

# Does running protect against knee osteoarthritis? Or promote it? Assessing the current evidence

Richard D Leech, Kim L Edwards, Mark E Batt

Running is extremely popular and knee osteoarthritis is one of the most common musculoskeletal conditions requiring healthcare intervention, thus the question of whether recreational (non-elite) running is associated with knee osteoarthritis has considerable personal and public health significance. The potential exists for a paradox relating to recreational running and joint health: promoting running may have unknown consequences for knee joint health, conversely, discouraging physical activity will negatively impact overall health, increasing the burden on healthcare systems. Additionally, risks (and/or benefits) associated with recreational running may not remain static but vary throughout life. Much remains unknown and the running research base to inform clinical decision-making is thin.

We aim to highlight the limitations of the current body of research and stimulate a wider debate regarding how this evidence is interpreted and conveyed. We also provide guidance on how future research should be structured and implemented to produce more robust science.

## CURRENT EVIDENCE

Wellness research often examines physical activity across different domains (eg, household, work, leisure) and usually incorporates running within recreational sport. The definitions for activities that constitute recreational sport also vary, as do the criteria for identifying runners, the methods for quantifying running exposure and the diagnostic tests for osteoarthritis. The number of active participants assessed in the relevant literature is small, and the number of runners from which conclusions are drawn is smaller still. Analysis therefore often identifies the level of risk accumulated from multiple sports or

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activities, rather than considering recreational running in isolation.

For the purpose of this editorial, we cite 10 key papers that explicitly report the effect of recreational running and the risk of knee osteoarthritis.<sup>1–10</sup> Many of these studies found no significant relationship between recreational running and knee osteoarthritis.<sup>1–7</sup> A recently published abstract goes further, suggesting running may protect the knee joint from osteoarthritis.<sup>8</sup> Conversely, a new systematic review identified long-distance running as a significant risk factor,<sup>9</sup> but importantly, only at elite levels. One small study (n=20) found the number of years training was significantly greater in those runners with degenerative joint changes compared to those without, but there was no difference in weekly mileage between the two groups. Additionally, potential confounders remained as age was not adjusted for and the degenerative joint group had a greater history of injury.<sup>10</sup>

Overall, the 'weight' of available evidence, albeit limited, suggests that recreational running is not a risk factor for knee osteoarthritis.

## CLINICAL IMPLICATIONS AND FUTURE RESEARCH

Within the recreational sporting population, too many confounders remain unaccounted for to determine the joint health consequences of running. Regular running influences other important risk factors for osteoarthritis including body mass index, muscle strength and joint injury. Injury is often recognised as the primary explanation for increased osteoarthritis risk among sportsmen<sup>7</sup> and with increasing exposure, the risk of injury rises. The key to implementing clinical recommendations (to run) will be to identify and understand the complexities of the aetiological factors that coexist and their interactions with one another. The potential effects of running may be reversed or exacerbated, either directly or indirectly, by other factors and all covariates should be comprehensively considered.

The shape of the curve representing increased (or decreased) risk of knee osteoarthritis as a consequence of running is

unknown; and specifically how much running (if any) is too much? Identification of a dose or load-response and defined individualised hazards ratios of running would be groundbreaking. A prospective, longitudinal, observational study is required to identify known and novel risk factors for knee osteoarthritis among recreational runners. The study must include a wide-range of running ability while encompassing training parameters such as volume, intensity and terrain. Collaborations with sporting organisations would stimulate interest, provide resources and aid translation of findings. Ideally, the population should include sufficient numbers of younger (<30 years of age) athletes for long-term analysis.

There is a clear self-selection bias in the current research that largely examines older participants who remain able to run in later life.<sup>5</sup> Generalising the conclusions from such research is difficult. Future research will require larger populations and a sufficiently long follow-up to enable identification of disease onset and development. Follow-up periods applied by other authors to analyse disease progression (9–11 years) may prove insufficient. Once participants are identified with joint pain/osteoarthritis, they must be retained within the study to enable ongoing review, as the risk factors for symptom development, incidence and progression may not be the same.

Currently, we would argue that insufficient evidence exists to identify the relationship between recreational running and the risk of knee osteoarthritis onset and progression. The definitive answer to the question—does recreational running contribute to the risk of knee osteoarthritis?—remains elusive.

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doi:10.1136/bjsports-2015-094749

## REFERENCES

- 1 Konradson L, Hansen EM, Sondergaard L. Long distance running and osteoarthritis. *Am J Sports Med* 1990;18:379–81.
- 2 Panush R, Schmidt C, Caldwell J, et al. Is running associated with degenerative joint disease? *JAMA* 1986;255:1152–4.
- 3 Sohn R, Micheli L. The effect of running on the pathogenesis of osteoarthritis of the hips and knees. *Clin Orthop Relat Res* 1985;198:106–9.
- 4 Lane N, Oehlert J, Bloch D, et al. The relationship of running to osteoarthritis of the knee and hip and

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- bone mineral density of the lumbar spine: a 9 year longitudinal study. *J Rheumatol* 1998;25:334–41.
- 5 Chakravarty E, Huber H, Lingala V, *et al.* Long distance running and knee osteoarthritis a prospective study. *Am J Prev Med* 2008;35:133–8.
- 6 Manninen P, Riihimaki H, Heliovaara M, *et al.* Physical exercise and risk of severe knee osteoarthritis requiring arthroplasty. *Rheumatology* 2001;40:432–7.
- 7 Thelin N, Holmberg S, Thelin A. Knee injuries account for the sports-related increased risk of knee osteoarthritis. *Scand J Med Sci Sports* 2006;16:329–33.
- 8 Lo G, Driban J, Kriska A, *et al.* Habitual running any time in life is not detrimental and may be protective of symptomatic knee osteoarthritis: data from the osteoarthritis initiative [Abstract]. *Arthritis Rheumatol* 2014;66:1265–6. [http://www.acrannualmeeting.org/wp-content/uploads/2014/10/2014-ACR\\_](http://www.acrannualmeeting.org/wp-content/uploads/2014/10/2014-ACR_)
- ARHP-Annual-Meeting-Abstract-Supplement.pdf Abstract No. 2895 (accessed 18 Nov 2014).
- 9 Driban J, Hootman J, Sitler M, *et al.* Is participation in certain sports associated with knee osteoarthritis? A systematic review. *J Athl Train* 2015;50. <http://natajournals.org/doi/pdf/10.4085/1062-6050-50.2.08> (accessed 16 Apr 2015).
- 10 McDermott M, Freyne P. Osteoarthritis in runners with knee pain. *Br J Sports Med* 1983;17:84–7.



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