INPLASY

Effects of exercise training on physical fitness of youth table tennis players: a systematic review

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ADMINISTRATIVE INFORMATION

Support - University of Putra Malaysia..

Review Stage at time of this submission - Data analysis.

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 14 March 2025 and was last updated on 14 March 2025.

INTRODUCTION

Review question / Objective This study adopted PICOS as the criterion for including research literature. PICOS is a framework that defines the key elements of a research question—population, intervention, comparison, outcomes, and study design—and helps structure and clarify the scope of a systematic review or research study (Table 1).
The inclusion criteria for this study were as follows: (1) The selected studies must be randomized controlled trials (RCTs) or non-randomized controlled trials (non-RCTs); (2) Participants must be young table tennis players, both male and female; (3) The study may include research on any exercise training methods, including those that use one or a combination of two or more training approaches as interventions; (4) The study must assess the impact of athletic training (e.g., physical fitness training, strength training, rehabilitation, and aerobic exercise) on young table tennis players, with at least one physical fitness component being evaluated, such as speed, power, endurance, coordination, or flexibility.

Studies were excluded if they: (1) involved young athletes from sports other than table tennis; (2) combined athletic training interventions with non-athletic interventions or included unsupervised training sessions; (3) were observational studies or interventions that specifically focused on exercise training implementation without direct assessment of its impact.

Condition being studied Table tennis fitness requires a unique combination of technical precision and physical fitness when developing long-term athletic potential. Although it is recognized that speed, strength, endurance, flexibility, and agility are of paramount importance to the physical fitness requirements of table tennis players, there is limited consensus on the optimal training strategies for young table tennis players.

As there are insufficient intervention studies targeting young table tennis players, this systematic review 'youth' covers table tennis players aged between 9 and 25 years, including the evidence on the effects of physical fitness composition on table tennis players in children,

adolescents, and young adults, and analyses the effects and mechanisms of physical fitness composition in young table tennis players after exercise training.

METHODS

Search strategy Following PRISMA guidelines, 12 studies (n=282 participants) were selected from PubMed, EBSCOhost, Web of Science, and Google Scholar (search period: inception–October 2024). Inclusion criteria encompassed randomized/non-randomized controlled trials evaluating exercise interventions (e.g., strength, agility, endurance training) with measurable fitness outcomes. Methodological quality was assessed using the PEDro scale (mean score: 6/10),The quality standards of these studies were very high. The results are relatively reliable.

Participant or population Participants must be young table tennis players, both male and female.

Intervention The study may include research on any exercise training methods, including those that use one or a combination of two or more training approaches as interventions; The study must assess the impact of athletic training (e.g., physical fitness training, strength training, rehabilitation, and aerobic exercise) on young table tennis players, with at least one physical fitness component being evaluated, such as speed, power, endurance, coordination, or flexibility.

Comparator The study may include research on any exercise training methods, including those that use one or a combination of two or more training approaches as interventions; The study must assess the impact of athletic training (e.g., physical fitness training, strength training, rehabilitation, and aerobic exercise) on young table tennis players, with at least one physical fitness component being evaluated, such as speed, power, endurance, coordination, or flexibility.

Study designs to be included Following PRISMA guidelines, 12 studies (n=282 participants) were selected from PubMed, EBSCOhost, Web of Science, and Google Scholar (search period: inception–October 2024). Inclusion criteria encompassed randomized/non-randomized controlled trials evaluating exercise interventions (e.g., strength, agility, endurance training) with measurable fitness outcomes. Methodological quality was assessed using the PEDro scale (mean score: 6/10),The quality standards of these studies were very high. The results are relatively reliable.

Eligibility criteria This study adopted PICOS as the criterion for including research literature. PICOS is a framework that defines the key elements of a research question—population, intervention, comparison, outcomes, and study design—and helps structure and clarify the scope of a systematic review or research study (Table 1).
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Information sources This study adhered to the PRISMA guidelines for its design and execution, conducting a comprehensive literature search across four major academic databases: PubMed, EBSCOhost, Web of Science, and Google Scholar. Gray literature was also included to expand the search. The search period ran from the study's inception through October 2024.
We used a combination of keywords across databases, such as: ("functional training", "strength training", "physical training", "aerobic exercise", "sport performance", "technical skills", etc.) in conjunction with terms related to "physical fitness", "endurance", "speed", "strength", and "agility". The search was further refined by focusing on adolescent table tennis players, using variations like "juvenile table tennis players", "teenage table tennis players", and "youth table tennis players". This approach was designed to enhance search precision and reduce the risk of duplication across multiple databases.
Main outcome(s) Of the 12 studies included in this systematic review, seven studies focused on evaluating the effects of exercise training on speed in table tennis players. These seven studies involved a total of 60 table tennis players aged 11

to 20 years old (Wang & Zhou, 2023; Zhan & Cui, 2023; Meng, 2023; Hao.

Quality assessment / Risk of bias analysis The methodological quality of the included studies was assessed using the PEDro scale, with all studies scoring 6 out of 10. While all trials demonstrated strengths in randomization, baseline comparability, and outcome reporting (e.g., point estimates and follow-up completeness), critical limitations were consistently observed. Notably, none of the studies adequately addressed allocation concealment or implemented blinding procedures for participants, therapists, or assessors, reflecting common practical challenges in exercise intervention research where masking training groups is often unfeasible. Despite these gaps, the adherence to intention-to-treat analysis and robust between-group comparisons in most studies supports the validity of the comparative findings. The uniform scoring pattern across trials highlights both the methodological rigor in design execution and the field-specific constraints inherent to sports science interventions.

Strategy of data synthesis A total of 95 articles were initially identified through database searches, comprising 55 records from Web of Science, 28 from PubMed, and 12 from EBSCOhost. Duplicate entries were systematically removed using EndNote reference management software. During the secondary screening phase, six articles were excluded: three due to unavailability of full-text and three as non-journal publications (e.g., conference abstracts, book chapters). Subsequently, 58 full-text articles underwent eligibility assessment. Of these, 48 were excluded for reasons including misalignment with the study's thematic focus (e.g., non-exercise interventions, non-youth players populations) or failure to meet predefined inclusion criteria (e.g., inappropriate age range, lack of fitness outcome measures). Ultimately, 12 publications satisfied the rigorous inclusion criteria and were selected for qualitative synthesis. The detailed screening process, including reasons for exclusion at each stage, is illustrated in the PRISMA flow diagram (Figure 1).

FIGURE 1 | The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram of the literature selection process.

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Subgroup analysis No.

Sensitivity analysis No.

Language restriction English.

Country(ies) involved China/University of putra.

Keywords table tennis, speed, strength, endurance, agility, flexibility, physical fitness, exercise training.

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