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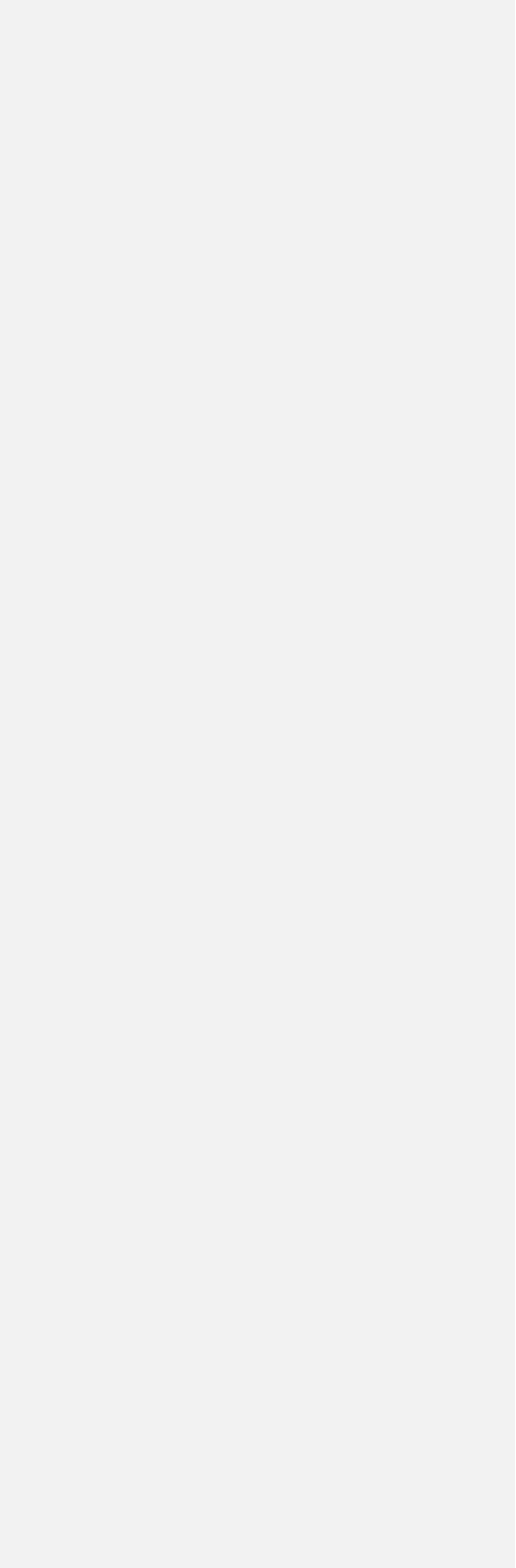
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Older, faster, stronger: The multiple benefits of masters sport participation

Deck, S., Doherty, A., Hall, C., Schneider, A., Patil, S., Belfry, G.



## 10 Abstract

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

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

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

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

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48 Games and Senior Olympic Games, that are organized events bringing senior athletes from  
49 around the world together to compete in sports such as athletics, cycling, judo, swimming and  
50 tennis (IMGA, 2020; Dionigi et al., 2013). Masters athletes are, however, a privileged cohort of  
51 older adults who are socially, economically, and physically able to engage in organized  
52 competitive sport as part of their lifestyle (cf. Katz, 2013; Son & Dionigi, 2020). It is not a  
53 leisure activity that is reasonably available to all, nor would it be of interest to all (Dionigi,  
54 2015b; Gard et al., 2017). Nonetheless, it is important to understand how masters sport  
55 participation, specifically, may contribute to older adults' positive experience of aging, and  
56 particularly the multiple dimensions (physical, cognitive, psychological, social) of individual  
57 wellbeing (cf. Marsillas et al., 2017). Such insights extend thinking about masters sport and its  
58 place in active aging (cf. Gard et al., 2017), and can help inform relevant active aging policy and  
59 programming for older adults in the context of masters sport.

60       Research on masters sport to date is focused predominantly within the physical domain;  
61 less is known about the psychological, cognitive, and social benefits of sport participation  
62 (Cannella et al., 2021; Geard et al., 2017; Macgregor et al., 2017; Stenner et al., 2020). In  
63 parallel, research on gender and age differences in masters athletes' experiences, that may  
64 provide further insight to active aging among a heterogeneous older population (cf. Cannella et  
65 al., 2021; Foster & Walker, 2015; Gayman et al., 2017; Wigglesworth et al., 2012), has also  
66 primarily focused on variations in physical aspects, including performance, and training  
67 adaptations, such as muscle strength, and power (see Baker, Horton, & Weir, 2010). Nonetheless,  
68 there is evidence that participation by older adults in competitive sport may have more than just  
69 physical benefits, such as giving meaning to life through building a strong identity (Dionigi,  
70 2002; Lyons & Dionigi, 2007). Masters athletes have also noted that through sport they are able

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

78 Research to date on the experiences of masters athletes has also identified drawbacks or  
79 costs of participation. Although not the focus of this paper, it is notable that there is a range of  
80 potential negative consequences of masters sport participation (e.g., Deck et al., 2021; Son &  
81 Dionigi, 2020; Stevenson, 2002). Financial expense can be a factor as some sports have high  
82 costs for equipment or facility use, and a number of costs may be incurred with travelling for  
83 competition, potentially limiting participation more privileged individuals (Dionigi, 2016;  
84 Horton et al., 2018; Son & Dionigi, 2020). Physical and psychological downsides such as  
85 injuries and burnout are also evident and may be more likely with excessive training (Baker et  
86 al., 2010; Horton et al., 2018). With excessive training there may also be social downsides to this  
87 aspect of active aging: an increased obsession or increased training load may leave less time for  
88 family, friends and social events (Appleby & Dieffenbach, 2016; Baker et al., 2010; Deck et al.,  
89 2021; Dionigi et al., 2012). In addition to some of these drawbacks for sport participants,  
90 researchers have also noted a number of barriers to participation in sport. Most notably, the  
91 socio-economic factors that tend to favor white, middle-class individuals in participation  
92 (Dionigi & Gard, 2017; Gard et al., 2018). The current study complements this body of work and

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

95         Much of the research on perceptions of masters sport has relied on survey instruments  
96 (Cannella et al., 2021) that capture general measures of the benefits of participation, and in some  
97 cases do not differentiate between physical, psychosocial, and cognitive health (Cardenas et al.,  
98 2009; Macgregor et al., 2017; Stenner et al., 2020). It is important to further unpack these  
99 seemingly distinct aspects for greater insight to their respective nuances and representation of the  
100 masters athlete experience. Researchers have used qualitative approaches to delve deeper into the  
101 psychological or social experiences of masters athletes, or both, and we consider this research  
102 here.

103         Scholars have uncovered what can be considered psychological benefits of masters sport  
104 involvement, including embracing a challenge, the satisfaction of winning, feeling a sense of  
105 accomplishment and even self-actualization by achieving goals, and increased self-confidence  
106 and positive self-image (Dionigi et al., 2011; Dionigi et al., 2018; Ferrari et al., 2017; Gayman et  
107 al., 2017; Horton et al., 2018). Masters sport has also been reported to help older adults make  
108 sense of and cope with aging (Dionigi, 2009; Gayman et al., 2017). Social benefits of masters  
109 sport engagement include the opportunity for travel, and particularly new friendships and  
110 expanded networks – and sometimes a further sense of companionship – with fellow athletes that  
111 can also extend off-field (Dionigi et al., 2011; Ferrari et al., 2017; Heo et al., 2013; Horton et al.,  
112 2018; Stevenson, 2002). Masters sport may cultivate a sense of community through shared  
113 interests, the desire to continue and remain healthy together, purpose fulfillment, and being able  
114 to give back in one's respective sport (Lyons & Dionigi, 2007). Young et al. (2018) argue that

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

117         The cognitive benefits of masters sport participation are less well understood. Research  
118 indicates that masters athletes, compared to less physically active adults of similar gender, age,  
119 and education, have shown superior capabilities on cognitive tasks including memory, reaction  
120 time, fluid intelligence, and letter and category fluency (Burzynska et al., 2015; Tseng et al.,  
121 2013; Zhao et al., 2016). More recently, Geard and colleagues (2021) compared masters athletes  
122 to non-sporting adults and found no differences in cognitive functioning (objective measures of  
123 memory, distractibility, blunders, and names). However, only a few studies have looked at the  
124 perceived cognitive benefits from the masters athlete's perspective. Siegenthaler and O'Dell  
125 (2003) found that golfers engage in their sport to help maintain cognitive function. Through  
126 focus group discussions, Stenner and colleagues (2016) found that regular golfers believe that  
127 concentration, problem solving, and memory are used regularly in their sport, and that this may  
128 help maintain these cognitive functions outside of sport as well. However, it is not clear whether  
129 and how a more diverse group of masters athletes consider such cognitive benefits.

130         A critical gap in understanding the perceived benefits of masters sport is the  
131 consideration of diverse aspects, such as age and gender (Cannella et al., 2021; Gayman et al.,  
132 2017; Macgregor et al., 2017; Stenner et al., 2020). Research to date suggests that women and  
133 men have different experiences in masters sport (Cardenas et al., 2009; Stenner et al., 2020). For  
134 example, for women in particular, sport can be a place to feel safe, have a sense of community,  
135 and develop a positive identify (Dionigi, 2010; Litchfield, 2011; Litchfield & Dionigi, 2012). For  
136 women brought up in a generation that did not encourage the same sport participation as for men,  
137 masters sport may be particularly empowering (Dionigi, 2016; Dionigi, 2018; Eman, 2012).



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

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

#### 156 **Method**

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

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

#### 170 **Participants and Recruitment**

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

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

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

### 186 **Data Collection**

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

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

### 205 **Data Analysis**

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

220 A qualitative matrix analysis was undertaken to determine any substantial divergence or  
221 irregularity in the pattern of benefit subthemes (Ayres et al., 2003) according to masters athletes’  
222 age and gender. Similar to a cross-case analysis (Patton, 2015), this involved “recontextualizing”  
223 the data (Ayres et al., 2003, p. 872) within subgroups of women and men participants, and  
224 subgroups of participants less than 65 years and 65+ years (distinguishing, per Cardenas et al.,  
225 2009, by likely age of retirement and standard age to start one’s pension (Statistics Canada,  
226 2022). The exact age ranges within the two groups were similar, spanning 50-64 years, and 65-  
227 79 years. Variation was determined to exist if the proportion of the subgroups indicating a  
228 subtheme differed by 25% or more (Harman & Doherty, 2014).

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## Results

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### Psychological Benefits

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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.

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

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

252 Becky related,

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

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

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

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

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

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

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

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

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

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

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

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

### 310 **Social Benefits**

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

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

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



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

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

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

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

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

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

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

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

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

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

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

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

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

### 376 **Cognitive Benefits**

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

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

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

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

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

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

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

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

408 Chris agreed:

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

413 Tony further described:

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

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

#### 426 **Physical Benefits**

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



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

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

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

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

484 Our study additionally identified overall psychological wellbeing – feeling happy and  
485 less stress – as a common benefit of masters sport, but one that has not been emphasized to date.  
486 This observation helps to further shift the focus from a biomedical model of successful aging,  
487 and the achievement of clinical standards, to one that includes – if not prioritizes – the  
488 consideration of general happiness and containment of stress through a lifestyle that includes  
489 masters sport. We also uncovered developing a sense of self/purpose in life as a psychological  
490 benefit, which may enhance the notion of masters sport giving meaning to life through a strong  
491 identity (Dionigi, 2002; Dionigi et al., 2011). These activities may also help contribute to one’s  
492 identity (new or alternative) later in life, and thus can help older individuals adapt to and process  
493 aging (Dionigi, 2002; Dionigi et al., 2011). Older individuals may see themselves as ‘winners’,  
494 ‘champions’, or ‘a physically active person’ and therefore feel more empowered (Dionigi et al.,  
495 2011). For athletes who may be going through transitional periods in life (i.e., divorce, empty  
496 nest, retirement), our findings have implications for identity management during these  
497 transitional (and albeit difficult) times, giving them a sense of purpose, pride, achievement, and



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

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

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

534 The social benefit of strengthened family relationships was indicated, but by relatively  
535 fewer participants. Family bonding has not received much attention as a benefit of masters sport  
536 to date, however, it was particularly prominent for men athletes. Becoming closer with children  
537 and grandchildren as a result of a shared interest and participation in sport was very meaningful  
538 to these athletes. This may have implications for individuals struggling to connect with family  
539 members or younger generations (Fingerman et al., 2020). As these types of connection are a  
540 concern with aging, involvement in masters sport can be a way to foster such relationships  
541 (Dionigi et al., 2018) and may be one way for older adults to become closer with their family by  
542 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.

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

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

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

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

580         The perceived physical benefits focused on overall physical health, which was described  
581 by weight control, disease management, and mobility. None of these were supported as a stand-  
582 alone benefit, and often there was overlap (weight control and mobility, disease management and  
583 mobility). All participants, regardless of age or gender, described at least some aspect of this  
584 overall benefit. There was relatively less, but some, indication of enhanced physical strength and  
585 energy as particular benefits. Objective measures of physical benefits of sport for older adults  
586 have identified strength, with variation by age and gender (Baker et al., 2010; Hunter et al.,  
587 2004; Tangen & Robinson, 2020), and cardiovascular function (Vogel et al. 2009) as important

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

#### 600 **Conclusion, recommendations, and implications**

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

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

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

634 disease, withdrawal, and passivity” (Cannella et al., 2021, p. 2). Policy and strategy aimed at  
635 active aging, particularly through physical activity (Canadian Society for Exercise Physiology,  
636 2021) as a leisure choice, can be informed by the insights provided here about the range of  
637 benefits that older adults may experience as a result of masters sport participation. The findings  
638 highlight implications for designing and promoting masters sport as a potentially positive aspect  
639 of active aging, along multiple dimensions. A variety of psychological benefits, friendship and  
640 comradery, and a perception of overall physical health may be promoted as possible outcomes of  
641 participation, while also acknowledging the potential for cognitive benefits and specific aspects  
642 of physical health (e.g., strength, energy). Based on the apparent variations in experienced  
643 benefits uncovered here, masters sport programs may be designed to ensure the most common  
644 benefits are realized while enhancing opportunities for family bonding that was identified  
645 particularly by men, and for self-confidence that was identified particularly by women and  
646 younger men.

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

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



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