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EFFECTS OF GRASSROOTS FOOTBALL PROGRAMS ON PHYSICAL FITNESS IN YOUNG SCHOOL AGED CHILDREN: A SYSTEMATIC REVIEW

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ABSTRACT

Grassroots football programmes represent accessible football-based interventions that may support physical fitness development in young school-aged children through structured, enjoyable and game-based physical activity. This systematic review aimed to synthesize the available evidence on the effects of grassroots football programmes on physical fitness in young school-aged children. Following PRISMA guidelines, relevant studies published up to April 2026 were searched in PubMed, Web of Science, Scopus and Google Scholar, with supplementary searches conducted through additional sources. Of the 512 records initially identified, 11 studies met the eligibility criteria and were included in the final synthesis (N=11). The 11 included studies comprised a total sample of 3,674 children, with six studies examining the "11 for Health" programme and five studies examining recreational football interventions. The most consistent findings were observed for cardiorespiratory fitness, with improvements in VO2max reported in most studies that assessed this outcome, while blood pressure changes were generally favorable but less uniform. Motor abilities also improved in several studies, particularly balance, explosive power, sprint performance and agility. Body composition findings were generally favorable, especially for body fat percentage and fat-free mass, although changes in BMI and body mass were less consistent. Overall, the findings suggest that grassroots football programmes may represent a practical and promising strategy for improving physical fitness in young school-aged children.

Key words: grassroots football, young school kids, body composition, motor abilities, cardiorespiratory fitness.

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INTRODUCTION

Football is the most popular sport in the world and represents one of the most accessible forms of organized and recreational physical activity for children (Fédération Internationale de Football Association, 2011). In childhood, football is not only a competitive sport, but also a play-based activity that includes running, jumping, turning, kicking, acceleration, deceleration, cooperation and decision-making in a socially engaging environment (Bangsbo, Mohr, & Krustrup, 2006; Krustrup, Dvorak, & Bangsbo, 2016). Because of these characteristics, football is suitable for school and community settings, especially when the aim is to increase children's participation in regular physical activity (North, Lara-Bercial, & Morgan, 2014; Bangsbo, Krustrup, Duda, Hillman, Andersen et al., 2016). A large proportion of children are introduced to the game through grassroots football, which refers to the non-elite and participatory level of football, mainly focused on inclusion, enjoyment, learning and broad access rather than competitive performance (Fédération Internationale de Football Association, 2011). In the context of child development, grassroots football may therefore represent a practical strategy for improving physical activity levels and supporting different aspects of physical fitness in young school-aged children. This is important because regular physical activity during childhood is associated with favorable health outcomes, while physical inactivity remains a major public health concern among children and adolescents (Bangsbo, Krustrup, Duda, Hillman, Andersen et al., 2016; van Sluijs, Ekelund, Crochemore-Silva, Guthold, Ha et al., 2021).

Physical fitness is a multidimensional construct that includes health-related and performance-related attributes related to the ability to perform physical activity (Caspersen, Powell, & Christenson, 1985). In the present review, physical fitness is considered through three main domains: body composition, motor abilities and cardiorespiratory fitness. Body composition refers to the structure of body mass and includes indicators such as fat mass, fat-free mass and body mass index (Ratamess, 2012; Nuttall, 2015). Motor abilities include capacities such as speed, agility, strength, balance and explosive power, which are important for efficient movement and participation in sport and physical activity during childhood (Bompa & Carrera, 2015). Cardiorespiratory fitness reflects the ability of the cardiovascular and respiratory systems to support sustained physical activity and represents one of the key components of health-related fitness (Vanhees et al., 2005). Football-based activities may influence these domains because they combine intermittent high-intensity movement, repeated accelerations, changes of direction, jumping, balance demands and small-sided play (Bangsbo, Mohr, & Krustrup, 2006; Bangsbo, Hansen, Dvorak, & Krustrup, 2015).

Among the most recognized grassroots football programmes are the "11 for Health" programme and recreational football. The "11 for Health" programme was developed as a school-based intervention that combines a football component, "Play Football", with a health-education component, "Play Fair" (Fuller, Junge, DeCelles, Donald, Jankelowitz et al., 2010; Fuller, Junge, Dorasami, DeCelles, & Dvorak, 2011). Although the "11 for Health" programme was originally designed to

improve health knowledge and promote healthy behavior (Fuller, Junge, DeCelles, Donald, Jankelowitz et al., 2010; Fuller, Junge, Dorasami, DeCelles, & Dvorak, 2011), several studies also examined its effects on physical fitness outcomes (Ørntoft, Fuller, Larsen, Bangsbo, Dvorak et al., 2016; Skoradal, Purkhús, Steinholm, Olsen, Ørntoft et al., 2018; Ryom, Christiansen, Elbe, Aggestrup, Madsen et al., 2022; Li et al., 2023). Positive effects have been reported in different physical fitness variables. Improvements in body composition were reported after "11 for Health" interventions in Danish, Faroese and Chinese schoolchildren (Ørntoft, Fuller, Larsen, Bangsbo, Dvorak et al., 2016; Lind, Geertsen, Ørntoft, Madsen, Larsen et al., 2018; Skoradal, Purkhús, Steinholm, Olsen, Ørntoft et al., 2018; Li et al., 2023). Improvements in sprint performance were also observed in several intervention studies (Ørntoft et al., 2016; Skoradal et al., 2018; Ryom, Christiansen, Elbe, Aggestrup, Madsen et al., 2022; Li et al., 2023). In addition, favorable changes were found in explosive power, balance and cardiorespiratory fitness, although the direction and magnitude of these effects differed across studies (Skoradal et al., 2018; Ryom et al., 2022; Li et al., 2023). Recreational football interventions have also been examined in children, although the reported effects differ across physical fitness variables. In relation to body composition, Cvetković, Stojanović, Stojiljković, Nikolić, Scanlan et al. (2018b) reported increased body mass and reduced body fat percentage, while Wang, Cao, Xie, and Wang (2018) found reductions in body fat percentage and muscle mass. By contrast, Krustrup, Hansen, Nielsen, Larsen, Randers et al. (2014) and Larsen, Madsen, Nielsen, Manniche, Hansen et al. (2020) did not report meaningful changes in body mass or body fat percentage. Improvements in explosive power and flexibility were reported by Cvetković, Stojanović, Stojiljković, Nikolić, and Milanović (2018a), while Cvetković et al. (2018b) also found improvements in explosive power and agility. Wang et al. (2018) reported favorable changes in sprint performance, reaction time and explosive power, as well as improvements in cardiorespiratory fitness, reflected in increased VO2max. Improvements in cardiorespiratory fitness were also observed by Cvetković et al. (2018b), who reported increased VO2max and reduced diastolic blood pressure, while Larsen, Madsen, Nielsen, Manniche, Hansen et al. (2020) found reductions in systolic and diastolic blood pressure. Additionally, recreational football interventions have also been examined in children and have shown favorable effects on physical fitness, especially aerobic capacity, sprint performance and selected motor abilities (Krustrup, Hansen, Nielsen, Larsen, Randers et al., 2014; Cvetković, Stojanović, Stojiljković, Nikolić, & Milanović, 2018a; Cvetković, Stojanović, Stojiljković, Nikolić, Scanlan et al., 2018b; Wang, Cao, Xie, & Wang, 2018; Larsen, Madsen, Nielsen, Manniche, Hansen et al., 2020). These findings suggest that both structured school-based football programmes and recreational football training may be useful for improving physical fitness in young school-aged children.

Previous reviews have already addressed related topics, but the available evidence remains partly dispersed. Milanović et al. (2019) showed broad-spectrum physical fitness benefits of recreational football, while Clemente, Moran, Ramirez-Campillo, Oliveira, Brito et al. (2022) reviewed the effects of recreational soccer training on physical fitness and health-related outcomes in pediatric populations. In addition,

Mao, Zhang, Li, Cao, Ding et al. (2022) reported that football practice may improve children's fundamental movement skills, including sprinting, jumping, object control and balance-related outcomes. However, these reviews were not specifically focused on grassroots football programmes in young school-aged children, nor did they synthesize the evidence from both "11 for Health" and recreational football interventions with physical fitness as the central outcome. At the same time, individual intervention studies differ in sample characteristics, intervention duration, weekly frequency, outcome measures and reported fitness components, which makes a focused synthesis necessary. Based on the available evidence, grassroots football programmes may represent an accessible, enjoyable and organizationally feasible strategy for increasing children's physical activity and improving relevant physical fitness components. This is particularly important in school and community settings, where interventions should be attractive to children, simple to implement and capable of producing meaningful health-related effects. However, although the effects of "11 for Health" and recreational football have been examined in several original studies, the evidence on body composition, motor abilities and cardiorespiratory fitness has not been sufficiently integrated within one systematic review focused on young school-aged children. Therefore, the aim of this systematic review was to synthesize and critically evaluate the available evidence on the effects of grassroots football programmes on physical fitness in young school-aged children.

METHODS

Search Strategy

This systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) statement (Page et al., 2021). The search for scientific literature relevant to this review was performed in PubMed, Web of Science, Scopus and Google Scholar. In addition, supplementary searches were conducted through ResearchGate and Academia.edu to identify potentially relevant full-text records and additional sources not retrieved through the primary databases. The reference lists of all eligible studies were also manually reviewed in order to identify further relevant publications. No time restrictions were applied. All relevant studies available up to June 2026 were considered. Searches were performed primarily in Title/Abstract fields, and, where applicable, Medical Subject Headings (MeSH) were also used in PubMed. Logical operators AND and OR were applied to combine search terms. The main keywords and their combinations included: "11 for Health", "Football for Health", "grassroots football", "recreational football", "football training", "soccer training", "physical fitness", "body composition", "motor abilities", "speed", "agility", "explosive power", "balance", "cardiorespiratory fitness", "VO2max", "children", "schoolchildren", and "young school-aged children". A typical search strategy combined intervention-related terms with outcome and population-related terms, for example: ("11 for Health" OR "Football for Health" OR "grassroots football" OR "recreational football" OR "soccer training") AND ("physical fitness" OR "body composition" OR "motor abilities" OR "speed" OR "agility" OR

"explosive power" OR "cardiorespiratory fitness" OR "VO2max") AND ("children" OR "schoolchildren" OR "young school-aged children").

Eligibility Criteria and Study Selection

Studies were considered eligible if they met the following criteria: (1) focused on young school-aged children, with the included studies covering children aged 6 to 12 years; (2) evaluated grassroots football programmes, including the "11 for Health" programme and recreational football interventions; (3) reported outcomes related to physical fitness, including body composition, motor abilities and/or cardiorespiratory fitness; and (4) were original full-text studies with quantitative or mixed-methods designs that allowed extraction of relevant outcome data. No language restrictions were applied. Studies were excluded if they examined programmes other than grassroots football, did not report relevant physical fitness outcomes, or were review papers, theses, dissertations, or preprints. Two reviewers (S.S, T.I.) independently screened titles, abstracts, and full texts for eligibility. Any disagreements were resolved through discussion, and a third reviewer (Z.M.) was involved in the final decision-making process when necessary. The study selection process was documented in accordance with PRISMA principles and will be presented in a flow diagram (Figure 1).

Data Extraction

Data were extracted independently from the included studies and then cross-checked among the reviewers. The following variables were extracted: author(s), sample characteristics, sex, sample size, age, programme type, programme duration, frequency of intervention, exercise content, and the main findings related to physical fitness. Physical fitness outcomes were grouped into three domains: body composition, motor abilities and cardiorespiratory fitness. When needed, reference list screening of the included studies was repeated in order to confirm eligibility and ensure that no relevant study had been overlooked. A formal methodological quality assessment or risk-of-bias assessment was not performed in the present review.

RESULTS

The initial search identified 512 records through database searching in PubMed, Web of Science, Scopus and Google Scholar. Before screening, 94 duplicate records were removed, while an additional 298 records were excluded for other reasons. As a result, 120 records remained for screening. After title and abstract screening, 83 records were excluded because they were not related to the outcomes of interest. The full texts of the remaining 37 reports were assessed for eligibility. Following full-text evaluation, 20 studies were excluded because they examined other programmes, and 6 studies were excluded because they did not report relevant physical fitness outcomes. Ultimately, 11 studies (six for 11 for Helath and 5 for recreational football) met the eligibility criteria and were included in the final review. The included studies were published between 2014 and 2023, indicating growing scientific interest in the

effects of grassroots football programmes on physical fitness in young school-aged children. The study selection process is presented in Figure 1.

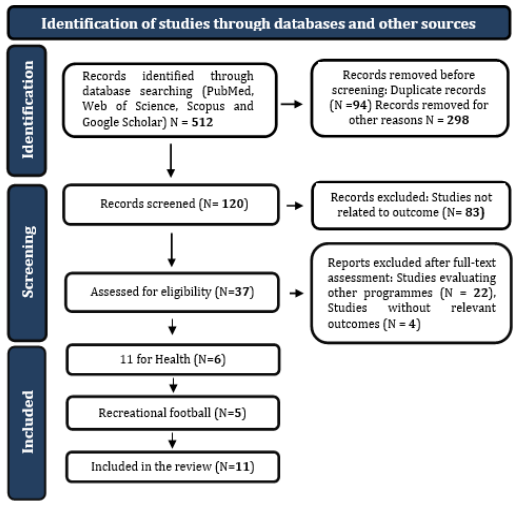

Figure. 1 PRISMA flow chart of the included studies

Study characteristics

The 11 included studies were published between 2014 and 2023 and all represented original intervention-based investigations of grassroots football programmes in young school-aged children. Six studies examined the "11 for Health" programme (Ørntoft et al., 2016; Lind et al., 2018; Skoradal et al., 2018; Ryom et al., 2022; Larsen et al., 2023; Li et al., 2023), while five studies examined recreational football interventions (Krustrup et al., 2014; Cvetković et al., 2018a; Cvetković et al., 2018b; Wang et al., 2018; Larsen et al., 2020), so the review was based exclusively on primary intervention studies. The total sample comprised 3,674 children, with sex reported in 10 studies, including 1,892 boys and 1,550 girls, while one study did not provide sex-specific data (Larsen et al., 2020). Sample sizes ranged from 38 participants (Wang et al., 2018) to 1,122 participants (Ryom et al., 2022), and the included samples covered children aged from 6 to 13 years, with most studies focused on children aged between 8 and 12 years.

The intervention duration ranged from 10 to 43 weeks, with "11 for Health" usually lasting 11 weeks and being delivered two times per week for 45 minutes, except in Li et al. (2023), where it was delivered three times per week for 35 minutes. Recreational football interventions lasted from 10 to 43 weeks, with two to three sessions per week and session duration from 40 to 60 minutes. Intervention content mainly included basic technical football elements, small-sided games, elementary games, shuttle runs and, in the "11 for Health" studies, an educational component. Physical fitness outcomes, for this review, were grouped into body composition, motor abilities and cardiorespiratory fitness.

Table 1. Overview of Previous Studies

Author(s) and year	Participants N, sex and age	Experimental program	PHYSICAL FITNESS		
			Body composition	Motor abilities	Cardiorespiratory parameters
11 FOR HEALTH					
Ørntoft et al. (2016)	N = 546 304M, 242F 11.1 ± 0.4 y	11 weeks; 2 × 45 min; BTE + EdC	↓BMI* -0.02kg/m^2 ↓%BF* -0.83%	↓ SPD* (S20) 0.03s Ø BAL Ø EP	↓SBP** -3.5% ↓DBP* -1.9% ↑VO2max*
Lind et al. (2018)	N = 931 479M, 452F 11.8 ± 0.3y	11 weeks; 2 × 45 min; BTE + EdC	↓ BM*	/	/
Skoradal et al. (2018)	N = 392 207M, 185F 11.1 ± 0.3y	11 weeks; 2 × 45 min; BTE + EdC	↑ FFM* +1.0% ↓%BF* -0.6%	↑BAL* +0.3s ↑EP* +5.9%	↓ SBP** -2.8% ↑VO2max* +18%
Ryom et al. (2022)	N = 1122 596M,526F 10–12y	11 weeks; 2 × 45 min; BTE + EdC	↓BMI*-0.13kg/m^2	↑BAL* +0.75s	↑VO2max* +3.5% Ø SBP Ø DBP
Larsen et al. (2023)	N=108 62M, 46F 10–12y	11 weeks; 2 × 45 min; BTE + EdC	↑FFM* ↓%BF* -0.6%	↑BAL* -0.5s Ø EP	/
Li et al. (2023)	N = 124 73M, 51F 9–11 years	11 weeks; 3 × 35 min; BTE + EdC	↓BM* -0.4kg	↑BAL* +13%; ↑EP* +5% ↓SPD** (S30) 4.1%	↓SBP** -2.9% ↑VO2max* +17%
RECREATIONAL FOOTBALL					
Krustrup et al. (2014)	N = 97 49M, 48F 9.4 ± 0.4 y	10 weeks; 3 × 40 min; BTE + 3v3 games	ØBM	/	Ø HR Ø SBP Ø DBP
Cvetković et al. (2018a)	N=42 42 M 11–13y	12 weeks; 2 × 60 min; BTE	/	↑EP* +6.57% ↑FLX* +6.21% ØSPD (S10) ØSPD (S30)	/
Cvetković et al. (2018b)	N=42 42 M 11–13y	12 weeks; 2 × 60 min; BTE + 4 × 8 min game	↑FFM* +4.3% ↓%BF** -7.7%	↑EP** +17%; ↓AG 10.6%	↑VO2max** +7.8% ↓DBP** -8.6%
Wang et al. (2018)	N = 38 38M 9.5 ± 0.7 y	10 weeks; 3 × 60 min; EG + BTE + shuttle runs	↓ %BF* -2.42% ↓FM* -0.93	↓ SPD* (S50) -0.9; ↑ BAL* ↑ EP*	↑VO2max* +3.42%
Larsen et al. (2020)	N = 232; / 8–10 y	43 weeks; 2 × 45 min; BTE + 3v3 games	Ø BM Ø %BF	/	↓ SBP* -1.8% ↓DBP* -1.32%

Legend: M - male; F - female; N - number of participants; * - statistical significance at $p < .05$; ** - statistical significance below $p < .05$; ↑ - increase/improvement; ↓ - decrease/reduction; Ø - unchanged; BTE - basic technical elements; EdC - educational component; EG - elementary games; BMI - body mass index; %BF - body fat percentage; BM - body mass; FFM - fat-free mass; FM - fat mass; BAL - balance; EP - explosive power; SPD - speed; AG - agility; FLX - flexibility; S10 - 10 m sprint test; S20 - 20 m sprint test; S30 - 30 m sprint test; S50 - 50 m sprint test; HR - heart rate; SBP - systolic blood pressure; DBP -diastolic blood pressure; VO2max - maximal oxygen consumption; y – years.

The most consistent findings across the reviewed studies were positive changes in physical fitness, i.e. in body composition, motor abilities and cardiorespiratory fitness. In relation to body composition, reductions in body fat percentage were reported in several studies, with decreases ranging from 0.6% to 7.7% (Ørntoft et al., 2016; Skoradal et al., 2018; Cvetković et al., 2018b; Wang et al., 2018; Larsen et al., 2023). Improvements in fat-free mass were also observed in three studies, with increases ranging from 1.0% to 4.3% where numerical values were reported (Skoradal et al., 2018; Cvetković et al., 2018b; Larsen et al., 2023). BMI was reduced in two "11 for Health" studies, although the magnitude of change was small (Ørntoft et al., 2016; Ryom et al., 2022). Body mass showed mixed findings, as Lind et al. (2018) and Li et al. (2023) reported reductions, whereas Krustrup et al. (2014) and Larsen et al. (2020) found no meaningful changes. Overall, the reviewed evidence indicates that grassroots football programmes may contribute to favorable body composition changes in young school-aged children, particularly through reductions in body fat percentage and improvements in fat-free mass.

Motor abilities were also improved in several studies, but the effects were not equally present across all variables. Improvements in balance were reported in five studies, although the magnitude and direction of measurement differed across tests (Skoradal et al., 2018; Wang et al., 2018; Ryom et al., 2022; Larsen et al., 2023; Li et al., 2023). Explosive power improved in five studies, with reported increases ranging from 5.0% to 17.0% in studies that provided numerical values (Skoradal et al., 2018; Cvetković et al., 2018a; Cvetković et al., 2018b; Wang et al., 2018; Li et al., 2023). Sprint performance improved in three studies, including changes in 20 m, 30 m and 50 m sprint tests (Ørntoft et al., 2016; Wang et al., 2018; Li et al., 2023), while two studies reported no changes in 10 m and 30 m sprint performance (Cvetković et al., 2018a) or no changes in explosive power (Ørntoft et al., 2016; Larsen et al., 2023). Agility and flexibility were less frequently assessed, but favorable changes were reported for agility in Cvetković et al. (2018b) and for flexibility in Cvetković et al. (2018a). Taken together, these findings suggest that grassroots football programmes are especially useful for improving motor abilities that are closely related to the movement demands of football, such as explosive power, balance, agility and sprint performance.

Cardiorespiratory parameters showed favorable changes in most studies in which they were assessed. Improvements in VO2max were reported after both "11 for Health" and recreational football interventions, with increases ranging from 3.42% to 18% across the studies that measured this outcome (Ørntoft et al., 2016; Skoradal et al., 2018; Cvetković et al., 2018b; Wang et al., 2018; Ryom et al., 2022; Li et al., 2023). Blood pressure changes were also generally favorable, although less uniform than VO2max. Reductions in systolic blood pressure were reported by Ørntoft et al. (2016), Skoradal et al. (2018), Li et al. (2023), and Larsen et al. (2020), while reductions in diastolic blood pressure were found by Ørntoft et al. (2016), Cvetković et al. (2018b), and Larsen et al. (2020). In contrast, Ryom et al. (2022) found no changes in systolic or diastolic blood pressure. Overall, the results indicate that grassroots football programmes may have particularly consistent effects on cardiorespiratory fitness, especially through improvements in VO2max and favorable changes in blood pressure indicators.

DISCUSSION

The aim of this review was to synthesize and critically evaluate the available evidence on the effects of grassroots football programmes on physical fitness in young school-aged children. The most consistent findings across the reviewed studies were positive changes in physical fitness, i.e. in body composition, motor abilities and cardiorespiratory fitness. Improvements were most consistent for VO2max and selected motor abilities, while body composition changes were generally favorable but less uniform. These findings suggest that grassroots football programmes may represent a useful school and community-based strategy for improving physical fitness in children.

Body Composition

In relation to body composition, reductions in body fat percentage were reported in several studies, with decreases ranging from 0.6% to 7.7% (Ørntoft et al., 2016; Skoradal et al., 2018; Cvetković et al., 2018b; Wang et al., 2018; Larsen et al., 2023). Improvements in fat-free mass were also observed in three studies, with increases ranging from 1.0% to 4.3% where numerical values were reported (Skoradal et al., 2018; Cvetković et al., 2018b; Larsen et al., 2023). BMI was reduced in two "11 for Health" studies, although the magnitude of change was small (Ørntoft et al., 2016; Ryom et al., 2022). Body mass showed mixed findings, as Lind et al. (2018) and Li et al. (2023) reported reductions, whereas Krustrup et al. (2014) and Larsen et al. (2020) found no meaningful changes. This pattern is generally in line with the broader literature showing that regular and sufficiently intense physical activity in children and adolescents is associated with more favorable adiposity and cardiometabolic indicators (Chaput, Willumsen, Bull, Chou, Ekelund et al., 2020). Football-based activity may influence body composition because it combines running, accelerations, decelerations, changes of direction and repeated game actions, which increase energy expenditure and provide both aerobic and neuromuscular stimulus. Similar effects have been reported in school-based and interval-type interventions, where improvements in body composition were more visible when exercise intensity was sufficient and the programme was repeated over several weeks (Martin-Smith, Cox, Buchan, Baker, Grace et al., 2020; Meng, Tang, Li, & Zou, 2022). However, the mixed findings for body mass and BMI are not unexpected. In children, growth and maturation may increase body mass even when fat mass decreases, while BMI cannot distinguish between fat mass and fat-free mass. Therefore, reductions in body fat percentage and increases in fat-free mass should be considered more informative than body mass alone.

Motor Abilities

Motor abilities were also improved in several studies, but the effects were not equally present across all variables. Improvements in balance were reported in five studies, although the magnitude and direction of measurement differed across tests

(Skoradal et al., 2018; Wang et al., 2018; Ryom et al., 2022; Larsen et al., 2023; Li et al., 2023). Explosive power improved in five studies, with reported increases ranging from 5.0% to 17.0% in studies that provided numerical values (Skoradal et al., 2018; Cvetković et al., 2018a; Cvetković et al., 2018b; Wang et al., 2018; Li et al., 2023). Sprint performance improved in three studies, including changes in 20 m, 30 m and 50 m sprint tests (Ørntoft et al., 2016; Wang et al., 2018; Li et al., 2023), while two studies reported no changes in 10 m and 30 m sprint performance (Cvetković et al., 2018a) or no changes in explosive power (Ørntoft et al., 2016; Larsen et al., 2023). Agility and flexibility were less frequently assessed, but favorable changes were reported for agility in Cvetković et al. (2018b) and for flexibility in Cvetković et al. (2018a). These results are plausible because football exposes children to repeated multidirectional and explosive movements. Sprinting, stopping, turning, landing, kicking and reacting to game situations create a neuromuscular stimulus that is directly related to speed, agility, balance and explosive power (Seifert, Button, & Davids, 2013). The findings are consistent with evidence showing that physical education and structured school activity can improve health-related fitness and movement-related outcomes in youth (García-Hermoso, Alonso-Martínez, Ramírez-Vélez, Pérez-Sousa, Ramírez-Campillo et al., 2020). They are also in line with recommendations that youth physical activity should include activities that strengthen muscles and bones, not only continuous aerobic exercise (Bull, Al-Ansari, Biddle, Borodulin, Buman et al., 2020). The absence of improvement in some tests may be explained by differences in programme content, test sensitivity and baseline fitness. For example, a programme with more small-sided games and changes of direction may be more likely to improve agility, while explosive power may require a larger amount of jumping, sprinting and high-force actions.

Cardiorespiratory Fitness

Cardiorespiratory parameters showed favorable changes in most studies in which they were assessed. Improvements in VO2max were reported after both "11 for Health" and recreational football interventions, with increases ranging from 3.42% to 18% across the studies that measured this outcome (Ørntoft et al., 2016; Skoradal et al., 2018; Cvetković et al., 2018b; Wang et al., 2018; Ryom et al., 2022; Li et al., 2023). Blood pressure changes were also generally favorable, although less uniform than VO2max. Reductions in systolic blood pressure were reported by Ørntoft et al. (2016), Skoradal et al. (2018), Li et al. (2023), and Larsen et al. (2020), while reductions in diastolic blood pressure were found by Ørntoft et al. (2016), Cvetković et al. (2018b), and Larsen et al. (2020). In contrast, Ryom et al. (2022) found no changes in systolic or diastolic blood pressure. The consistency of VO2max improvements is probably related to the intermittent intensity profile of football. Small-sided games and football drills repeatedly alternate moderate, high and very high intensity actions with short recovery periods, which may stimulate aerobic adaptation in a time-efficient way. This interpretation is supported by evidence that high-intensity and interval-type activity improves cardiorespiratory fitness in adolescents (Martin-Smith et al., 2020). It is also important from a health perspective, because higher cardiorespiratory fitness during youth is associated with lower later risk of obesity and cardiometabolic disease

(García-Hermoso, Ramírez-Vélez, García-Alonso, Alonso-Martínez, & Izquierdo, 2020). The less uniform blood pressure findings may reflect the fact that most children were healthy and probably had normal baseline values, leaving less room for improvement. Nevertheless, the repeated VO2max improvements and several favorable blood pressure changes suggest that grassroots football programmes have a particularly strong potential for improving cardiorespiratory fitness in young school-aged children.

This review has several limitations that should be considered when interpreting the findings. First, the evidence base was relatively small and consisted of 11 studies. Second, the included studies differed in sample size, age range, programme duration, weekly frequency, intervention content and outcome measures. Third, not all studies assessed all three domains of physical fitness, which means that the evidence is stronger for some outcomes, especially VO2max, than for others. Fourth, the absence of a formal risk-of-bias assessment limits the strength of methodological conclusions. Fifth, most outcomes were reported immediately after the intervention, so the long-term maintenance of body composition, motor abilities and cardiorespiratory fitness changes remains unclear.

CONCLUSION

The analysis showed that grassroots football programmes generally improve physical fitness in young school-aged children, particularly in relation to cardiorespiratory fitness, selected motor abilities and certain body composition indicators. The most consistent effects were observed for VO2max, while favorable changes were also found in balance, explosive power, sprint performance, body fat percentage and fat-free mass. Although the present review cannot provide final conclusions on all aspects of programme effectiveness, especially because the included studies differed in programme structure, duration and outcome measures, the findings confirm that grassroots football has an important place in school- and community-based physical activity promotion. The results also suggest practical value for teachers, coaches and health-promotion practitioners, because these programmes use football activities that are accessible, enjoyable and suitable for group work with children. Future research should include larger and methodologically diverse studies, standardized physical fitness testing procedures, longer follow-up periods and more detailed reporting of programme intensity, adherence and exercise content in order to strengthen the evidence base further.

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