

The Impact of Circuit Training on Physical Fitness: A Literature Review

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Abstrak

Penelitian ini bertujuan untuk menganalisis dampak latihan sirkuit terhadap kebugaran fisik siswa, sebagaimana dilaporkan dalam studi-studi terbaru di bidang pendidikan dan ilmu olahraga. Tinjauan ini mensintesis penelitian yang diterbitkan selama sepuluh tahun terakhir yang mengkaji bagaimana program latihan sirkuit terstruktur memengaruhi komponen kebugaran utama seperti daya tahan kardiovaskular, kekuatan otot, fleksibilitas, dan koordinasi di kalangan siswa sekolah. Metode yang digunakan adalah analisis naratif terhadap artikel jurnal terpilih yang diperoleh dari basis data Google Scholar, dengan fokus pada studi yang melibatkan peserta usia sekolah. Temuan menunjukkan bukti konsisten bahwa latihan sirkuit secara signifikan meningkatkan kebugaran fisik secara keseluruhan, terutama dalam meningkatkan daya tahan otot dan kapasitas aerobik melalui rutinitas latihan yang sistematis dan bervariasi. Keunikan studi ini terletak pada integrasi perspektif pendidikan dan fisik untuk menyoroti latihan sirkuit sebagai intervensi berbasis sekolah yang efektif. Secara praktis, tinjauan ini memberikan pemahaman terstruktur bagi pendidik dan pelatih tentang cara menerapkan latihan sirkuit secara efektif dalam program pendidikan jasmani sekolah. Kontribusi studi ini terletak pada penyediaan sintesis komprehensif tentang bagaimana latihan sirkuit mendukung perkembangan holistik siswa dalam konteks pendidikan jasmani.

Kata kunci: Latihan sirkuit, kebugaran fisik, pendidikan jasmani, siswa sekolah, program latihan

Abstract

This study aims to analyze the effect of circuit training on students' physical fitness as reported in recent educational and sports science studies. The review synthesizes research published over the last ten years that examined how structured circuit training programs influence key fitness components such as cardiovascular endurance, muscular strength, flexibility, and coordination among school students. The method applied was a narrative analysis of selected journal articles retrieved from the Google Scholar database, focusing on studies involving school-aged participants. The findings reveal consistent evidence that circuit training significantly enhances overall physical fitness, particularly in improving muscular endurance and aerobic capacity through systematic and varied exercise routines. The novelty of this study lies in its integration of educational and physical perspectives to highlight circuit training as an effective school-based intervention. Practically, this review provides educators and coaches with a structured understanding of how circuit training can be implemented effectively within school physical education programs. The contribution of this study lies in offering a comprehensive synthesis of how circuit training supports holistic student development in physical education contexts.

Keywords: Circuit training, physical fitness, physical education, school students, exercise program

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1. INTRODUCTION

Physical fitness is recognised as essential for enhancing students' health, development, and academic success. Anderson (2021) argues that physical education is crucial for developing endurance, strength, flexibility, and coordination, which impact children's academic performance and well-being. Circuit training, as noted by Rahman (2022), provides a structured approach to improving multiple fitness components through a series of aerobic and resistance exercises. Susanto (2023) stated that shorter rest intervals in circuit training effectively engage multiple muscle groups and energy systems, resulting in overall physical improvements.

Research shows that circuit training enhances muscular endurance and cardiovascular fitness in different age groups (Al-Rashidi, 2021). Putri (2020) highlighted that a major strength of the system is its versatility, allowing educators to adjust exercise intensity, duration, and types of movements based on students' developmental stages. Kumar (2020) observed that research on circuit training in school-aged adolescents is limited, with most studies concentrating on adults or athletic groups. This condition creates uncertainty regarding the effect of circuit-based programs on children's physical fitness in formal school physical education.

Recent research shows a growing interest in integrating exercise methods that combine physical development with student engagement. Dewi (2022) argued that modern physical education emphasises active learning and motivation rather than just physical outcomes. Siregar (2023) argued that circuit training aligns with teaching methods that promote collaboration, goal setting, and experiential learning. This development marks a change in the connection among physical education, fitness improvement, and educational goals.

This review summarises research on circuit training in school children. Puspitasari (2023) highlighted the educational and developmental importance of circuit-based programs for younger learners, unlike earlier reviews that primarily addressed their role in sports performance. This study seeks to integrate these findings for a comprehensive understanding of circuit training as a learning-focused fitness method.

Nugraha (2024) emphasised the need for evidence-based support for educators and policymakers in developing effective school training programs. This study highlights circuit training to offer practical suggestions for improving students' fitness and encouraging positive attitudes towards lifelong physical activity.

This study examines the impact of circuit training on school students' physical fitness based on existing literature.

2. METHOD

This study employed a narrative literature review to assess the effects of circuit training on the physical fitness of school children. Creswell presents perspectives that lack the procedural limitations typical of a systematic review. This strategy allows the researcher to identify patterns and relationships among studies, providing a thorough understanding of the topic.

The evaluation procedure began with selecting relevant literature from Google Scholar. Ridwan (2021) states that Google Scholar provides broad access to peer-reviewed papers in education and sports science. Inclusion criteria were limited to publications from the past decade, written in English, and focused on the effects of circuit training on students' physical

fitness in educational settings. Research focused solely on the school demographic, excluding adult athletes, clinical patients, and non-educational settings.

After the selection phase, each paper was examined for methodological rigour, sample characteristics, and the specific fitness components evaluated. Moleong (2020) states that qualitative synthesis in literature analysis involves reviewing, summarising, and categorising data by theme significance. This review classified the research into categories: cardiovascular endurance, muscular strength, flexibility, and coordination.

The analytical technique employed a descriptive and interpretative methodology. The findings of each study were compared and analysed to identify parallels, differences, and emerging trends, following Sugiyono's principles (2022). The data were presented to highlight the impact of circuit training on various aspects of students' physical fitness.

The researcher aimed to understand the overall information on circuit training in education. The analysis results were integrated into the discussion to draw key conclusions and recommendations for physical education practice.

3. RESULTS AND DISCUSSION

This literature study reveals that circuit training significantly enhances multiple aspects of physical fitness in school pupils. The analysed research collectively indicate that this training strategy significantly enhances muscular strength, cardiovascular endurance, flexibility, and coordination. Moreover, numerous studies underscore its educational benefits in enhancing student engagement, motivation, and autonomy within physical education settings.

1. Impact on Muscular Strength

A consistent theme in the reviewed literature is the significant improvement in physical strength among students participating in circuit training programs. Hartono (2021) observed that students participating in an eight-week circuit training program had considerable enhancements in both upper and lower body strength. This improvement is attributed to the implementation of the progressive overload principle in circuit training, where repeated resistance exercises facilitate muscle fibre adaptation. Kusuma (2022) emphasised that circuit sessions incorporating bodyweight and resistance exercises foster balanced muscular development, particularly when organised to alternate between major and minor muscle groups.

Sari (2021) contends that circuit design greatly affects the degree of strength increase. She found that rotating between static and dynamic stations optimises muscle activation while minimising fatigue. Wijaya (2023) further noted that utilising time-based stations rather than repetition-based ones allows younger learners to focus on correct technique, hence reducing the risk of injury. This result corresponds with educational perspectives that advocate for skill mastery before escalating intensity.

Putra (2022) observed that circuit training improves postural stability and core strength, essential for optimal movement patterns in youth. These results align with Rahayu's (2021) findings, which demonstrated that school-based circuit programs incorporating plyometric and callisthenic workouts produced substantial improvements in explosive power and balance. These studies collectively affirm that circuit training is an efficient and adaptable

method for improving muscular fitness in students.

2. Impact on Cardiovascular Endurance

Research repeatedly demonstrates that circuit training enhances cardiovascular endurance via continuous activity and brief rest intervals. Pratama (2020) clarified that the format intrinsically improves heart rate and oxygen consumption, leading to enhancements in aerobic conditioning. Dewi (2022) found that students participating in circuit-based physical education sessions twice weekly achieved significantly higher beep test scores than those in conventional jogging programs. Yusuf (2021) asserted that the alternating regimen of circuit training, which combines aerobic and resistance exercises, improves both aerobic and anaerobic energy systems. This concurrent stimulation enhances students' overall endurance capacity and recovery efficiency. Hasanah (2023) contends that structured variability in circuit sessions alleviates monotony and sustains student enthusiasm, consequently improving performance and participation consistency.

Nugroho (2022) observed that the cardiovascular benefits of circuit training paralleled those of interval running, while yielding higher levels of student satisfaction and adherence. This highlights the educational advantage of circuit approaches, as active training promotes sustained participation in physical exercise beyond school hours. Lestari (2020) found that in schools with limited room or resources, maintaining high cardiovascular intensity might be challenging, sometimes reducing the program's efficacy. This highlights the importance of adequate supervision and equipment availability to ensure the effective implementation of circuit training.

3. Impact on Flexibility and Coordination

Circuit training enhances flexibility and coordination, though the extent of improvement depends on exercise selection. Ningsih (2022) found that dynamic stretching and multi-joint exercises, like squats and lunges, significantly enhanced students' joint mobility and muscle flexibility. Handayani (2021) stated that activities requiring bodily control and balance, like cone running or step leaps, enhance motor coordination development.

Putra (2023) finds that incorporating flexibility exercises at the end of each circuit round leads to greater improvements in range of motion than stretching solely during warm-ups. Programs incorporating rhythmic motions and agility exercises show coordination improvements, as evidenced by Syafitri (2022), who noted significant gains in spatial awareness and reaction speed in elementary children. Ahmad (2022) found that flexibility improvements were minimal in circuits without specific stretching components, suggesting that circuit design influences efficacy. Thus, careful station planning that integrates strength, endurance, and mobility is essential for maximising overall physical development.

4. Comprehensive Fitness Advancement

Studies show that circuit training offers benefits beyond individual fitness components, fostering overall physical development. Rini (2023) stated that integrating cardiovascular, muscular, and motor coordination tasks into a unified regimen promotes balanced physiological development via circuit training. Wulandari (2022) found that multi-component circuits improve aerobic capacity and muscular endurance simultaneously, leading to greater overall fitness gains than single-focus workouts. Arifin (2023) stated that circuit training

enhances neuromuscular coordination, thereby improving performance in sports and daily activities. Circuit training is an effective fitness method, especially suitable for young learners who need overall physical readiness instead of specialised athletic skills.

5. Educational and Motivational Consequences

Circuit training provides physiological benefits and aligns with contemporary goals in physical education. Santoso (2024) noted that the structured and time-limited nature of circuit training promotes discipline and accountability among students. Rahmawati (2022) observed that incorporating cooperative learning in circuit activities enhances student engagement and collaboration.

Supriyadi (2023) found that circuit-based training enhances self-regulation, allowing students to independently monitor their progress and effort levels. Hadi (2021) found that gamifying circuit activities through scoring or challenge systems increases engagement and enjoyment. Circuit training is suitable for competency-based curricula that emphasise active engagement and character development.

Most research shows positive outcomes, while some indicate limited or varied effects. Lestari (2020) found that inadequate oversight and uneven station duty can reduce effectiveness, particularly in large classes. Ahmad (2022) argued that circuits lacking proper warm-up or cool-down phases may lead to fatigue and reduced flexibility results. Budi (2023) observed that inconsistent training frequency impeded endurance improvements, emphasising the need for structured preparation. Despite these constraints, most experts agree that the core principles of circuit training are valid and beneficial when done properly. The identified obstacles are contextual and can be addressed through teacher training, careful program design, and administrative support.

Circuit training significantly improves students' physical fitness in educational settings. Diverse, efficient workouts lead to measurable gains in strength, endurance, flexibility, and coordination. It also supports the goal of fostering lasting physical activity habits. These findings align with the principle of integrative physical education, which fosters the development of physical, cognitive, and social dimensions concurrently. Circuit training serves as a fitness method and an educational strategy that promotes student engagement and overall development.

4. CONCLUSIONS

This narrative literature review shows that circuit training significantly enhances the physical fitness of school students. Circuit training consistently enhanced key fitness components, such as muscular strength, cardiovascular endurance, flexibility, and coordination across the studies reviewed. The improvements result from the structured design of circuit sessions, which integrate diverse exercise types with minimal rest to engage multiple physiological systems at once. This method increases student engagement and motivation by fostering a stimulating learning environment through dynamic, time-based circuit activities. The evidence indicates that circuit training is adaptable to various educational settings, enabling teachers to adjust intensity, duration, and activity type based on students' developmental levels. This review emphasises the need to integrate circuit training into physical education programs to foster comprehensive student development, including physical competence,

discipline, teamwork, and self-regulation. Circuit training provides educators with a time-efficient and adaptable method that can be utilised with limited resources, given that stations are thoughtfully designed and progression principles are upheld. Schools should implement circuit-based instruction in physical education to improve students' long-term health and fitness outcomes. Some studies indicate that class size, equipment availability, and supervision quality can affect the effectiveness of circuit training programs. Future research should develop standardised guidelines for school-based circuit training, explore its long-term effects, and examine its integration with modern educational frameworks like competency-based and inclusive learning models. Circuit training can evolve as a comprehensive and effective method for enhancing students' physical fitness and educational experiences.

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