Citation for published version (APA):

Citing this paper
Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights
Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

• Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
• You may not further distribute the material or use it for any profit-making activity or commercial gain.
• You may freely distribute the URL identifying the publication in the Research Portal.

Take down policy
If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.
What future for older women ex-athletes?

Anthea Tinker, Elodie Haines, Laura Molloy, Laura Pennells, Evelina Russell, Imogen Monks
Institute of Gerontology, King’s College London
Corresponding author: Anthea Tinker email anthea.tinker@kcl.ac.uk

Introduction
When the athletes from the UK returned home after the 2016 Olympics there was rejoicing at their successes. Many of them have now been given awards in the Queen’s New Year’s Honours list in January 2017. But what about their future health? In particular what will be the physical cost for the women athletes? The example of Beryl Burton, arguably the UK’s finest ever athlete, top of her sport of cycling for over 25 years, is a salutary one. Retiring at 57 she dropped dead at 59. Although she was known to have had a cardiac arrhythmia her husband recalls that to the end she was always trying to thrash herself back into shape and trying to get back to her former glories. 1 Inevitably this all proved too much and she collapsed and died on her bike delivering invitations to her birthday party.

There is a lack of research on the health of older women who were once professional athletes. The limited research that has been done suggests health trends for this group of older women are, perhaps surprisingly, not all positive across the life course but there are, of course, benefits.

Some benefits
One major benefit is that older women who were previously physically active to a high level appear to have a lower risk of breast cancer 2, 3. Cardiovascular fitness is another well-known benefit of high level athleticism. “Athlete’s heart” is the term used to describe the changes seen in the heart consequent of high levels of physical training. 4, 5 A small cross-sectional study found that post-menopausal former elite athletes retained a greater capacity for exercise compared with sedentary women. This finding also showed cardiac enlargement but without increased ventricular wall thickness. 5 Another study found that postmenopausal women who are highly trained in endurance sports have a higher stroke volume and cardiac output during exercise compared to sedentary women. 4

Some disbenefits
Despite our knowledge of the benefits of mild to moderate physical exercise, women can suffer negative physical consequences from elite level exercise throughout a lifetime. These include cardiovascular events, urinary incontinence and osteoporosis.

For cardiovascular fitness all changes may not be beneficial and there is uncertainty whether heart structure and electrocardiographic changes, which about 40% of athletes are thought to show, are just physiological or represent a more sinister problem. 6

Urinary incontinence is another example. This is related to physical activity in a complex manner, but it is thought to be common in women who have undertaken high levels of physical activity over their lifetimes. 2 One study found a surprisingly high rate of urinary incontinence in young women athletes, where over half reported
experiences of urinary loss. However, the numbers are almost equally balanced between those who suffered urine loss while participating in their sport (43%) and almost the same proportion (42%) in normal life. And this study was weakened by the lack of a comparison group. A more recent cohort study using a control group found no difference in the prevalence of urinary incontinence in former athletes compared to controls. Interestingly though in this study the biggest predictor of urinary incontinence in later life was urinary incontinence at an earlier stage of life associated with sport.

Generally, physical exercise is thought to be protective for osteoporosis in later life. However, for athletes compared to non-athletes, little difference is found for bone mineral density. Furthermore, it may even be that training to an elite level when younger may be linked to a higher risk of osteoporosis, not lower. The ‘female athlete triad’ is a combination of low energy availability, menstrual function problems and bone mineral density loss. This combination of a negative energy balance, poor diet including low calcium and vitamin D and menstrual problems (suggesting low oestrogen levels) coalesce to cause decreased bone density at a young age, which is exactly when peak bone mass is attained and will not improve thereafter, setting the scene for poor bone mineral density into adulthood resulting in osteoporosis.

Finally, and perhaps most surprisingly, athletes who trained to a very high cardiovascular intensity, such as rowing or cycling, did not live longer than comparable athletes from a lower intensity disciplines. Further to this, the same study found that those involved in sports with high collision rates or contact sports have a higher mortality rate which appeared to persist after the age of 50 years.

**Summary**

In summary there are benefits of exercise throughout life for women such as the need to maintain healthy body weight, do moderate exercise which they enjoy and do weight bearing exercises. However these need to be balanced with possible disbenefits. There are also the mental effects such as the tendency to push oneself and not acknowledge that growing older has the inevitable consequence of some slowing down. It must also be acknowledged that there are risks associated with high level elite sports. More research on this neglected subject would be helpful.

**Declarations**

**Competing interests:** None declared

**Funding:** None declared

**Ethical approval:** Not applicable

**Guarantor:** AT

**Contributorship:** All authors shared equally in the research for this article and in writing it. EH, LM, LP, ER, IM did the research for this while they undertook the Intercalated BSc in Gerontology at King’s College London under the supervision of AT. They are all active in sports.
Acknowledgements: None

Provenance: Not commissioned
References

1. *Cycling Weekly*. Obituary of Beryl Burton; 5.5.16.