The Hearing Aid Podcasts

Episode 10.8

Activity, Exercise and the Ageing Athlete

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Learning Outcomes

Knowledge

- To understand what the physiology of elite athletes can tell us about the 'healthy' ageing process

Skills

- To be able to identify the things that might prohibit people continuing (or taking up) sport and exercise as they age

Attitudes

- To acknowledge that there are a multitude of factors that affect participation in sport and exercise, some related to ageing and some not

Definitions

Athlete - A person who has undertaken training or exercises to become proficient in physical activities such as competitive sports (athletics). (oxford english dictionary)

Oxford english dictionary

There are **masters athletes** - professional/serious competitors aged over 35 (with no absolute upper age limit), with masters events held in many sports, on international level

How does age change sport performance? Master athletes have the answer, accessed at https://researchoutreach.org/articles/age-change-sport-performance-master-athletes-answer/22/06/2021

Ageing athletes, can be grouped into 3 types (these are not mutually exclusive)

- Serious lifetime athletes
- Those who take up sport as older adults
- Those who go back to sport, after a break in their early adulthood

Interestingly, most world records in events by age group are held by different individuals. There are, however, a few individuals who hold world records for events longitudinally.

Three types of Masters Athletes – Human Kinetics, accessed at https://us.humankinetics.com/blogs/excerpt/three-types-of-masters-athletes 22/06/2021 and excerpt from "Faster Road Racing" by Pete Pfitzinger and Phillip Latter

Main Discussion

Background

For background on

- theories of ageing - listen to episode 4.01
- physiology of ageing - listen to episodes on frailty and sarcopenia

http://thehearingaidpodcasts.org.uk/episode-4-01-theories-of-ageing/
http://thehearingaidpodcasts.org.uk/episode-2-1-frailty/
http://thehearingaidpodcasts.org.uk/8-01-sarcopenia/

To define two terms which are commonly used interchangeably;

"Physical activity is used as an umbrella term that includes both structured and unstructured forms of leisure, transport, domestic and work-related activities. Physical activity entails body movement that increases energy expenditure relative to rest, and is often characterised in terms of intensity from light, to moderate to vigorous.

Exercise is defined as a subset of structured physical activities that are more specifically designed to improve cardiorespiratory fitness, cognitive function, flexibility, balance, strength and/or power."

Copenhagen Consensus statement 2019: physical activity and ageing

"Sport is an underutilized yet important contributor to physical activity for people of all ages" (WHO, 2018).

Guidelines: American College of Sports Medicine Position Stand on Exercise and Physical Activity for Older Adults: Chodzko-Zajko W et al. Exercise and Physical Activity for Older Adults, Medicine & Science in Sports & Exercise: July 2009 - Volume 41 - Issue 7 - p 1510-1530

Exceptional examples of the 'ageing athlete'

Ed Whitlock

- remains the only person >70 to complete a marathon in <3 hours, and also holds the fastest marathon time for someone in their mid-eighties - under 4 hours.
- Found to have highest recorded VO2 max for anyone of his age

Fauja Singh

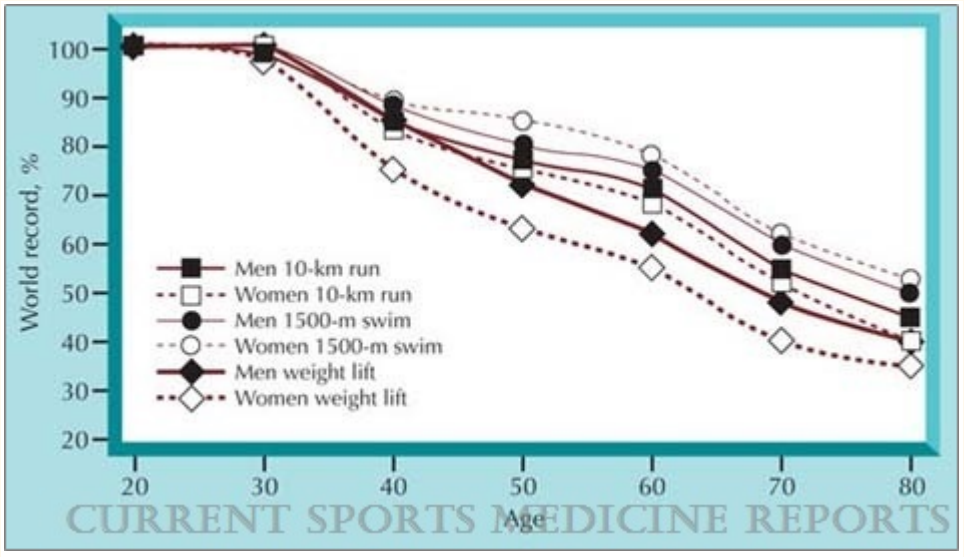
- Completed his first marathon aged 89, after taking up running aged 81
- Continued running marathons until retiring at the age of 104

https://www.nytimes.com/2017/03/14/sports/ed-whitlock-dead-masters-marathon-record-setter.html

What can ageing athletes tell us about the physiology of ageing, and the benefits of exercise?

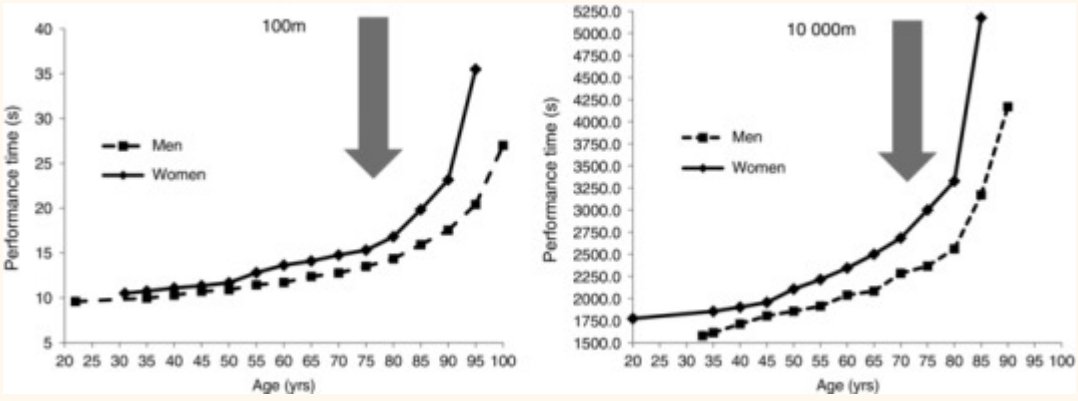
For elite athletes to perform at the top of their field, different physiological systems have to perform at their maximum capacity and have to be integrated (ie have to work together).

It has been suggested that athletic performance decreases steadily up to ~the 7th decade, where the rate of deterioration becomes more marked as the years increase further.



Schematic pattern (based on data from multiple sources) of decreases in best performances by age in running (10-km), swimming (1500-m), and weight lifting. Closed symbols represent men, and open symbols represent women. After age 60, the rate of deterioration may increase in both men and women.

Foster, C et al. Training in the Aging Athlete, Current Sports Medicine Reports: June 2007 - Volume 6 - Issue 3 - p 200-206



World record times for masters athletes performances in the 100 and 10000m events

Lazarus NR, Harridge SDR. Declining performance of master athletes: silhouettes of the trajectory of healthy human ageing? J Physiol. 2017 May 1;595(9):2941-2948. PMID: 27808406

Lazarus and Harridge argue that this pattern of decline in function reflects the reduction in physical capacity that is due to ageing alone - using elite athletes as the subjects removes the confounding effects of inactivity on physiological performance.

However, there may be much more to performance than physiological function alone (which is not perhaps reflected by studying such an elite group), as is set out in the Copenhagen consensus statement on physical activity, and we will start to explore that furter later in the episode.

Harridge, Lazarus and team also argue that research on the physiology of ageing and the biological approaches that underpin our current understanding of ageing should be carried out in those who exercise above a threshold which protects them from inactivity related illnesses (which may act as confounding factors).

Pollock RD et al. An investigation into the relationship between age and physiological function in highly active older adults. J Physiol. 2015 Feb 1;593(3):657-80; discussion 680. PMID: 25565071

A marker of endurance/ability is the **VO2 max** - the maximal oxygen uptake.

- This is what is often measured in studies of athletes (old and young) when looking at physical performance.
- VO2max values improve when sedentary people take up exercise, for example, and can be viewed as a marker of integrated cardiorespiratory system performance.

When looking at longitudinal data, athletes who maintain high training intensity into older age generally have a higher VO2max than those who do not.

BUT the rate of decrease in VO2max in elite athletes over time has been shown generally to be comparable to (or even larger than) the rates of decrease seen in people who do not exercise -ie the absolute VO2max values remain higher in those who continue to train intensely as they age, but they decrease at a rate comparable to those who don't train.

(this has been contested, however, in some studies which show that if training is maintained at very high intensity, the rate of decline can be slowed)

VO2 max: can veteran athletes prevent a decline in aerobic capacity? accessed at https://www.sportsperformancebulletin.com/endurance-training/masters/vo2-max-can-veteran-athletes-prevent-decline-aerobic-capacity/ 22/06/2021

For athletes in the most active/able group when young, who reduce their training to a lower intensity over time (often in line with fitness recommendations), comparatively large decreases in VO2max (particularly after age 60) have been shown to occur when compared to values typical of active but not athletic age-matched individuals

Foster, C et al. Training in the Aging Athlete, Current Sports Medicine Reports: June 2007 - Volume 6 - Issue 3 - p 200-206

Why is there this reduction in function/attainment?

It is thought that it is the response of different physiological systems to both ageing and inactivity that affect the ability of someone to **train**, and that this is what ultimately affects athletic performance and the decline in attainment with age.

Lazarus, N.R., Lord, J.M. and Harridge, S.D.R. (2019), The relationships and interactions between age, exercise and physiological function. J Physiol, 597: 1299-1309.

Foster et al, in an article which discusses the training needs and changes in performance of older elite athletes, categorises things slightly differently and identify 4 issues that they suggest affect the response of older adults to training in comparison to older athletes:

1. the presence of underlying pathologies independently related to age;
2. the presence of residual injuries;
3. reduced hormonal concentration, which affects the rapidity and magnitude of the response to exercise
4. the need for longer recovery times from hard training bouts in older individuals.

We also need to consider

- lack of available time for training and competition
- reduced drive to achieve performance excellence because of framing of sport as a recreational activity (compared to how younger participants may view it)
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Foster C et al. Training in the aging athlete. Curr Sports Med Rep. 2007 Jun;6(3):200-6. PMID: 19202668.

A scientific approach to training and sports/exercise physiology has been shown to support and encourage participation in physical activity as participants age. This is seen particularly in clubs, giving participants impetus to continue with their sport/activity.

Tulle E, Acting your age? Sports science and the ageing body, Journal of Aging Studies, Volume 22, Issue 4, 2008, Pages 340-347,

Tulle E. Running to Run: Embodiment, Structure and Agency amongst Veteran Elite Runners. Sociology. 2007;41(2):329-346.

Factors which have been shown in Professor Tulle's research to limit participation in exercise as we age include tiredness, injury or poor health and familial obligations.

Participation in sport, associated with age

The Active People Survey in England:

> Showed in one instance that being > 65 years old reduced the probability of participating in sport by 25%, the most significant factor affecting participation of those looked at in the survey

Active People Survey Analysis Tool, accessed via https://activepeople.sportengland.org/ 22/6/2021 and survey superseded by Active Lives Adult Survey by Sport England, accessed via https://www.sportengland.org/know-your-audience/data/active-lives?section=access_the_reports 22/6/2021

Frequency of participation also declines with increasing age

- Eurobarometer survey on physical activity (europe-wide)
    - majority of 15-24 year olds (62%) exercise or play sport regularly or with some regularity
    - this falls to 46% in the 25-39 age group
    - 39% for 40-54 year-olds
    - 30% for the 55+ age group.
    - Those who never participate in sport = 24% of 15-24 year olds, 61% of those aged 55 or over.

Special Eurobarometer 472, Report, Sport and Physical Activity, December 2017, Requested by the EC Directorate General for Education, Youth, Sport and Culture and co-ordinate by the Direcorate General for Communication accessed via https://op.europa.eu/en/publication-detail/-/publication/9a69f642-fcf6-11e8-a96d-01aa75ed71a1/language-en 22/06/2021

It is useful to think about how early experiences of sport and physical activity might affect participation in sport over the rest of someone's life, in a deterministic way not dissimilar to the effects of experience of social class.

Levels of participation in graphical form

Physical activity levels in Scotland, 2018

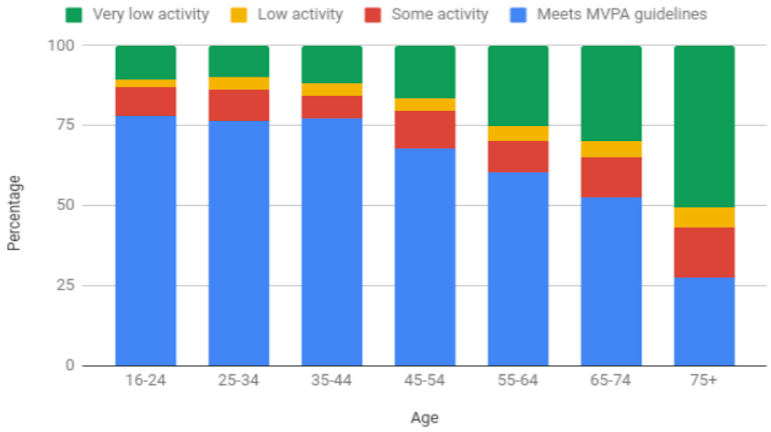

Fig 2 Scottish Health Survey 2017, Physical activity levels by age group

Meets moderate/vigorous physical activity (MVPA) guidelines: at least 150 minutes of moderately intensive physical activity or 75 minutes vigorous activity per week or an equivalent combination of both. Some activity: 60-149 minutes of moderate activity or / 30-74 minutes of vigorous activity or an equivalent combination of these. Low activity: 30-59 minutes of moderate activity or 15-29 minutes of vigorous activity or an equivalent combination of these. Very low activity: less than 30 minutes of moderate activity or less than 15 minutes of vigorous activity or an equivalent combination of these.

Women participate less than men across all age groups:

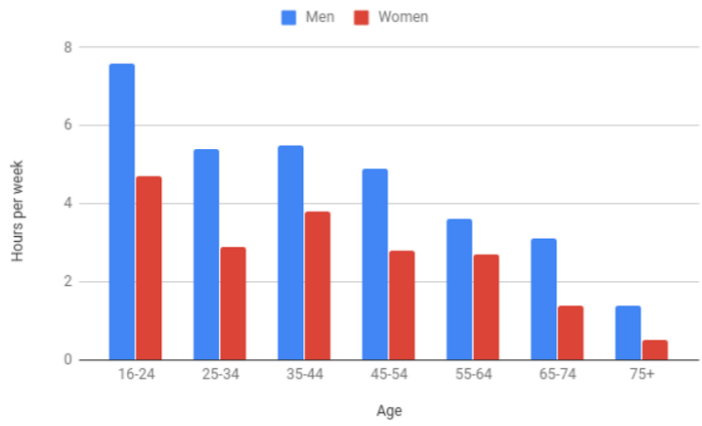

Fig 4 Scottish Health Survey 2017, Sport and Exercise participation, hours per week

Interestingly, walking is a significant mode of sport/exercise;

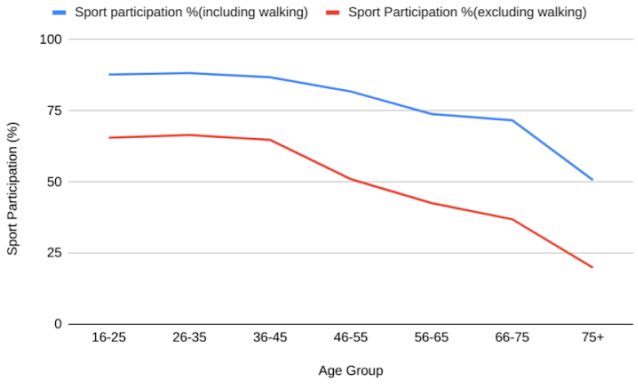

Fig 5 Adult participation in sport in Scotland in the last 4 weeks by age (SHS 2018)

Sports Participation and Ageing - Influence and Impact, from the Observatory for Sport in Scotland, accessed via

https://www.oss.scot/wp-content/uploads/2020/05/Sports-Participation-and-Ageing-Paper.pdf

Trends for participating in sports as people age

- community sport participation in the general population for older age groups is fairly consistent
- in the more elite competitions, older age group participation is increasing significantly
- elite masters level competition is flourishing (van Uffelen et al., 2015)
- Participation rates in the marathon show that master athletes now make up about 55% (Lepers & Cattagni, 2012) of the total field growing to about 70% of the field in ultra-marathons

Sports Participation and Ageing - Influence and Impact, from the Observatory for Sport in Scotland, accessed via https://www.oss.scot/wp-content/uploads/2020/05/Sports-Participation-and-Ageing-Paper.pdf

Barriers to sport participation in older age

A significant reason why people of all ages do not take part in sport or other physical activity is a self-reported perception of 'a lack of time'. This finding is consistent across Europe with 40% of respondents across Europe stating that time was the major reason for not partaking in sport

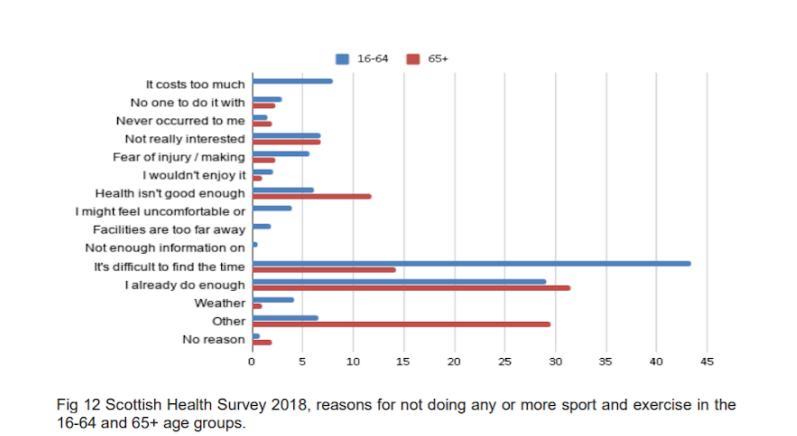

Fig 12 Scottish Health Survey 2018, reasons for not doing any or more sport and exercise in the 16-64 and 65+ age groups.

Sports Participation and Ageing - Influence and Impact, from the Observatory for Sport in Scotland, accessed via https://www.oss.scot/wp-content/uploads/2020/05/Sports-Participation-and-Ageing-Paper.pdf

'Lack of time' might be seen as a socially acceptable response/reason for not participating in sport and activity, but to be able to continue training at a good level, a

certain amount of time is required to prioritise the activity. This may require discipline, negotiation with family/friends/commitments and this requirement of a commitment of time and attention to activity needs to be considered when considering barriers to participation in sport.

Jenkin et al 2016 (australia) - reasons cited by community dwelling older adults for not participating in sport:

Personal Reasons	Social Reasons	Organisational Reasons
Time constraints Physical health concerns Costs	Family commitments Friends stopped playing sport Working patterns changed Lack of social acceptance that older adults played sport	Lack of sports that specifically catered for older adults Lack of playing opportunities with peers Older adults not a high priority for sporting organisations Non inclusive marketing

Jenkin, C. R et al (2018). Sport for Adults Aged 50+ Years: Participation Benefits and Barriers, Journal of Aging and Physical Activity, 26(3), 363-371.

It is also helpful to consider what is culturally perceived to be appropriate and how that might affect people's participation.

> For example - women as they age may consider how they will be perceived as an older woman, if out running in local public areas.

What might encourage people to take up or continue with physical activity into older age?

A recent study of 'park run' participants looked at the sporting identities, engagement of and perceptions of those who took part.

When looking at perceptions of body image, men reported an interest in continuing to 'look like' athletes into older age, and incorporated park run into already established training routines.

Women, however, tended to be newer to the activity of running, and from a body image perspective were more interested in weight loss. They noticed positive changes in their bodies, which acted as motivation to continue participating.

Bowness J, McKendrick J, Tulle E. From non-runner to parkrunner: Subjective athletic identity and experience of parkrun. International Review for the Sociology of Sport. 2021;56(5):695-718.

https://www.parkrun.org.uk/

What can we do to promote uptake and continuation of involvement in sport and activity with ageing?

Things to consider:

- Offering a multitude of opportunities for sport and exercise participation
    - Different types of activity
    - Different forms of activity - eg solo, group, team, competition based

- Encourage sustainable participation by providing activities that are enjoyed, so that people are motivated to continue
- Move away from promoting exercise as a 'moral imperative' with the onus being on individual responsibility and a focus on health
- Move away from 'top-down' and normative approach to the activities offered
- Improve local funding for initiatives, moving away from funding being controlled by central governments

http://thehearingaidpodcasts.org.uk/population-health-and-ageing/

Further reading:

Rickly JM. The (re)production of climbing space: bodies, gestures, texts. cultural geographies. 2017;24(1):69-88

Modifying Older Adults' Daily Sedentary Behaviour Using an Asset-based Solution: Views from Older Adults

Curriculum Mapping

NHS Knowledge Skills Framework

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Foundation Programme

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GPVTS

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Internal Medicine Stage 1

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Geriatric Medicine Specialty Training

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