



Review article

Exercise training on skill-related physical fitness in adolescents with intellectual disability: A systematic review and meta-analysis



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ABSTRACT

Background: Skill-related fitness (SRF) is a component of physical fitness related to sports or occupational performance. Adolescents with intellectual disability (ID) can take advantage of SRF for enhancing work performance and enjoying participation with peers in leisure activities. However, few studies have examined the benefits of exercise on SRF in adolescents with ID.

Objective: This study synthesized the results from the reviewed studies and determined whether exercise training improves SRF in adolescents with ID.

Methods: We searched ten electronic databases and used the Physiotherapy Evidence Database (PEDro) scale to assess the methodological quality of included studies. This study pooled quantitative data where possible in statistical meta-analyses and expressed the effect sizes (ESs) as Cohen's *d* and converted it to Hedges's *g*. Eighteen studies met inclusion criteria for systematic review, of which 14 for further meta-analyses.

Results: Nine meta-analyses were conducted in this study. The results supported positive exercise training effects on agility, power, RT, and speed, but not balance (Hedges's *g* range −1.465–0.760) in adolescents with ID.

Conclusions: We found only a limited number of studies exhibiting high quality evidence and were being included in the meta-analyses. Therefore, the results of our systematic review and meta-analyses should be interpreted with caution.

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Skill-related fitness (SRF) is a component of physical fitness (PF) pertaining to performance ability in sports or occupations other than health-related fitness (HRF)^{1–3}; which is associated with motor skill performance. SRF consists of agility, balance, coordination, power, speed, and reaction time (RT).^{2,3} HRF is primarily

focused on health, whereas SRF is critical for improving health and wellness.

Although adolescence (13–18 years of age) is a short life stage, PF in adolescence yields a significant health outcome.⁴ Previous studies have considered PF in adolescence to be a predictor of adulthood activity.⁵ Moreover, SRF speed, agility, and muscular fitness could have a positive effect on skeletal health.⁴ Hence, Ortega et al.⁴ suggested designing health promotion to improve PF components, such as muscular fitness, speed and agility, in addition to cardiorespiratory fitness in adolescents. According to the statistical data of the Ministry of Health and Welfare in Taiwan, the

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prevalence of adolescents with ID is 0.005%.⁶ Moreover, adolescents with ID do not achieve the same level of HRF as their peers, exhibiting a high body mass index,⁷ low muscle strength of the lower body (abdominal and knee muscles),^{8–10} and low cardio-pulmonary fitness (VO_{2max}).¹¹ SRF performance in adolescents with ID is also poor compared with that of their peers, such as balance,^{9,12} power,¹³ speed,¹⁴ and RT.¹⁵ Nevertheless, adolescents with ID can take advantage of SRF by reducing RT,¹⁶ enhancing work performance,^{17–19} and enjoying participation with peers in leisure activities.^{18,20}

Exercise training is the most effective means for improving the health of people with ID²¹ as evidenced by systematic review²² and meta-analyses.^{23,24} Positive associations exist between PF levels and health in adolescents with ID.²⁵ Exercise training also improves SRF performance in people with ID,^{26–29} as well as in people with physical disability.³⁰ However, few studies have investigated the specific benefits of exercise on SRF in adolescents with ID. Therefore, this study conducted a systematic review and meta-analysis to determine whether exercise training improves SRF in adolescents with ID.

Methods

Search strategy and selection criteria

This study followed the guidelines of the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA).³¹ Ten electronic databases were searched: PubMed, MEDLINE, PsycINFO, Education Resources Information Center (ERIC), Physiotherapy Evidence Database (PEDro), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Google Scholar, Scopus, Chinese Electronic Periodical Services (CEPS), and National Digital Library of Theses and Dissertations (NDLTD) in Taiwan. Reviews were systematically searched from the earliest available date until April,

2014. Inclusion criteria were as follows: (a) peer-reviewed original research of adolescents with ID or mental retardation between 13 and 18 years of age, (b) intervention with exercise training, (c) measured variables associated with SRF, (d) levels of evidence higher than 4 in accordance with the Oxford 2011 Levels of Evidence,³² including randomized controlled trials (RCTs), non-randomized controlled cohort and follow-up studies, and (e) written and published in English or Chinese. The terms used for searching were intellectual disability, mental retardation, intervention, exercise, training, adolescents (13–18 years of age), agility, balance, coordination, speed, power, and RT. Relevant systematic reviews were considered for hand-searching reference lists to identify primary research articles for inclusion. The PRISMA diagram is shown in Fig. 1.

Quality assessment and data extraction

After the search was conducted, the PEDro scale (<http://www.pedro.org.au>) was used to assess the methodological quality of the included studies. The PEDro scale has been indicated as a valid measure of methodological quality of clinical trials in systematic review, with a good-to-fair reliability.^{33,34} Eleven items in the PEDro scale use a Yes (1 point) or No (0 point) response rating scale (PEDro, 1999). Item 1 (eligibility criteria) is not counted for the overall score because it does not affect the internal or statistical validity of the study.³⁴ The PEDro scale score ranges from 0 to 10. Studies scoring 9 to 10 were considered to be methodologically “excellent” in quality, those ranging from 6 to 8 to be “good” in quality, those between 4 and 5 to be “fair” in quality, and those scoring below 4 to be “poor” in quality.³⁵

Two independent reviewers selected and assessed papers for methodological validity prior to including in the review. Each eligible study was appraised by two reviewers independently. A consensus meeting was held to resolve any discrepancies on

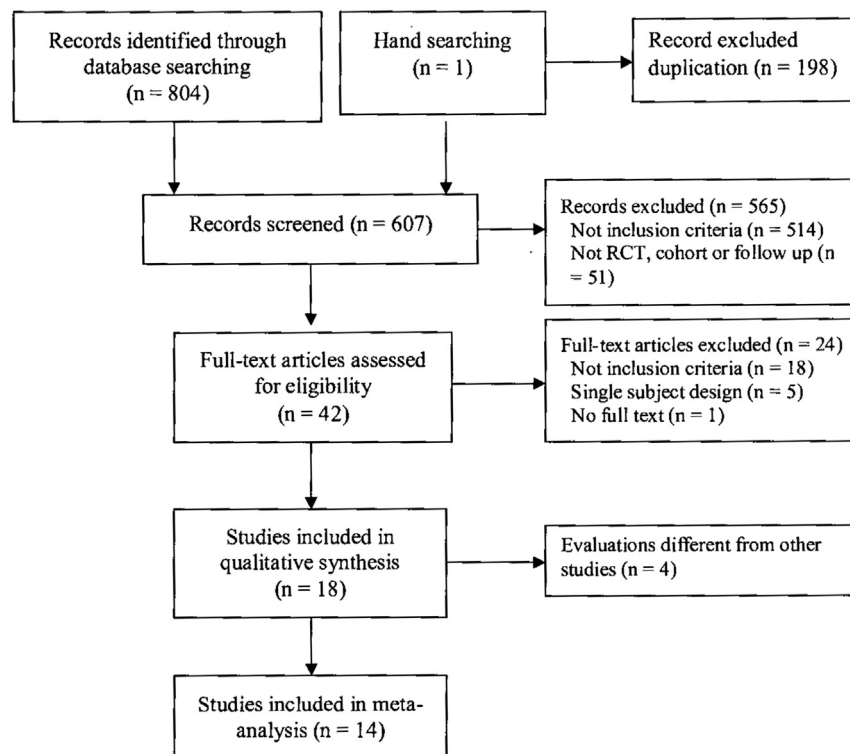


Fig. 1. PRISMA diagram of study selection. RCT, randomized controlled trial.

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