



BS Structured Summary



Article: Running and Knee Osteoarthritis

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Original Article: Effects of Running on the Development of Knee Osteoarthritis: An Updated Systematic Review at Short-Term Follow-up

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INTRODUCTION / BACKGROUND

Knee osteoarthritis (OA) is the most common joint disorder in the United States and a leading cause of disability in the elderly. It is seen radiographically in 33% of adults over 60, with symptomatic OA (SOA) prevalence of approximately 10% in men and 13% in women in this age group. Classically recognized risk factors include age, obesity, occupation, prior joint trauma, and repetitive movements such as kneeling and squatting. More recently, the understanding has shifted: OA is no longer viewed as a purely cartilaginous disease, but rather as a chronic disease of the entire knee — involving articular cartilage, meniscus, ligaments, periarticular musculature, and mediated by cytokines, leptin, and mechanical forces.

In this context, the impact of running on the development of knee OA remains one of the most frequent questions in the knee surgeon's office. The literature's answer has historically been contradictory: some studies suggest running increases OA risk, while others argue it has a protective effect. The question matters because it involves two distinct patient groups — the healthy recreational runner who wants to know whether they will "wear out" their knee, and the patient already with mild to moderate OA who wants to know whether they can keep running.

This 2023 systematic review, conducted by the Kraeutler group (Houston Methodist) and published in the Orthopaedic Journal of Sports Medicine, updates the Timmins et al meta-analysis (AJSM, 2017) by adding 7,944 additional patients to the body of evidence. The objective is to answer in a structured way whether cumulative running alters the course of knee OA — evaluating both patient-reported outcomes (PROs) and radiological and MRI findings. The authors hypothesized that there would be no significant differences between high-volume runners and non-runners.

OBJECTIVE

To perform an updated systematic review of the literature to determine the effects of running on the development of knee osteoarthritis, evaluating both patient-reported outcomes (PROs) and radiological findings (plain radiograph and MRI).

METHODS

Systematic review conducted according to PRISMA guidelines. Two independent reviewers (J.D., J.W.B.) searched PubMed, Embase, and Cochrane Library databases through October 3, 2021. Search strategy: "knee AND osteoarthritis AND (run OR running OR runner)". A total of 1,485 studies were reviewed by title/abstract, plus 13 identified via gray literature. Disagreements between the two reviewers were resolved by a third (M.J.K.).

Inclusion criteria: studies evaluating the effect of cumulative running on the development of knee OA or chondral damage based on imaging or PROs. Exclusion criteria: non-knee studies, non-human studies, non-English studies. One study whose full text was unavailable was also excluded.

Outcomes assessed — PROs: presence of knee pain (6 studies), KOOS (2 studies), HAQ-DI (1 study). Radiological: radiographic OA by Kellgren-Lawrence scale (6 studies), MRI T2 mapping (1 study), MOAKS (1 study), Ahlbäck criteria (3 studies), joint-space narrowing by OARSI Atlas (3 studies), tibiofemoral and patellofemoral osteophytes (2 studies).

Methodological quality assessed by the Modified Coleman Methodology Score (MCMS, 0-100 scale). Statistical analysis: weighted average for numerical variables; chi-square for comparison of knee pain and total knee replacement between runners and non-runners.

MAIN RESULTS

Seventeen studies were included, totaling 14,141 patients — 7,194 runners and 6,947 non-runners. Distribution by level of evidence: 6 level 2 studies, 9 level 3, and 2 level 4. Mean age 56.2 years in the runner group and 61.6 years in the non-runner group. Mean BMI 26.7 kg/m² in runners versus 28.0 kg/m² in non-runners. Mean follow-up 55.8 months in runners and 99.7 months in non-runners. Male predominance (58.5%). Mean MCMS score 63.2 ± 13.9 ("fair" quality), with only 2 studies reaching "excellent" classification.

Knee pain: 5 studies with comparative data. Overall prevalence of pain significantly higher in the non-runner group — 41% (1,658/4,041) versus 28.2% (384/1,360) in runners ($p < 0.0001$). The effect was driven primarily by the Lo et al (2017) study, which showed prevalence of 58.8% vs 35.4% ($p < 0.0001$). Other studies individually did not reach statistical significance but trended in the same direction.

Radiographic OA and joint-space narrowing: three studies compared ROA between runners and non-runners and none found significant differences (Chakravarty 2008: 20% vs 32%, $p > 0.05$; Lo 2017: 53.5% vs 58.8%, $p > 0.05$). The only study to find higher prevalence of patellofemoral joint-space narrowing and osteophytes in runners was Spector et al (1996), with an exclusively female population of former athletes.

MRI findings: three studies (Mosher 2010, Mühlbauer 2000, Konradsen 1990) compared cartilage thickness between runners and non-runners in different compartments (patella, trochlea, femoral condyles, tibial plateau) — none found significant differences. Horga et al (2019) used MOAKS post-marathon and described improvements in structures such as lateral patellar cartilage, semimembranosus tendon, iliotibial band, and prepatellar bursa in runners. No difference in prevalence of meniscal lesions.

Progression to total knee replacement (TKR): Lo et al (2018) — no significant difference (3.9% vs 4.3%; $p=0.79$). Lo et al (2017) — significantly lower TKR rate among runners: 2.6% (20/778) versus 4.6% (86/1,859) in non-runners ($p=0.014$). Manninen et al (2001) showed that patients with high cumulative exercise volume ($\geq 8,654$ hours in men and $\geq 6,862$ in women by age 49) had significantly lower arthroplasty risk versus sedentary controls ($p<0.05$).

Overall synthesis: no consistent evidence that running worsens PROs or radiological findings in the short to medium term. Protective signal suggested in three fronts: less knee pain, lower progression rate to TKR in the largest study, and lower BMI in runners.

AUTHORS' CONCLUSION

In the short term, running is not associated with worsening patient-reported outcomes or radiological signs of knee osteoarthritis, and may be protective against generalized knee pain.

BS DISCUSSION

This is one of those papers that's less about changing practice and more about giving us ammunition for the office visit. "Doctor, can I go back to running?" comes up every week. The honest answer, based on what this SR consolidates, is: yes, in the short and medium term, with no evidence of harm. And on some endpoints (pain, progression to TKR, BMI) running actually appears to protect.

But it's worth separating what the paper says from what it does not say. It says that running 4-15 miles per week for years is not associated with more radiographic OA, more joint-space narrowing, or thinner cartilage on MRI. It says nothing about elite runners, ultramarathoners, or runners with poor mechanics. Mean runner follow-up was 55.8 months — just under 5 years. For a disease that takes 20-30 years to develop, "short term" is literally short.

The point that bothers me most methodologically is selection bias. Someone who has been running for 30 years is, by definition, someone whose knees handled running for 30 years. Those whose knees didn't handle it stopped earlier and probably ended up in the non-runner group. This is the classic "healthy runner bias" — the SR mentions it but cannot control for it. The systematically lower BMI in the runner group (26.7 vs 28.0) reinforces this: the comparison is not "running vs sedentary with everything else equal", it is "runner vs general population".

On the finding of fewer TKRs in runners (2.6% vs 4.6% in Lo 2017): be careful with the mechanistic reading. It's not that running lubricates cartilage or regenerates

chondrocytes. It's more likely that we are looking at different patient phenotypes — runners have lower BMI, better metabolic control, more muscle mass, and better overall function. When recommending running to a patient, the real argument is that, not "running does not cause OA".

What I take to the office: patient without prior injury, controlled BMI, no significant deformity — running cleared, no need to restrict volume or frequency on the grounds of "OA risk". Patient with already established mild to moderate OA — running does not accelerate progression according to current best evidence, but the support is more fragile (few studies, small populations, short follow-up). Post-ACL, meniscus, or cartilage surgery patient — this paper does not cover. The selection bias sits in a different place here and specific evidence needs to be searched separately.

A limitation worth flagging for anyone discussing this topic: the SR has level of evidence 4 and a mean MCMS of "fair". Of 17 studies, only 2 are "excellent" by MCMS and 5 are "poor". Heterogeneity among studies is large — age, running volume, OA definition, and PRO instruments all vary. The strength of the conclusion comes more from the aggregate sample size (14,000+ patients) and the consistency of effect direction than from individual study quality.

For BS editorial use: this paper speaks directly to talks on prevention, return to sport, and contraindications. It works well as a reference in any module touching OA and physical activity. For group discussion, the most productive question is probably not "does running cause OA?" — the literature has effectively closed that debate — but rather "what dose, in which patient, with what technique?". That is where there is still room for relevant research, especially in post-surgical patients, which this SR does not cover.

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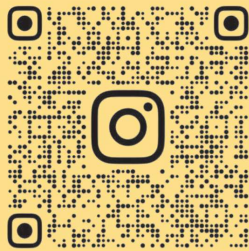
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