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LETTER TO THE EDITOR

Comment on "Health Consequences of an Elite Sporting Career: Long-Term Detriment or Long-Term Gain? A Meta-Analysis of 165,000 Former Athletes"

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Dear Editor,

We read with pleasure, the recent meta-analysis by Runacres et al. showing that compared to the general population, athletes have lower all-cause mortality, cardiovascular disease mortality and cancer mortality [1]. The authors made a conclusion that the results refute the argument made by some literature, that vigorous exercises give no additional health benefit and may increase the chance of cardiovascular events, and the relationship between exercise volume and longevity may be 'J' shaped. We found that studies included in the meta-analysis took former athletes as a study group and the general population as a reference group, and the mortality outcomes in most of the studies were simply adjusted by age, sex and calendar year due to the lack of data of the general population, while most of the studies proposing a 'J' curve cited by the meta-analysis or the included literature, were based on the general population cohort, and the mortality outcomes were adjusted by a number of demographic factors, socioeconomic status (SES), lifestyle factors and some risk factors of chronic diseases [2–5]. Given these differences, we proposed that it is difficult to refute the 'J' curve conclusions by the results of this meta-analysis, and the advantage of intensive exercise may not be extendable to the general population.

In addition to lifestyle factors and some risk factors of chronic diseases discussed by the authors, some other confounding may influence the interpretation of findings. Professional athletes have higher level of physical fitness compared to the general population [6]. They usually spend much of their training in controlled environments and receive nutritional guidance during their sporting careers. Thus, they may be adaptable to intensive exercise and even derive some health benefits from it. Moreover, better SES of some professional athletes may have positive effects on their longevity [7]. Genetic factors have recently proved to have significant effects on longevity and cardiovascular aging [8, 9]. However, only a few studies included in the meta-analysis adjusted the mortality outcomes by SES [6, 10–12], and only one study tried to control the genetic confounding by taking the age-matched brothers of the athletes as a reference group [10].

Given these differences between athletes and the general population, future research may deliberate over choosing athletes, especially the professional ones, as experimental participants when exploring the relationship between intensive exercise and longevity. It needs to be cautious to extend any conclusion to the general population. A variety of confounding factors needs to be considered to adjust mortality outcomes. Health records collected by health management institutes of the regional or national level may serve as useful data sources. Data related to demographic factors, SES, lifestyle factors such as smoking, alcohol consumption, family history and risk factors of chronic diseases are usually available in health records. Risk adjustment models with those factors could be built to calculated mortality outcomes. Furthermore, intensive exercise may be associated with morbidities of some musculoskeletal diseases. Thus, health outcomes reflecting the quality of life may be considered

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when exploring the relationship between exercise volume and health.

In addition, populations in the included studies were all from Europe or North America with no studies from Asia, Africa or other continents. This might hinder the generalizability of the study results as well since there was a lack of evidence in the Asian or African population. This also suggests an evidence gap in these areas or regions. Moreover, according to the Table 1 in the paper in question [1], the average follow-up years varied significantly among the included studies and the studies with shorter follow-up years seemed more likely to have better results (lower standardized mortality ratio), future studies should consider doing stratified meta-analysis by average follow-up years (e.g. >50 years versus ≤ 50 years).

Declarations

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Conflict of interest Huixuan Zhou, Xueyan Han, Ningxin Ding and Xiaotong Dai report no potential conflict of interest.

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Consent for publication Not applicable.

Availability of data and materials Not applicable.

Code availability Not applicable.

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