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Agility ladder drills in sports training: a systematic review

Ejercicios con escalera de agilidad en el entrenamiento deportivo: una revisión sistemática multidimensional

Abstract

Objective: This systematic review aimed to evaluate the effectiveness of agility ladder drills— traditional, innovative, elevated, and upper-limb—across different age groups, sports contexts, and performance domains, while identifying evidence gaps and future research priorities.

Methodology: The review followed PRISMA 2020 guidelines and was prospectively registered in PROSPERO (ID: 1143436). Searches were conducted in PubMed, Scopus, and Google Scholar (January 2003–17 September 2025), limited to human studies in English. Seventy records were screened; 54 empirical studies were included, alongside 14 theoretical references analyzed contextually. Data extraction was performed independently in pairs with substantial inter-rater agreement ($\kappa = 0.81$). The risk of bias was assessed using the RoB 2 and JBI tools, yielding 21 low-risk, 19 some-concern, and 14 high-risk studies.

Results: Most studies (≈67%) examined traditional ladders, while fewer investigated smart (n=7), elevated (n=5), or upper-limb ladders (n=3). Evidence consistently shows improvements in agility, change of direction, balance, and motor coordination, particularly in youth and team-sport athletes. Limited studies assessed physiological markers such as VO_2, lactate, HRV, or EMG, highlighting a significant gap. Integrating ladders with plyometric or skill-based training yielded additive benefits; however, heterogeneity in protocols and outcome measures pre-cluded a meta-analysis.

Conclusions: Preliminary evidence suggests that agility ladder drills are valuable complemen-tary tools for enhancing agility, coordination, and functional balance. However, the strength of evidence varies across different ladder types and populations. Standardized protocols, more diverse samples (including females, the elderly, and athletes with disabilities), and longitudinal trials incorporating physiological outcomes are urgently needed to strengthen the evidence base.