Review Protocol

Title	Secular Trends in Physical Fitness of Children and Adolescents: Review of Large-scale Epidemiological Studies Published after 2006
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1. Background

Monitoring of physical fitness (PF) in youth is important, because PF is known as one of the most relevant resource for health [1–4] and is regarded as one of the foundations of an active lifestyle [5].

Childhood is a critical period for the development of motor PF as it lays the foundation for later PF. Young children acquire a wide range of locomotor and object control skills that enable them to learn adaptive, skilled actions and to adjust them flexibly in different contexts. PF is the base on which children can build more specific motor skills or develop movement patterns [5, 6].

The development of motor perfomanceMP either encourages or discourages an individual to engage in physical activity through limiting one's opportunities [7–10].

Various definitions of the term PF exist. In Germany, the most commonly used definition was published by Bös [11]. According to this definition, five main dimensions of PF can be distinguished: endurance, strength, speed, and coordination, with flexibility as an additional passive dimension [12]. This definition is based on the concept of physical fitness by Caspersen, Powell & Christenson [13] and is the basic of this analyses.

In many parts of life, systematic monitoring is used to document changes in society and to describe their course over a certain period of time. Considering the high impact of PF on health in childhood and adolescence, it is crucial to examine how PF has changed over time in children and adolescents. Systematic monitoring of PF is thus needed to assess, and design interventions and programs aiming to maintain or increase PF [14–16].

2. Objectives

The objective of this review is to summarize the evidence regarding secular trends in physical fitness of children and adolescents in large- scale epidemiological studies published after 2006

3. Inclusion criteria

Population / participants	Participants between the ages of 4 to 18 years
Interest / exposure	No intervention
Comparison group	Comparison(s) with former measurement point(s)
Outcome of interest	Statements of trends in the different dimensions of physical fitness (endurance, strength, speed, flexibility and coordination)

Study design	Cohort studies with at least two different measurement points
Other criteria	Single study articles published in peer-reviewed journals (full-texts) English language
Exclusion criteria	• Study populations characterized by a physical disease or conducted in a clinical setting, such as diabetes or preterm birth. Additionally, studies among participants with a competitive athletic background • Study population N <100 • Studies analyzing relations, effects or influences of a specific variable such as socio-demographic status • Articles published in any other language than English
4. Search Methods	
Electronic Databases	The following databases will be searched: PubMed
5. Methods of the Review	
Details of methods	All identified articles are exported to a reference manager program. In a first step, duplicates will be removed. In the second step, articles will be screened based on title and abstract, and in the third step, based on full-texts. The whole screening process will be conducted by two reviewers independently. Two main reviewers (Tanja Eberhardt, Lydia Buchal) will review the studies. Studies will be included based on agreement of two reviewers, a third reviewer will be contacted (Claudia Niessner) for any disagreements. The same approach will be taken for the study quality assessment.
Quality assessment	EPHPP Assessment tool
Data extraction	Data will be extracted and summarized in a table, including: • Authors and year • Country • Period • Measurements • Age • Sample size • Dimension of physical fitness tested • Test Items
Data synthesis	• Categorization into three directions of trends Increase- Stagnation- Decrease

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