Are Cardiovascular Risk Factors Responsible for the U-shaped Relationship Between Running and Longevity? The MASTERS Athletic Study

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Background:
Recent studies have noted a U-shaped relationship between running and longevity. While running was generally associated with increased life span, the subgroup who reported training on average >20 miles or >2.5 hours per week did not experience significantly longer lifespan vs non-runners. It is hypothesized that this U-shaped mileage/longevity relationship is due to detrimental cardiac effects of higher mileage training.

Detrimental effects that have been described are micro-tears of the atria and ventricles due to acute volume overload associated with chronic vigorous exercise. These micro-tears are thought to be a precursor to myocardial fibrosis and remodeling with a reduction in cardiac function and ultimately a substrate for malignant ventricular arrhythmias. Imaging studies have demonstrated variable rates of fibrosis, possibly as a result of these processes.

In the present study we examined the hypothesis that confounding factors associated with longer distance training, specifically differences in cardiac risk factors or medication use, account for this U-shaped dose-response curve of running and longevity. Included in these confounders is the use of nonsteroidal anti-inflammatory drugs (NSAIDs), which has been the topic of recent studies examining an association with increased cardiovascular events in runners and the general public. 2

Methods:
• The MASTERS Athletic Study is a longitudinal, web based study of training and health habits of runners ages 35 and older. Participants were stratified by self-reported average weekly mileage into those running < 20 and those running >20 miles/week.

• Comparisons between the low- and high-millage groups included typical cardiac risk factors and use of both protective (aspirin) and potentially harmful (NSAIDs) medications.

Results:
• Of 3,875 respondents, 2,704 (69.8%) reported training >20 miles/wk. Comparisons of weekly mileage and potential confounders are reported in Table 1.

• Table 2: Prevalence of potential confounders of CAD risk factors and medication use by low and high mileage runners.

• Table 3: Training mileage and intensity comparing low and high mileage runners.

• Figure 1: Percentage of runners reporting use of NSAIDs > 1x/week stratified by training distance/pace groups

Conclusion:
Decreased longevity in runners averaging >20 miles/week vs those who run lower average weekly mileage could not be explained by higher prevalence of CAD risk factors or differences in the primary preventative use of daily aspirin.

In addition, we found that frequent NSAID use was paradoxically more common in runners reporting lower average weekly mileage and slower average pace.

The underlying cause of the observed U-shaped relationship between training mileage and longevity remains unclear and should be the topic of further study.

Table 1. Baseline Participant Characteristics Low vs High Training Mileage

Table 2. Potential Confounders and Reported Medication Follow-up

Table 3. Reported Training Characteristics

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References:
1.^ Vissel B, Clark DJ. 2013
2. Schmier JS Assessing outcomes of patients with the CABG. JAMA Cardiol 2014;1(12):794-796. 2014
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