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Effect of core training on landing performance among athlete a systemactic review and meta-analysis

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None.

ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 26 April 2025 and was last updated on 26 April 2025.

INTRODUCTION

Review question / Objective To evaluate the effects of core training on jumping performance (e.g., jump height, power output) and landing stability (e.g., dynamic balance, force distribution) among athletes, and to explore potential mechanisms (e.g., neuromuscular control, energy transfer efficiency).

Condition being studied In modern competitive sports, jumping and landing movements are fundamental technical actions across various disciplines (e.g., basketball, volleyball, football). Research indicates that during 3×3 basketball games, athletes perform approximately 1.05 (female) to 1.63 (male) vertical jumps per minute for offensive/defensive maneuvers, with frequency increasing during critical game situations. However, improper landing mechanics significantly elevate risks of lower extremity injuries (e.g., patellofemoral pain syndrome, ankle sprains), particularly when combined with aerial rotations or physical contact. Studies demonstrate that athletes with poor dynamic balance face 2-7 times higher injury rates. Core musculature serves as the kinetic link between upper and lower limbs during jump-landing sequences, where insufficient core stability may compromise energy transfer efficiency and postural control, thereby amplifying injury risks while impairing athletic performance. This systematic review investigates whether.

METHODS

Participant or population Competitive athletes (aged 16-40 years) regularly engaged in jumping-intensive sports (basketball, volleyball, football, etc.) with no current lower extremity injuries.

Intervention Core Training Program Targeting Trunk Musculature(Abdominal, lumbar, and pelvic muscles).

Comparator The experimental group will undergo core training, while the control group may receive either routine training or alternative training methods.

Study designs to be included RCT.

Eligibility criteria As for population: competitive athletes (aged 16-40 years) in jumping sports (basketball/volleyball/football); as for intervention: the study must involve structured core training (≥4 weeks, targeting ≥2 core muscle groups); as for outcome: study should report at least one quantitative result related to jump performance or landing stability; as for study design: the study must be RCT or quasi-experimental with control group.

Information sources The following academic databases will be systematically searched: EBSCOhost, Scopus, PubMed, and Web of Science. Complementary searches will be conducted in Google Scholar and reference lists of relevant studies, with a cutoff date of March 2025.

Main outcome(s) Core training could improve jumping performance in terms of vertical jump height, take-off velocity, and power output, while enhancing landing stability through optimized ground reaction forces and knee joint kinematics, potentially reducing lower extremity injury incidence.

Quality assessment / Risk of bias analysis The 8 included studies scored between 6-9 points on the PEDro scale, with one study achieving the maximum score of 9 points. All studies clearly specified inclusion/exclusion criteria. Three studies failed to provide detailed randomization procedures, while none reported allocation concealment measures. Due to the inherent nature of core training interventions, participant blinding was impossible to implement. Notably, none of the studies mentioned therapist blinding status. Follow-up data reporting was incomplete in one study. Five studies implemented assessor blinding through objective measurement tools.

Strategy of data synthesis None.

Subgroup analysis None.

Sensitivity analysis None.

Country(ies) involved China.

Keywords Core training; Landing performance; Athletes.

Contributions of each author

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