INPLASY

Effects of swimming exercise on early adolescents' physical conditioning and health: a systematic review

INPLASY2023100078

doi: 10.37766/inplasy2023.10.0078

Received: 23 October 2023

Published: 23 October 2023

Ferreira, FA[1]; Santos, CC[2]; Palmeira, AL[3]; Fernandes, RJ[4]; Costa, MJ[5].

Corresponding author:
Francisco A. Ferreira

up202100039@up.pt

Author Affiliation:
Centre of Research, Education, Innovation and Intervention in Sport (CIFI2D), Faculty of Sport, University of Porto, Porto, Portugal; Porto Biomechanics Laboratory (LABIOMEP), Faculty of Sport, University of Porto, Porto, PortugalFaculty of Sport, University of Porto.

ADMINISTRATIVE INFORMATION

Support - There was no financial support.

Review Stage at time of this submission - The review has not yet started.

Conflicts of interest - None declared.

INPLASY registration number: INPLASY2023100078

Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 23 October 2023 and was last updated on 23 October 2023.

INTRODUCTION

Review question / Objective This review aims to systematically summarize the available literature on longitudinal effects of swimming exercise on physical conditioning and health status variables in healthy adolescents (aged up to 15 years old) including both sexes.

Rationale Nowadays, physical fitness during and pre-puberty is a necessary preventive measure to pursue greater health benefits during lifespan. Regular exercise (framed in physical activity) has shown to have benefits for different age groups, particularly improvements in cognitive function, cardiorespiratory or muscular fitness, bone health, quality of sleep, decreased risk of cognitive deviations, anxiety levels and depression. From the various exercise types, swimming has become one of the most practiced exercises at early ages, mostly for health benefits and safety purposes. However, studies regarding potential benefits for the cardiovascular system and health remain scarce. There is also a lack of information on how swimming can develop the various conditional and coordinative skills on water and if those can be transferred to daily activities. A systematic review examining the benefits of swimming exercise on physical conditioning and health-related outcomes will allow us to understand the true impact on adolescents. The systematic review will focus on comparison with controlled groups and will provide a synthesis for the different parameters assessed, the different methods used and the gaps related to ages up to years old.

Condition being studied How swimming exercise affects physical conditioning and health during early adolescence.

METHODS

Search strategy This systematic review will be conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 statement. The Boolean search method (including AND/ OR) will be used to search literature related to physical conditioning and health-related variables. While the terms in databases search (PubMed, Scopus and Web of Science) must be present in the title, abstract or keywords, in International Symposium of Biomechanics and Medicine in Swimming proceedings they can be in all fields. Search lines selected will contain: (1) ("swim*"); AND (2) ("adolescen*" OR "pedriatri*" OR "teenag*" OR "youth" OR "young*" OR "age group*" OR "(pre)pubert*"); AND (3) ("intervent*" OR "program*" OR "train*" OR "lesson*" OR "exercise*"); AND (4) ("health*" OR "physical condition*" OR "fitness").

Participant or population The population will include healthy adolescents, aged up to 15 years old, and will exclude all spectrum of disabled adolescents and other aquatic activities practitioners (e.g. hydrotherapy and aquatic interventions).

Intervention The intervention will include swimming programs/interventions or training sessions and exclude combined interventions where the effects of swimming cannot be isolated.

Comparator Comparison will be provided with passive control groups and/or placebo or longitudinal interventions.

Study designs to be included The study designs to be included are randomized and non-randomized longitudinal designs. Cross-sectional designs will be excluded.

Eligibility criteria Peer-reviewed articles searching the current review scope will be eligible, without restrictions on language (as long as the studies include the title and abstract written in English) and the deadline for searching is November 2023. Also, conference abstracts will be included if published in the International Symposium of Biomechanics and Medicine in Swimming (BMS) proceedings since 1970, due to its relevance in swimming-specific context. Nonpeer-reviewed articles/ journals, reviews (qualitative review, systematic review, meta-analysis), books, book chapters, commentaries, editorials, letters to the editor, overviews, dissertations, thesis or trial registrations will be excluded from the analysis. According to PRISMA 2020 guidelines, eligibility criteria will be designed with PICOS (population, intervention, comparison, outcome and study design) framework.

Information sources The initial search will be conducted in three electronic databases (PubMed, Scopus, Web of Science) and in BMS proceedings (available at: https://www.iat.uni-leipzig.de/datenbanken/iks/bms/). There will be no restrictions on language (as long as the title and abstract of the studies are written in English) or publication date, and no filtering application to increase the chances of identifying appropriate studies. After data extraction, an additional search will be performed through manual search, snowballing citation tracking and expert consultation.

Main outcome(s) The outcomes will include physical conditioning (addressing muscle function, coordination and aerobic/anaerobic conditioning) and health status (sleep quality, cognitive function and mental health). Will be excluded outcomes aiming for performance measures in swimming (such as intracycle variation of velocity or maximal oxygen uptake).

Additional outcome(s) None declared.

Data management Database screening will be realized by two authors using manual search and snowballing track citation methods. Automated duplicates removal will be performed automatically using EndNote 20.6 for Windows (ClarivateTM, Philadelphia, PA, USA). Two authors will complete an independent initial data extraction and, in case of disagreements a third author will provide arbitrage and meet with authors until consensus. Records will be extracted into a tailored Microsoft® Excel 2016 worksheet (Microsoft Corporation Redmond, WA, USA) created for data summary.

Quality assessment / Risk of bias analysis Two independent reviewers will perform the risk of bias analysis of each included record and disagreements will be solved by consensus. RoBANS tool will be used to perform non-randomized studies risk of bias (which includes the domains: selection of participants, confounding variables, measurement of exposure, blinding of the outcome assessments, incomplete outcome data, and selective outcome reporting) and Review Manager Software (version 5.4; The Nordic Cochrane Centre, The Cochrane Collaboration, Copenhagen, Denmark) will be used for randomized studies (which includes the domains:

selection, performance detection, attrition, reporting and other bias).

Strategy of data synthesis Data will be grouped in accordance with the physical conditioning or health-related outcomes and information will be synthesized by: (i) author(s); (ii) year of publication; (iii) title; (iv) aim; (v) sample characteristics (e.g., sex, number of participants, age and maturation status when available); (vi) evaluated variables (e.g. muscle function, coordination, aerobic/anaerobic conditioning, sleep quality, cognitive function, mental health); (vii) results; (viii) main findings.

Subgroup analysis We will not perform subgroup analysis.

Sensitivity analysis No analysis to report.

Language restriction There will be no restrictions on language (as long as the title and abstract of the studies are written in English), imposed on inclusion criteria.

Country(ies) involved Portugal.

Other relevant information None declared.

Keywords Swimming; longitudinal; health; physical fitness; adolescence.

Dissemination plans The systematic review will be submitted and published in international peer-reviewed journals with impact factor and disseminated in sport sciences related scientific conferences.

Contributions of each author

Author 1 - Francisco A. Ferreira.
Email: up202100039@up.pt
Author 2 - Catarina C. Santos.
Email: cmsantos@fade.up.pt
Author 3 - António L. Palmeira.
Email: antonio.palmeira@ulusofona.pt
Author 4 - Ricardo J. Fernandes.
Email: ricfer@fade.up.pt
Author 5 - Mário J. Costa.
Email: mjcosta@fade.up.pt