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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 >2.5hours² 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.¹
- These micro-tears are thought to be a precursor to myocardial fibrosis and remodeling with a reduction in cardiac function and efficiency, and ultimately a substrate for malignant ventricular arrhythmias.¹ 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.³

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-mileage 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 >20miles/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

Table 1. Baseline Participant Characteristics and Reported Training Intensity

| Characteristic | Value |
|--|--------------|
| Mean age, years (Range) | 46.6 (35-85) |
| Sex, male (%) | 66.7 |
| Average miles/week (%) | |
| <10 | 168 (4.3) |
| 11-20 | 1003 (25.9) |
| 21-30 | 1318 (34.0) |
| 31-40 | 769 (19.9) |
| 41-50 | 359 (9.3%) |
| Average training pace, minutes/mile (% total) | |
| <6min/mile | 19 (0.5) |
| 6-7 min/mile | 165 (4.3) |
| 7-8 min/mile | 881 (22.8) |
| 8-9 min/mile | 1093 (28.3) |
| 10-11 min/mile | 460 (11.9) |
| 11-12 min/mile | 202 (5.2) |
| >12 min/mile | 102 (2.6) |
| Family History of CAD | 1566 (40.7) |
| Hypertension | 825 (21.5) |
| Rx'ed HTN Meds | 271 (7.0) |
| Hypercholesterolemia | 858 (22.6) |
| Rx'ed Cholesterol Meds | 246 (6.4) |
| Diabetes Mellitus | 47 (1.2) |
| Use Analgesic Medicines for Running-related Pain | 1393 (36.0) |
| Use Aspirin Daily | 208 (5.4) |

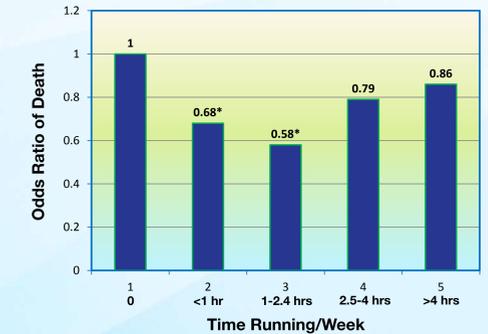
Table 2. Potential Confounders and Reported Medica Follow-up

| | Low Mileage | High Mileage | p-Value |
|---|--------------|--------------|---------|
| Demographics | | | |
| Median age, years (25-75%) | 45 (40-52.2) | 45 (40-52) | 0.895 |
| Mean age, years (SD) | 46.5 (8.62) | 46.4 (8.40) | 0.758 |
| Sex, %male | 58.6 | 70.3 | <0.001 |
| Risk Factors | | | |
| Hypertension (%) | 263 (22.7) | 562 (21.0) | 0.256 |
| Family History CAD (%) | 483 (41.5) | 1083 (40.4) | 0.543 |
| Hyperlipidemia (%) | 310 (26.9) | 548 (20.8) | <0.001 |
| Smoking History (%) | 379 (32.7) | 801 (30.1) | 0.117 |
| Diabetes (%) | 15 (1.3) | 32 (1.2) | 0.941 |
| Medicine Use | | | |
| Any NSAID use (%) | 761 (65.0) | 1627 (60.2) | 0.005 |
| NSAID use >1 dose/week (%) | 252 (21.5) | 405 (14.5) | <0.001 |
| NSAID use >1 dose/day (%) | 20 (1.7) | 33 (1.2) | 0.285 |
| Daily aspirin use (%) | 69 (5.9) | 134 (5.0) | 0.268 |
| Hyperlipidemia Dx on meds (%) | 87 (28.1) | 159 (29.0) | 0.840 |
| Hypertension Dx on meds (%) | 88 (33.5) | 183 (32.6) | 0.860 |
| Medical Evaluation | | | |
| Primary doctor visit in past year (%) | 675 (59.3) | 1488 (56.3) | 0.103 |
| No primary doctor identified (%) | 51 (4.5) | 113 (4.3) | 0.849 |
| Had stress test within last 5 years (%) | 197 (17.2) | 509 (19.3) | 0.137 |
| Had ECG within past 5 years (%) | 462 (40.6) | 1116 (42.5) | 0.294 |
| Discussed risk/benefits of running with doc (%) | 540 (47.0) | 1329 (50.5) | 0.055 |

Table 3. Reported Training Characteristics

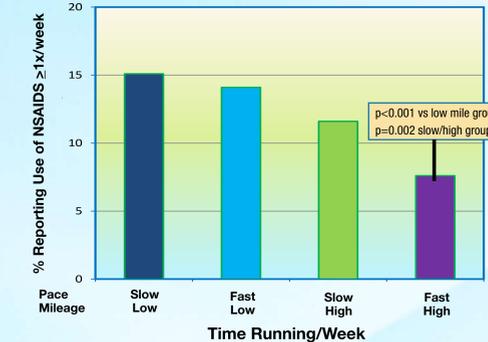
| | Low Mileage | High Mileage | p-Value |
|---|-------------|--------------|---------|
| Training Characteristics | | | |
| Training pace < 8 minutes/mile (%) | 164 (14.0) | 901 (33.4) | <0.001 |
| Competition Characteristics | | | |
| Longest race marathon or greater (%) | 322 (28.9) | 1838 (68.2) | <0.001 |
| Longest race ultramarathon (%) | 23 (2.0) | 349 (13.0) | <0.001 |
| Compete in triathlons/multisport events (%) | 427 (36.9) | 889 (33.2) | 0.029 |
| Miscellaneous | | | |
| Consume > 4 cups coffee/day (%) | 164 (10.3) | 274 (10.5) | 0.952 |

The Copenhagen City Heart Study



*Adapted from Schnohr et al, Am J Epidemiology, 2013 (reference 2).

Figure 1: Association of Reported NSAID Use <1x/wk With Training Characteristics



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.

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References:

- O'Keefe JH, Lavie CJ. Heart 2013.
- Schnohr P. Assessing prognosis: a glimpse of the future. Jogging healthy or hazard? In: Cardiology ESo, ed. EuroPrevent 2012. Dublin, Ireland: European Heart Journal, 2012.
- Kuster M, Renner B, Ooppel P, Niederweis U, Brune K. Consumption of analgesics before a marathon and the incidence of cardiovascular, gastrointestinal, and renal problems: a cohort study. BMJ Open, 2013.

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