Older, faster, stronger: The multiple benefits of masters sport participation

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Abstract

While masters sport aligns with the holistic concept of active aging, related research has focused predominantly on the physical domain, and less is known about the psychological, cognitive, and social benefits of older adults' participation. This study examined, in combination, the perceived psychological, social, cognitive, and physical benefits of training and competing as a masters athlete, while considering age and gender differences. 40 masters athletes residing in Canada were interviewed (21 men and 19 women; 15 who were 50-64 years and 25 who were 65-79 years), representing 15 different sports. Interviews were coded both deductively and inductively, revealing several sub-themes of benefits for the broader perceived psychological, social, cognitive, and physical benefits, with few but notable differences between women and men, and those younger than 65 years and those 65+. Our findings provide new insights to the positive experiences of active aging associated with high levels of physical activity among older adults, such as greater self-confidence, especially for women, comradery, and feeling mentally sharper, especially for the older age group.

Keywords: Masters athletes, Sport participation, Benefits, Active aging

Masters sport participation by older adults aligns with the "active aging" discourse, which focuses on "quality of life for people as they age" through "participation in social, economic, cultural, spiritual and civic affairs" (WHO, 2002, p. 12). Active aging was adopted by the World Health Organization to describe the positive experience of aging wherein individuals may realize physical, mental, and social wellbeing through participation according to their particular needs, desires, and capacities (WHO, 2002). It was a response, in part, to a long-standing focus on "successful" aging that is based primarily on a biomedical model and "the achievement of clinical and medically inspired criteria" (Foster & Walker, 2015, p. 85). Subsequently, the WHO shifted its focus to broader "healthy ageing as the process of developing and maintaining the functional ability that enables well-being in older age" (WHO, 2015, p. 28). Key additional considerations are acknowledging the diversity of older adults and the environment and opportunities that support healthy aging. Active aging may be seen as a continuing part of this broader discourse (Active Aging Canada, 2022; Liotta et al., 2018), and indeed the WHO maintains that active aging is reflected in "opportunities for health, participation and security in order to advance quality of life as people age" (WHO, 2015, p. 225). The consideration of masters sport helps to address the call for the inclusion of leisure activities as part of active aging for healthy living (Foster & Walker, 2015; see Dionigi et al., 2006a).

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A number of older adults engage in masters sport, defined as higher levels of physical activity than their general population cohorts, typically with weekly training and regular competition (Dionigi, 2015a). Participants in masters sport can be 'continuers,' who have played sport over the lifespan; 're-kindlers,' who played sport in their youth and have returned to it after not playing for many years; or they may be 'late bloomers,' who began sport at a later age (Dionigi, 2015a). The popularity of masters sport is evident in such events as the World Masters

Games and Senior Olympic Games, that are organized events bringing senior athletes from around the world together to compete in sports such as athletics, cycling, judo, swimming and tennis (IMGA, 2020; Dionigi et al., 2013). Masters athletes are, however, a privileged cohort of older adults who are socially, economically, and physically able to engage in organized competitive sport as part of their lifestyle (cf. Katz, 2013; Son & Dionigi, 2020). It is not a leisure activity that is reasonably available to all, nor would it be of interest to all (Dionigi, 2015b; Gard et al., 2017). Nonetheless, it is important to understand how masters sport participation, specifically, may contribute to older adults' positive experience of aging, and particularly the multiple dimensions (physical, cognitive, psychological, social) of individual wellbeing (cf. Marsillas et al., 2017). Such insights extend thinking about masters sport and its place in active aging (cf. Gard et al., 2017), and can help inform relevant active aging policy and programming for older adults in the context of masters sport.

Research on masters sport to date is focused predominantly within the physical domain; less is known about the psychological, cognitive, and social benefits of sport participation (Cannella et al., 2021; Geard et al., 2017; Macgregor et al., 2017; Stenner et al., 2020). In parallel, research on gender and age differences in masters athletes' experiences, that may provide further insight to active aging among a heterogeneous older population (cf. Cannella et al., 2021; Foster & Walker, 2015; Gayman et al., 2017; Wigglesworth et al., 2012), has also primarily focused on variations in physical aspects, including performance, and training adaptions, such as muscle strength, and power (see Baker, Horton, & Weir, 2010). Nonetheless, there is evidence that participation by older adults in competitive sport may have more than just physical benefits, such as giving meaning to life through building a strong identity (Dionigi, 2002; Lyons & Dionigi, 2007). Masters athletes have also noted that through sport they are able

to make new friends, find companionship, and form a sense of community (Dionigi et al., 2011; Dionigi et al., 2018 Gayman et al., 2017; Jenkin et al., 2018a; Lyons & Dionigi, 2007). Further, masters athletes have described gaining a sense of achievement and intellectual stimulation by embracing challenges and becoming more motivated to work harder (Dionigi, 2002; Dionigi et al., 2011; Gayman et al., 2017). A further understanding of the psychological, social and cognitive benefits of masters sport, in concert with perceived physical advantages, and how they differ by age and gender, may help advance understanding of the experiences of masters athletes.

Research to date on the experiences of masters athletes has also identified drawbacks or costs of participation. Although not the focus of this paper, it is notable that there is a range of potential negative consequences of masters sport participation (e.g., Deck et al., 2021; Son & Dionigi, 2020; Stevenson, 2002). Financial expense can be a factor as some sports have high costs for equipment or facility use, and a number of costs may be incurred with travelling for competition, potentially limiting participation more privileged individuals (Dionigi, 2016; Horton et al., 2018; Son & Dionigi, 2020). Physical and psychological downsides such as injuries and burnout are also evident and may be more likely with excessive training (Baker et al., 2010; Horton et al., 2018). With excessive training there may also be social downsides to this aspect of active aging: an increased obsession or increased training load may leave less time for family, friends and social events (Appleby & Dieffenbach, 2016; Baker et al., 2010; Deck et al., 2021; Dionigi et al., 2012). In addition to some of these drawbacks for sport participants, researchers have also noted a number of barriers to participation in sport. Most notably, the socio-economic factors that tend to favor white, middle-class individuals in participation (Dionigi & Gard, 2017; Gard et al., 2018). The current study complements this body of work and

provides some direction for future research that can continue to build out knowledge of the benefits of masters sport participation, while acknowledging the downsides of that participation.

Much of the research on perceptions of masters sport has relied on survey instruments (Cannella et al., 2021) that capture general measures of the benefits of participation, and in some cases do not differentiate between physical, psychosocial, and cognitive health (Cardenas et al., 2009; Macgregor et al., 2017; Stenner et al., 2020). It is important to further unpack these seemingly distinct aspects for greater insight to their respective nuances and representation of the masters athlete experience. Researchers have used qualitative approaches to delve deeper into the psychological or social experiences of masters athletes, or both, and we consider this research here.

Scholars have uncovered what can be considered psychological benefits of masters sport involvement, including embracing a challenge, the satisfaction of winning, feeling a sense of accomplishment and even self-actualization by achieving goals, and increased self-confidence and positive self-image (Dionigi et al., 2011; Dionigi et al., 2018; Ferrari et al., 2017; Gayman et al., 2017; Horton et al., 2018). Masters sport has also been reported to help older adults make sense of and cope with aging (Dionigi, 2009; Gayman et al., 2017). Social benefits of masters sport engagement include the opportunity for travel, and particularly new friendships and expanded networks – and sometimes a further sense of companionship – with fellow athletes that can also extend off-field (Dionigi et al., 2011; Ferrari et al., 2017; Heo et al., 2013; Horton et al., 2018; Stevenson, 2002). Masters sport may cultivate a sense of community through shared interests, the desire to continue and remain healthy together, purpose fulfillment, and being able to give back in one's respective sport (Lyons & Dionigi, 2007). Young et al. (2018) argue that

more information is needed to understand these social benefits, especially as many of the studies involve small and homogeneous samples (Gayman et al., 2017; Stenner et al., 2020).

The cognitive benefits of masters sport participation are less well understood. Research indicates that masters athletes, compared to less physically active adults of similar gender, age, and education, have shown superior capabilities on cognitive tasks including memory, reaction time, fluid intelligence, and letter and category fluency (Burzynska et al., 2015; Tseng et al., 2013; Zhao et al., 2016). More recently, Geard and colleagues (2021) compared masters athletes to non-sporting adults and found no differences in cognitive functioning (objective measures of memory, distractibility, blunders, and names). However, only a few studies have looked at the perceived cognitive benefits from the masters athlete's perspective. Siegenthaler and O'Dell (2003) found that golfers engage in their sport to help maintain cognitive function. Through focus group discussions, Stenner and colleagues (2016) found that regular golfers believe that concentration, problem solving, and memory are used regularly in their sport, and that this may help maintain these cognitive functions outside of sport as well. However, it is not clear whether and how a more diverse group of masters athletes consider such cognitive benefits.

A critical gap in understanding the perceived benefits of masters sport is the consideration of diverse aspects, such as age and gender (Cannella et al., 2021; Gayman et al., 2017; Macgregor et al., 2017; Stenner et al., 2020). Research to date suggests that women and men have different experiences in masters sport (Cardenas et al., 2009; Stenner et al., 2020). For example, for women in particular, sport can be a place to feel safe, have a sense of community, and develop a positive identify (Dionigi, 2010; Litchfield, 2011; Litchfield & Dionigi, 2012). For women brought up in a generation that did not encourage the same sport participation as for men, masters sport may be particularly empowering (Dionigi, 2016; Dionigi, 2018; Eman, 2012).

Sport has been described by older women athletes (> 75 years) as a place to combat traditional gendered and ageist views and structure (Horton et al. 2018). Horton and colleagues (2019) also found that older (> 75) men masters athletes use their participation in sport to compare to themselves and their health status to non-athletes of the same age; bolstering their sense of self and motivation to avoid becoming "worse-off" or making what is believed to be the same poor choices of their non-athlete counterparts (Horton, 2019). These nuances prompt further research that is needed to unpack the underlying elements determining if any gender effect extends to other benefits of masters sport (cf. Stenner et al., 2020). This can be achieved with the consideration of a more diverse sample of athletes and sports (Gayman et al., 2017).

Consistent with the notion of older adults' multidimensional positive experiences with active aging, the purpose of this study was to investigate the combination of perceived psychological, social, cognitive, and physical benefits of masters sport among a diverse sample of older athletes (aged 50 years+; Dionigi, 2006b; Dionigi et al., 2018). Acknowledging that older adults are not all the same (WHO, 2015), and the importance of understanding the differences among them, including their masters sport experiences, a secondary purpose was to determine if there is any variation in those benefits based on athlete gender (men and women) and age ("younger" < 65 years and "older" 65 years+; cf. Cardenas et al., 2009). A cross-sectional qualitative research design was used to achieve these purposes.

Method

This research followed a constructivist paradigm (Finlay & Ballinger, 2006), exploring how individuals experience the focal context. In this approach, knowledge is co-created through a dialogue between the participants and researchers and the respective experiences they bring. We used semi-structured interviews with a conversational approach to invite participants to

reflect on and discuss what they perceive to be the personal benefits of masters sport. This provided researchers flexibility in the interview process and participants the opportunity to elaborate and build on responses (Patton, 2015). Participants were able to review their own transcripts in order to be able to confirm or deny any points within the data. Data were also collected from multiple participants, and so different perspectives were collated to generate an understanding of the perceived psychological, social, cognitive, and physical benefits of training and competing as a masters athlete. In-depth interviews with multiple participants, and the use of multiple researchers to analyze data collected, helped strengthen our study findings and conclusions, and increased their trustworthiness (Guba & Lincoln, 1989).

Participants and Recruitment

To ensure our study focused on older masters athletes who were still competing, the following inclusion criteria were used: (1) must be 50 years of age or older, (2) must be able to read and write in English in order to give consent, and (3) must still be competing at the masters level. Athletes were recruited through local masters teams and clubs, and through Masters Ontario, the governing body for masters-level sport in the province. Following Internal Review Board approval, coaches and club managers, and Masters Ontario, were contacted to distribute recruitment posters. Athletes were invited to follow up with the research team directly, and interview times were set with those who were interested in participating in the study.

A total of 40 masters athletes who resided in Canada were interviewed (21 men and 19 women; aged 50-79 years, M=66.34, SD=7.7; 15 were < 65 years, 25 were 65+ years). They represented 15 different sports, and their level of competition varied from local and recreational to provincial, national and international competitions. To reduce burden, participants were not asked about their race/ethnicity or socioeconomic status as that was not the focus of the study or

the research questions. Saturation was reached at 40 interviews, with consistent (and no new) descriptions of psychological, social, cognitive or physical benefits of participation.

Data Collection

Following written informed consent, each participant engaged in a semi-structured interview with one of two interviewers from the research team. Interviews were conducted over the phone or in person, based on each participant's preference. The same interview guide was used for both modalities and both interviewers engaged in phone and in person data collection. A similar conversational approach, and rich dialogue, was attained across all interviews. Interviews lasted between 22 and 75 minutes (M = 48 minutes). Upon completion of the interview, it was transcribed verbatim. Participants were then invited to review the transcription to ensure that the information was conveyed in its intended manner (Madill et al., 2000).

The interview guide was developed by the research team to uncover the various benefits experienced by the masters athletes. Interviews first explored the background of each participant, including their age, gender, and history in sport. Participants were then asked about the positive impacts of training and competing at the masters level. Specifically, they were asked to describe what they perceive to be the psychological, social, cognitive, and physical benefits of their masters sport engagement. Participants were asked, "How has being a competitive masters athlete benefited you psychologically?" "How has it benefitted you socially?" "What are the cognitive benefits of being a masters athlete?" and "What are the physical benefits?" The semi-structured design allowed participants to answer openly and provided flexibility to explore some topics that may vary between participants (Patton, 2015; Rubin & Rubin, 1995).

Data Analysis

Interviews were transcribed into Microsoft Word, then imported into NVivo8 ©. Original transcripts were replaced with amended versions for participants who reviewed their document and provided changes. Next, ideas and concepts were found and organized from the data to build over-arching themes (Patton, 2015). A coding schematic was created both deductively and inductively. Deductively, our coding framework was based on previous research and the broad categories of psychological, social, cognitive, and physical benefits. Further inductive analysis was undertaken to identify possible sub-themes within those broad codes. This coding process began with one team member reading the transcripts line-by-line and devising an initial draft framework. To establish trustworthiness, the remaining team members analyzed at least four different interviews with the draft coding schema as a guide. Alternative interpretations of certain data, although few, were discussed and reconciled among the authors (Smith & McGannon, 2018). Convergence and divergence in coding was used through the process to ensure that coded data belonged to one theme (Patton, 2015). Once the final scheme was determined, all transcripts were coded.

A qualitative matrix analysis was undertaken to determine any substantial divergence or irregularity in the pattern of benefit subthemes (Ayres et al., 2003) according to masters athletes' age and gender. Similar to a cross-case analysis (Patton, 2015), this involved "recontextualizing" the data (Ayres et al., 2003, p. 872) within subgroups of women and men participants, and subgroups of participants less than 65 years and 65+ years (distinguishing, per Cardenas et al., 2009, by likely age of retirement and standard age to start one's pension (Statistics Canada, 2022). The exact age ranges within the two groups were similar, spanning 50-64 years, and 65-79 years. Variation was determined to exist if the proportion of the subgroups indicating a subtheme differed by 25% or more (Harman & Doherty, 2014).

Results

Several sub-themes of benefits were identified for each of the broader perceived psychological, social, cognitive, and physical benefits of masters sport. A few differences in these sub-themes by age group and gender were found. The benefits within each broad type are presented below, along with selected representative quotations from participants indicated by a pseudonym. The further differences by age and gender are also highlighted. The proportion of athletes indicating a particular benefit, and by age group and gender, are presented in Table 1.

[INSERT TABLE 1 ABOUT HERE]

Psychological Benefits

The psychological benefits described by the masters athletes are distinguished as enhanced wellbeing, increased self-confidence, pride/sense of achievement, and sense of self/purpose in life.

Wellbeing. Almost half of the participants in this study indicated a sense of positive wellbeing in terms of being happy, having less stress, and enjoying life through sport. For example, Bob shared that, "it's given me a lot of satisfaction, so I guess my wellbeing is up there somewhere. I'm both pleased and happy I'm able to compete and I'm just really happy about it." Pat further described that "…it just has prolonged my life. It's prolonged my wellbeing." Life enjoyment comes from both sport and the relaxation sport brings, according to Larry: "I enjoy it because it's fun to do but it's a stress reliever. You're out on the water, and a lot of times if it's a nice day, it's nice out there, things like that."

Increased self-confidence. Being a masters athlete gave half the participants increased self-confidence both within and outside of sport. Sue described that "continuing to play is the

confidence piece, that I can keep up with competitors whether they're older or younger." As Becky related,

> I get up early and I think that requires a lot of discipline and doing that every day and knowing that it's hard to do and continuously doing it every day builds more confidence and makes me feel like I got this and I can do this. I have been through some hard stuff, so it makes me feel, it makes it feel a lot more doable.

Increased self-confidence, characterized by setting and working towards higher goals, was captured by Brenda: "Well certainly it's a drive. There is something motivating you to, to reach that level." Joseph shared that "running [has given] me the confidence to look for different answers to other questions."

Pride/Sense of achievement. Almost half of the masters athletes expressed a sense of pride in their achievements, that was reinforced through recognition from their family and social networks. Sue said, "There's an importance to a masters event, [and] the recognition that comes with that from family, friends, colleagues…that feels pretty good sometimes." Joanne added to this by discussing her accomplishments: "It was a huge psychological benefit because of the bragging rights part."

Sense of self/Purpose in life. Another psychological benefit, indicated by about one-third of study participants, was the belief that competing in masters sport had contributed to their sense of purpose in life. As Harold shared,

> In an environment where I am the caregiver, so 90, 95 percent of my time is doing that, I need something that I can do, time where I can feel like a person because I'm not just a caregiver.

Some participants mentioned sport as 'life-saving' in difficult times, such as divorce. Others seem to 'find themselves' through sport and cited that they have truly changed mentally and physically. Bernice shared:

> Oh, yeah. [Sport's] been lifesaving. Really, it's been lifesaving as far as happiness is concerned. It's funny because before I was divorced, life was happy, very happy. Then the divorce happened and life just kind of ended. So, I had to start a second kind of life with mostly new people. I only had maybe two or three really close friends from before the divorce. It was quite a life changer and so it really saved me in a way.

Meanwhile, Brad described how sport re-affirmed who he is: "Certainly I like identifying myself as an individual that is fit. Being a fairly competitive person, its great to have the opportunity to actually affirm myself as a competitor, as somebody who is capable of competing."

Differences by age – Self-confidence. The only apparent variation in psychological benefits between the two age groups of masters athletes was the boost in self-confidence experienced from sport. This was indicated to a far greater extent by athletes in the younger group (< 65 years), most of whom described training and competing in their sport as reinforcing their confidence to continue to push themselves on the field, in the pool or on the court, as well as in other aspects of life. In contrast, the athletes aged 65 years and older related this psychological benefit to a far lesser extent, focusing more on their sense of achievement but without noting the further confidence that engendered.

Differences by gender – Pride/Sense of achievement and Self-confidence. Greater proportions of women than men indicated that both pride/sense of achievement and increased self-confidence were particular benefits of their sport participation. The following quotations illustrate women's perceptions of personal pride and achievement:

> Because there's an importance to a Masters event, the recognition that comes with that from family, friends, colleagues: 'Oh, you're still playing basketball, [name]! Are you still traveling? Are you still competing? Oh my God, that's so cool!' So there's a recognition that comes with that, that feels pretty good sometimes that yeah, I'm still playing, and wow, you even notice that I'm still playing? For sure. (Sue)

Joanne said, "I was the second female and the first Masters female in a really hard 10 mile race. That was like the pinnacle, and I felt it just doesn't get better than this. It was still a huge psychological benefit because of the bragging rights part." Cheryl added, "Yeah. It's a pride thing for sure because I think we do well. The fact that we've been playing for longer than these people have been alive is a feather in our cap so to speak. So yeah, it is a good thing, and it makes you feel good." With regard to confidence, Wanda also added, "Certainly helps the self-image and things like that, so yeah, it's definitely a positive." Women discussed how sport made them feel better about themselves and gave them more confidence in general: "I definitely feel better about myself outwardly, so I feel more confident that way" (Becky).

Social Benefits

The masters athletes described social benefits pertaining to positive relationships with family and with friends, and a sense of comradery through sport participation.

Family bonding. Over a third of the masters athletes described that their family relationships were better overall because of their participation; including stronger relationships with their spouse and other members, and that playing sport brought them closer with their kids. "My kids think I rock now," noted Nicole. This athlete added:

> Yes, they are volleyball players. So, we get to share a lot more now. I talk about my varsity days but they don't know any of that, so they have nothing to talk about other than

> just to listen to me. But now that I travel and play, they can relate, right? Because it's what they do. … we can share a lot more about nutrition, and recovery, and muscles and we can share about, like, "oh do you know a stretch for this?" you know, these sorts of things. So, we talk on like an athlete to athlete level instead of a parent to child.

Jim discussed the support felt from his spouse: "My wife enjoys the events, watching the events and obviously she is my number one cheerleader and that is definitely a benefit."

Friendship. With their engagement in masters sport, three-quarters of the participants described having a larger group of friends, more diverse (and some younger) friends, as well as friends with the same dedication and goals. As Hubert described,

> It's given me a broader social circle than I would have if I wasn't competing. I think in general if you are not competing, your friends are going to be relatively same age group, maybe same ethnic or cultural background, and easily in your proximity, say in your neighbourhood or through work or going way back to school. But in competing and training with groups, now that's group training right, I have met all kinds of different people. Many of them are younger, a few older, not too many, but most of them younger, and also, you know, a variety of background, both cultural, different work backgrounds, different, um, kind of income levels.

Participants also discussed how their involvement with friends in masters sport led to other activities and social events, such as book clubs and weekly breakfasts. These types of gatherings and social events outside the sports field were common among the athletes. Pat described the social benefits from masters sport travel:

> When we compete at the World Masters Games, we travel. We stay together and we travel around, and we stay an extra couple of weeks depending on where we are and we hang out and we do fun stuff. Socially, it's huge.

The masters sport connections extended still further to social support in other aspects, as summed up by Nicole:

> Its not just the connections socially, it's the connections to people health wise. You know, and like "how's your back?" "How's your knee?" If someone injure themselves, then you continue to share, and "oh, do you want to come to yoga with me?" Or "hey, how was your mom?" Or I had to miss this tournament because my mom was in the hospital, so then you get to connect with them on a life level; on a life level and also on a competition level. Like what are we all striving for, and you're not alone, right?

Comradery. A sense of fellowship and companionship was also discussed as a social benefit for the large majority of the masters athletes. "There is a lot of comradery…we are quite close, and we spend a lot of time together, because we are not only training, but we are fundraising, we travel together, so it's certainly a unique experience" (Brenda). Roy added, "I think competing does offer a different opportunity for personal growth. In terms of comradery, when you have been on a relay with somebody it means something." The fellowship and companionship that is experienced in masters sport was described by Nicole as,

> The connections, um, personal, social, emotional, I think is the A number 1 part of being [involved], because again when you think of that stage of your life… its that in-between time where you need as much connection and engagement… cause you don't know what's going to come next.

Differences by gender – Family bonding. The only apparent variation among the masters athletes with regard to social benefits was the greater proportion of men who indicated family bonding as a particular benefit of their sport involvement. They discussed being able to participate with family members in sport, as well as being able to interact with their grandchildren more. As Harold noted:

> …Actually, my son does triathlons. My grandkids do triathlons. Now I have four great grandkids; 2 of them are 5 and 6, they've done triathlons, so they're all into sport. I think I had something to do with that maybe. They have seen my dedication to sport and they all do sport. My son was a swimmer… Oh yeah. You look around. How many people in the 60s, they can't lift their grandkids. I go biking with my grandkids. Instead of sitting in a chair. They phone me up, 'Papa, you want to go for a bike ride?' So we go for a bike ride.

The opportunity to spend more time together, share an activity, and thus strengthen family bonds was reported relatively more often by the men than women athletes in this study.

Cognitive Benefits

The masters athletes described cognitive benefits as feeling sharp, focused, being able to clear their mind, and generating and using brain power.

Sharp. About one-fifth of the masters athletes described being alert and aware as a benefit realized both during and in preparation for their sport engagement. Hubert related: "I feel that having to be a better time manager just makes me more alert. Time management, the training that goes with the competition and the event, I just think that makes me sharper." Becky reiterated this point: "I think it keeps me aware and it keeps me alert because I'm staying relatively healthy."

Focus. Several participants also discussed being able to focus because of their sport participation, including outside of sport (e.g., work setting). Lesley speculated that, "Its probably also good for my brain, I mean that I suspect that the fact that I'm still working, I suspect if I wasn't swimming I might find it more difficult working." George agreed that "I think the training gives you a focus… because your mind is active all the time."

Clear mind. Over a quarter of participants described how participating in sport, whether in training or in competition, allowed – and required – one to clear their mind of other things. Brian captured these notions:

> When I run or go to the gym, I keep thinking about work stuff, solving work problems… I think of solutions when I am walking the dog, but I find when I play games – strategy and scores and stuff – you actually have to mentally engage, like you fully mentally engage, so you kind of sort of wipe your brain from all your daily concerns with work or whatever, it is sort of a complete, like I don't know, brain cleanse, rest.

Larry also described that, "I think it clears your mind. When you go out and row, you're exercising, and at the end of it, it benefits the blood flow to your brain so that's good."

Brain power. Over one-third of the masters athletes reported the benefit of generating – and using – greater cognitive energy or "brain power" through problem solving and strategizing in their sport. The following quotations demonstrate this:

> Yeah. I would say I benefit. . . because I strategize. When I'm playing at that level it forces me to think in a different way and although Masters level athletes aren't as agile, their cognitive level is at a higher level than let's say a younger player would be. It's more mental than it is… Sorry, there is a larger mental capacity than physical capacity. (Carl)

Chris agreed:

> The other benefit of curling is the game is very strategic so there is a cognitive benefit when you're looking at the situation where the rocks are and what your best shot should be at the next rock. There's a lot of thinking in curling in terms of how you play the game and what strategy is right.

Tony further described:

> Well, yeah, there's no doubt about that. Regardless of what sport other than non-structured or running, whatever sport you may be engaged in, there is a certain amount of mind required. Thinking, planning, what are you going to do if he does this, where are you going to put the ball if they put it here, are you ready to get a lob, are you ready to cover your partner behind, so that if they miss it, you're there? All of that is involved in thinking and planning.

Differences by age – Sharp. Athletes in both age groups discussed cognitive benefits of their masters sport participation, but those in the 65+ age group were the only ones who talked about how sport participation kept them sharp. Nancy stated this clearly: "The competition is what keeps you sharp, I think, and besides competing it is also the practicing that goes with it and the sociability. It's just the nature of sport." Joseph added, "Well I was never the sharpest knife in the drawer anyways, and I think because of [sport] I feel more alert."

Physical Benefits

The masters athletes described physical benefits of overall physical health, increased strength, and more energy because of their sport participation.

Overall physical health. All participants described a range of physical health benefits, including weight control, disease management, and mobility. The following quotations demonstrate how participants feel masters sport contributes to their overall physical health:

> I think it just, there is a lot of things, … its cardiovascular, flexibility, I mean so many people at this stage of life, overweight, I mean so much of our society is overweight, so there is so many health benefits. (Brenda)

> You feel stronger, you stand straighter, you know, if you want to compete, hopefully you are eating better, you are cognizant of your sleep pattern. (Monika).

> I feel so invigorated and it keeps me fit. It's keeping my Parkinson's under control besides all the other fitness. (Marion)

> Physically, it helped me to keep my weight under control. It is one of the reasons why I started swimming was to lose some of my baby fat or beer fat, I guess. (Brad)

Strength. A few participants specifically indicated the feeling of physical strength they believe they had developed through their participation. For example, Jim said, "I think I have the strength, you know, to meet demands that come in everyday living because, I think it gives me more tools because of the fitness level perhaps that I have." This was echoed by Lesley who said, "I think generally, positively, feeling good and strong."

Energy. Some participants also discussed that they believed they had greater physical energy throughout the day to complete more tasks or to continue going to work. Brian discussed this: "I personally think being fit gives you probably more energy. I don't know if it's changed my life, but I would say I enjoy life, and it has maintained my life, and I think I have continued to be sort of energetic, and hopefully younger."

Discussion

With the consideration of masters sport as a leisure aspect of active aging, the purpose of this study was to examine, in combination, the perceived psychological, social, cognitive, and physical benefits of training and competing as a masters athlete. Age and gender differences regarding these benefits were also considered. There was consensus among the 40 interviewees that being a masters athlete had a positive influence on several areas of their lives, with few but notable differences between women and men, and those younger than 65 years and those 65+. Our findings support and extend understanding of the multidimensional benefits of masters sport as a potentially positive leisure experience for older adults.

Almost half of the participants identified one or more psychological benefits of competitive sport participation, and particularly a boost to their self-confidence. This reported benefit, along with a sense of achievement, aligns with previous research highlighting these aspects among masters athletes (Dionigi, 2002; Dionigi et al., 2011; 2018; Gayman et al., 2017; Jenkin et al., 2018a). Further insight to these benefits was uncovered with the observation that younger masters athletes (< 65 years) and women were more likely to indicate self-confidence from participation than their older (65+) counterparts and men, respectively. Younger participants (< 65 years) reported increased self-confidence from continuing to push and challenge themselves in sport. As these athletes may be in the twilight of their professional careers (cf. Cardenas et al., 2009), or experiencing life transitions, such as no longer having dependent children, physical training and competition may be perceived as a mechanism for a renewed attitude about competence and control in their life (Hirvensalo & Lintunen, 2011; Walsh et al., 2019).

Sport has been identified as an area for younger girls to learn life skills and increase self-confidence (see Gould & Carson, 2008), yet the importance of sport for older generations of

women may still be overlooked (Litchfield & Dionigi, 2012), and even viewed with dispersion (Horton et al., 2018). Two-thirds of the women masters athletes in the current study reported experiencing pride and increased self-confidence and this is an important finding. Women tend to be pigeonholed in certain roles in society (e.g., care givers), and this finding suggests that competitive sport participation may help women change their perception of themselves. In society, older women are denigrated more (i.e., "don't be an old woman", "woman driver") with social comments that have a negative connotation. It may be possible that activities such as competitive sport, where women view themselves as 'strong' and 'champions,' can help fight both gender and age stereotypes (Dionigi, 2010; Horton et al., 2018; Roy & Avalon, 2020).

Our study additionally identified overall psychological wellbeing – feeling happy and less stress – as a common benefit of masters sport, but one that has not been emphasized to date. This observation helps to further shift the focus from a biomedical model of successful aging, and the achievement of clinical standards, to one that includes – if not prioritizes – the consideration of general happiness and containment of stress through a lifestyle that includes masters sport. We also uncovered developing a sense of self/purpose in life as a psychological benefit, which may enhance the notion of masters sport giving meaning to life through a strong identity (Dionigi, 2002; Dionigi et al., 2011). These activities may also help contribute to one's identity (new or alternative) later in life, and thus can help older individuals adapt to and process aging (Dionigi, 2002; Dionigi et al., 2011). Older individuals may see themselves as 'winners', 'champions', or 'a physically active person' and therefore feel more empowered (Dionigi et al., 2011). For athletes who may be going through transitional periods in life (i.e., divorce, empty nest, retirement), our findings have implications for identity management during these transitional (and albeit difficult) times, giving them a sense of purpose, pride, achievement, and

comradery. As Nicole put, ‘it’s that in-between time where you need as much connection and engagement… cause you don’t know what’s going to come next.’ Dionigi et al. (2018) found similar traits, such as confidence and competence and also suggested that these contribute to personal development for adults through sport. Overall, this finding suggests there are richer stories to be uncovered about older adults’ sense of self and personal identity through their masters sport experience (cf. Dionigi, 2002; Horton et al., 2018; Litchfield & Dionigi., 2012). It is not clear whether this psychological benefit is particular to masters sport, however it highlights an intriguing effect of this form of leisure in active aging. Notably, these psychological benefits appear to be realized consistently across the age and gender groups; although, they may have unique deeper meanings among different individuals.

The social benefits that most participants perceived to gain from their sport came from two main areas: friendship and comradery. The benefit of friendship in masters sport was described as having a large, and possibly diverse, group of friends with common goals and dedication to their sport, and who also provide social support, including through events beyond sport. Comradery was described as a further sense of fellowship and companionship that develops among sport friends. These benefits have been identified in previous research (Dionigi et al., 2011; 2018; Ferrari et al., 2017; Horton et al., 2018; Stevenson, 2002) and are further highlighted here. Scholars have identified that sport can help older adults gain social connections, reducing social isolation that can be common amongst this cohort (e.g., Pike, 2012), with implications for quality of life of both individuals and communities (Heo et al., 2013). Many of these athletes seem to have their own communities within their sport that allow them to engage in other activities outside of sport, and which was seen as a positive benefit of their participation in sport. These types of relationships and social support in later adult life have been

shown to be very important including, for example, an increase in social activity being associated with less cognitive decline (James et al., 2011). Although no variation by gender was apparent for the masters sport benefits of friendship and comradery (nor by age), as women tend to live longer and become more socially isolated compared to men (Statistics Canada, 2018), these findings have implications for the potential role of masters sport in active aging policy and interventions targeting older women adults in particular, with a special consideration for those who may be isolated or never played sport before. Opportunities to engage in sporting activities, and settings, that are appealing for this particular cohort (e.g., modified sport activities focused on social engagement; Jenkin et al., 2021) may help to foster valuable social connections that can enhance quality of later life. For example, walking sports (modified modality with no physical contact) were first introduced in 2011 and are becoming more popular for older adults interested in the social aspect of sport but who may not be able to meet some of the physical demands (Jenkin et al., 2018b).

The social benefit of strengthened family relationships was indicated, but by relatively fewer participants. Family bonding has not received much attention as a benefit of masters sport to date, however, it was particularly prominent for men athletes. Becoming closer with children and grandchildren as a result of a shared interest and participation in sport was very meaningful to these athletes. This may have implications for individuals struggling to connect with family members or younger generations (Fingerman et al., 2020). As these types of connection are a concern with aging, involvement in masters sport can be a way to foster such relationships (Dionigi et al., 2018) and may be one way for older adults to become closer with their family by being able to participate alongside family members or having similar interests to discuss with

Commented [SD2]: One comment from reviewer is that this may be identity management: "The latter (younger men) may be more focused on maintaining a competitive identity, as per page 12, whereas for older men it seems to be more about connecting with family, grandchildren etc. (see further points about identity management below). " -but again we didnt analyze these subgroups an don't sure if it fits here better than where I have it?

Commented [AD3R2]: We did not analyze gender by age so we cannot comment on this. And it is not appropriate to speculate that younger men may have a stronger competitive identity, etc. Rev is speculating by sussing out our percentages, but that is just a game and not appropriate.

one another. Although the family perspective was not captured in this study, this finding suggests that masters sport may engender benefits beyond the older adult athletes themselves.

Masters athletes in this study were less likely to indicate cognitive benefits of their sport participation. This may be because of the noted challenge in pinning down the nature of such a benefit; the interviewers found they had to probe more for possible cognitive benefits, and participants tended to indicate, “That’s hard to answer, I think” (Lesley). Nonetheless, the athletes described feeling sharp, having good focus, a clear mind, and enhanced brain power in and as a result of sport participation. With relatively little consideration of perceived cognitive benefits of masters sport to date, these new insights extend understanding of the potential impact of this leisure type of active aging. They generally correspond with the reported greater mental acuity of physically active adults based on objective measures (Burzynska et al., 2015; Tseng et al., 2013; Zhao et al., 2016), perhaps putting some of those measures into the athletes’ own words about improved cognitive function. The findings also extend to a more diverse sample the observations of Siegenthaler and O’Dell (2003) and Stenner et al. (2016), who reported that golfers value the improved cognitive function, and specifically concentration, problem solving and memory, they realize through their sport engagement. Further, despite research showing that prolonged exercise and training may drain cognitive energy (Tomporowski et al., 2007) and no differences in cognitive functioning between masters athletes and nonsporting adults (Geard et al., 2018; 2021), masters athletes in the current study felt that training and competing gave them more brain power, to complete not only more but also more difficult tasks. These findings appear to align with research showing that increased physical activity can lead to possible improvement in cognitive function (Brisswalter et al., 2002; Van Uffelen et al., 2008). Further research is

required to understand perceived cognitive effects of masters sport, and their alignment or contrast with more objective indicators.

Although the proportion of study participants indicating the various cognitive benefits was low, there was one notable variation apparent among younger and older masters athletes. A relatively greater number of older athletes (65+) perceived they were sharper because of their participation in sport. Younger athletes (< 65) did not mention being sharp as a benefit at all but cited cognitive benefits more in terms of enhanced brain power. Research on cognitive benefits of sport has tended to focus on comparisons of active and inactive same-age cohorts. Our study contributes to the literature by identifying an apparent age-based variation among active individuals. It is possible that older and younger adults simply value their cognition in different ways. Alternatively, older adults may be making downward comparisons to individuals similar in age, who do not partake in sport and activity, and trying to minimize age-related declines (Horton et al., 2019). Older adults may also be disassociating with their age group by reporting ways in which they can identify with, and others can be perceive them as, being younger (Chopik et al. 2018).

The perceived physical benefits focused on overall physical health, which was described by weight control, disease management, and mobility. None of these were supported as a stand-alone benefit, and often there was overlap (weight control and mobility, disease management and mobility). All participants, regardless of age or gender, described at least some aspect of this overall benefit. There was relatively less, but some, indication of enhanced physical strength and energy as particular benefits. Objective measures of physical benefits of sport for older adults have identified strength, with variation by age and gender (Baker et al., 2010; Hunter et al., 2004; Tangen & Robinson, 2020), and cardiovascular function (Vogel et al. 2009) as important

effects. However, the perception of physical benefits, according to the masters athletes, focused on feeling physically good overall rather than particular physiological aspects. Even though research indicates physically active older adults are stronger and have more energy to perform basic activities of daily living than their less active same-age counterparts, benefits like strength may not be as important when asked what stands out for them (Concannon et al., 2012; Seguin & Nelson, 2003). This too serves to shift the focus from clinical standards inherent in a biomedical model of successful aging to a more individualized approach of active aging that focuses on the perception of physical wellbeing as a component of individuals' quality of life, based on their particular needs, lifestyle interests and capacities (cf. Foster & Walker; WHO, 2015). Master sport as a positive physical experience can be an important consideration as a motive and reinforcement for engagement, especially with the possibility of modified sport that focuses less on the physical demands and more on the social engagement (Jenkin et al. 2021).

Conclusion, recommendations, and implications

It is important to consider the cross-sectional nature of our study as a limitation, and we recommend longitudinal investigation with multiple timepoints for future research, to be able to consider and capture perceived benefits at different points in an athlete's sport year and through different life transitions (Cannella et al., 2021). Although the sample was sufficient for our purposes, a larger sample in future research would allow more nuanced and intersectional analyses to consider possible variation in the range of perceived benefits between, for example, smaller ranges of age groups (e.g., 50-54 years, 55-59 years and so on), and gender by age groups (younger and older women, younger and older men). This may show how identity management through sport may help with adapting to aging through maintaining an 'active/competitive' identity and could determine further variations among younger and older

men; the former who may use sport to support their competitive identity and fight aging stereotypes, and the latter who may engage to support their social life/identity or maintain 'sharpness' compared to their non-athletic counterparts. Moreover, future researchers should consider other factors such as race and ethnicity that may shape both the opportunities and experiences that master athletes may have. The current study provides a springboard for such further investigation. In addition, future research may explore the potentially multiple drawbacks or costs of masters sport participation, such as the financial expense (Horton et al., 2019; Son & Dionigi, 2020) or excessive training (Baker et al., 2010; Dionigi et al., 2012; Stevenson, 2002) and negative social consequences, such as less time for family, friends and social activities due to increased time spent in sport (Deck et al., 2021), and how they may vary by age and gender. This will enrich understanding of masters sport as a leisure aspect of the active aging discourse. It may also be of interest to explore further any variation in the multiple perceived benefits (and costs) by type of sport (e.g., individual, team) and by participation status (e.g., lifelong vs. late starter), to continue to build understanding of this activity for older adults. Additionally, gender was considered in the current study as a biographic attribute of masters athletes and for the purpose of considering variation based on that attribute. Building on the gender-based variation identified here, and recent considerations of the meaning of masters sport for older adult women (e.g., Horton et al., 2018; Kirby & Kluge, 2021) and men (Horton et al., 2019) future research should continue to explore gendered perspectives on masters sport, including the process of reproducing – or challenging – gender and gender norms in this activity (Dionigi, 2010; Kirby & Kluge, 2021).

Taken together, the findings of this study highlight that "later life can be a period of wellbeing, personal development, and social engagement, rather than focusing on the ideas of

disease, withdrawal, and passivity" (Cannella et al., 2021, p. 2). Policy and strategy aimed at active aging, particularly through physical activity (Canadian Society for Exercise Physiology, 2021) as a leisure choice, can be informed by the insights provided here about the range of benefits that older adults may experience as a result of masters sport participation. The findings highlight implications for designing and promoting masters sport as a potentially positive aspect of active aging, along multiple dimensions. A variety of psychological benefits, friendship and comradery, and a perception of overall physical health may be promoted as possible outcomes of participation, while also acknowledging the potential for cognitive benefits and specific aspects of physical health (e.g., strength, energy). Based on the apparent variations in experienced benefits uncovered here, masters sport programs may be designed to ensure the most common benefits are realized while enhancing opportunities for family bonding that was identified particularly by men, and for self-confidence that was identified particularly by women and younger men.

Nonetheless, masters sport is not necessarily 'for all' older adults and should be viewed as one active aging option for those who have the interest and capacities to engage as part of their leisure lifestyle (Son & Dionigi, 2020). The potential benefits of masters sport must be understood, and supported, in the context of inherent social and cultural barriers to the involvement of older adults in this activity (cf. WHO, 2015). Masters athletes tend to be more privileged individuals, with higher education and socioeconomic levels, and primarily Caucasian (Gaymen et al., 2017). Such barriers to participation must also be understood and addressed (Appleby & Dieffenbach, 2016; Baker et al., 2010; Deck et al., 2021; Dionigi, 2016; Son & Dionigi, 2020; Stevenson, 2002). For example, the financial barriers of sport for those with a lower socioeconomic status (Dionigi & Gard, 2017; Gard et al., 2018), or the cultural stereotypes

for both age and gender for older adult women, who faced lack of opportunities in sport during their youth and continue to face similar barriers at an older age (Horton et al., 2018) must be addressed. Domestic roles within families may also be a barrier; women tend to feel guilty in their pursuit of sport that may interfere with caregiver responsibilities or chores, and this can influence their participation (or lack of) in sport (Dionigi et al., 2012). Understanding what is good about masters sport is only part of the story. The future research considerations identified above can help to continue to extend understanding of masters athletes' experiences and the role of masters sport in active aging for healthy living.

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