Systematic review

Developmental coordination disorder in school children- A systematic review

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(Received: August 2021 Revised: November 2022 Accepted: December 2022)

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ABSTRACT

Developmental Coordination Disorder (DCD) is defined as a severe delay in perceptual-motor and psychomotor development that affects children who are intellectually normal and have no physical, sensory, or neurological conditions. It is described as a deficiency in the development of gross and fine motor abilities that cannot be accounted for by a lack of general education or exposure to equivalent opportunities to develop motor skills as their peers. Between May 2000 and May 2021, systematic reviews were published; these were included. The articles were shortlisted for full-text review after the reviewers independently read each title and abstract and determined that they looked at motor interventions intended to enhance movement skills in kids with developmental coordination disorder to improve fitness levels for the heart and lungs. This study looked at 72 review articles in total. The study included articles that offered advice on how to improve someone's cardiovascular and respiratory fitness. Activities such as organized sports, exercise, movement, balance training, and motor interventions were defined as motor interventions. According to the study's findings, kids with DCD have trouble moving about and are generally inactive. Conclusion: Improving motor skills and cardiorespiratory fitness have a significant impact on DCD children's quality of life.

Keywords: DCD; physical fitness; motor training; children.

INTRODUCTION

Children with DCD show a clear loss in their perceptual-motor and psychomotor growth despite intellectual capacity and the absence of any physical, sensory, or neurological conditions (1). It is described as a failure to acquire abilities in both gross and fine motor skills that cannot be explained by a deficiency in general education or exposure to experiences that would allow one to acquire motor skills comparable to those of their peers. Clinicians occasionally overlook DCD as a developmental issue. However, there is ample evidence to demonstrate that these issues can have a substantial impact on children's lives since they find it difficult to plan and arrange themselves. They typically affect the child at home and at school, in contrast to youngsters of similar ages who naturally acquire these skills (2). Children with developmental co-ordination disorder (DCD) have obvious motor deficits, which have a substantial influence on their everyday activities. It is regarded as a motor disorder, along with tic disorders and stereotyped movement disorders. However, these aberrations from typical psychomotor development resulted in impairments in the acquisition and application of coordinated motor skills (both gross and fine), which negatively impact daily living (ADL) tasks, notably academic learning (3). DCD manifests early warning indications (before the child enters grade school).The severity of motor skill impairment can range from extremely limited bounds to developmental impairments. Children with DCD may experience a variety of issues that limit their range of motion, mobility, visuomotor

abilities, and handwriting. They typically develop critical social skills more slowly and inconsistently than their peers (4), which makes it more difficult for them to do so. Additionally, they are less coordinated than their peers in terms of their hand dexterity, balance, multitasking, ball skills, response time, etc. They frequently lack athletic ability as well, which prevents them from participating in sports and other physical activities. Consequently, individuals are more likely to experience health issues like obesity, overweight, and cardiovascular disease.

Children with DCD are at risk for having low levels of physical fitness because of their motor deficiencies (PF; 10-13). All five of the PF health-related components—muscle strength, muscle endurance, flexibility, and body composition—are decreased in children with DCD (14-16). This decreased PF may have significant short- and long-term effects on functioning and health (17-20). Impaired mental and cognitive performance could be a short-term effect, whereas cardiovascular disease could be a long-term effect (21-23).
Developmental Coordination Problem (DCD), although predominantly a motor disorder, can impact a child's emotional and psychological development (24-26). Even while research suggests that children with DCD have a lower quality of life than their peers with health-related quality of life, there haven't been many studies specifically focused on the quality of life associated to their health (27-30).

Eligibility criteria

Only publications published between May 2000 and May 2021 were returned by our computerized literature searches. The reviewers independently evaluated each title and abstract, and those whose information indicated that the article was either a randomized controlled trial or a systematic review of randomized controlled trials looking into motor interventions intended to improve movement skills in children with developmental coordination disorder were shortlisted for full-text review. There were additional studies in the research that provided suggestions for enhancing cardiorespiratory fitness. Motor interventions were defined as activities that include a physical activity program, such as sports, exercise, movement, balance, and motor training. Any disagreements concerning this or other evaluative criteria between reviewers were resolved through discussion, including consultation with at least one additional reviewer.

Information sources

We searched the Cochrane Library (Cochrane Database of Systematic Reviews and DARE), MEDLINE, EMBASE, and PEDro for systematic reviews released between May 2000 and May 2021. To find reviews, MEDLINE and EMBASE were filtered according on the SIGN criteria. The PEDro and Cochrane Library searches were restricted to words contained in the record title, abstract, or key phrases. Additionally, we looked over the included research' reference lists. We carried out an updated search in the Cochrane Database of Systematic Reviews and the MEDLINE database in May 2021.

Identifying relevant reviews and assessment of methodological quality

The reviewers independently assessed the applicability of all references based on abstracts, read the complete texts of pertinent reviews, evaluated the methodological quality of the included reviews using a modified version of a previously validated checklist. The nine criteria-search strategy, inclusion criteria, quality assessment, combining studies, and conclusion-were rated as “met,” “unclear/partially met,” or “not met.” Disagreements were resolved through conversations among the reviewers. Based on a summary of these 9 criteria, each review's overall scientific quality was rated as having "minor limits" (at least 7 of the criteria were satisfied), "moderate limitations" (at least 4 of the criteria were satisfied), or "significant limitations" (fewer than 4 of the criteria met). Reviews with major limitations were excluded. The data extraction and synthesis were both done by the same author. Data were independently retrieved from each included review and then shared with the other author. For those reviews that were included, the Jadad scale and the PEDro scale, respectively, were

taken from the reviews and added to the table of characteristics.

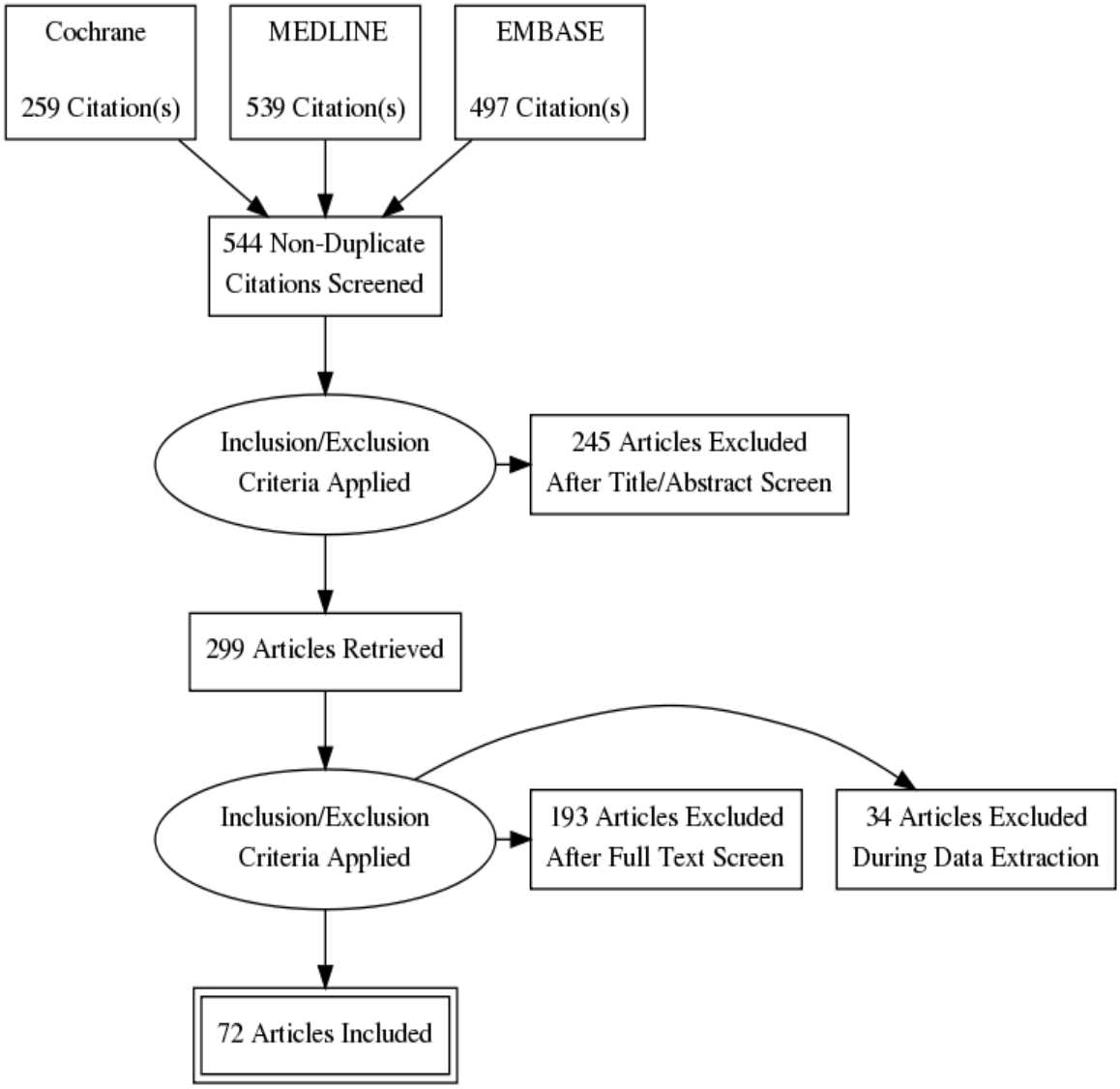

Fig.1: Prisma diagram

The literature search turned up 1,295 pertinent reviews (539 from MEDLINE, 497 from EMBASE, 259 from the Cochrane Library). The full texts of 299 reviews were retrieved after abstracts were examined. Finally, as 72 reviews satisfied the criteria for inclusion, they were included in the summary.

Cardiorespiratory fitness

The ability of the cardiorespiratory system to effectively supply oxygen to muscle tissue and the ability of those tissues to utilize that oxygen to produce energy are the two components of cardiorespiratory fitness (CRF). Therefore, peak VO2 is widely acknowledged as the most accurate CRF indication. In the absence of any known neuromuscular disorders, children with DCD exhibit relatively low motor skills. The degree of disability would considerably hinder their everyday activities as well as their social and academic performance.

ADL activities

For instance, children with DCD have a lot of difficulty writing, tying shoelaces and buttons, playing simple ball games, tasks requiring eye-hand coordination, and complex sequential motions used in play and athletics. Sadly, the problem typically goes unrecognized and unaddressed.

Physical activity

Children with DCD usually shun exercise due to their motor deficits. This avoidance seems to be

increasing the proportion of DCD kids with low CRF. Children with DCD have lower aerobic fitness levels than kids whose development is typical. Therefore, it's crucial to encourage kids to participate in healthy physical activities, especially those with DCD who already have low participation rates and poor cardiovascular fitness.

Quality of life

The study adds to the growing body of research showing that kids with DCD, regardless of co-occurring disorders, run the risk of having significantly lower HRQOL than their peers who are typically growing in terms of QOL. HRQOL depends on peer relationships, and negative peer interactions can cause peer victimization and isolation.

Writing and handwriting

A different study found that children with DCD produce less text than their peers when writing. But instead of a delayed movement execution, this was the outcome of more frequent halting. Once we have a better understanding of the perceptual and motor timing impairments in DCD and how they differ between subtypes, we may use this information to create treatment plans.

Most kids with DCD do not recover on their own. A prompt diagnosis and specialist referral should be given to kids with severe functional limitations. Programmed early intervention is more likely to improve these children's coordination and motor skills, which are then more likely to be sustained. As a result, these young people (and adults) will have improved self-esteem, socialization, and more successful and rewarding participation in their communities.

It has been shown that there are varying degrees of unfavorable correlations between poor motor proficiency and body composition, cardiorespiratory fitness, muscle strength and endurance, anaerobic capacity, power, and physical activity. In fitness tests that required a lot of coordination, a study indicated that children with DCD fared lower than their counterparts who were typically developing. Fitness for the heart and lungs is essential for raising QOL and avoiding co-morbidities like obesity.

To address any associated learning difficulties, psychological assistance is crucial if there are any following behavioral effects, such as low self-esteem and social isolation. In addition, it's essential that efforts be made to boost confidence in what is essentially a social disease and that schools provide a supportive environment. Different forms of therapy can improve motor function.

Numerous studies have concluded that the best interventions for children with DCD should primarily focus on improving their motor activity. However, some other research suggested enhancing the cardiorespiratory fitness of the kids with DCD. It is essential to raise the motor and cardiorespiratory fitness of children with DCD in order to improve their quality of life.

CONCLUSION

According to the study's findings, children with DCD had problems with their motor skills and were physically unfit. When both motor skills and cardiorespiratory fitness are enhanced in children with DCD, their quality of life is greatly improved.

ACKNOWLEDGEMENT

Authors acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals, and books from where the literature for this article has been reviewed and discussed.

CONFLICT OF INTEREST

Authors declare no conflict of interest.

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