horton, S. (2010). The emergence of masters sport: Participatory trends and historical developments. In *The Masters athlete: Understanding the role of sport and exercise in optimizing aging* (pp. 7–14). <https://doi.org/10.4324/9780203885512>

Young, B. W., & Callary, B. (2017). Doing 'more for adult sport': Promotional and



programmatic efforts to offset adults' psycho-social obstacles. *Sport and Physical Activity Across the Lifespan: Critical Perspectives*, 263–282. [https://doi.org/10.1057/978-1-137-48562-5\\_14](https://doi.org/10.1057/978-1-137-48562-5_14)

## Appendices

## Appendix A

### Scoping Review: Supplementary Table

Table 4 Detailed information from studies on athletes since 1985 WMGs

Study, year, (Design)	Age (Range, Mean, SD)	Sex	Ethnicity	Income/Career and Education (athletes)	Recruitment (country)	Participant or training history	Sample	Sport (type and level)
<b>Cognitive</b>								
Caserta et al., 2007, (Intervention)	50 years and above Males: (M=62.50, SD=8.44), Female: (M=56.59, SD=8.53)	10 males, 17 females	N/A	N/A	United States - North Central Florida local clubs	Competed regularly in United States Tennis Association NTRP certified rating	N=27	Tennis (Competitive)
Muinos & Ballesteros, 2015 (cross-sectional)	<i>Judo</i> : 56-67 years, M=64.1, SD=3.6 <i>Judo</i> : 21-32 years, M=27.6, SD=3.8 <i>Karate</i> : 55-67 years, M=63.7, SD=3.2 <i>Karate</i> : 19-34 years, M=25.3, SD=4.8 <i>Non-athletes</i> : 19-28 years, M=23.5, SD=3.2 <i>Non-athletes</i> : 55-68 years, M=64.7, SD=4.3	15 males each group (OA Judo, Karate, & Non-athletes); 30 males each group (YA Judo, Karate, & Non-athletes)	European	N/A - Matched educational level but detailed info not provided	Spain - Castellon - martial arts schools	Practiced in a gym or martial arts school	N=135 (45 Judo, 45 Karate, 45 Non-athletes)	Multisport: Judo and karate (Recreational)
Tseng BY, Gundapuneedi T et al., 2013 (cross-sectional)	MA: 61-80 years; M=72.4, SD= 5.6 years SED: 66-82 years; M=74.6, SD=4.3	7 males, 3 females (MA); 8 males, 2 females (SED)	N/A	Education years: M=16.2, SD=2.2 (MA); M=15.8, SD=2.3 (SED)	United States, Texas - recruited mainly from the running clubs	Training >15 years; participated in competitions	N=20 (10 MA, 10 SED)	Running (Competitive)
Tseng BY, Uh J et al., 2013 (cross-sectional)	M=72.4, SD=5.6 years (MA) M=74.6, SD=4.3 years (SED)	9 males, 3 females (MA);	N/A	Education years: M=16.2, SD=2.2 years (MA); M=15.8, SD=2.3 years (SED); M=27.2, SD=3.6 years (YC)	United States, Texas - Recruited mainly from the running clubs	>15 years training experience (MA)	N=33 (12 MA, 12 SED, 9 YC)	Running (Competitive)

	M=27.2, SD=3.6 years (YC)	8 males, 4 females (SED);						
		5 males, 4 females (YC)						
Zhao et al., 2016 (cross-sectional)	40-80 years M=57.3, SD=8.2 (MA) M=57.6, SD=8.9 (SED)	45% females (MA); 45% females (SED)	N/A	MA: 52.9% graduate degree, 31.4% Bachelors degree, 15.7% High-school	United States, Pittsburgh – local MA community	Training <3 times/week in their sport (M=4.9, SD=1.1 days of exercise/week). Competed 1/year in respective sport	N=102 (51 MA, 51 non-athletes)	Type of sport N/A (Competitive)
Zhu et al., 2013 (cross-sectional)	M=72, SD=6 years (MA) M=27, SD=5 years (SED YA); M=72, SD=4 (SED OA)	9 males; 2 females (MA); 7 males, 5 females (Young SED); 7 males and 3 females (OA SED)	N/A	N/A	United States, recruited from race records	>15 years of participation	N=32 (11 MA, 11 young SED, 10 old SED)	Running (Competitive)
Participation								
Cardenas et al., 2009 (cross-sectional)	55-96 years old (M=70)	211 (48%) males, 227 (52%) females	81% white, not Hispanic origin; 10% African-American; 5% American Indian; 3% Hispanic/Latino, Asian American, Non-response, Multiracial or other	29% >\$60K; 11% 50-59K; 12% 40-49K; 14% 30-39K; 13% 20-29K; 14% 10-19K; 6% <10K	United States - North Carolina, USA (64% rural; 36% urban)	N/A	N=444	Multisport: Archery, badminton, bocce, softball tournament as well as a softball throw, tennis, track and field, swimming and a variety of other possibilities depending on the interests within the local community  (Recreational and Competitive) Pickleball
Casper & Jeon, 2019	55 and above athletes,	364 males, 324 females	White (n=649, 94.1%);	N/A	United States, North Carolina - USA	N/A	N=690	

(cross-sectional)	55-64 years (n=249, 36.1%),  65-74 years (n=370, 53.6%),  75 and over (n=71, 10.3%)		African American (n=13, 1.9%);  Hispanic or Latino (n=5, 0.7%);  Asian (n=8, 1.2%);  Other (n=15, 2.2%)		Pickleball Association Ambassadors Online survey			(Recreational n=443, 64.2% and Competitive n=247, 35.8%)
Harada, 2016 (cross-sectional)	60 and above (M=60.2) MA  60 and above (M=66.8) Senior university students	91.6 % males, 8.4% females (MA);  53.1% males, 46.9% females (senior university students)	Japanese	N/A – no data for MA provided	Japan	90% began participating after the age of 55;  10% below age 55	N=439 (166 MA, 273 senior university students)	Multisport: Masters track and field MA also participated in various sport and exercise: jogging, golf, baseball, tennis, swimming, exercise, downhill skiing, volleyball, ping pong.  (Recreational and Competitive) Multisport: Archery, badminton, basketball, golf, horseshoes, swimming, tennis, track and field events, and more.  (Competitive)
Heo & King, 2009 (cross-sectional)	50 and above MA;  50-59 years (n=52, 23.9%),  60-69 years (n=80, 36.7%), 70-79 years (n=70, 32.1%),  80-89 years (n=15, 6.9%),  90 and above (n=1, 0.5%)	(n=155, 71.1%) males, (n=63, 28.9%) females	Caucasian (n=206, 94.5%),  African American (n=6, 2.8%),  Asian (n=2, 0.9%), Hispanic (n=2, 0.9%)	Employment: Retired (n=128, 58.7%), Employed full time (n=68, 31.2%)  Education: Highschool (n=13, 5.9%), College (n=112, 51.4%), Graduate school (n=79, 36.2%)	United States, Indiana and other Midwest cities- 2008 Indiana Senior Games	Training hours/week (M=6.23, SD=4.31)  Years participated (M=6.29, SD=6.27)	N=218 MA	
Junhyouiig et al., 2015 (cross-sectional)	Athletes: 50 years and above (M=65.89, SD=9.48)	70% males, 30% females	88% Caucasian	Retired (60%)  Graduate degree (48%), Undergrad degree (36%)	United States, Indiana – 2010 Indiana State Senior Games	N/A	N=139	Multisport: Swimming (12.2%), pickleball (13.7%) , track and field (35.3%) , cycling (6.5%).

								volleyball (7.2%), tennis, basketball, road race, archery, bowling, shuffle board and golf
McCracken & Dogra, 2018 (cross-sectional)	55 and over; MA: (M=62.8, SD=7.3),  Recreational athletes (M=65.2, SD=7.7)	46 males, 33 females (MA);  60 males, 64 females (REC)	N/A	<p>Employment: <i>MA (males, female):</i> full time (37%, 24.2%), part-time (2.2%, 12.1%), self-employed (10.9%, 18.2%), retired (47.8%, 42.4%), unemployed (2.2% 3.0%);</p> <p><i>Recreational Athletes (males, female):</i> full time (16.7%, 7.8%), part-time (1.7%, 9.4%), self-employed (15%, 6.3%), retired (65%, 75%), unemployed (1.7% 1.6%);</p> <p>Education: <i>MA (males, female):</i> &lt;community college (17.8%, 12.1%), completed community college (0%, 9.1%), some university (13.3%, 27.3%), completed university (44.2%, 36.4%), completed post-doc (24.4%, 15.2%);</p> <p><i>Recreational Athletes (males, female):</i> &lt;community college (25%, 14.1%), completed community college (15%, 7.8%), some university (13.3%, 14.1%), completed university (25%, 40.6%), completed post-doc (21.7%, 23.4%)</p>	Canada, Ontario - online surveys and locally recruited	<p>Competition in the last 12 months - <i>MA</i> (males =89.1%, female=97%) ;</p> <p><i>Recreational athletes</i> (males=80%, female=76.6%)</p>	N=203 (79 MA, 124 recreational athletes)	<p>(Competitive) Multisport - snow/ice, team, water, skill, racquet, multiple, endurance, lifting, urban, other</p> <p>(Recreational and Competitive)</p>
<b>Performance</b>								
Allen et al., 1985 (Cross-sectional)	50-66 years; M=56, SD=5 years (MA); M=26, SD=3 years (YA)	N/A	N/A	N/A	United States, Washington	Finished in the top 10% of their age-group in 10 km road race	N=16 (8 MA, 8 young athletes)	Running (Competitive)
Backman & Molander, 1986 (cross-sectional)	Study 1: 47-58 years; M=50.2 (MA);	Study 1: 3 males, 2 females (MA);	N/A	N/A	Sweden, Umea	Study 1: M=7 years of competition (MA);	N=36 (11 study 1, 14 study 2, 11 study 3)	Miniature golf (Competitive)

	22-32 years; M=27.4 (young athletes);  Study 2: 7-14 years (youth), 15-18 (junior adults), 19-45 years (young athletes);  Study 3: 48-59 years; M=51 (MA), 23-35 years (young adults)	5 males (young athletes);  Study 2: 12 males, 2 females (young athletes);  Study3: 3 males, 3 females (MA);  5 males, 1 female (young athletes)					Study 3: M=11.6 years of competition (MA)		
Bagley et al., 2019 (cross-sectional)	37-90 years (MA)	19 males, 20 females	N/A	N/A	Germany - European Veterans Athletics Championships	N/A	N=39 (20 Power, 19 Endurance athletes)	Multi-sport: Endurance and power (throwing) sports	
Coggan et al., 1990 (Cross-sectional)	55-72 years (M=63, SD=6)  22-31 years (M=27, SD=3)	8 males (MA);  8 males (young athletes)	N/A	N/A	United States, Washington	Finished in the top 10% of their age-group in 10 km road race. Training and competing events for at least 3 years	N=16 (8 MA, 8 young athletes)	(Competitive) Running (Competitive)	
Cortis et al., 2013 (Cross-sectional)	M=52.3, SD=10.2	10 males	N/A	N/A	Italy, Rome - Knights of Columbus club	1.5 hr/week training, friendly match for the previous 10 years	N=10	Soccer (Recreational)	
Dascal et al., 2016 (Cross-sectional)	Tennis: (M=67.3, SD= 5.3),  Runners (M=68, SD=5.2),  Exercise (M=68.2, SD=5.1);	11 males, 10 females (tennis);  13 males, 10 females (runners);	N/A	Average of self-declared number of years of formal education:  Runners (M=8.2, SD=3.6),  Tennis (M=9.5, SD=2.6),  Exercisers (M=8.7, SD=4.5)	Brazil	10 years of experience in sport; 2/week training	N=84 (21 tennis, 23 runners, 20 exercise, 20 young)	Multi-sport: Tennis, Running (Competitive)	

	Young (19-29 years; M=21.8, SD=2.4)	10 males, 10 females (Exercise);							
		10 males, 10 females (young)							
Doering et al., 2017 (Intervention)	M=52.1, SD=2.1 years (MA)	8 males	N/A	N/A	Australia	6.5 ± 2.7 (years of triathlon)	N=8	Multi-sport: Triathletes	
Fell, 2008 (Intervention)	≥35 years (39-54 years), M=45, SD=6	8 males, 1 female	N/A	N/A	Australia	Cycling 200km/week for 6 months prior to study and actively competing at club level	N=9	(Competitive) Cyclist	(Competitive)
Fleg et al., 1995 (Cross- sectional)	52-76 years; M=65, SD=8 (athletes)  M=63, SD=6 (OA control);  M=31, SD=5 (YA control)	16 males 23 males (OA control);  17 males (YA control)	Predominantly white	>80% work or retired from professional, managerial, scientific positions  70% college degree	United States - Baltimore	>80 km/month running, 16 years of training	N=56 (16 older athletes, 23 old control, 17 young control)	Running	(Competitive)
Gent & Norton, 2013 (Cross- sectional)	35-64 years; M=47.1, SD=7.5 (males);  M=44.7, SD=7.3 (females)	156 males, 17 females	N/A	N/A	Australia	2 years minimum training and/or competing with 150 minutes of weighted PA/week	N=156	Cyclists	(Competitive)
Giada et al., 1998 (Cross- sectional)	50-65 years, M=55, SD=5 (Cyclists)  M=58, SD=6 (OC),  M=24, SD=6 (YA),  M=23, SD=2 (YC)	12 males (older athletes);  12 males (Older control);  12 males (young athletes);  12 males (YC)	N/A	N/A	Italy	Training M=213, SD=89 km/week	N=42 (12 older athletes, 12 young athletes, 12 old control, 12 young control)	Cyclists	(Competitive)
Glenn et al., 2016 (Intervention)	40-68 years; M=51, SD=9	17 females	N/A	N/A	United States	Years training (M=10, SD=8.2), competitive for	N=17	Tennis	(Competitive)



						at least past 2 years		
Glenn et al., 2014 (Cross-sectional)	≥60 years; M=72.45, SD=4.86 (MA)	20 males (M=74.85, SD=5.12),  18 females (M=69.95, SD=3.03)	N/A	N/A	United States - Senior Olympic basketball tournament in the Midwest region	N/A	N=38	Basketball  (Competitive)
Hagberg et al., 1985 (Cross-sectional)	M=56, SD=5 years (MA)  M=26, SD=3 years (competitive young athletes);  M=25, SD=3 (young runners matched with MA);  M=58, SD=5 years (Healthy SED)	8 males (MA)  8 males (competitive young athletes);  8 males (young athletes matched);  15 males (Healthy SED)	N/A	N/A	United States	N/A	N=39 (8 MA, 15 SED healthy, 8 young competitive, 8 young case-matched)	Running  (Competitive)
Hagberg et al., 1998 (Cross-sectional)	51-67 years (M=56, SD=5.6) M=58.4, SD=3.6	7 males (MA);  12 males (SED)	N/A	N/A	United States	Trained continuously for M=9, SD=10 years;  Sport participant since high-school (n=4);  Running (M=53, SD=18 km/week)	N=19 (7 MA, 12 SED)	Multi-sport: Running, triathlon  (Competitive)
Hawkins et al., 2001 (Longitudinal)	49 and above (10 years age categories); M=53.9, SD=1.1 (males),  M=49.1, SD=1.2 (females); Individual Means and SD also provided for each males and female within individual age categories	86 males, 49 females	N/A	N/A	United States, California	Training for at least 5 years, competitive at least once a year	135 40-49 (males=31, females=24); 50-59 (males=34, females=16); 60-69 (males=13, females=9); 70+ (males=8)	Running  (Competitive)

Herbert et al., 2017 (Intervention)	M=60, SD=5 years	17 males	N/A	N/A	N/A	>30 years	N=17 (MA)	Multisport: Water polo, triathlon, track cycling, road cycling and distance running
Karamanidis et al., 2006 (Cross-sectional)	60- 69 years (M=64, SD=3) (endurance runners)  M=64, SD=2 (Old non-active);  M=27, SD=4 (Young active);  M=29, SD=3 (Young non-active)	30 males (combined runners and non-active);  19 males (YA combined runners and non-active)	N/A	N/A	Germany	Endurance running at least 3/week over the last 10 years and participated regularly in middle- and long-distance running competitions	N=49 (30 older adults*, 19 Young adults* (Number of endurance runners and non-active subgroups not provided))	(Competitive) Running  (Competitive)
Langley, 2001 (Qualitative)	60 years	1 male	N/A	Administrator in university	United States - Midwest	7 months - period of study	N=1	Golf
Langley & Knight, 1996 (Qualitative)	58 years	1 male	N/A	University physics professor	United States	28 years	N=1	(Recreational) Tennis
Leti & Bricout, 2013 (Intervention)	45-60 years; M=51, SD=5	10 males (MA)	N/A	N/A	France	Training for M=4.5, SD=1.8 hours/week; took part in at least 1 competition per quarter (4 running sessions were scheduled)	N=10	(Competitive) Running  (Competitive)
Lobjois et al., 2006 (Cross-sectional)	60-79 years athletes;  M=65.7, SD=3.4 (60-69 years), M=76.4, SD=3.4 (70-79 years)  M=23.5, SD=2.7 (20-30 years players),  M=25.7, SD=3.8 (20-30 years non-athletes),	20 males (older athletes);  20 males (older non-athletes);  10 males (young athletes);  10 males (young non-athletes)	N/A	Employment: Retired (no specific info provided)  Years of education: M=14.8, SD=3.8 (young old), M=14.5, SD=3.3 (Old)	France – Tennis associations	>10 years (2-4 hrs/week)	N=60 (20 older athletes, 20 old non-athletes, 10 young athletes, 10 young non-athletes)	Tennis  (Recreational)

	M=65.3, SD=2.1 (60-69 years non-athletes),  M=73.7, SD=2.5 (70-79 years non-athletes)							
Lobjois et al., 2007 (Cross-sectional)	60-80 years (2 groups, 60-70, 70-80) 20-30 years (athletes), 20-30 years (non-athletes), 60-80 years (non-athletes)	16 males (older athletes);  16 males (older non-athletes);  8 (young athletes);  8 (young non-athletes)	N/A	Retired (no specific info provided)	France	>10 years, 60-70 years (M=31, SD=16), 70-80 years (M=37, SD=19) years of experience	N=48 16 (older athletes), 16 (OA non-athletes), 8 (YA athletes); 8 (YA non-athletes)	Tennis  (Recreational)
Marcell et al., 2003 (Longitudinal)	39-77 years; Age group 50s (initial: M=54.3, SD=0.8, follow-up: M=59.8, SD=0.7); Age group 60s (initial: M=61.1, SD=0.3, follow-up: M=67.1, SD=0.4) Age 40s (initial: M=44.9, SD=0.7, follow-up: M=50.3, SD=0.8)	51 males, 23 females*	N/A	N/A	United States	Training for at least 5 years, competing at least 1/year	N=74	Running  (Competitive)
Mitchell et al., 2003 (Cross-sectional)	50-86 years (M=68, senior athletes)  18-24 years (M=20, college)  25-48 years (M=36, middle age)	22 males (senior athletes),  24 males (middle-aged athletes)	N/A	N/A	United States - Palm Beach Florida	N/A	N=65	Golf  (Competitive)
Pantoja et al., 2016 (Cross-sectional)	39-96 years; 3 age groups –  45-64 years (M=51.1, SD=3.97);  65- 96 years (M=77.7, SD=9.93)	19 males (college) 6 males (35-44 years),  14 males (45-64 years),  7 males (65-95 years)	N/A	N/A	Lyon, France - European Master Games in Nice, France, 2015 World Master Athletics Outdoor	N/A	N=27 (MA)	Running  (Competitive)

Sayers et al., 2015 (Cross-sectional)	35-44 years (M=40.4, SD=2) <65 years (M=61, SD=3.8) and >65 years (M=71, SD=4.6)	15 males, 15 females	N/A	N/A	Championship in Lyon, France. Australia	Playing experience: <65 years (M=8, SD=6.7); >65 years (M=12.6, SD=8.4 )	N=30	Lawn bowling (Competitive)
Seifert et al., 2017 (Cross-sectional)	M=69, SD=4 M=25, SD=3	19 males, 19 female (old and young combined)*	N/A	N/A	Austria	N/A	N=38 (18 older athletes, 20 young)	Alpine Skiing (Recreational and Competitive)
Stone et al., 2018 (Cross-sectional)	40-68 years; M=50.5, SD=8.6 years (MA)	17 females (MA) 15 females (REC YA)	N/A	N/A	United States - Southern States	MA: playing tennis (M=3.4, SD=0.9) days per week; M=10, SD=8.2 years of training experience	N=32 (17 MA, 15 REC young)	Tennis (Recreational and Competitive)
Suominen et al., 2017 (Intervention)	19-22 years; M=20.6, SD=0.8 (recreationally active) 40-85 years; M=60.2, SD=11.8 (experimental group),	72 males	N/A	N/A	Finland	Long-term training and success in international competitions	N=72 (40 experimental), 32 control)	Running (Competitive)
Tanaka et al., 1990 (Cross-sectional)	M=61.8, SD=12.1 (control group) 43-79 years (M=57.5, SD=9.7)	48 males	Japanese	N/A	Japan	Training (M=5.3, SD=1.4 days/week) for (M=14, SD=8 years); (M=53, SD=22 km/week)	N=48	Running - (Competitive)
Weir et al., 2002 (Cross-sectional)	MA: Males: (36-87 years, M=53), Females: (40-71 years, M=53.8) International level: (Males: 15-24 years, M=20.4, Females: 17-20, M=18.7); Junior-national-level: (Males:15-16, M=15.5, Females: 14-17, M=15.6);	25 males, 16 females 9 males, 4 females (International -level); 7 males, 11 females (Junior-national);	N/A	N/A	Canada	Time spent in training and practice provided in detail	N=81 (41 MA, 40 young athletes)	Swimming (Competitive)

	Varsity swimmers: (Males:18-22, M=19.8, Females: 18-21, M=19.2)	4 males, 5 females (Varsity)						
Young & Starkes, 2005 (Cross-sectional)	47-69 years (M=56.9, middle distance runners), 45-69 years (M=55.2, long distance runners)	7 males (middle-distance), 9 (long distance)	N/A	N/A	Canada	20.1 years career (middle distance), 18.9 years career (long distance)	N=15* (additional comparisons with participants from other studies)	Running - 7 middle distance, 9 long distance) (Competitive)
Young et al., 2008 (Cross-sectional)	40-59 years; Study 1: M=50.1, SD=5.6; Study 2: M=49.7, SD=4.9 years	26 males, 4 females	N/A	N/A	Canada and United States – 2004 Canadian Masters Athletics Association Championship, or the 2004 or 2005 United States Track and Field Association Masters Outdoor Track and Field Championships	Weekly running: M=62.05 km, SD=23.8	N=30 (30 Study 1, 25 Study 2)	Running (Competitive)
Physiological								
Aengevaeren et al., 2013 (Cross-sectional)	M=73, SD=6 years (MA) M=71, SD=6 years (SED)	8 males, 3 females (MA) 7 males, 5 females (SED)	N/A	N/A	United States - Texas local clubs or records from competitive events	>15 years; regionally or nationally ranked runners	N=23 (11 MA, 12 SED)	Multi-sport: Running, cycling, swimming (Competitive)
Backmand et al., 2006 (Longitudinal )	M=64.6, SD=9.2 years (former elite players); ≤59 years = 33.7%, 60-69 years = 40.7%, ≥70 years= 25.6 % M=62 years (control); ≤59 years = 43.2%,	644 males athletes 500 control	European	Executives: Athletes= 21.9%, Control=12.8%; Clerical workers: Athletes=41.5%, Control=28.2%; Skilled workers: Athletes=30.2%, Control=42.6%; Unskilled workers: Athletes=2%, Control=3.8%;	Finland - competed at least once in Olympic Games, World or European championships, or inter-country competitions from 1920-1965	Former athletes	N=1164 (644 athletes, 500 control)	Multisport: 1985 - 85% for endurance, 83% power combat and individual athletes, 87% team athletes, 86% shooters, and 77% controls; In 1995 - 81% for endurance, 76% power combat and individual athletes, 76%

	60-62 years = 42%, ≥70 years =14.8%			Agricultural workers: Athletes=4.4%, Control=12.6%				team athletes, 73% shooters, and 71% for controls (26%).
Barranco- Ruiz et al., 2017 (Cross- sectional)	Trained athletes: >55 years, (M=60.71, SD=4.6)  REC: >55 years, (M=60.78, SD=6.81)  Trained athletes: 40- 55 years, (M=45.75, SD=3.61)  REC: 40-55 years, (M=47.50, SD=4.67),  REC, Trained athletes and Inactive groups :18-25 years,  Inactive: 40-55 years,  Inactive OA: >55 years	<i>Athletes:</i> 8 males (18- 25 years),  8 males (40- 55 years),  8 males (>55 years),  <i>REC:</i> 8 males (18- 25 years),  8 males (40- 55 years),  8 males (>55 years),  <i>Inactive:</i> 8 males (18- 25 years),  8 males (40- 55 years)  8 males (>55 years), N/A	European	N/A	Spain - local clubs in Granada	REC group = 3- 8hr/week, Trained athletes = >8hr/week began sport from a young age.	N=72 (9 groups with n=8) 45-55 years (Trained, REC, Inactive)  >55 years (Trained, REC, Inactive),  18-25 years (Trained, REC, Inactive)	(Competitive) Multi-sport - Cycling and long distance running  (Recreational and Competitive)
Brauer et al., 2008 (Cross- sectional)	Athletes: 62- 84 years, (M=69.8, SD=5.7)  Healthy OA: 64-86 years, (M=72, SD=7)	N/A	N/A	N/A	United States - Orgeon	17.5 years	N=34 (19 elite athletes)	Running  (Competitive)
Castillo- Lozano, 2017 (Cross- sectional)	50-66 years, (M=56.8, SD=4.6 years)	107 males, 24 females	European	N/A	Spain	M=9.4, SD=6.3 years; >3 times/week during time of study	N=131	Paddle-tennis  (Recreational and Competitive)
Castillo- Lozano & Casuso-	55-66 years (M=60.4, SD=3.5)	30 males (older athletes)	European	N/A	Spain	Older athletes (M: 10.33, SD 6.42 years)	N=60 (30 older athletes, 30 junior)	Paddle-tennis  (Recreational)

Holgado, 2015 (Cross-sectional)	14-20 years (junior players)	24 males (junior athletes)							
Di Bello et al., 1993 (Cross-sectional)	M=65.7, SD=7.1 (senior athletes) M=69.7, SD=8.4 (controls)	12 males (older athletes) 11 males (control)	N/A	N/A	Italy - Sport Medicine Ambulatory Clinic	5-10km or a long distance (20km) race once a week or 2 weeks; 1-2 hours endurance (3 days) and aerobic and anaerobic training (2 days)	N=23 (12 elite senior athletes, 11 normal/healthy participants)	Running (Competitive)	
Doering, 2016 (Cross-sectional)	≥50 years (M=57.7, SD=6.5) M=24.3, SD=3.8 (≤30 years)	34 males, 17 females (≥50 years) 11 males, 19 females (≤30 years)	N/A	N/A	Australia	N/A	N=182 (51 MA; 30 YA)	Multi-sport: Swimming, cycling and running (Competitive)	
Douglas & O'Toole, 1992 (Cross-sectional)	50-71 years; M=58, SD=6 (OA athletes) M=23, SD=2 (YA athletes); M=25, SD=3 (YA SED); M=65, SD=6 (OA SED)	18 males, 3 females (OA athletes) 19 males, 5 females (YA athletes); 6 males, 8 females (YA SED); 5 males, 5 females (OA SED)	N/A	N/A	United States - Hawaii Ironman Triathlon	≥20 hrs/week (training), swimming (10 miles/week), biking (250 miles/week), running (50 miles/week)	N=69 (24, YA athletes, 21 OA athletes, 14 YA SED, 10 OA SED)	Multi-sport: Triathletes (Competitive)	
Evans et al., 1995 (Cross-sectional)	49-56 years (M=52, SD=1) 23-35 years (M=30, SD=1), 37-47 years (M=42, SD=1)	10 females (49-56 years) 10 females (23-35 years), 11 females (37-47 years)	N/A	N/A	United States - Boulder	N/A	N=31	Running (Competitive)	
Feland et al., 2005 (Cross-sectional)	50 and above	107 males, 66 females	N/A	N/A	United States - Huntsman World Senior Games in St George, Utah	N/A	N=173	Multisport - not specified (Recreational and Competitive)	

Fein et al., 2017 (Cross-sectional)	40-49 years 50-59 years (n=66), 60-69 years (n=30), 70-79 years (n=18)	19 males, 23 females (40-49 years); 39 males, 27 females (50-59 years); 11 males, 19 females (60-69 years); 9 males, 9 females (70-79 years)	N/A	N/A	Australia - 2014 Pan Pacific Masters Games	Participation years: 40-49 years (M=5.9, SD=5.9), 50-59 years (M=10.4, SD=8.5), 60-69 years (M=11.1, SD=10.6), 70-79 years (M=15.8, SD=10.5); Training info also provided	N=156 (<50 years, n=42; >50 years, n=114)	Multi-sports - 43 sports (not specified) (Competitive)
Fuchi et al., 1989 (Cross-sectional)	30-39 years (M=35.2, SD=2), 40-49 years (M=46.7, SD=2.7) 50-59 years (M=54.5, SD=2.5); 60-69 years (M=63.9, SD=2.9); 70-80 years (M=74, SD=3.2)	15 males (50-59 years); 11 males (60-69 years); 9 males (70-80 years); 13 males (40-49 years); 7 males (30-39 years);	Japanese	N/A	Japan	Regularly training for 3 years and competitive in 5-10 km or marathon races	N=55	Running (Competitive)
Galetta et al., 2004 (Cross-sectional)	M=68.1, SD=6.2 years (Athletes) M=67.6, SD=4.5 (OA control)	25 males (athletes) 24 males (SED)	N/A	N/A	Italy - National Veterans Sport Club of Pisa	M=37, SD=5 (years of training)	N=50 (25 OA athletes, 25 SED)	Running (Competitive)
Glenn, Gray et al., 2015 (Intervention)	M=53.3, SD=1.0 years	22 females	N/A	N/A	United States - Midwestern States	At least 2 years of competitive cycling, minimum 3 day/week cycling competitively	N=22 (11 experimental, 11 placebo)	Cycling (Competitive)
Glenn, Gray, Stewart, et al., 2016 (Intervention)	>47 years MA experimental: (M=54, SD=2) MA Placebo: M=53, SD=1 years	11 females (MA), 11 females (MA placebo)	N/A	N/A	United States - Southern States	cycled at least 2 years for 3 day/week	N=22 (11 experimental, 11 placebo)	Cycling (Competitive)
Glenn, Gray, Vincenzo et al., 2016	M=56.7, SD=5.4 years (MA)	8 males, 18 females (athletes)	N/A	N/A	United States - Northwest Arkansas area	At least two years competing	N=74 (26 MA, 35 RA, 13 SED)	Multisport: 5 cycling, 7 long distance



(Cross-sectional)	M=59.6, SD=5 years (REC); M=59.3, SD=4.5 years (Sedentary or SED)	21 males, 14 females (RA); 4 males, 9 females (SED)						running, 2 sprinters, 4 triathlon, 7 tennis, 1 CrossFit, 1 golf  (Recreational and Competitive) Multisport: running, cycling, triathlon, tennis, crossfit  (Recreational and Competitive) Multi-sports: Running, swimming, cross-country skier, downhill skier
Glenn, Vincenzo, et al., 2015 (Cross-sectional)	M=57.5, SD=1.5 (MA) M=63.5, SD=1.1 years (REC); M=61, SD=1.3 years (SED)	12 males, 12 females (MA) 7 males, 13 females (SED)	N/A	N/A	United States - Northwest Arkansas area	MA had been competing for at least 2 years	N=102 (25 MA, 57 RC, and 20 SED)	
Hagmar et al., 2005 (Cross-sectional)	M=56, SD=3.5 (athletes) M=56.8; SD=3.4 (control)	20 females (former athletes) 19 females (SED control)	N/A	N/A	Sweden	Career training: 8 hours/week (5-24 hours/week)	N=39 (20 older athletes, 19 SED control)	
Hood et al., 1999 (Longitudinal)	56-83 (M=67, SD=6.2)	19 males	N/A	N/A	Scotland - Scottish Veteran Harriers Club	Year 1997: 9-70 miles/week (M=34, SD=21); Year 1985 (M=43, SD=26) N/A	N=19	(Competitive) Running  (Recreational and Competitive)
Jordre et al., 2013 (Intervention)	>50 years (M=64.9, SD=15)	104 males, 172 females	N/A	N/A	United States - athletes part of 2011 National Senior Summer Games or the 2011 South Dakota Senior Games.		N=276	Multisport: (active sport) Badminton, basketball, cycling, pickle ball, race-walking, racquetball, road races (5K, 10K), softball, swimming, table tennis, tennis, triathlon, track & field, volleyball; (leisure sport) Archery, bowling, golf (with cart),

								horseshoes, shuffleboard
Kavanagh et al., 1988 (Cross-sectional)	35 and above (10 year age categories);  M=47.9, SD=11.1 years	1220 males, 468 females*	N/A	N/A	Canada (n=980, 58%), USA (n=462, 27.4%), Australia and New Zealand (n=78, 4.6%), Europe (n=68, 4%), Latin-America (n=51, 3%), West Indies (n=35, 2.1%), Other (n=14, 0.8%)	Sport since leaving school (42% males, 36.6% females);  Remainder of athletes began sport M=39 years (males), M=38 (females);  Training: M=7.5 hours/week (males), M=6.8 hours/week (females)	N=1688	(Competitive) Multi-sport: Running, swimming, cycling, cross-country skiing, orienteering, rowing, racquetball  (Competitive)
Kawashima et al., 2003 (Cross-sectional)	M=40.1, SD=9.6 (Professional);  M=55.8, SD=11.7 (General Amateur);  M=19.9, SD=0.8 (collegiate golfer);  M=19.7, SD=1 (Collegiate recreational);  M=19.2, SD=0.5 (Control);  M=44.7, SD=3.6 (Senior Control)	63 males (athletes)  65 males (non-athletes)	Japanese	N/A	Japan	M=17.7, SD=8.8 years career length (Amateur); M=23, SD=7.8 (Professional golfers)	N=128 (63 golfers, 65 non-golfers)	Golf  (Competitive)
Lamoth et al., 2012 (Cross-sectional)	M=66.3, SD=6.3 years  M=66.3, SD=4.9 years (age-matched elderly);  M=22.6, SD=1.4 years (young adults)	11 males, 2 females (athletes)  8 males, 2 females (inactive OA);  7 males, 3 females (YA)	N/A	N/A	Netherland	>5 years and trained at least once a week	N=33 (13 athletes, 10 young, 10 inactive older adults)	Ice speed skating  (Recreational and Competitive)

Lane et al., 1986 (Cross-sectional)	50-72 years; (M=57.5)  M=57.5 (Matched-control)	23 males, 18 females (athletes)  23 males, 18 females (matched controls)	N/A	Highschool graduate or above	United States	Years running (M=9.3)	N=82 (41 50+ runners; 41 matched community control)	Running  (Recreational and Competitive)
Lane et al., 1987 (Cross-sectional)	50-72 years;  Runners club (M=58.6, SD=0.3),  Runner (M=58.9, SD=0.2)  Community control (M=63, SD=0.4),  Non-runner (M=63.9, SD=0.04)	Runner Club males (M=0.86, SD=0.02);  Runner males (M=0.85, SD=0.03)  Community control males (M=0.56, SD=0.03);  Nonrunner (M=0.47, SD=0.03)	N/A	High professional status highly educated	United States	N/A	N=863 (498 Runners, 365 Community control)	Running  (Recreational and Competitive)
Leigey et al., 2009 (Cross-sectional)	50-93 years (M=65.9)	289 (51.6%) males, 298 (53.2%) female - conflicting info provided in the results table	'Most were Caucasian' (n=510); minority (n=50)	N/A	United States - Pittsburgh, Pennsylvania - National Senior Games 2005	N/A	N=560	Multisport: archery, badminton, basketball, bowling, cycling, golf, horseshoes, race walking, racquetball, road race, shuffleboard, softball, swimming, table tennis, tennis, track and field, triathlon, and volleyball  (Competitive) (Recreational and Competitive)
Leightley & Yap, 2018 (Cross-sectional)	M=66.93, SD=5.03 years;  M=26.40, SD=3.16 years (young),	N/A	N/A	N/A	United Kingdom - Manchester Metropolitan University and local athletic	N/A	N=40 (15 MA, 15 young, 10 healthy old)	

Leightley et al., 2017 (Cross-sectional)	M=74.90, SD=4.11 years (healthy old)				clubs in Manchester			
	M=67.2, SD=5.2;	15 (47%) males MA	N/A	N/A	United Kingdom, Manchester - as part of ongoing RCUK Life Long Health and Wellbeing Study	51.1-year (SEM: 5.5) history of competing in athletics	15 MA, 13 Old healthy, 15 young (all males); female data not provided	Running - endurance runners (73%) and sprinters (27%).  (Competitive)
	M=67.6, SD=3.9 years (healthy OA),	13 (65%) males healthy;						
	M=25.5, SD=6.4 years (YA)	15 (68%) males young						
Lepers et al., 2019 (Qualitative)	59-year-old	1 male	White - Irish Caucasian	N/A	United Kingdom - Northern Ireland	Age 21-32 years; 16-year gap before running again at age 48	N=1	Running - Marathon  (Competitive)
Martin et al., 2015 (Cross-sectional)	55 and above (M=63.13, SD=4.61)	8 males MA 9 YA	N/A	N/A	United States - Hartford Marathon registration website and	>5 years of running; 25 miles/week average in the last 3 months	N=17 (8 MA, 9 YA)	Running - Marathon  (Competitive)
	25-39 years (M=31.89, SD=4.96 years)							
Mattern et al., 2003 (Cross-sectional)	M=64.6, SD=2.7 (older athlete)	9 males (older athletes)	N/A	N/A	United States - Ohio	N/A	N=27 (9 older athletes, 9 middle aged athletes, 9 young athletes)	Multi-sport - Cycling, Triathlon  (Competitive)
	M=43.2, SD=1 years (middle aged athletes)	9 males (middle aged);						
	M=25.9, SD=1 years (young athletes)	9 males (young athletes)						
Merghani et al., 2017 (Cross-sectional)	40-82 years (M=54.4, SD=8.5);	106 males, 70%, 46 females	92% white	N/A	United Kingdom	Endurance exercise (M=31, SD=12.6 years); Training hours (M=7.7, SD=3.5)	N=244 (152 athletes, 92 SED)	Multi-sport: 77% Running (marathons), 23% Cyclists  (Recreational and Competitive)
	Males (40-82 years; M=55.1, SD=9.1),	30% (older athletes)						
Merom et al., 2014 (Cross-sectional)	Females (40-71 years; M=53.1, SD=7.1)	54 males, 38 females (SED control)			Australia - Sydney, Concord Health and Aging in Men Project (CHAMP) between 2005 and 2011	Past 12 months - swimming, lawn bowl and golf	N=1667	Multisport: golf (n = 160), calisthenics (i.e., class- or home-based exercise, n = 156), lawn bowls (n = 130), use of aerobic
	70 years and older, M=76.8, SD=5.4 (total sample);	160 males (golf),	N/A - born in non-English speaking country: 12.5% (golf), 28.5% (lawn bowl), 39.8% (swimming), 38.5% (calisthenics),	≥10 years of education: 11.2% (golf), 7.3% (lawn bowl), 7% (swimming); 10.9% (calisthenics), 7.6% (aerobic exercise), 15.2% (total sample)				
	M=75.2, SD=4.6 (golf);	130 males (lawn bowl), 88 males (swimming)						

	M=77.1, SD=5.4 (lawn bowl); M=75.7, SD=4.6 (swimming) M=77.6, SD=5.9 years (calisthenics); M=76.7, SD=6 years (aerobic exercise)	152 males (calisthenics), 91 males (aerobic exercise)	27.5% (aerobic exercise)					exercise machines (e.g., stationary bicycle, treadmill, n = 91), swimming (n = 88), muscle strengthening (n = 74), fishing (n = 56), dancing (n = 49), tennis (n = 47), cycling (n = 46), and sailing (n = 27)
Minuzzi et al., 2017 (Cross-sectional)	40 years and above; M=53.2, SD=9.08 M=54.2, SD=5.94	16 males, 3 females (older athletes)  6 males, 4 females	N/A	N/A	Portugal	Minimum of 20 years of regular training and competition participation	N=29 (19 MA, 10 Control)	(Recreational and Competitive) Multi-sport: Judo, swimming, athletics  (Competitive)
Morrison et al., 2018 (Cross-sectional)	35-81 years (M=54.6, SD=9.5)	500 males, 298 females	Caucasian (88%, n=700); Asian/Asian Caucasian (5.8%, n=46); South Asian (0.6%, n=5); Aboriginal/Aboriginal Caucasian (0.6%, n=5); African/African Caucasian (0.6%, n=5); Other (1.6%, n=13)	>\$75K (55.8%, n=445); \$40-75K (27%, n=219); \$20-40K (7.1%, n=57); ≤\$20K (4.6%, n=37); No response (5%, n=40) Graduate/professional degree (38.5%, n=307), Vocational/college/undergraduate (53.5%, n=427); Completed high school (6.1%, n=49); Did not complete high school (1.2%, n=10)	Canada – British Columbia	Elite - professional, provincial, national (9.8%, n=78);  Weekly training hours (M=10.9, SD=6.4);  Years physically active (M=35.1, SD=14.8)	N=798 (185 Competitive, 535 Recreational)	Multi-sports: 23 sports; most athletes participated in more than one sport; common primary sports: running (34.2%), cycling (19.1%), hockey (10.9%), triathlon (9.5%) and rowing (4.3%)  (Recreational and Competitive)
Mukherjee et al., 2014 (Intervention)	50-60 years (M=53.4, SD=3.2) M=54.3, SD=5.0 years (control)	9 males (athletes) 8 males (control)	N/A	N/A	Canada - Kingston, Ontario	Most considered lifelong athletes (range: 8-42 years); at least 8 years of	N=17 (9 MA, 8 control/untrained individuals)	Multi-sport - cycling, triathlete  (Competitive)

Naderi, Degens, et al., 2018 (Cross-sectional)	M=68.8 SD=4.6 years (Table tennis players)	20 males (athletes)	Iranian	N/A	Iran	competitive racing 5-19 years (M=11.6, SD=3.6) training experience	N=40 (20 tennis players, 20 SED)	Table tennis (Recreational)
Naderi, Zagatto, et al., 2018 (Cross-sectional)	69.5 SD 3.9 years (SED)	20 males (SED)	N/A	N/A	Iran - Shiraz city	5-19 years	N=40 (20 athletes)	Table tennis (Recreational)
Newsham-West et al., 2009 (Cross-sectional)	65-70 years athletes (M=68.8, SD=4.6)	20 males (athletes)	N/A	N/A	New Zealand - 2008 New Zealand Masters Games	Playing history (15 years, 0-66 years)	N=199	Football/soccer (Recreational and Competitive)
	35-73 years;	199 males						
	40-44 years (n=61),							
	45-49 years (n=60)							
	50-54 years (n=23),							
	≥55 (n=12) 35-39 years (n=43),							
Nikolaïdis et al., 2011 (Cross-sectional)	≥35 and above, (M=43.25, SD=5.37)	18 males (older athletes)	N/A	N/A	Greece	At least 1 competition 6 months prior to study	N=31 (18 MA, 13 <35 years)	Cycling (Competitive)
	<35 years, M=28.78, SD=4.95 (Senior level athletes)	13 males						
Nowak et al., 2010 (Cross-sectional)	40-64 years;	26 males (athletes)	White	N/A	Poland - European Veterans Athletic Championships Stadia	Training 4 times/week, regular participants in international athletic championships	N=39 (14 endurance or long-distance runners, 12 speed-power athletes, 13 non-sport control)	Multi-sports: 14 (endurance or long-distance runners), 7 (speed-power sprinters), 1 (high-jumper), 1 (long jumper), 2 (pentatholons), 1 (hammer thrower)
	M=49.2, SD=5.4 (endurance),	13 males (non-sport control)						
	M=50.6, SD=6.2 (speed-power)							
	M=49.4, SD=5.7 (control)							
Oborný, 2016 (Mixed-method approach)	M=64.38 (males, M=62 (females))	16 males, 2 females	N/A	N/A	Slovakia - 11th ČSOB Bratislava Marathon 2016 and the Košice Peace	M=35.3 years (males); M=34.5 (female) years running	N=18	(Competitive) Running - long distance (Competitive)

Opar et al., 2015 (Longitudinal)	≤13 years (Junior high-school), 14-18 years (high-school), 19-40 years (college/elite including pre-Olympic/professional athletes) ≥40 years	693 males, 42 females (MA)	N/A	N/A	Marathon 2016 United States - Penn Relays Carnival	N/A	N=48,473 (Junior high-school, n=1824; High-school n=28,886; College n=17,028; MA, n=735)	Multi-sport: Track and Field (hurdles, sprints, relay, 5000m walk, pole vault, high jump, long jump, triple jump, shot put, discus, Hammer, Javelin)  (Competitive)
Opar et al., 2014 (Longitudinal)	≤13 years (Junior high-school), 14-18 years (high-school), 19-40 years (college/elite including pre-Olympic/professional athletes) ≥40 years	693 males, 42 females (MA) 912 males, 912 females (Junior high-school); 14514 males, 14372 females (high-school); 9113 males, 7915 females (college)	N/A	N/A	United States - Penn Relays Carnival	N/A	N=48,473 (Junior high-school, n=1824; High-school n=28,886; College n=17,028; MA, n=735)	Multi-sport: Track and Field (hurdles, sprints, relay, 5000m walk, pole vault, high jump, long jump, triple jump, shot put, discus, Hammer, Javelin)  (Competitive)
Patelia et al., 2018 (Cross-sectional)	MA: 50-59 (n=33, 49%), 60-69 (n=21, 30.4%), 70-79 (n=10, 14.5%), 80 and above (n=5, 7.2%)  Chess: 50-59 (n=20, 40%), 60-69 (n=17, 34%),	69 males MA 50 males (chess players), 64 males (Moderately active), 62 males (Inactive)	N/A	MA: >\$80K (69.6%); \$60-79K (8.7%); <\$60K (21.7%) –  Post-secondary (69.6%); Other (13%); Secondary graduate (8.7%); < Secondary (8.7%)	Canada - Ontario	>21 years (27.9%), 16-20 years (8.8%), 6-15 years (35.3%); <5 years (27.9%) - years competing	N=245 (69 MA, 50 Chess, 64 Mod, 62 Inactive)	Running  (Competitive)

	70-79 (n=8, 16%),  ≥80 (n=5, 7.2%);  <i>Moderately active:</i>  50-59 (n=27, 42%),  60-69 (n=21, 32%),  70-79 (n=10, 15%),  ≥80 (n=6, 9%);  <i>Inactive:</i>  50-59 (n=28, 45%),  60-69 (n=21, 33%),  70-79 (n=9, 14%),  ≥80 (n=4, 6%)								
Peiffer et al., 2016 (Cross-sectional)	M=59.8, SD=1.3 years (MA)  M=28.5, SD=2.6 years (YA)	N/A	N/A	N/A	France - French Federation of Triathlon regional clubs	Must regularly participate in long-distance competitive triathlon; weekly training in cycling and running  N/A	N=40 (20 MA; 20 YA)	Multi-sport: Triathletes - study focused on running and cycling  (Competitive)	
Piasecki et al., 2019 (Cross-sectional)	M=68, SD=5 years (MA)  M=73, SD=4 years (OA)	111 males, 39 females (MA)  29 males, 30 females (OA)	N/A	Educated to minimum university degree or professional qualification (n=59, (early starters), n=58 (Late starters))	United Kingdom		N=209 (150 MA; 59 older adults)	Running  (Competitive)	
Pollock et al., 1987 (Longitudinal )	50-82 years	24 males	N/A	10/24 (retired), others mainly professional with a variety of occupations (58%)	United States	>10 years	N=24 (11, competitive, 13 post competitive)	Multi-sport-Running (n=22) and speed walking (n=2)  (Competitive)	
Pollock et al., 1997 (Cross-sectional)	Testing 1 (M=50.5, SD=8.5), Testing 2 (M=60.2, SD=8.8), Testing 3 (M=70.4, SD=8.8) years	21 males	20 white, 1 black	N/A	United States	Competitors ranked 1st, 2nd, 3rd in regional, national, or international competition	N=21	Multi-sport: Running and Race walking  (Competitive)	



Power et al., 2016 (Cross-sectional)	M=78.8, SD=3.8 (athletes)  M=23.4, SD=1 years (YA);  M=78.2, SD=9.4 years (OA)	6 males (MA)  5 males (non-athletes),  6 males (YA)	N/A	N/A	Canada - World Masters Championship track and field	N/A	N=17 (6 MA, 5 Non-athletes old, 6 young adults)	Multi-sport: track and field  (Competitive)
Rantalainen et al., 2014 (Cross-sectional)	72.4, SD=5.3 (athletes),  M=71.6, SD=4.2 (Referent) M=27.4, SD=5.1 (19-39 years),  M=28.7, SD=5.8 (Referent)	<i>Sprinters:</i>  35 males (>65 years),  26 males (<40 years)  <i>Referents:</i>  24 males (>65 years),  41 males (<40 years)	N/A	N/A	Finland - Track and field organizations	>65 years age (M=35.4, SD=19.1 years of training);  <40 years of age (M=15.4, SD=6.2 years of training)	N=127 (67 athletes, 60 referents)	Running  (Competitive)
Rogers et al., 1990 (Longitudinal)	47-84 years,  M=62, SD=2.3 (athletes)  M=61.4, SD=1.4 (SED)	18 males (MA initial study);  15 males (MA follow-up)  14 males (SED)	N/A	N/A	United States	MA training for ~10 years; frequent local race competitors (3.1- 26.2 miles)	N=29 (15 MA, 14 SED)	Multi-sport: cyclist (n=2), runners (n=16)  (Competitive)
Sanada et al., 2009 (Cross-sectional)	M=65.7, SD=3.0 years (athletes)  M=25.3, SD=2.7 years (23 YC);  M=20.3, SD=1.0 years (26 young rowers);  M=65.2, SD=4.1 years (OA control)	24 males (older athletes)  23 males (YC),  26 males (young rowers),  22 males (OC)	N/A	N/A	Japan - Tokyo	40-50 years (M=46.7, SD=2.8 yr);  2 days/week 12-16 km of rowing (during the study)	N=95 (24 older rowers, 22 older control, 26 young rowers, 23 young control)	Rowing  (Recreational and Competitive)
Schmidt et al., 2015 (Cross-sectional)	65-75 years; M=68.1, SD=2.1	17 males (athletes)	N/A	N/A	Denmark - local football clubs in Copenhagen	M=52, SD=11 years (enrolled in football clubs), M=26,	N=43 (17 OA athletes, 26 OA control)	Soccer/Football

	M=68.2, SD=3.2 (OA control)	26 males (OA control)				SD=12 (football matches)		(Recreational and Competitive) Running
Schroeder et al., 2007 (Longitudinal )	Initial visit: M=50.8, SD=8;  Follow-up: M=60.0, 7.9 years	56 males, 35 females	N/A	N/A	United States - California	5-10 km/week, cross training in swimming, cycling and/or resistance exercise	N=91	(Recreational and Competitive)  Running
Seals et al., 1994 (Cross- sectional)	M=64, SD=2 years (MA)  M=63, SD=1 years (untrained)	9 males (MA)  9 males (untrained)	N/A	N/A	United States	M=43, SD=6 miles/week for M=10, SD=2 years	N=18 (9 MA, 9 SED)	Running  (Competitive)
Shapero et al., 2016 (Cross- sectional)	≥35 and above (M=50, SD=9)	391 males (M=51, SD=9),  200 females (M=48, SD=9)	N/A	N/A	United States - Boston	Participation in sports, years: endurance (M=21.3, SD=13.29), high school sport (441/591, 74.6%), college sport (282/591, 47.7%)	N=591	Multi-sports: Cycling (41.6%), Running (24.9%), Swimming (12.2%), Triathlon (9.1%), Rowing (9.5%), Other (5.5%)
Simovitch et al., 2015 (Longitudinal )	61-88 years (M=73, SD= 7.2)	15 males, 25 females	N/A	N/A	United States	N/A	N=40	(Competitive) Multisport - 75% golf, 29% swimming, water aerobics 24%, 21% deep sea fishing, shooting/hunting sports 21%, weightlifting 18%, softball 11%, tennis 11%, table tennis 7%, scuba diving 7%, racquetball 5%, surfing 2%, water skiing 2%
								(Recreational and Competitive)

Sipila & Suominen, 1993 (Cross-sectional)	66-85 years, M=73.7, SD=5.6 (athletes)  M=73.6, SD=2.9 (Control)	21 females (athletes)  15 females (control)	N/A	N/A	Finland	Training regularly for 15-74 years	N=36 (21 athletes, 15 control)	Multi-sport: long distance running, cross-country skiing, track and field and gymnastics
Sipila & Suominen, 1991 (Cross-sectional)	70-90 years (M=75.2, SD=3.4)	21 males	N/A	N/A	Finland	Most had lifelong history and still were active in competitive sports	N=21 (power athletes, n=7; endurance athletes, n=14)	(Competitive) Multi-sport: long-distance runners, orienteers, cross-country skiers, sprinters, jumpers, throwers  (Recreational and Competitive) Multi-sport: track and field, sprinters, throwers, orienteers, cross-country skiers  (Competitive)
Sipilä et al., 1991 (Cross-sectional)	70-81 years; M=74.3, SD=2.9 (Strengthen Training),  M=75.5, M=3.8 (Speed training group),  M=73.7, SD=2.7 (Endurance)  M=74.2, SD=2.8 (Control)	97 males (athletes)  42 males (control)	N/A	N/A	Finland	Athletes trained throughout their life; specific training (hours/week) provided for each group	N=139 (97 athletes, 3 training groups, 42 control non-athletes)	Multi-sport: track and field, sprinters, throwers, orienteers, cross-country skiers  (Competitive)
Smith & Storandt, 1997 (Cross-sectional)	55 and above	57 males, 43 females (athletes)  24% males (non-competitors),  21% males (non-exercisers) 13 females (MA)	All white except Asian American (n=1), African American (n=4)	N/A	United States	Competitors (42 min, 4 days/week aerobic training)	N=246 (Competitors, n=100; non-competitors, n=83; non-exercisers, n=63)	Multi-sport: tennis, swimming, 10Km races, softball, badminton, racquetball, handball, track and field  (Competitive) Running  (Competitive)
Stevenson et al., 1994 (Cross-sectional)	49-67 years, M=54.8, SD=1.5 (athletes)	13 females (MA)	N/A	N/A	United States	Training M=18, SD=2 years (10-40 years); M=31, SD=3	N=30 (13 MA, 17 healthy control)	(Competitive) Running  (Competitive)

Tessitore et al., 2006 (Cross-sectional)	50-64 years; M=56.1, SD=1.2 (healthy control) 50-64 years, M=55, SD=5	17 females (healthy control) 10 males	N/A	N/A	Italy - IUSM of Rome	miles/week including speed intervals 10 years - 1.5 hr sessions	N=10	Basketball  (Recreational and Competitive) Golf
Thompson et al., 2007 (Intervention)	60-80 years; M=70.7, SD=9.1 years	18 males	N/A	N/A	United States - Westcoast	Averaging more than 40 rounds/year	N=18 (11 exercise group, 7 control group)	(Recreational and Competitive) Multi-sport: 397 soccer, 147 handball, 69 hockey, 43 canoeists, 20 long distance, 9 weight lifters, 8 gymnasts, 8 swimmers, 6 biathletes, and 2 racing cyclists
Tveit et al., 2013 (Longitudinal)	50-93 years, M=69 (athletes) 51-93 years, M=70 (control)	709 males (former athletes) 1368 males (control)	European	N/A	Sweden - Contacted athletes from a review book of former Swedish Athletes, the Archives of the Swedish Olympic Committee, and previously published studies	Active career was between ages 15-35 years	N=2077 (709 former athletes and 1368 controls)	(Competitive) Multi-sport: cyclist, marathon runners, duathletes, triathletes
Wiebe et al., 1999 (Cross-sectional)	20-63 years; M=50.8, SD=0.8 (49-54 years), M=60.3, SD=1.2 (58-63 years) M=42.7, SD=0.6 (40-45 years) M=22.4, SD=1.4 (20-29 years)	6 males (49-54 years); 5 males (58-63 years) 6 males (20-29 years), 6 males (40-45 years)	N/A	N/A	Canada	Training for minimum 3 years	N=23 (20-29 years, n=6; 40-45 years, n=6; 49-54 years, n=6; 58-63 years, n=5)	(Competitive)
Wiswell et al., 2001 (Cross-sectional)	40-86 years; M=53.9, SD=9.9 (Males), M=49.41, SD=7.7 (Females)	139 males, 82 females	N/A	N/A	United States - California	Competed in running events (87% men, 91% women), 40% considered highly competitive	N=221	Runners  (Competitive)
Wiswell et al., 2000 (Cross-sectional)	Aged 40 and above (10 years age categories):	111 males, 57 females* (aged 40 and	N/A	N/A	United States - California	Training for at least 5 years, 15km/week and	N=168 (40-49 years, n=58; 50-59 years, n=55; 60-69 years,	Running  (Competitive)

Wroblewski et al., 2011 (Cross-sectional)	M=56.5, SD=10.2 (Males), M=52, SD=9 (Females)	above grouped)	N/A	N/A	United States - Pittsburgh	competing at least once/year	n=33, 70+, n=10)*	Multi-sport: Track and field/running, bikers and swimmers  (Competitive)
	M=60.1, SD=11.5; ≥40 years (10-year age categories);	20 males, 20 females (5 M & 5F in each 10-year category)				N/A	N=40 MA	
	40-49, 50-59, 60-69 & ≥70 40-49 year							
Psychosocial								
Backmand et al., 2001 (Cross-sectional)	38 and above (age ranges classified according to type of sport at time periods (1985 and 1995)* 20 years (healthy referents)	1040 males (athletes in 1985),	European	N/A	Finland - former athletes from 1985 to 1965	N/A	Surveyed in 1985 (n=1040), Follow-up 1995 (n=758)	Multi-sport: cross country skiing, long distance running, boxing, wrestling, weightlifting, throwers, soccer, ice hockey, basketball, shooting sports  (Competitive)
		758 males (athletes in 1995)						
		777 males (referent in 1985),						
		578 males (referent in 1995)						
Brennan et al., 2018 (Qualitative)	58-84 years (M=67)	68% males, 32% female	N/A	Graduate/professional school (15); university (1); college (2); some university (1); high school (1); grade 12 or less (2)	Canada	Continuer (13); rekindler (6); late starter (2); unknown (1)	N=22 MA	Multisport: Badminton, Dragon boat, Hockey, Rowing, Volleyball, Field hockey, Track and field (sprint relay, long jump, pole vault and more), Cycling, Formula race car, Ironman, Road running, Swimming, Triathlon  (Competitive)
Callary et al., 2015 (Qualitative)	45-65 years	5 males, 5 females	N/A	N/A	Canada - Ontario	On average, participants swam for 29 years over their life span	N=10 MA	Swimming  (Competitive)

						(ranging from 8 to 50) and competed at a Masters level for 13.5 years (ranging from 1 to 37).		
Dionigi et al., 2018 (Qualitative)	46-61 years	9 males, 5 females	N/A	Probational Officer, County worker, Part-time nurse, Business Owner, Fitness instructor, Consulting, Sales, Guidance Counsellor, Museum Researcher, Special education Consultant, Auto Plant, Symphony Musician, Non-Governmental Organisation	Canada - Southern Ontario	Age of sport adoption (varies between 20-46 years); Training (4-12 hours/week)	N=14	Multi-sport: Swimming, Running, Volleyball, dragon boating, Triathlon, Ice Hockey, Cycling  (Recreational and Competitive) Swimming  (Competitive)
Geard et al., 2018 (Cross-sectional)	>65 years  <65 years	63% females (<65 years),  60% females (≥65 years)	Caucasian	Middle to high income earners: <65 years - \$100K (44%), \$50-100K (42%), <\$50K (14%); ≥65 years - \$100K (19%), \$50-100K (39%), <\$50K (42%)  <65 years: University Degree (79%), High-school/equivalent (13%), None/other (8%); ≥65 years: University Degree (72%), High-school/equivalent (21%), None/other (7%)	Australia - 2014 Australian National Masters Swimming Championships	N/A	N=169 (n=112, <65 years); n=57, ≥ 65 years)	
Geurin-Eagleman, 2015 (Qualitative)	20 and above years; 50–59 years (2.8%) , over the age of 60 (0.6%) 20–29 years (67.5%); 30–39 (23.4%), 40–49 (5.7%)	34.8% males, 65.3% female (old and young combined)	N/A	21.7% \$100,000 USD or higher, 14.3% \$80–100,000, 10.3% \$60–80,000, 18.3% \$40–60,000, 18.3% \$20–40,000, 15.4% \$0–20,000, and 1.7% no household income; (age 20 and above info combined*)  79.4% bachelor's degree or higher, 15.4% some university, 4.6% high school diploma, and 0.5% attended some high school; (age 20 and above info combined*)*	United States (62.9%) - followed by Australia (9.7%), Canada (9.1%), England (6.9%), New Zealand and the Netherlands (1.7% each), Spain, and Ireland, (1.1% each), other (0.6% -see paper for the list of others); (age 20 and above info combined*)	N/A	N=164	Gymnastics  (Competitive)

Heo, Culp et al., 2013 (Qualitative)	M=63 (52-71 years)	6 males, 4 females	>90% Caucasian; 9 white, 1 African American	5 retired and 5 employed N/A	United States - National Senior Games	N/A	10	Multi-sport: tennis, volleyball, track and field, cycling, swimming, shuffle board, table tennis, and race walk.
Heo et al., 2012 (Cross-sectional)	50 years and above (68.16 years, SD = 9.58)	(n=300) 65.4% males, (n=159) 34.6% females	Caucasian (n=430, 94.1%), African American (11, 2.4%), Asian (n=8, 1.8%), Hispanic (n=3, 0.7%) and other (n=7, 1.5%)	Retired (n=304, 66.5%), employed (n=153, 33.3%) Other (n=2, 4% other) bachelor's degrees (n=226, 50%), graduate degrees (n=195, 43.3%), highschool (n=29, 6.4%), other (n=9, 1.9%)	United States - Indiana and Colorado Senior Games in 2008	N/A	N=459	(Competitive) Multisport - Indiana and Colorado Senior Games (sports not specified)
Heo, et al., 2018 (Cross-sectional)	51-85 years (M=64.65, SD=7.40)	63 males (41.2%), 90 females (58.8%)	88.1% Caucasians, African American 4%, Hispanics 3.3%, Asian 2.6%	Employed 28.3%; Retired 71.7% Graduate school 23.5%, College 61.4%, high-school 15%	United States - Southern States	N/A	N=153	Pickleball (Competitive)
Heo, Stebbins et al., 2013 (Cross-sectional)	50 - 95 years (M=68.16 years, SD=9.58)	300 males (65.4%), 159 female (34.6%)	Caucasian 94.1%	Retired 66.5% Graduate education: High involvement group (37.9%); Medium involvement group (46.2%); Low involvement group (43.4%)	United States - 2008 Indiana Senior Olympic Games and 2008 Colorado Senior Olympic Games.	High involvement group (7.8 years); Medium involvement group (6.4 years); Low involvement group (6.6 years)	459 (n = 166; 36.2%) High involvement group; (n = 171; 37.2%) Medium involvement group; (n = 122; 26.6%) Low involvement group	Multisport - not specified (Competitive)
Heuser, 2005 (Qualitative)	64-88 years	18 females	N/A	N/A	Australia - Perth	20-40 years participation	N=18	Lawn Bowls (Recreational and Competitive)
Hoar et al., 2012 (Qualitative)	55-89 years (M=67.44, SD=6.62)	161 males, 67 females, 6 did not self-identify a gender	N/A	N/A	Canada - Winter Games competition Western Canada	4-79 years of sport experience (M=49.66, SD=16.02)	N=234 MA	Multisport: 10 alpine Skiing, 4 badminton, 43 bowling, 23 cross-country, 58 curling, 89 ice-hockey, 7 table tennis (Competitive)

Hoffmann et al., 2020 (Cross-sectional)	35 and above (M=58.01, SD=11.33)	279 males, 281 females, 1 undisclosed	93.5% Caucasian	N/A	68% Canada, 22.3% USA, 9.6% Other	Coached athletes (M=4.29, SD=1.55 times/week training); moderately coached (M=4.71, SD=1.92 times/week training); non-coached MA (M=4.77, SD=1.77 times/week training)	N=561	Multi-sport: 45.3% swimming, 17.3% cross-country running, 13.9% track and field  (Competitive)
Kim et al., 2012 (Qualitative)	66-83 years (M=71)	3 males, 7 females	Korean	100% college or university degree - Bachelor's degree (all participants)	Korea - metropolitan area of South Korea	Members of the sport club more than 15 years	N=10 MA	Multisport - not specified  (Recreational and Competitive)
Kwang et al., 2012 (Cross-sectional)	60 and above	143 males, 100 females	Korean	N/A	Korea - Daejeon and Incheon	between <1 year to >5 years	N=243 serious leisure participants	Multi-sport - bowling and table tennis  (Recreational and Competitive)
Langley & Knight, 2012 (Qualitative)	68 years old	1 male	N/A	University Professor	United States	Since forth-fifth grade	N=1	Multisport - baseball, swimming, tennis, bowling  (Competitive)
Medic et al., 2013 (Cross-sectional)	35-93 years (M=55.3, SD=11.8) 35-39 years (n=27), 40-44 years (n=49), 45-49 years (n=40) 50-54 years (n=43), 55-59 years (n=54), 60-64 years (n=55), 65-69 years (n=31), 70-74 years (n=17), 75-79 years (n=16), 80-84 years (n=2), 85-89 years (n=2), 90-94 years (n=3)	154 males, 184 females (old and young combined*)	N/A	N/A	United Kingdom - 2008 FINA World Masters Championships	N/A	N=338	Swimming - international level (51%), national level (25%), provincial level (24%)  (Competitive)



Newton, 2012 (Cross-sectional)	49-83 years (M=64.47, SD=7.76)	54 males, 82 females, 1 did not identify	Caucasian 92.6%	N/A	United States - regional Senior Olympic Games competition - Memphis	Participating in sport (M=23.91 years, SD=20.18);  Competing (3.17 years, SD=0.50); training (4.96 hr/week, SD=4.76)	N=137	Multisport - tennis, track and field. and bowling, etc.  (Competitive)
Ostlund-Lagerstrom et al., 2012 (Mixed-method approach)	66-71 years: O-Ringen orienteering athletes;  68-72 years local orienteering athletes	O-Ringen orienteering athletes (n=81 males, n=41 female);  local orienteering athletes (n=7 males, n=7 female)	European	58.2% higher education - O-Ringen orienteering athletes (n=51, 41.8% no university; n=71, 58.2% higher education); local orienteering athletes (n=6,42.9% no university; n=8, 57.1% higher education)	Sweden	O-Ringen: medium 36.5 years (30-50); Local orienteering 45.5 years (31.5-57)	N=136 (n=122 O-Ringen international athletes), n=14 local orienteering athletes)	Orienteering  (Competitive)
Pero et al., 2009 (Cross-sectional)	45-80 years (3 age groups): 45-55 years; 56-65 years; >65 years	348 males, 82 female	European	N/A	Italy	All athletes had at least 10 years of training; most had lifelong history of sport participation (65%)	N=430 (45-55 years, n=229, 53%; 56-65 years, n=114, 27%; >65 years, n=87, 20%)	Multi-sport - swimming, track and field  (Competitive)
Rathwell & Young, 2015 (Qualitative)	58 years	1 male	White	Family physician	Canada - Quebec	Participated in team sport during youth; during study was racing competitively for 9 years; 6hr/week running	N=1	Multi-sport - Long-distance running (main sport); but also participated in other sports (swimming, cross-country skiing, hockey and squash)  (Competitive)
Reed & Cox, 2007 (Cross-sectional)	50-92 years (M=61.58 years)	337 males, 109 females	N/A	N/A	United States - Missouri State Senior Games	N/A	N=981 (446 subsample included in the study)	Multisport - no specifics provided  (Competitive)
Salama-Younes, 2018 (Cross-sectional)	Study 1: 55 and 72 years (M=63.03, SD=6.99); Study 2: 53 and 71 years (M=58.42, SD=8.11)	Study 1: males=248, female=319; Study 2: 305	European	N/A	France - Study 1&2: Rennes city and other nearby villages	Study 1: more than 10 years (M=27.09, SD=8.71) regularly 4-6	Study 1: 567; Study 2: 556 Study 1: 567; Study 2: 557	Running  (Competitive)

		males, 229 female				times/week for between 60 -90 minutes daily;  Study 2: 10 years (M=17.08, SD=4.44), running regularly 4-6 times/week for 60-120minutes each time		
Shaw et al., 2005 (Cross- sectional)	M=65.7, SD=9 years (range 50-94)	N/A	Information of SES, age, gender, race/ethnicity. Education, and degree collected but not provided in paper	Information of SES, age, gender, race/ethnicity. Education, and degree collected but not provided in paper	United States - Kissimmee, Florida (Florida Senior Games State Championships )	N/A	N=347 athletes	Multisport - not specified  (Competitive)
Siegenthaler, & O'Dell, 2003 (Qualitative)	67-87; M=77	8 males, 11 females	N/A	N/A	United States - Southeast region	20-66 years (M=43.9)	N=19	Golf  (Recreational and Competitive)
Steinberg et al., 2001 (Cross- sectional)	50-90 years (M= 68.49, SD = 8.13)	66 males, 56 female (50 - 90 years)	N/A	N/A	United States - National Senior Games	N/A	N=220 (122 older athletes, 71 NCAA young athletes, 27 highly competitive middle-aged recreational athletes)	Multisport - Track and field, golf, softball, basketball, and volleyball  (Competitive)
	31-49 years (M=37.22, SD=8.67) (Middle-Adults)	34 males, 37 females (18- 30 years),						
	18-30 years (M=20.08, SD=2.14) (Young Adults)	12 males, 15 females (31- 49 years)						
Stone et al., 2018 (Cross- sectional)	60 years and above	44 males, 19 females (≥20 years ex);	N/A	Retired 96% (high experience curlers)	Canada - Toronto	Two groups (>20 years and <20 years of experience)	N=160 (116 athletes and 44 non curlers control group)	Curling  (Recreational and Competitive)
	M=77.3; SD=8.9 (control group)	28 males, 25 females (≤ 20 years ex)		49% undergraduate degree/college degree (high experience curlers)				
		19 males, 25 females (control group)						
Wilson et al., 2004 (Cross- sectional)	50-96 years (M = 64.29; SD = 10.10)	159 males, 57 females	Caucasian American 83%, African American 11%	37% income level between \$25K-\$49,999 Masters degree 26%	United States - Senior Olympics	23.49 (SD = 15.50) years competing; 6.99	N=216 (MA)	Multisport: swimming (n = 23), tennis (n =

					headquarters of a midwestern state (swimming and tennis); Track and field data came from 38 states, the District of Columbia, and Canada	hours (SD = 4.33) per week practicing their sport		26), and track and field (n = 167) (Competitive)
Young et al., 2015 (Cross-sectional)	35-83 years (M=53.4, SD=11.3)	88 males, 33 females	N/A	N/A	One-hundred and twenty-one participants responded, representing Finland (n = 27), UK (19), Australia (13), USA (13), Canada (9), Germany (7), Italy (4), Netherlands (4), and 14 other countries (20), Other (5)	Out-of-season (M=4, SD=2.8 months training); In-season (M=7.4, SD=3.2 months training), M=13.4, SD=8.4 hours/weekly training	N=121	Multi-sport: Track and field - Jumps (n=9), throws (n=15), sprint/hurdles (n=37), middle-distance (n=21), long-distance (n=23), multi-events (n=12) (Competitive)
<b>Sociological</b>								
Appleby & Dieffenbach, 2016 (Qualitative)	35 and above; 35-39 (n = 1), 40-44 (n = 2), 45-49 (n = 1), 50-54 (n = 3), 60-64 (n = 2), and 65-69 (n = 1)	6 male (age 52 -68 years) 1 male, 3 female (age 39-47)	N/A	N/A	United States - USA Cycling Masters and USA Elite National Championship	USA Elite National Championship in the past 2 years or placement in the top 10 in a USA Cycling Masters	N=10 (35-39 years, n = 1; 40-44 n = 2; 45-49 n = 1; 50-54, n = 3; 60-64, n = 2; 65-69, n = 1)	Cycling (Competitive)
Dionigi et al., 2011 (Qualitative)	56-90 years (M=72)	21 males, 23 females	White	Middle class	Australia - Sydney 2009 World Masters Games; Australia (n=24), Canada (n=9), the United States of America (n=6) and New Zealand (n=5)	45% began competing in Masters >50 years, 55% lifelong 'continuers' or 'restarters' after retirement/raising children	N=44	Multisport: swimming (n=21), athletics/track and field (n=9), squash (n=4), orienteering (n=3), weightlifting (n=3), tennis (n=2), badminton (n=2) or cycling (n=1).

Dionigi, et al., 2013 (Qualitative)	50-90 years (M=72)	21 males, 23 females	White	'typically middle-class'	Australia - Sydney 2009 World Masters Games; Australia (n=24), Canada (n=9), the United States of America (n=6) and New Zealand (n=5)	45% began competing in Masters >50 years, 55% lifelong 'continuers' or 'restarters' after retirement/raising children	N=44	(Competitive) Multisport: swimming (n21), athletics/track and field (n9), squash (n4), orienteering (n3), weightlifting (n3), tennis (n2), badminton (n2) or cycling (n1)
Dionigi, 2005 (Qualitative)	60-89 years	13 males, 15 females	N/A	N/A	Australia- 8th Australian Masters Games	50% were continuers (sport throughout their life), others were rekindlers and late starters	N=28	(Competitive) Multi-sport: Australian Masters Games
Dionigi, 2006 (Qualitative)	60-89 years; 60-69 (n=14), 70-79 (n=9), 80-89 (n=5)	13 males, 15 females	N/A	N/A	Australia- 8th Australian Masters Games	N/A	N=28	(Competitive) Multi-sport: Australian Masters Games
Dionigi, 2010 (Qualitative)	55-90 years; 56-90 (n=23, World Masters Games), 55-82 (n=70, Australian Masters Games)	93 females	White	'primarily middle-class'	Australia	1/3 played sport since young, 3rd began restarted later in life and remaining at Masters level	N=93 (n=70, Australian Masters Games; n=23, 2009 WMG)	(Competitive) Multi-sport: Track and field, swimming, cycling, weightlifting, triathlon, marathon, tennis, badminton, hockey, basketball, netball and softball
Dionigi, & O'Flynn, 2007 (Qualitative)	Stage 1: 54-94 years; Stage 2: 60-89 years	Stage 1: 55 males, 55 females;  Stage 2: 13 men, 15 women	White	Middle-class	Australia - 8th Australian Masters Games	N/A	N=138 (Stage 1: 110 athletes, Stage 2: 28 athletes)	(Competitive) Multi-sport: running, triathlon, cycling, swimming, ice hockey, field hockey, soccer, netball,

								basketball, tennis, squash, badminton, gymnastics, baseball, touch football, and the like
Eman, 2012 (Qualitative)	66-90 years (most were between 70-80 years)	10 males, 12 females	N/A	N/A	Sweden	Active throughout their lives; most participated in competitions	N=22	(Competitive) Multi-sport: track and field, swimming, skiing
Gard et al., 2017 (Qualitative)	60-87 years	34 males, 29 females	White - white/Caucasian Netherland, Russian American, Canadian and Australian; African America; Métis- First Nations and European ancestry	Income info collected but not reported for participants.  Some were retired pharmacist, retired nurse, property manager, retired bank teller, security company owner, retired chairman, retired school teacher, retired general practitioner	Italy - Turin, 2013 WMG - participants from various countries	N/A - overall range not provided but for a select few athlete 'years of involvement' provided	N=63 MA	(Recreational and Competitive) Multisport: individual and team sports such as track and field, swimming, taekwondo, badminton, table tennis and basketball.
Grant, 2001 (Qualitative)	71-79 years	7 males, 8 females	N/A	"varied socio-economic status" varied backgrounds in education'	New Zealand - South Pacific Masters Games	>60 years of competition	N=15	(Competitive) Multi-sport: tennis, swimming, badminton, croquet, bowls, athletics, line dancing, golf, cycling, running
Horton., 2019 (Qualitative)	70-90 years	17 males	16 Caucasian, 1 Asian	Highly educated but varied between formal education to a PhD	Italy - Turin 2013 WMG, New Zealand 2017 WMG	N/A	N=17	(Competitive) Multi-sport: badminton, basketball, lawn bowls, swimming, tennis, track and field, and weightlifting
Horton., 2018 (Qualitative)	70-80 years	16 females	15 Caucasian and 1 Aboriginal Canadian	Retired (n=10), partially retired (n=5), Full-time work (n=1);	Italy - Turin 2013 WMG	N/A	N=16	(Competitive) Multi-sport: track and field,

				Teachers (n=5), nurses (n=5), physicians (n=2), Secretary, engineer, lawyer and bank-teller				swimming, weightlifting, table tennis and badminton
				'highly educated' - University/college degree (n=11), higher education (PhD, n=1), <high-school (n=1)				(Competitive)
Jenkin et al., 2018 (Qualitative)	Older athletes: 50-85 years (M=62)	50% males, 50% females (athletes);	N/A	N/A	Australia - Tennis and cricket	N/A	N=49 (4-9 participants in each group)	Multisport: Cricket, tennis
	NSOs: 23-67 years (M=41);	85% males (NSOs);						(Recreational and Competitive)
	Non-sport club members: 51-65 years (M=57)	50% males, 50% females (non-sport club members)						
Kirby & Kluge, 2013 (Qualitative)	65-76 years	10 females	N/A	N/A	United States - University of Notre Dame	first time playing volleyball or over 50 years gap (gym class)	N=10	Volleyball
						Began softball: 12 or younger (n= 15 ), teens (n=5), age 20s (n=6), age 30s (n=1), and age >50 (n=12)		(Competitive)
Liechty et al., 2017 (Qualitative)	55 and above years; M=69.3	64 females	40 out of 42 identified as Caucasian; 42/64 females provided demographic info	2/3 (retired), n=5 (part-time work) n=40 (high school), n=15 (college), n=8 (professional or graduate degree)	United States - North Carolina Senior Games program		N=64	Soft-ball
								(Competitive)
Litchfield et al., 2012 (Qualitative)	55-90 years; 56-90 (n=23, World Masters Games),	38 females (OA athletes)	"most of the participants were white"	Middle class	Australia - from 8th Australian Masters Game, Northern central hockey club. 2009 WMG (Australia (n=12), Canada (n=4), New Zealand (n=3) and the United States of America (n=4))	Varies - Young age, return to sport, novice	N=46 (38 OA, 8 middle aged)	Multi-sport: badminton, tennis, swimming, cycling, cross-country running, half-marathon, track and field, triathlon, squash, field hockey, basketball, or netball.
	60-82 (n=15, Australian Masters Games)	8 females (middle-age athletes)						(Recreational and Competitive)
	32-52 years (M=42) (middle age)							

Lyons & Dionigi, 2007 (Qualitative)	55-94 years; 55-59 (n=26, 26%), 60-69 (n=55, 50%), 70-79 (n=20, 18.2%), 80-89 (n=8, 0.7%), 90-95 (n=1)	55 males, 55 females	'predominantly white'	Middle class	Australia- from 8th Australian Masters Games	N/A	N=110	Multi-sport: long distance running and walking, triathlon, cycling, track and field athletics, archery, canoeing, swimming, gymnastics, indoor rowing, netball, tennis, baseball, ice hockey, squash, soccer, badminton, field hockey, softball, cricket (indoor and outdoor), basketball, and touch football
Phoenix & Smith, 2011 (Qualitative)	50-73 years	11 males, 2 females	N/A	N/A	United Kingdom - recruited via natural body building internet forum	N/A	N=13	(Competitive) Body Building  (Competitive)
Roper et al., 2003 (Qualitative)	88 years	1 male	White	Retired professor	United States - Southeastern States	Began at age 64, competitive for 24 years; running 5 days/week 15 miles/week	N=1 (other individuals related to/know the participant were also interviewed)	Running  (Competitive)
Ryan, 2006 (Qualitative)	39-55 years	9 females	N/A	N/A	New Zealand - Auckland masters women's hockey teams	N/A	N=9	Field hockey  (Recreational and Competitive)
Tulle, 2007 (Qualitative)	50-86 years (males); 48- 67 years (females)	14 males 7 females	N/A	N/A	Scotland	"Longstanding participation in athletics, either as track and field or long-distance runners"	N=21	Running  (Recreational and Competitive)

Wheaton, 2017 (Qualitative)	45 to over 70 years	7 males, 4 females	White	Relatively affluent	United Kingdom - South Coast of England and Cornwall, UK	life-long surfers, those who had taken up surfing in mid-life (which I defined as post 40), and one newcomer.	N=11	Surfing  (Recreational)
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Note. MA = Masters Athletes; YC = Young Control Group; SED = Sedentary, OA=Older adults, YA = Young adults, REC = recreational athletes  
 An asterisk is used to signify combined information of young and old.  
 Of the n=23 studies with younger adults (35-39 years) and older adults, only 3 studies provided information on education and income



## **Appendix B**

### **Phase 2: Semi-Structured Interview Guide**

First I want to start by thanking you very much for agreeing to take part in this interview. Obviously, we are in unprecedented times, and I know these times have likely influenced your ability to engage in sport as you usually would. Just because it is at the forefront of everything we're doing right now, I thought I would start the interview with a couple questions about your current engagement with sport and/or physical activity.

- Have you maintained any engagement in sport or physical activity over the past several weeks, during the Public Health mandate to physically distance? Can you tell me a bit about that? (Why? Why not? How did your patterns change?)
- Do you think your participation in sport (or being an active person) might have made the navigation of these interesting times, harder or easier for you (or both) – than if you were not involved in those things (or than for other people not involved in sport)? Why? Can you provide me with some examples.
- Thank you for sharing your thoughts. I appreciate these are difficult times. I may come back to some other questions later in the interview about COVID-19 – but thought we'd start there – given the uniqueness of these times...

Can you tell me a little about yourself?

- Age? Retired? Previous/current work
- Living alone or with someone?

How has life changed as you have gotten older?

- What aspects of getting older excites you?
- Can you provide examples? Elaborate?
- What are you not looking forward to? Why?

Can you tell me about the type of day-to-day activities you take in part in?

- How often do you participate in this activity?
- Do you prefer competing? Or playing recreationally? Why?

Can you tell me a little about your journey in sport?

- What is your preferred/main sport? When did you begin participating in this sport?
- How often do you compete? Train?

Can you describe your experience in sport(s) that is/are important to you?

- Why do you participate in sport?
- What do you love about sport? Dislike?

Do you think you get benefits from sport that you wouldn't get from just exercise? Why or Why not?

- Are the benefits only limited to physical health?

- Can you provide examples?
- How is sport different from other types of physical activities (exercise) to gain these benefits?

Do you think involvement in sport has contributed to your psychological development?

- Can you elaborate? Examples?
- How do you think sport led to this type of development?
- Why could the same not be achieved from other types physical activity involvement (exercise)?

Do you think sport has contributed to your social development?

- Can you elaborate? Examples?
- How do you think sport led to this type of development?
- Why could the same not be achieved from other physical activity involvement (exercise)?

**[Ask if the above questions are vague/unclear for the participant]** Some older adults have suggested that involvement in sport has contributed to their *competence/confidence* development in older adulthood. Do you feel that a similar development of *competence/confidence* has also occurred with your involvement?

- Can you elaborate how this may have occurred? Why or why not?
- Can you provide some examples?

[Repeat question using, *connection, character, commitment, cognition, challenge, resilience, and outlook on aging*]

Are there other psychosocial assets/skills that are developed through sport besides the ones mentioned?

- Can you provide some examples?
- How are these different from the previous psychological and social benefits mentioned previously?

How much to do you think the skills/assets developed through sport are specific to the needs of your gender or ethnic group?

- Do you think the skills/assets develop differ for males (or females depending on who you're talking to)?
- Could you provide some examples?
- Do you think the skills/assets you've developed are specific to your ethnic or cultural group?
- Could you provide some examples of skills/assets that are specific to your group and/or ones that are more general?

How important are these benefits to your development as you get older?

- Do these skills/assets positively contribute to your aging process? How so?
- How do these benefits/assets impact your day-to-day life outside of sport?
- Can you provide examples?

- 

What types of skills/assets do you wish you had to help you negotiate your aging process? Why?

- What aspects of your aging process would these skills help? Can you provide some examples?
- Do you think they can be attained from sport? Why?
- How would you develop these skills/assets?

How has the lack of sport impacted you in this current situation?

- How are you staying socially active within your sport? [Repeat with psychologically and physically].
- Are you training more or less? Are you spending more of your time to focus on other things besides sport?

Has sport equipped/prepared you in any way to help navigate the current COVID19/Coronavirus situation?

- Can you provide some examples of skills/assets that sport has helped you develop to face our current situation?
- How do you think people outside of sport/non-athletes are adjusting to this situation? Are there skills/assets they may be lacking to help adjust during this time?
- Do you think you still have the skills/assets you gained from sport?

Going back to the COVID 19 questions:

- Have you learned anything about yourself through COVID-19 – and particularly the forced discontinuation of organized sport and engagement in physical activity in groups?

Obviously, this sudden forced removal from organized sport and access to fitness facilities was unexpected – and no one is sure how long it will be until we return to normal – or if we will return to a “new normal”.

- If you had a wish for how sport for older adults might stay the same – or change - to be better delivered when we return from this unexpected interruption... what would it look like? Would it be exactly the same? Is there anything you think should change? (Anything you really miss? Anything you don't miss?)

*Note:* Depending on the responses, if new topics/inquires arise, the interviewer will formulate questions that are not in the standardized interview guide, during the course of the interview

**Appendix C**  
**Supplementary information for the DAP-modified**

Original item #	Updated item #	DAP	Modified DAP	Decisions
1	1	1. I...Stand up for what I believe in	1. I...Stand up for what I believe in	No revision
2	2	2. I...Feel in control of my life and future.	2. I...Feel in control of my life and future.	No revision
3	3	3. I...Feel good about myself.	3. I...Feel good about myself.	No revision
4	4	4. I avoid things that are dangerous or unhealthy	4. I...Avoid the pressure to partake in things that are unhealthy for me.	Revised
5	5	5. I...Enjoy reading or being read to	5. I...Enjoy reading.	No revision
6	54	6. I...Build friendship with other people	I have... meaningful friendships with other people.	Revised
7	7	7. I...Care about school	7. I...Stay engaged with my community.	Revised
8	# reassigned	8. I...Do my homework	Item Removed	Removed
9	9	9. I...Stay away from tobacco, alcohol, and other drugs	9. I...Resist or moderate my use of tobacco, alcohol, and other drugs.	Revised
10	10	10. I...Enjoy learning.	10. I...Enjoy learning.	No revision
11	11	11. I...Express my feelings in proper ways.	11. I...Express my feelings in when I need to.	Revised
12	12	12. I...Feel good about my future.	12. I...Feel good about my future.	No revision
13	13	13. I...Seek advice from my parents	13. I... Seek advice from my family and/or friends.	Revised
14	14	14. I...Deal with frustration in positive ways.	14. I...Deal with my frustrations in positive ways.	No revision
15	15	15. I...Overcome challenges in positive ways.	15. I...Try to overcome my challenges.	Revised
16	16	16. I...Think it is important to help other people.	16. I...Think it is important to help other people.	No revision
17	17	17. I...Feel safe and secure at home.	17. I...Feel safe and secure at home.	No revision
18	18	18. I...Plan ahead and make good choices.	18. I...Plan ahead and make informed choices.	Revised
19	19	19. I...Resist bad influences.	19. I... Resist certain influences that could affect me.	Revised
20	20	20. I...Resolve conflicts without anyone getting hurt.	20. I...Help resolve conflicts between other people.	Revised
21	21	21. I...Feel valued and appreciated by others.	21. I...Feel valued and appreciated by others.	No revision
22	22	22. I...Take responsibility for what I do.	22. I...Take responsibility for what I do.	No revision
23	23	23. I...Tell the truth even when it is not easy.	23. I...Tell the truth even when it is not easy.	No revision

24	24	24. I...Accept people who are different from me.	24. I...Accept people who are different from me.	No revision
25	25	25. I...I feel safe in school	25. I...Feel safe in my clubs and/or community	Revised
26	26	26. I am...Actively engaged in learning new things.	I...Actively try to learn new things.	Revised
27	55	27. I am... Developing a sense of purpose	I have... A sense of purpose in my life.	Revised
28	28	28. I am...Encouraged to try things that might be good for me.	I...Try things that might be good for me.	Revised
29	41	29. I am...Included in family tasks and decisions	I am...Included in family tasks.	Revised
30	42	30. I am...Helping to make my community a better place.	I am...Helping to make my community a better place.	No revision
31	# reassigned	31. I am...Involved in a religious group or activity.	Item removed	Removed
32	56	32. I am...Developing good health habits.	<b>I have...</b> Good health habits.	Revised
33	6	33. I am...Encouraged to help others.	I...Help others.	Revised
NEW	8		I...Feel a sense of independence.	New
NEW	27		I...Feel like a leader.	New
NEW	29		I...feel a sense of accomplishment.	New
NEW	30		I...Spend time working on my weaknesses.	New
NEW	31		I...Structure my time to meet all my daily goals.	New
NEW	32		I...Take part in activities to help my community.	New
NEW	33		I...Enjoy setting new goals.	New
NEW	34		I...Enjoy competing with myself.	New
NEW	35		I...Enjoy meeting people from different cultures and backgrounds.	New
NEW	36		I...Take the time to congratulate the winner after I lose a challenge or activity.	New
NEW	37		I...Show my support and appreciation to my family and/or friends	New
NEW	38		I...Apologize for my mistakes.	New
NEW	39		I...Maintain an identity that I am proud of.	New
NEW	40		I...Challenge common negative stereotypes related to me.	New
34	43	34. I am...Involved in a sport, club, or other group.	I am...Involved in a club, or other leisure group.	Revised
35	44	35. I am...Trying to help solve social problems	I am...Trying to help solve social problems	No revision

36	45	36. I am...Given useful roles and responsibilities.	I am...Given important roles and responsibilities in my clubs and/or community.	Revised
37	57	37. I am...Developing respect for other people.	<b>I have...</b> Respect for other people.	Revised
38	46	38. I am...Eager to do well in school and other activities.	I am...Eager to do well in my leisure activities.	Revised
39	47	39. I am...Sensitive to the needs and feelings of others.	I am...Sensitive to the needs and feelings of others.	No revision
40	48	40. I am...Involved in creative things such as music, theater, or art.	I am...Involved in creative things such as music, theater, or art.	No revision
41	49	41. I am...Serving others in my community.	I am...Serving others in my community.	No revision
42	50	42. I am...Spending quality time at home with my parent(s).	I am...Spending quality time with my family and/or friends.	Revised
NEW	51		I am...Included in family decisions.	New
NEW	52		I am...Driven to continuously better myself.	New
NEW	53		I am...Eager to travel to new places.	New
43	58	43. I have...Friends who set good examples for me.	I have...Friends who set good examples for me.	No revision
44	# reassigned	44. I have...A school that gives students clear rules	Removed, Item number reassigned	Removed
45	59	45. I have...Adults who are good role models for me.	I have...People who are good role models for me.	Revised
46	60	46. I have...A safe neighborhood.	I have...A safe neighborhood and/or community.	Revised
47	61	47. I have... Parent(s) who try to help me succeed.	I have...Family and/or friends who try to help me succeed.	Revised
48	62	48. I have...Good neighbors who care about me.	I have...Good neighbors who care about me.	No revision
49	63	49. I have...A school that cares about kids and encourages them.	I have...A community that cares about its people and/or encourages them.	Revised
50	64	50. I have...Teachers who urge me to develop and achieve.	I have...People who urge me to develop and achieve.	Revised
51	65	51. I have...Support from adults other than my parents.	I have...Support from people other than my family.	Revised
52	66	52. I have...A family that provides me with clear rules.	I have...People that provide me constructive or quality instruction.	Revised
53	# reassigned	Parent(s) who urge me to do well in school.	Removed	Removed
54	67	I have...A family that gives me love and support.	I have...A family that gives me love and support	No revision

55	68	Neighbours who help watch out for me.	I have...Neighbours who help watch out for me.	No revision
56	69	Parent(s) who are good at talking with me about things.	I have...Friends who talk with me about things.	Revised
57	# reassigned	A school that enforces rules fairly.	Removed	Removed
58	# reassigned	A family that knows where I am and what I am doing.	Removed	Removed
NEW	70		I have...People who help me set goals and progress in them.	New
NEW	71		I have...Friends who challenge me.	New

	<b>Initial number of items</b>	<b>Items removed during EFA</b>	<b>Items retained post EFA</b>
Revised	30	14	16
No Revisions	22	9	13
New	19	7	12
<b>Total</b>	<b>71</b>	<b>30</b>	<b>41</b>

## Psychosocial Development

### SECTION 1: BACKGROUND INFORMATION

- 1) Please indicate your date of birth (mm/dd/year): \_\_\_\_/\_\_\_\_/\_\_\_\_
  
- 2) Sex:
 

☐ Male  
☐ Female

☐ Do not wish to identify
  
- 3) Please indicate your current marital status:
 

☐ Married or domestic partnership  
☐ Divorced/Separated  
☐ Widowed

☐ Single, never married  
☐ Other \_\_\_\_\_
  
- 4) Ethnicity (individuals with mixed background or parents from two different backgrounds please select all that apply):
 

☐ Black (African, Caribbean and Other)  
☐ White (Caucasian or European)  
☐ Hispanic or Latino/Latina (Mexican, Central American, and others)  
☐ Native Hawaiian or Other Pacific Islander  
☐ Southeast Asian (Chinese, Japanese, Korean and others)  
☐ Canadian Aboriginal or Native  
☐ South Asian (Indian, Bangladeshi, Nepali, Tamil, Afghan and others)  
☐ Other (*please specify*): \_\_\_\_\_
  
- 5) In what country were you born? (please specify): \_\_\_\_\_
  
- 6) Where do you live now? (please specify): \_\_\_\_\_ for \_\_\_\_\_ (years)
  
- 7) Please specify the highest degree, certificate or diploma you obtained:
 

☐ Higher Education (Professional Degrees, Doctoral)  
☐ University and/or College Graduate  
☐ Completed trade or apprenticeship certificate or diploma  
☐ High-school graduate  
☐ Did not complete high school
  
- 8) Employment status:
 

☐ Full-time worker  
☐ Part-time worker  
☐ Less than part-time worker  
☐ Unemployed but looking for work  
☐ Partially retired



☐ Completely retired

9) Please indicate your total household income:

☐ <\$40,000

☐ \$80,000 to <\$90,000

☐ \$40,000 to < \$50,000

☐ \$90,000 to <\$100,000

☐ \$50,000 to <\$60,000

☐ \$100,000 to <\$150,000

☐ \$60,000 to <\$70,000

☐ \$150,000 and over

☐ \$70,000 to <\$80,000

☐ Prefer not to answer

10) In general, would you say your physical health is:

☐ Excellent

☐ Very good

☐ Good

☐ Fair

☐ Poor

11) In general, would you say your mental health is:

☐ Excellent

☐ Very good

☐ Good

☐ Fair

☐ Poor

12) How often do you have trouble going to sleep or staying asleep?

☐ Never

☐ Rarely

☐ Sometimes

☐ Most of the time

☐ All the time

13) How often do you find your sleep refreshing?

☐ Never

☐ Rarely

☐ Sometimes

☐ Most of the time

☐ All the time

14) How long do you usually spend sleeping each night? Please specify.

\_\_\_\_\_hours

**SECTION 2: LEISURE INVOLVEMENT**

1) Please list the types of leisure activities (e.g., sports, hobbies, gardening) you participate in?

Activity	Participation (times/week)	Duration (hours/minutes)
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

2) Is there a leisure activity you participate in more than others? What is it?

☐ Yes: \_\_\_\_\_

☐ No, I participate in a number of activities without focusing on one

*If you answered yes to the above question please complete the questions below (if selected no, skip to sedentary activity):*

3) Does this leisure activity require an instructor (e.g., coach, teacher, leader) to manage/lead the activity?

☐ Yes

☐ No

4) Do you have a coach?

☐ Yes

☐ No

5) Does this leisure activity require any type of training or practice to get better?

☐ Yes

☐ No

a. If yes, do you prefer to improve or get better in your leisure activity by practicing alone and/or with the help of others?

☐ Alone

☐ With others

☐ Both

6) Are there any competitions for your leisure activity (e.g., sporting events)? If yes, do you take part in these competitions?

☐ Yes

☐ No

Can you specify how often you take part in competitions and their names within a given year?

\_\_\_\_\_Times/years

Names of the  
competitions:\_\_\_\_\_

7) At what age did you begin seriously participating in the leisure activity you most enjoy?  
\_\_\_\_\_years

8) Was there a period(s) where you did not participate in this activity?

☐Yes

☐No

If yes, please specify:

Age\_\_\_\_\_ years (stopped participating in this activity)

Age\_\_\_\_\_ years (reintroduced to this activity)

Age\_\_\_\_\_ years (stopped participating in this activity)

Age\_\_\_\_\_ years (reintroduced to this activity)

Age\_\_\_\_\_ years (stopped participating in this activity)

Age\_\_\_\_\_ years (reintroduced to this activity)

### **SECTION 3 SEDENTARY ACTIVITY**

*The next questions pertain to specific activities (sitting or lying down) you do in your leisure time, that is, activities not at work:*

1) In a typical week in the past 3 months, how much time did you usually spend on the computer, including playing computer games and using the internet?

☐None ☐Less than 1 hour ☐1-2 hours ☐3-5 hours ☐6-10 hours ☐11-14 hours ☐15-20 hours ☐More than 20 hours

2) In a typical week in the past 3 months, how much time do you spend playing video games such as XBOX, Nintendo and PlayStation?

☐None ☐Less than 1 hour ☐1-2 hours ☐3-5 hours ☐6-10 hours ☐11-14 hours ☐15-20 hours ☐More than 20 hours

3) In a typical week in the past 3 months how much time do you spend watching television or videos on any electronic device?

☐None ☐Less than 1 hour ☐1-2 hours ☐3-5 hours ☐6-10 hours ☐11-14 hours ☐15-20 hours ☐More than 20 hours

4) In a typical week in the past 3 months, how much time do you spend reading, not counting at work? (includes books, magazines, newspapers)

☐None ☐Less than 1 hour ☐1-2 hours ☐3-5 hours ☐6-10 hours ☐11-14 hours ☐15-20 hours ☐More than 20 hours

### **SECTION 4: SATISFACTION WITH LIFE**

*The following questions pertain to your satisfaction with various aspects of your life. For each question, please select whether you are very satisfied, satisfied, neither satisfied nor dissatisfied, dissatisfied or very dissatisfied:*

**1 = Very Dissatisfied, 2 = Dissatisfied, 3 = Neither satisfied or dissatisfied, 4= Satisfied, 5 = Very satisfied**

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 1. How satisfied are you with your job or main activity?              | 1 | 2 | 3 | 4 | 5 |
| 2. How satisfied are you with your leisure activities?                | 1 | 2 | 3 | 4 | 5 |
| 3. How satisfied are you with your financial situation?               | 1 | 2 | 3 | 4 | 5 |
| 4. How satisfied are you with yourself?                               | 1 | 2 | 3 | 4 | 5 |
| 5. How satisfied are you with the way your body looks?                | 1 | 2 | 3 | 4 | 5 |
| 6. How satisfied are you with your relationships with family members? | 1 | 2 | 3 | 4 | 5 |
| 7. How satisfied are you with your relationships with friends?        | 1 | 2 | 3 | 4 | 5 |
| 8. How satisfied are you with your housing?                           | 1 | 2 | 3 | 4 | 5 |
| 9. How satisfied are you with your neighbourhood?                     | 1 | 2 | 3 | 4 | 5 |

## **SECTION 5: PSYCHOSOCIAL ASSETS SCALE**

*Below is a list of positive things that you might have in yourself, your family, friends, neighbourhood, work, leisure activities, and community. For each item that describes you now or within the past 3 months, check if the item applies to you:*

**Not at All or Rarely      Somewhat or Sometimes      Very or Often      Extremely or Almost Always**

*If you do not want to answer an item, leave it blank. But please try to answer all the items as best you can.*

	Not At All or Rarely	Somewhat or	Very or	Extremely
<b>I...</b>				
1. Stand up for what I believe in.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Feel in control of my life and future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Feel good about myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Avoid the pressure to partake in things that are unhealthy for me.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Enjoy reading.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Help others.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Stay engaged with my community	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Feel a sense of independence.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Resist or moderate my use of tobacco, alcohol, and other drugs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Enjoy learning.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Express my feelings in when I need to.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Feel good about my future.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Seek advice from my family and/or friends.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 14. Deal with my frustrations in positive ways.                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Try to overcome my challenges.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Think it is important to help other people.                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 17. Feel safe and secure at home.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Plan ahead and make informed choices.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 19. Resist certain influences that could affect me.                                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Help resolve conflicts between other people.                                   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 21. Feel valued and appreciated by others.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Take responsibility for what I do.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 23. Tell the truth even when it is not easy.                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 24. Accept people who are different from me.                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 25. Feel safe in my clubs and/or community.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 26. Actively try to learn new things.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 27. Feel like a leader.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 28. Try things that might be good for me.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 29. Feel a sense of accomplishment.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 30. Spend time working on my weaknesses.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 31. Structure my time to meet all my daily goals.                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 32. Take part in activities to help my community.                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 33. Enjoy setting new goals.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 34. Enjoy competing with myself.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 35. Enjoy meeting people from different cultures and backgrounds.                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 36. Take the time to congratulate the winner after I lose a challenge or activity. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 37. Show my support and appreciation to my family and/or friends.                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 38. Apologize for my mistakes.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 39. Maintain an identity that I am proud of.                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 40. Challenge common negative stereotypes related to me.                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### I AM...

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 41. Included in family tasks.  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 42. Helping to make my community a better place.                             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 43. Involved in a club, or other leisure group.                              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 44. Trying to help solve social problems.                                    | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 45. Given important roles and responsibilities in my clubs and/or community. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 46. Eager to do well in my leisure activities.                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 47. Sensitive to the needs and feelings of others.                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 48. Involved in creative things such as music, theater, or art.              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

- |  |                          |                          |                          |                          |
|--|--------------------------|--------------------------|--------------------------|--------------------------|
| 49. Serving others in my community.                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 50. Spending quality time with my family and/or friends. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 51. Included in family decisions.                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 52. Driven to continuously better myself.                | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 53. Eager to travel to new places.                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### I HAVE...

- |   |                          |                          |                          |                          |
|---|--------------------------|--------------------------|--------------------------|--------------------------|
| 54. Meaningful friendships with other people.                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 55. A sense of purpose in my life.                                  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 56. Good health habits.   | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 57. Respect for other people.                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 58. Friends who set good examples for me.                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 59. People who are good role models for me.                         | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 60. A safe neighborhood and/or community.                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 61. Family and/or friends who try to help me succeed.               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 62. Good neighbors who care about me.                               | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 63. A community that cares about its people and/or encourages them. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 64. People who urge me to develop and achieve.                      | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 65. Support from people other than my family.                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 66. People that provide me constructive or quality instruction.     | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 67. A family that gives me love and support.                        | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 68. Neighbours who help watch out for me.                           | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 69. Friends who talk with me about things.                          | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 70. People who help me set goals and progress in them.              | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 71. Friends who challenge me.                                       | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

### Initial Exploratory Factor Analysis

Variables = 71

N=437 participants

Determinant =  $2.96^{-19}$

Kaiser-Meyer-Olkin Measure = 0.934

Bartlett's Test of Sphericity =  $p < 0.0001$

14 factors extracted based on eigenvalues  $> 1$

Factor loading of  $> 0.30$

#### **KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.934
Bartlett's Test of Sphericity	Approx. Chi-Square	17555.230
	df	2485
	Sig.	.000

#### **Communalities**

	Initial	Extraction
1) I stand up for what I believe in.	1.000	.438
GW 2) I feel in control of my life and future	1.000	.707
GW 3) I feel good about myself.	1.000	.716

HABITS 4) I avoid the pressure to partake in things that are unhealthy for me.	1.000	.543
5) I enjoy reading.	1.000	.590
SER 6) I help others.	1.000	.635
SER 7) I stay engaged with my community	1.000	.710
8) I feel a sense of independence.	1.000	.469
HABITS 9) I resist or moderate my use of tobacco, alcohol, and other drugs.	1.000	.670
LEARN 10) I enjoy learning.	1.000	.675
11) I express my feelings in when I need to.	1.000	.570
GW 12) I feel good about my future.	1.000	.663
13) I seek advice from my family and/or friends.	1.000	.567
14) I deal with my frustrations in positive ways.	1.000	.521
- 15) I try to overcome my challenges.	1.000	.545
SER 16) I think it is important to help other people.	1.000	.598
SAFE 17) I feel safe and secure at home.	1.000	.691
18) I plan ahead and make informed choices.	1.000	.518



HABITS 19) I resist certain influences that could affect me.	1.000	.617
20) I help resolve conflicts between other people.	1.000	.596
GW 21) I feel valued and appreciated by others.	1.000	.605
INT 22) I take responsibility for what I do.	1.000	.638
23) I tell the truth even when it is not easy.	1.000	.536
- 24) I accept people who are different from me.	1.000	.587
SAFE 25) I feel safe in my clubs and/or community.	1.000	.666
LEARN 26) I actively try to learn new things.	1.000	.718
27) I feel like a leader.	1.000	.644
LEARN 28) I try things that might be good for me.	1.000	.563
GW 29) I feel a sense of accomplishment.	1.000	.674
LEARN 30) I spend time working on my weaknesses.	1.000	.621
DRIVE 31) I structure my time to meet all my daily goals.	1.000	.583
SER 32) I take part in activities to help my community.	1.000	.757

DRIVE 33) I enjoy setting new goals.	1.000	.698
DRIVE 34) I enjoy competing with myself.	1.000	.689
35) I enjoy meeting people from different cultures and backgrounds.	1.000	.584
INT 36) I take the time to congratulate the winner after I lose a challenge or activity.	1.000	.535
INT 37) I show my support and appreciation to my family and/or friends.	1.000	.624
INT 38) I apologize for my mistakes.	1.000	.608
39) I maintain an identity that I am proud of.	1.000	.637
40) I challenge common negative stereotypes related to me.	1.000	.459
FAM 41) I am included in family tasks.	1.000	.660
SER 42) I am helping to make my community a better place.	1.000	.786
43) I am involved in a club, or other leisure group.	1.000	.718
SER 44) I am trying to help solve social problems.	1.000	.588

45) I am given important roles and responsibilities in my clubs and/or community.	1.000	.723
46) I am eager to do well in my leisure activities.	1.000	.615
47) I am sensitive to the needs and feelings of others.	1.000	.582
48) I am involved in creative things such as music, theater, or art.	1.000	.472
SER 49) I am serving others in my community.	1.000	.763
50) I am spending quality time with my family and/or friends.	1.000	.582
FAM 51) I am included in family decisions.	1.000	.777
DRIVE 52) I am driven to continuously better myself.	1.000	.628
53) I am eager to travel to new places.	1.000	.465
54) I have meaningful friendships with other people.	1.000	.586
GW 55) I have a sense of purpose in my life.	1.000	.669
56) I have good health habits.	1.000	.639
57) I have respect for other people.	1.000	.627

58) I have friends who set good examples for me.	1.000	.724
SS 59) I have people who are good role models for me.	1.000	.774
SAFE 60) I have a safe neighborhood and/or community.	1.000	.607
61) I have family and/or friends who try to help me succeed.	1.000	.651
62) I have good neighbors who care about me.	1.000	.846
63) I have a community that cares about its people and/or encourages them.	1.000	.680
SS 64) I have people who urge me to develop and achieve.	1.000	.644
SS 65) I have support from people other than my family.	1.000	.715
SS 66) I have people who provide me constructive or quality instruction.	1.000	.644
FAM 67) I have a family that gives me love and support.	1.000	.640
68) I have neighbours who help watch out for me.	1.000	.819
SS 69) I have friends who talk with me about things.	1.000	.660

SS 70) I have people who help me set goals and progress in them.	1.000	.702
SS 71) I have friends who challenge me.	1.000	.613

Extraction Method: Principal Component Analysis.

### Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	19.808	27.899	27.899	19.808	27.899	27.899	9.458
2	4.134	5.823	33.722	4.134	5.823	33.722	9.590
3	3.344	4.709	38.432	3.344	4.709	38.432	8.614
4	2.768	3.898	42.329	2.768	3.898	42.329	8.048
5	2.488	3.504	45.834	2.488	3.504	45.834	6.443
6	1.823	2.567	48.401	1.823	2.567	48.401	8.213
7	1.713	2.413	50.814	1.713	2.413	50.814	3.752
8	1.634	2.302	53.116	1.634	2.302	53.116	4.018
9	1.361	1.916	55.032	1.361	1.916	55.032	2.052
10	1.293	1.821	56.853	1.293	1.821	56.853	7.482
11	1.276	1.798	58.651	1.276	1.798	58.651	2.710
12	1.237	1.742	60.393	1.237	1.742	60.393	1.582
13	1.132	1.594	61.987	1.132	1.594	61.987	5.248
14	1.053	1.484	63.470	1.053	1.484	63.470	4.603
15	.992	1.397	64.868				
16	.954	1.343	66.211				

17	.942	1.326	67.537				
18	.907	1.277	68.814				
19	.870	1.225	70.039				
20	.856	1.206	71.246				
21	.842	1.186	72.432				
22	.811	1.142	73.574				
23	.787	1.108	74.682				
24	.725	1.022	75.704				
25	.697	.981	76.685				
26	.667	.940	77.625				
27	.648	.913	78.538				
28	.628	.884	79.422				
29	.610	.860	80.282				
30	.581	.818	81.100				
31	.557	.785	81.885				
32	.533	.751	82.636				
33	.513	.723	83.359				
34	.507	.715	84.073				
35	.495	.697	84.771				
36	.478	.673	85.444				
37	.473	.667	86.111				
38	.463	.652	86.762				
39	.451	.635	87.397				
40	.439	.619	88.016				
41	.433	.610	88.626				
42	.417	.587	89.213				
43	.413	.582	89.795				
44	.385	.542	90.337				
45	.380	.535	90.872				
46	.370	.521	91.394				

47	.345	.487	91.880				
48	.345	.486	92.366				
49	.326	.459	92.825				
50	.324	.456	93.281				
51	.316	.445	93.726				
52	.306	.430	94.157				
53	.294	.414	94.570				
54	.289	.407	94.977				
55	.284	.400	95.377				
56	.276	.389	95.766				
57	.262	.369	96.135				
58	.254	.358	96.493				
59	.247	.348	96.841				
60	.245	.345	97.186				
61	.230	.324	97.510				
62	.220	.310	97.821				
63	.211	.297	98.118				
64	.205	.289	98.407				
65	.193	.272	98.679				
66	.190	.267	98.946				
67	.182	.257	99.203				
68	.161	.226	99.429				
69	.158	.223	99.652				
70	.132	.187	99.838				
71	.115	.162	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

### Pattern Matrix<sup>a</sup>

[illegible]



SS 66) I have people who provide me constructive or quality instruction.		-.698												
SS 70) I have people who help me set goals and progress in them.		-.677												
SS 65) I have support from people other than my family.		-.666												
SS 59) I have people who are good role models for me.		-.653												
SS 69) I have friends who talk with me about things.		-.634												
SS 71) I have friends who challenge me.		-.616												
58) I have friends who set good examples for me.		-.591												
SS 64) I have people who urge me to develop and achieve.		-.583												
54) I have meaningful friendships with other people.		-.481												
61) I have family and/or friends who try to help me succeed.		-.464					.304							
13) I seek advice from my family and/or friends.		-.411												
SER 49) I am serving others in my community.		.837												
SER 42) I am helping to make my community a better place.		.830												
SER 32) I take part in activities to help my community.		.813												
SER 7) I stay engaged with my community		.758												
SER 44) I am trying to help solve social problems.		.645												
SER 6) I help others.		.551												
SER 16) I think it is important to help other people.		.421					-.307							
27) I feel like a leader.		.399												
20) I help resolve conflicts between other people.		.340												
INT 38) I apologize for my mistakes.						.725								
INT 37) I show my support and appreciation to my family and/or friends.						.639								
47) I am sensitive to the needs and feelings of others.						.604								
INT 36) I take the time to congratulate the winner after I lose a challenge or activity.						.573								
- 24) I accept people who are different from me.						.479								
57) I have respect for other people.						.471								
39) I maintain an identity that I am proud of.	.305					.438								
INT 22) I take responsibility for what I do.						.428								
40) I challenge common negative stereotypes related to me.						.368								
LEARN 26) I actively try to learn new things.							.757							

LEARN 10) I enjoy learning.					.754										
LEARN 28) I try things that might be good for me.					.445										
35) I enjoy meeting people from different cultures and backgrounds.				.348	.431										
LEARN 30) I spend time working on my weaknesses.					.383										
1) I stand up for what I believe in.					.302										
- 15) I try to overcome my challenges.															
FAM 51) I am included in family decisions.					.887										
FAM 41) I am included in family tasks.					.807										
FAM 67) I have a family that gives me love and support.					.722										
50) I am spending quality time with my family and/or friends.					.575										
SAFE 17) I feel safe and secure at home.										-.591					
SAFE 60) I have a safe neighborhood and/or community.										-.588					
SAFE 25) I feel safe in my clubs and/or community.										-.585					
HABITS 9) I resist or moderate my use of tobacco, alcohol, and other drugs.										.793					
56) I have good health habits.										.608					
HABITS 4) I avoid the pressure to partake in things that are unhealthy for me.										.535	.379				
HABITS 19) I resist certain influences that could affect me.										.474					.426
5) I enjoy reading.											.698				
8) I feel a sense of independence.											.391				
62) I have good neighbors who care about me.												.890			
68) I have neighbours who help watch out for me.												.849			
63) I have a community that cares about its people and/or encourages them.												.617			
43) I am involved in a club, or other leisure group.													.761		
45) I am given important roles and responsibilities in my clubs and/or community.				.476									.606		
53) I am eager to travel to new places.														.467	
48) I am involved in creative things such as music, theater, or art.											.315			.396	
DRIVE 34) I enjoy competing with myself.															-.726
DRIVE 33) I enjoy setting new goals.															-.574
DRIVE 52) I am driven to continuously better myself.															-.562
46) I am eager to do well in my leisure activities.													.449		-.505



Initial analysis of the correlation matrix was inspected for any alarming high correlations, indicated by any values less than -0.80 or greater than 0.80.

Item #	Item	SMCs	Factor Loading	Removal (Y/N)	Reason for removal
58	I have friends who set good examples for me	0.787	0.591	N – $r$ is close to high correlations but not greater than 0.80	
59	I have people who are good role models for me	0.787	0.653	N – $r$ is close to high correlations but not greater than 0.80	
62	I have good neighbors who care about me	0.82	0.890	N	
68	I have neighbours who help watch out for me	0.82	0.849	Y	Has a lower factor loading compared to its correlated item and conceptually could be less meaningful for all older adults

**Final EFA**

Variables approaching significance in the correlation matrix

	32) I take part in activities to help my community.	42) I am helping to make my community a better place.	49) I am serving others in my community.
32) I take part in activities to help my community.	1.000	0.774	0.725
42) I am helping to make my community a better place.	0.774	1.000	0.744
49) I am serving others in my community.	0.725	0.774	1.000

**KMO and Bartlett's Test**

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.923
Bartlett's Test of Sphericity	Approx. Chi-Square	9320.702
	df	820
	Sig.	.000

Determinant:  $2.4^{-10}$

**Communalities**

	Initial	Extraction
GW 2) I feel in control of my life and future	1.000	.722
GW 3) I feel good about myself.	1.000	.717
HABITS 4) I avoid the pressure to partake in things that are unhealthy for me.	1.000	.558
SER 6) I help others.	1.000	.573
SER 7) I stay engaged with my community	1.000	.712

HABITS 9) I resist or moderate my use of tobacco, alcohol, and other drugs.	1.000	.666
LEARN 10) I enjoy learning.	1.000	.743
GW 12) I feel good about my future.	1.000	.669
SAFE 17) I feel safe and secure at home.	1.000	.722
HABITS 19) I resist certain influences that could affect me.	1.000	.520
GW 21) I feel valued and appreciated by others.	1.000	.551
INT 22) I take responsibility for what I do.	1.000	.552
23) I tell the truth even when it is not easy.	1.000	.461
SAFE 25) I feel safe in my clubs and/or community.	1.000	.675
LEARN 26) I actively try to learn new things.	1.000	.786
LEARN 28) I try things that might be good for me.	1.000	.550
GW 29) I feel a sense of accomplishment.	1.000	.643
DRIVE 31) I structure my time to meet all my daily goals.	1.000	.591
SER 32) I take part in activities to help my community.	1.000	.778
DRIVE 33) I enjoy setting new goals.	1.000	.752
DRIVE 34) I enjoy competing with myself.	1.000	.650
INT 36) I take the time to congratulate the winner after I lose a challenge or activity.	1.000	.545
INT 37) I show my support and appreciation to my family and/or friends.	1.000	.644
INT 38) I apologize for my mistakes.	1.000	.653
FAM 41) I am included in family tasks.	1.000	.715
SER 42) I am helping to make my community a better place.	1.000	.805
SER 44) I am trying to help solve social problems.	1.000	.595
47) I am sensitive to the needs and feelings of others.	1.000	.492
SER 49) I am serving others in my community.	1.000	.761
FAM 51) I am included in family decisions.	1.000	.769
DRIVE 52) I am driven to continuously better myself.	1.000	.644
GW 55) I have a sense of purpose in my life.	1.000	.635
SS 59) I have people who are good role models for me.	1.000	.610
SAFE 60) I have a safe neighborhood and/or community.	1.000	.735
SS 64) I have people who urge me to develop and achieve.	1.000	.672

SS 65) I have support from people other than my family.	1.000	.675
SS 66) I have people who provide me constructive or quality instruction.	1.000	.665
FAM 67) I have a family that gives me love and support.	1.000	.640
SS 69) I have friends who talk with me about things.	1.000	.630
SS 70) I have people who help me set goals and progress in them.	1.000	.732
SS 71) I have friends who challenge me.	1.000	.633

Extraction Method: Principal Component Analysis.

### Total Variance Explained

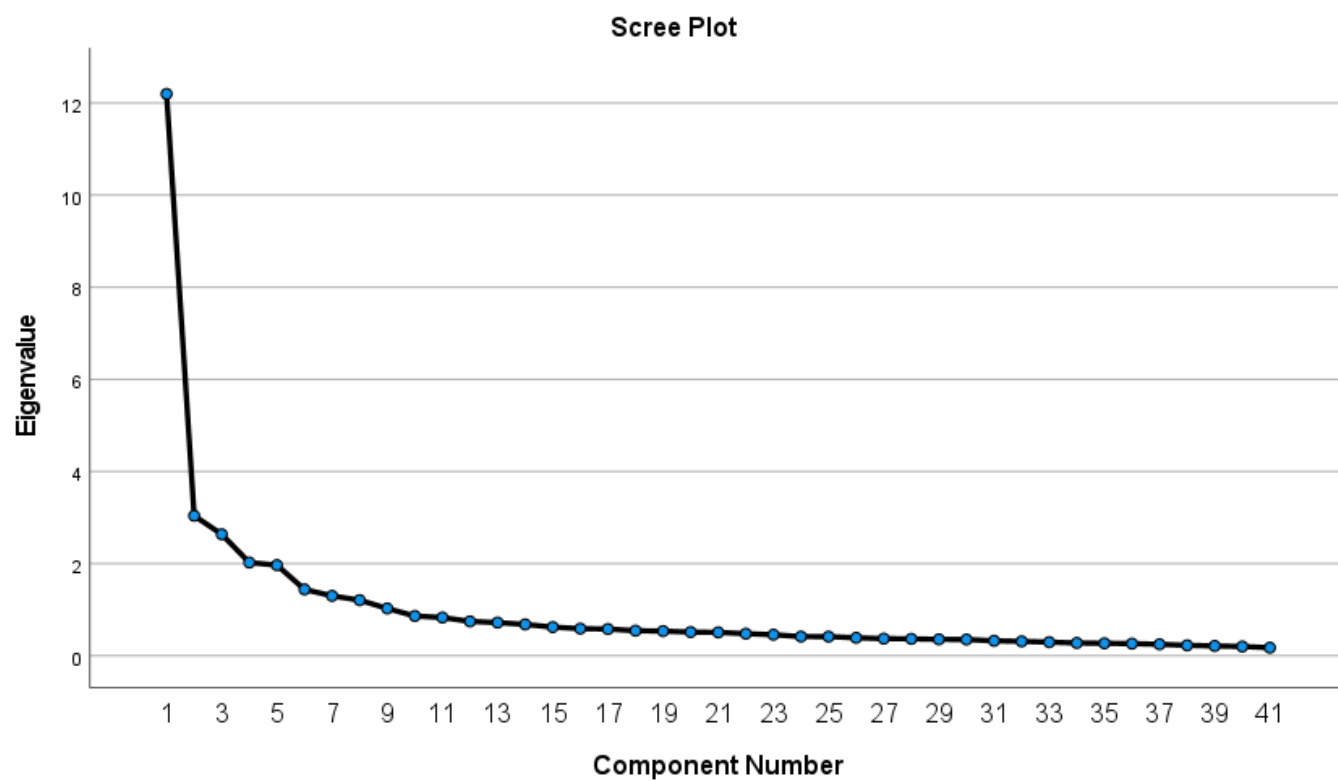
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings <sup>a</sup>
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	12.199	29.753	29.753	12.199	29.753	29.753	6.898
2	3.040	7.416	37.169	3.040	7.416	37.169	5.836
3	2.637	6.432	43.601	2.637	6.432	43.601	6.144
4	2.024	4.936	48.537	2.024	4.936	48.537	3.605
5	1.968	4.799	53.336	1.968	4.799	53.336	6.433
6	1.441	3.514	56.849	1.441	3.514	56.849	4.277
7	1.300	3.171	60.020	1.300	3.171	60.020	3.373
8	1.208	2.945	62.965	1.208	2.945	62.965	4.521
9	1.028	2.506	65.471	1.028	2.506	65.471	4.435
10	.864	2.107	67.578				
11	.830	2.025	69.603				
12	.747	1.821	71.423				
13	.721	1.758	73.181				
14	.681	1.661	74.842				
15	.623	1.519	76.361				
16	.590	1.438	77.799				

17	.581	1.416	79.215				
18	.545	1.328	80.543				
19	.536	1.306	81.849				
20	.514	1.254	83.103				
21	.508	1.239	84.343				
22	.479	1.169	85.512				
23	.457	1.115	86.627				
24	.417	1.018	87.645				
25	.416	1.014	88.659				
26	.390	.952	89.611				
27	.372	.907	90.518				
28	.367	.896	91.414				
29	.357	.870	92.283				
30	.353	.860	93.143				
31	.325	.793	93.936				
32	.313	.762	94.698				
33	.296	.721	95.420				
34	.278	.678	96.098				
35	.271	.660	96.758				
36	.264	.643	97.401				
37	.249	.608	98.009				
38	.227	.553	98.562				
39	.214	.521	99.083				
40	.201	.490	99.572				
41	.175	.428	100.000				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.





Pattern Matrix<sup>a</sup>

	Component								
	1	2	3	4	5	6	7	8	9
SS 70) I have people who help me set goals and progress in them.	.799								
SS 66) I have people who provide me constructive or quality instruction.	.788								
SS 65) I have support from people other than my family.	.754								
SS 71) I have friends who challenge me.	.725								
SS 64) I have people who urge me to develop and achieve.	.724								
SS 69) I have friends who talk with me about things.	.700								
SS 59) I have people who are good role models for me.	.630								
INT 38) I apologize for my mistakes.		.820							
INT 37) I show my support and appreciation to my family and/or friends.		.720							
INT 36) I take the time to congratulate the winner after I lose a challenge or activity.		.645							
47) I am sensitive to the needs and feelings of others.		.578							
INT 22) I take responsibility for what I do.		.548							
23) I tell the truth even when it is not easy.		.455							
SER 49) I am serving others in my community.			.868						
SER 42) I am helping to make my community a better place.			.866						
SER 32) I take part in activities to help my community.			.839						
SER 7) I stay engaged with my community			.835						
SER 44) I am trying to help solve social problems.			.647						
SER 6) I help others.			.547						
LEARN 10) I enjoy learning.				.825					
LEARN 26) I actively try to learn new things.				.790					
LEARN 28) I try things that might be good for me.				.456					
GW 2) I feel in control of my life and future					-.823				
GW 3) I feel good about myself.					-.786				
GW 12) I feel good about my future.					-.751				
GW 55) I have a sense of purpose in my life.					-.612				
GW 29) I feel a sense of accomplishment.					-.562				

GW 21) I feel valued and appreciated by others.						-.492				
FAM 51) I am included in family decisions.							.839			
FAM 41) I am included in family tasks.							.812			
FAM 67) I have a family that gives me love and support.							.704			
HABITS 9) I resist or moderate my use of tobacco, alcohol, and other drugs.								.840		
HABITS 4) I avoid the pressure to partake in things that are unhealthy for me.								.740		
HABITS 19) I resist certain influences that could affect me.								.572		
SAFE 60) I have a safe neighborhood and/or community.									.802	
SAFE 25) I feel safe in my clubs and/or community.									.690	
SAFE 17) I feel safe and secure at home.									.680	
DRIVE 34) I enjoy competing with myself.										-.718
DRIVE 33) I enjoy setting new goals.										-.703
DRIVE 52) I am driven to continuously better myself.										-.632
DRIVE 31) I structure my time to meet all my daily goals.										-.624

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

a. Rotation converged in 13 iterations.

**Component Correlation Matrix**

Component	1	2	3	4	5	6	7	8	9
1	1.000	.214	.319	.165	-.303	.258	.090	.241	-.276
2	.214	1.000	.256	.281	-.272	.279	.310	.324	-.198
3	.319	.256	1.000	.162	-.272	.224	.170	.129	-.203
4	.165	.281	.162	1.000	-.157	.097	.158	.172	-.246
5	-.303	-.272	-.272	-.157	1.000	-.260	-.217	-.319	.289
6	.258	.279	.224	.097	-.260	1.000	.166	.223	-.176
7	.090	.310	.170	.158	-.217	.166	1.000	.238	-.142
8	.241	.324	.129	.172	-.319	.223	.238	1.000	-.159
9	-.276	-.198	-.203	-.246	.289	-.176	-.142	-.159	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Relationship between Factors ( $r=0.32$ ):

- Social support(1) & Service (3)
- Integrity (2) and Safety (8)
- General Well-being (5) and Safety (8)