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**Background:** Restrictions during the COVID-19 pandemic induced changes in the fitness behavior of children and adolescents, which may be associated with long-term public health challenges. This systematic review analyses how physical fitness has changed during the pandemic and to what extent the changes remain in the aftermath of the pandemic.

**Methods:** We conducted a systematic search in seven databases with a peer-reviewed search string for studies until Dec 2023. Our inclusion criteria encompassed studies with children and adolescents  $\leq 19$  years living in the WHO European Region and in which validated measurements were used (single measurements or test batteries). Eligibility screening, data extraction and risk of bias assessment (using ROBINS-E instrument) were all carried out independently by two reviewers. We published an a priori protocol in a peer-review journal and conducted reporting in accordance with the PRISMA 2020 statement. Trial registration: PROSPERO: CRD42023395871.

**Results:** Our search retrieved 28 studies from 15 WHO European Region countries with an age range from 5 to 19 years. Physical fitness was reported in 21 validated single measurements (e.g. 20 m shuttle run, handgrip strength, standing long jump) and 9 validated test batteries (e.g. Alpha-Fitness Battery, German Motor Test, International Physical Performance Test Profile). The preliminary analyses pointed to a sharp decline in youth physical fitness during the COVID-19 pandemic. After restrictions were eased, physical fitness improved, but remained under pre-pandemic levels, particularly in boys.

**Conclusions:** The findings indicate a potential suboptimal behavioral adaptation of children and adolescents after the COVID-19 pandemic. Medium and long-term programs to change passive behavior and improve physical fitness are urgently needed. In addition to individual prevention programs, stronger consideration should also be given to schools and sport clubs regarding activities promoting physical fitness.

**Key messages:**

- Physical fitness in children and adolescents remains below pre-pandemic levels after restrictions removal.
- Initiating immediate public health action to increase physical fitness is urgently needed.

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**Physical fitness in youth: a systematic review of changes during and after the COVID-19 pandemic**

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