INPLASY

INPLASY202420056

doi: 10.37766/inplasy2024.2.0056

Received: 13 February 2024

Published: 13 February 2024

Effects of cycling intervention on physical literacy components in children and adolescents: A Systematic Review with Meta-Analysis

Rodríguez, D[1]; Valle, V[2]; Ramírez, A[3]; Muntaner, A[4]; Chillón, P[5]; Barranco, Y[6]; Villa-González, E[7].

Corresponding author:
David Rodríguez Sánchez

davidrodriguezsanchez2001@gmail.com

Author Affiliation:
University of Granada. Faculty of Sports Sciences.

ADMINISTRATIVE INFORMATION

Support - No.

Review Stage at time of this submission - Preliminary searches.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY202420056

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 13 February 2024 and was last updated on 13 February 2024.

INTRODUCTION

Review question / Objective The objectives of this systematic review and meta-analysis is: 1) to synthesize and quantify the effect of bicycle interventions (randomized controlled trials and quasi-experimental trials) on different components of physical literacy in children and adolescents.

Rationale The World Health Organization's Global Action Plan on Physical Activity (PA) aims to increase physical activity and reduce sedentary behavior by 2030. It proposes actions to transform social norms and attitudes, promoting enjoyable, accessible, and culturally appropriate PA experiences that encourage widespread participation, behavior change, and physical literacy (PL). This universal document invites the world to perceive PL as an important component of individual and collective actions to promote PA and health in the global population. PL refers to a set of characteristics or attributes that enhance an individual's potential to engage in and sustain PA. The components of PL involve not only physical domain behaviors but also components related to the psychological domain, social domain, and cognitive domain. Consequently, interventions aimed at promoting cycling have been identified as potentially effective in improving components of physical literacy in children and adolescents. However, to date, a comprehensive systematic review examining the overall impact of cycling on these components has not been conducted.
The results obtained provide strong evidence of the benefits of these interventions in motor development, coordination, cardiovascular endurance, and other aspects related to the health and physical well-being of this population. First, there is evidence that cycling interventions significantly contribute to the development of motor skills in children and adolescents. These skills include balance, hand-eye coordination, fine and gross motor coordination, among others. Cycling provides a safe and fun environment for young people to practice and improve these fundamental motor skills. Additionally, it has been observed that cycling interventions have a positive

impact on participants' overall coordination. Regular cycling practice requires precise coordination between body movements, balance, and bike control. These aspects contribute to improving overall coordination and the ability to adapt to different situations in the physical environment. Regarding cardiovascular endurance, it has been shown that cycling interventions promote significant improvements in this component of PL. Cycling is an aerobic activity that involves large muscle groups and requires sustained effort for extended periods. This leads to improvements in lung capacity, blood circulation, and overall cardiovascular endurance.

Furthermore, the components of PL related to cycling not only involve improvement in physical domain elements but also factors related to psychological domains centred on feelings, attitudes, and emotions involved in movement and physical activity such as motivation, enjoyment, empathy, fatigue, and pain management, as well as persistence in effort and learning new movements during bicycle commuting. In this way, it will also contribute to the social domain due to the ability to interact with others in aspects of collaboration and support in different activities to be carried out. Lastly, another important aspect to highlight related to PL is the cognitive domain, allowing young people to develop the knowledge and understanding necessary for the safe and effective use of bicycles. Additionally, cycling can promote active and healthy lifestyles from an early age, contributing to the prevention of chronic diseases associated with sedentary behavior.

In summary, these findings will be of great scientific value as they will help inform health professionals, educators, and other stakeholders involved in promoting physical activity in this population about the effectiveness of cycling as an intervention on different components of PL.

Condition being studied Physical literacy (PL) is defined as an individual's ability to achieve motivation, confidence, physical competence, knowledge, and understanding to value and take responsibility for maintaining physical activities throughout life. The World Health Organization's Global Action Plan on Physical Activity aims to promote enjoyable, accessible, and culturally appropriate physical activity (PA) experiences that encourage widespread participation and behavioral change. PL reflects ongoing changes that integrate physical, psychological, social, and cognitive abilities. A physically literate person can harness their integrated physical, psychological, social, and cognitive abilities to support health promotion and engagement in movement and PA throughout their life. It is vital for helping us lead a healthy and fulfilling life through movement and PA. The components of PL involve not only physical domain behaviors (e.g., movement skills, coordination, balance, strength...) but also components related to the psychological domain (e.g., enjoyment, motivation, confidence...), social domain (e.g., relationships, collaboration, ethics...), and cognitive domain (safety and risk, knowledge, understanding...). Cycling has been identified as a potentially effective intervention for improving the PL of young people. Additionally, cycling has benefits for fostering the development of different components of PL such as coordination, cardiovascular endurance, balance, motivation, confidence, knowledge of rules, and social relationships to promote active and healthy lifestyles from an early age.

METHODS

Search strategy Keywords and synonyms were entered in various combinations in the title, abstract or keywords: (“child” OR “adolescent” OR “Youth” OR “Teen” OR “Young people” OR “Young person” OR “Juvenile”) AND (“cycling” OR “cycle” OR “bicycle” OR “bike” OR “bike capacity” OR “active commuting” OR “active transport” OR “intervention” OR “programme”) AND (“physical literacy” OR “physical activity” OR “exercise” OR “physical fitness” OR “sports” OR “sedentary” OR “cardiovascular” OR “activity” OR “aerobic” OR “motor control” OR “coordination” OR “performance”) AND (“physical literacy” OR “affective well-being” OR “affective” OR “self-efficacy” OR “self-confidence” OR “confidence” OR “behaviour” OR “motivation” OR “enjoyment” OR “emotion” OR “attitude” OR “belief”) AND (“physical literacy” OR “cognitive function” OR “cognitive” OR “well-being” OR “knowledge” OR “understanding” OR “value”).

Participant or population Children and adolescents between the ages of 5 to 17 who are seemingly healthy.

Intervention Interventions based on promoting cycling.

Comparator Control conditions.

Study designs to be included RCT and non-RCT.

Eligibility criteria Inclusion criteria: (1) healthy children and adolescents (between five and seventeen years old); (2) cycling interventions; (3) evaluate at least one specific component of physical literacy; (4) designs (randomized and nonrandomized trials); (5) Only original studies and

full text written in English. Exclusion criteria: (1) Other population other than children and adolescents (for example adults); (2) children and adolescents with some type of injury, chronic or acute illness; (3) Other physiological or physical conditions not related to the included results; (4) Other study designs that do not allow within-subjects comparisons for the two conditions; (5) Written in a language other than English. Other types of articles in addition to the original (e.g., reviews, letters to the editors, trial records, protocol proposals, editorials, book chapters, and conference abstracts).

Information sources Electronic databases (PubMed, Scopus, SPORTDiscus, and Web of Science) were searched for relevant publications prior to 1 February 2024.

Main outcome(s) Evaluate at least one specific component of physical literacy.

Data management Data extraction will be prepared in a Microsoft Excel sheet using the data extraction template from the Cochrane Consumer and Communication Review Group. The Excel sheet will be used to assess inclusion requirements and will be approved for all selected studies. Additionally, the bibliographic manager Endnote version X6 will be used for extracting articles and including or excluding them from the review.

Quality assessment / Risk of bias analysis The quality of the studies to be included will be judged by two independent reviewers using the Cochrane Collaboration's risk of bias tool, consisting of seven elements: generation of random sequence, allocation concealment, blinding of participants and personnel, blinding of outcome assessors, incomplete outcome data, incomplete outcome reporting, and other biases. Low, uncertain, and high risk of bias will be graded as levels of study quality, respectively. Additionally, we will use the Grading of Recommendations Assessment, Development and Evaluation (GRADE) system to rate the findings as described in the GRADE handbook. Comparisons were initially rated as high-quality evidence and will decrease accordingly based on study limitations, imprecision, inconsistency, directionality, and publication bias.

Strategy of data synthesis The analysis and interpretation of the results of this systematic review will be grouped using the PL checklist developed and validated by Shearer et al., (2021). This checklist emphasizes the grouping of different components of PL into three domains: physical, affective, and cognitive. Additionally, data extraction from the selected articles will be provided based on: study and country, images and instructions, design, intervention, type of bicycle, physical literacy component, and outcomes.

Subgroup analysis Fitness status; Previous cycling experience; Age; Sex.

Sensitivity analysis They will study the individual influence of each study on the meta-analysis result and determine if the results may be biased by low methodological quality studies, unpublished work, or those that do not strictly meet the selection criteria to ensure the validity and reliability of the findings. The presentation of the sensitivity analysis results will allow readers to assess how solid the synthesized results were with respect to the decisions made during the review process.

Country(ies) involved Spain.

Keywords health; physical literacy; cycling; interventions.

Contributions of each author

Author 1 - David Rodríguez Sánchez - Performed the search and methodological search and made the synthesis of results. Wrote and revised the manuscript.
Email: davidrodriguezsanchez2001@gmail.com
Author 2 - Victor Manuel Valle Muñoz - Wrote and revised the manuscript.
Email: victor_96@go.ugr.es
Author 3 - Ana María Ramírez Osuna - Performed the search and methodological search and made the synthesis of results. Wrote and revised the manuscript.
Email: anaramirez461@gmail.com
Author 4 - Adriá Muntaner Mas - Wrote and revised themanuscript.
Email: adria.muntaner@uib.es
Author 5 - Palma Chillón - Wrote and revised the manuscript.
Email: pchillon@ugr.es
Author 6 - Yaira Barranco Ruiz - Wrote and revised the manuscript.
Email: ybarranco@ugr.es
Author 7 - Emilio Villa González - Wrote and revised the manuscript.
Email: evilla@ugr.es