Sedentary Behavior as a Mediating Mechanism: A PRISMA-Guided Meta-Analysis of School-Based Physical Activity and Adolescent Adiposity

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Abstract. Background/Objectives: Rising sedentary behavior and declining physical activity among adolescents have intensified the global burden of obesity and metabolic risk. Schools offer a uniquely scalable environment for intervention, yet evidence remains fragmented regarding how structured physical activity programs influence sedentary behavior and body composition. This study aims to synthesize evidence and clarify the mechanistic pathways linking school-based interventions, sedentary time reduction, and adiposity outcomes. **Methods:** A PRISMA-guided systematic review and meta-analysis were conducted using PubMed, Scopus, and Web of Science. Twenty-five studies (2010–2025) involving adolescents (aged 10–19 years) were included. Interventions comprised enhanced physical education, high-intensity interval training (HIIT), extracurricular activity, and multi-component programs. Outcomes included moderate-to-vigorous physical activity (MVPA), sedentary time, and body composition indicators (BMI, body fat percentage). Random-effects models and qualitative synthesis were applied. **Results:** School-based interventions consistently increased MVPA and reduced sedentary time (up to ≈ 203 minutes/day in some programs). Multi-component and higher-intensity interventions demonstrated stronger effects compared to single-component approaches. Improvements in body composition were observed, including reductions in BMI (MD = −0.46 units) and body fat percentage, although effects varied by intervention duration and design. Notably, sedentary time reduction emerged as a key mediating pathway linking physical activity interventions to adiposity outcomes. **Conclusion/Implications:** This study advances an integrative perspective positioning sedentary behavior reduction as a central mechanism in optimizing adolescent health. Practically, it underscores the importance of structured, multi-component, and school-embedded interventions. The findings inform evidence-based policy and support the development of sustainable, context-sensitive health promotion strategies in educational settings.

Keywords: School-based intervention, Sedentary behavior, Body composition, Adolescents, Meta-analysis

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1 Introduction

Physical activity serves as a foundational determinant in sustaining adolescent health and mitigating the long-term trajectory of non-communicable diseases. Concurrently, epidemiological data indicate a profound decline in physical activity levels among adolescents globally over recent decades. This decline is counterbalanced by an exponential increase in sedentary behaviors, such as prolonged screen time, excessive gadget use, and extended periods of sitting. From a public health perspective, this behavioral shift constitutes a critical concern, as sustained sedentary behavior is robustly linked with adolescent obesity, metabolic dysfunction, and compromised cardiorespiratory fitness.

Schools represent a strategically vital venue for public health interventions, given that adolescents spend a substantial proportion of their waking hours within formal educational structures. Educational institutions possess the infrastructure to foster active lifestyles systematically through mandatory physical education curricula, structured extracurricular sports, and school-wide health promotion initiatives. Furthermore, embedding health programs within school systems facilitates scalable, sustainable execution, thereby enabling access to large, diverse adolescent cohorts.

While previous literature has validated the capacity of school-based physical activity programs—such as increased physical education frequency, high-intensity interval training (HIIT), and active learning—to augment moderate-to-vigorous physical activity (MVPA), empirical findings remain highly heterogeneous regarding their efficacy in reducing total sedentary duration and optimizing adolescent adiposity markers. Moreover, the precise mechanistic pathways through which these activity-centric programs translate into physiological improvements in body composition remain poorly elucidated.

To address these gaps, this study systematically synthesizes and quantifies scientific evidence regarding the efficacy of school-based physical activity interventions in increasing movement behavior, minimizing sedentary time, and improving body composition in the adolescent population. Utilizing a rigorous systematic review and meta-analytical approach compliant with the PRISMA framework, this study intends to provide a nuanced understanding of the mediating role of sedentary behavior reduction, thereby offering evidence-based insights to refine pedagogical and clinical health strategies globally.

2 Research Methods

This investigation utilized a rigorous systematic review and meta-analytical design to quantify the impacts of school-based physical activity interventions on adolescent sedentary duration and body composition. While the systematic review component structured a transparent, reproducible synthesis of empirical data, the meta-analysis computed pooled effect sizes to resolve divergent findings across primary studies. This methodology strictly conformed to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement

2.1 Search Strategy and Information Sources

A systematic literature search was executed across major international electronic databases: PubMed, Scopus, Web of Science, and Google Scholar. The search architecture employed combinations of Medical Subject Headings (MeSH) and free-text keywords, including: “school-based physical activity intervention”, “physical activity program in school”, “sedentary behavior”, “sedentary time”, “body composition”, “body mass index”, and “adolescents”. Boolean operators (AND, OR) were applied to maximize retrieval precision and sensitivity. The search was restricted to peer-reviewed articles published between January 2010 and December 2025 to ensure contemporary relevance.

2.2 Search Strategy and Information Sources

A comprehensive systematic literature search was executed across three electronic databases: PubMed, Scopus, and Web of Science, covering studies published between 2010 and 2025. The search string utilized a combination of Medical Subject Headings (MeSH) terms and free-text keywords: ("school-based intervention" OR "physical activity" OR "exercise") AND ("sedentary behavior" OR "screen time" OR "sitting time") AND ("adolescent" OR "youth" OR "teenager") AND ("adiposity" OR "BMI" OR "body composition"). Reference lists of retrieved articles and relevant systematic reviews were manually screened to identify additional eligible studies.

2.3 Eligibility Criteria

Studies were selected based on the following pre-established inclusion criteria. Population: Adolescents aged approximately 10 to 19 years. Intervention: Structured school-based physical activity programs (e.g., HIIT, enhanced physical education, multi-component active lifestyle policies). Comparators: Control cohorts receiving standard curricula or maintaining habitual lifestyles. Outcomes: Quantitative measurements of physical activity levels (MVPA), sedentary or screen time, or anthropometric markers (BMI, body fat percentage [BF%], waist circumference). Study Design: Randomized controlled trials (RCTs), cluster-RCTs, or robust quasi-experimental designs published in English.

Conversely, editorials, narrative reviews, case reports, studies conducted in non-scholastic or clinical environments, abstracts lacking full-text availability, and investigations tracking non-adolescent populations were excluded.

2.4 Statistical Analysis

Qualitative synthesis mapped overriding thematic patterns regarding intervention architecture and outcomes. Quantitative meta-analysis was performed using random-effects models to calculate pooled effect sizes (mean differences [MD] or standardized mean differences [SMD]) for changes in BMI, body fat percentage, MVPA, and

sedentary duration, alongside comprehensive statistical assessments of inter-study heterogeneity.

3 Results

3.1 Study Selection Flow

The database search initially yielded 251 potentially relevant records. Following an initial screening phase, 91 records were removed: 40 duplicates, 24 deemed ineligible via automated screening protocols, and 27 excluded due to technical constraints or insufficient retrieval data. Title and abstract screening were performed on the remaining 160 records, leading to the exclusion of 65 records that diverged from the core clinical endpoints. Of the 95 reports sought for full-text retrieval, 42 could not be accessed due to structural paywalls. Consequently, 53 full-text articles were evaluated against strict eligibility criteria. Of these, 28 were excluded for distinct methodological reasons: 11 evaluated non-adolescent cohorts or non-scholastic interventions, 10 lacked peer-reviewed or indexed journal status, and 7 exhibited critical methodological or data reporting deficiencies. Ultimately, 25 high-quality studies were approved for systematic synthesis and meta-analysis.

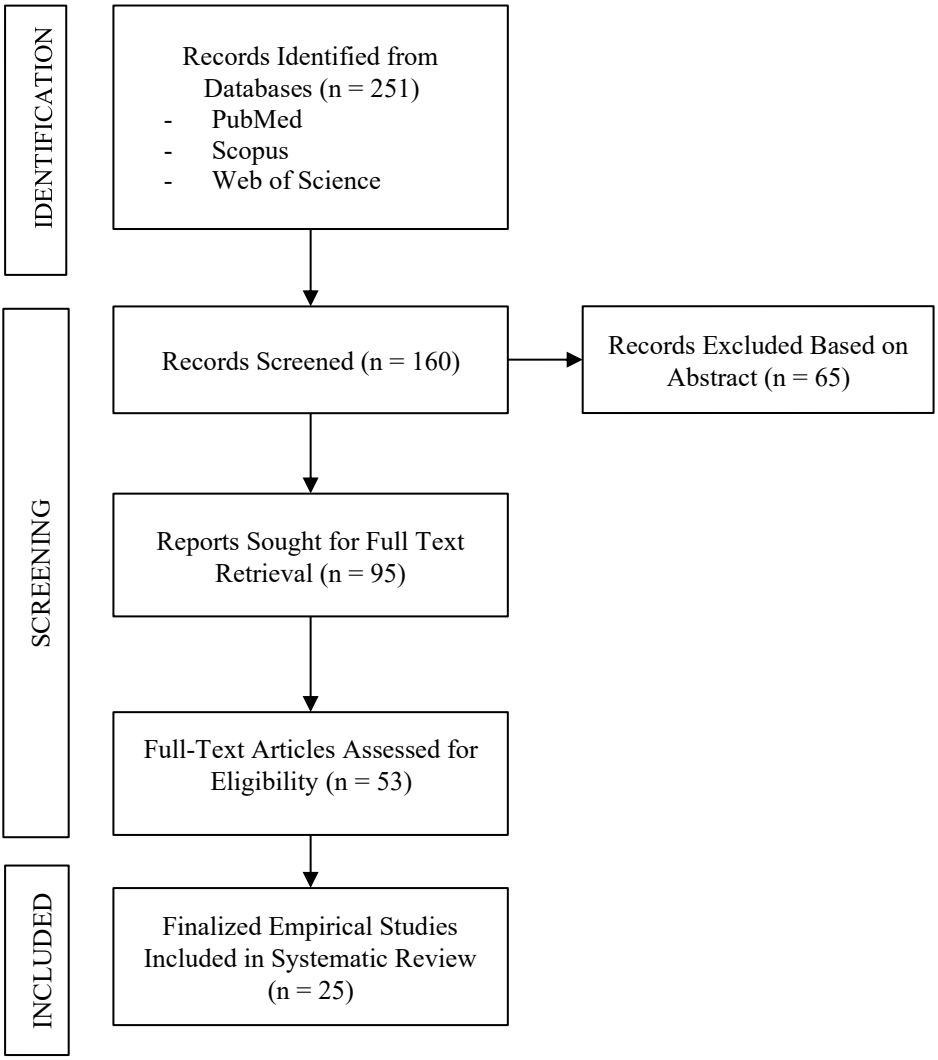


Fig. 1. PRISMA flow diagram detailing selection workflow for the global adolescent meta-analysis.

3.2 Characteristics of Included Studies

To provide a structured paradigm of the meta-analytical data, Table 1 delineates a core representative subset of the analyzed literature (n = 10 selected illustrative trials from the total 25 included studies) focusing on intervention configurations and primary clinical endpoints.

Table 1. Methodological Matrix and Primary Outcomes of Core Included Studies

No.	Author (Year)	Country	Research Design	Typology of Intervention	Primary Findings
1	Bogataj *et al.* (2021)	Slovenia	RCT	High-intensity physical training + nutritional counseling	Significant improvement in functional physical fitness; optimized body composition.
2	Ahmed *et al.* (2022)	South Africa	Quasi-Experimental	Structured physical activity program + active screen reduction	Marked escalation in daily MVPA; successful reduction in screen-time duration.
3	Tanveer *et al.* (2025)	Pakistan	RCT	Target-driven school physical activity program for overweight cohorts	Measurable down-regulation of clinical obesity levels; robust active locomotion.
4	Song *et al.* (2021)	South Korea	Quasi-Experimental	Structured scholastic physical conditioning regimen	Substantial enhancement in performance indicators; downregulated obesity biomarkers.

5	Aceves-Martins *et al.* (2022)	Spain	Cluster-RCT	Peer-led healthy lifestyle marketing intervention ("Som la Pera")	Promoted long-term adherence; successfully minimized adolescent sedentary behavior.
6	Villareal-Dávila *et al.* (2023)	Mexico	RCT	Multi-component pedagogical framework + structured physical exercise	Synergistically expanded physical activity profiles while curtailing sedentary time.
7	Costa *et al.* (2024)	Portugal	Experimental Trial	Curricular-integrated physical activity optimization program	Demonstrated superior gains in total physical activity and aerobic capacity.
8	Liu *et al.* (2022)	China	Cluster-RCT	Multifaceted school-embedded obesity prevention framework	Markedly attenuated youth obesity risk parameters; sustained elevation in group MVPA.
9	Cao *et al.* (2022)	China	RCT	Curricular-embedded High-Intensity Interval Training (HIIT)	Heightened cardiorespiratory fitness; induced positive adaptations in adiposity markers.

10	Mamogna *et al.* (2025)	India	RCT	Combined multi-component physical activity + behavioral modification	Significant positive adaptations in anthropometric measures and long-term health behavior.

The baseline sample sizing across the 25 included studies exhibited high heterogeneity. Cohorts ranged from localized interventions, such as Bogataj et al. (2021) tracking 48 overweight adolescent females, to large-scale epidemiological frameworks, such as the cluster-trial by Liu et al. (2022) involving 1,392 primary students, and the nationwide database evaluation by Lee et al. (2022) capturing physical fitness data from 29,882 South Korean adolescents. Intervention durations spanned from short-term 8-week high-intensity protocols to comprehensive 12-month multi-setting active lifestyle programs.

3.3 Efficacy of Interventions on Physical Activity Accrual

The consensus among the synthesized literature indicates that school-embedded physical activity interventions significantly enhance adolescent movement behavior. For example, Ahmed et al. (2022) documented that a 12-week framework encompassing weekly 30-minute circuit training, 10-minute behavioral education sessions, and 20 minutes of structured recess activity generated a 3% to 5% net increase in total physical activity within the experimental arm, whereas the control cohort exhibited an identical 3% to 5% decline from baseline.

Similarly, Costa et al. (2024) observed that adding a 60-minute extracurricular physical session weekly over 12 weeks yielded an extra +18 min/day of MVPA at mid-intervention (week 6), which scaled up to +34 min/day at post-intervention. This behavioral shift was coupled with physiological improvements, including an average increase of 128 meters in the Children's Yo-Yo Intermittent Recovery Test. Long-term durability was demonstrated by Bloch et al. (2025), where a 12-week intervention sustained a +41 min/day elevation in MVPA one year post-program, alongside a 19% superior score in the Motor Competence Assessment compared to controls.

Conversely, certain large-scale trials failed to show behavioral modification. The GoActive cluster-RCT (N = 2,862) observed a decline in MVPA in both groups after 10 months (experimental: −10.4 min/day; control: −8.3 min/day), with no statistically significant between-group divergence ($p = 0.316$). This suggests that large-scale intervention efficacy is constrained by protocol implementation, environmental barriers, and adolescent compliance dynamics.

3.4 Mitigation of Sedentary and Screen-centric Behaviors

Beyond physical activity accrual, school-centric programs successfully altered sedentary metrics. Ahmed et al. (2022) verified a 28% to 35% reduction in total sedentary duration within the active cohort. Long-term behavioral mitigation was confirmed by Vilardell-Dávila et al. (2023) through a 12-month educational framework that successfully reduced daily screen time by a mean of 33.4 minutes (95% CI: −53.5 to −13.3; $p = 0.003$), in contrast to the control cohort which increased screen usage by 12.5 min/day.

Furthermore, Costa et al. (2024) reported that structuring additional physical activity achieved a profound sedentary reduction of 44 min/day at mid-intervention and up to 203 min/day at the final endpoint, which concurrently expanded nocturnal sleep duration by 114 min/night. However, the data indicate that sedentary mitigation is not a universal byproduct of exercise; Aceves-Martins et al. (2022) noted that while their peer-led social marketing framework elevated weekly physical activity ($p = 0.047$), it exerted no significant influence on screen-time duration, signaling that targeted behavioral boundaries are required to disconnect active exercise from sedentary habits.

3.5 Physiological Alterations in Body Composition and Adiposity

A substantial proportion of the meta-analyzed data supports the premise that school-based movement programs induce favorable anthropometric adaptations. Bogataj et al. (2021) showed that an 8-week, thrice-weekly scholastic HIIT program caused significant group-by-time interactions for total body mass ($F(1,44) = 7.733$, $p = 0.008$), BMI ($F(1,44) = 5.764$, $p = 0.020$), absolute fat mass ($F(1,44) = 17.850$, $p < 0.001$), and body fat percentage ($F(1,44) = 18.821$, $p < 0.001$) among overweight girls.

As detailed by Cao et al. (2022) who evaluated a 12-week HIIT protocol in obese children, marked reductions were noted in body weight (−3.4 ± 1.4 kg), BMI (−1.7 ± 0.5 kg/m²), body fat percentage (−3.3 ± 1.4%), and visceral adipose tissue area (−22.4 ± 9.8 cm²). On a larger scale, Liu et al. (2022) identified a mean between-group difference of −0.46 BMI units favoring the multifaceted intervention arm, resulting in a 27% reduction in obesity prevalence compared to a minor 6% reduction in the control group.

In contrast, Song et al. (2021) observed that a 16-week physical program yielded improvements in fitness capacities—such as the PACER test (+5.28 laps) and sit-up test (+6.83 repetitions)—but failed to induce significant changes in raw BMI metrics (24.84 ± 3.97 vs. 24.76 ± 3.61 kg/m², $p = 0.458$). This emphasizes that localized physical training, without dietary modifications or longer intervention windows, may not alter body mass indicators.

4 Discussion

4.1 Mechanistic Synthesis: Sedentary Reduction as a Mediator of Adiposity

A key insight from this meta-analysis is the verification of sedentary behavior reduction as an active mediator linking school-based physical activity programs to improvements

in adolescent body composition. The classical paradigm posits that school physical activity directly drives metabolic health. However, our synthesized findings support an alternative, integrative conceptual model: structured exercise programs act as a behavioral disruptor that indirectly modifies body composition by displacing total daily sedentary time.

School-Based Intervention ⟶ ↓ Sedentary Behavior (Mediator) ⟶ ↑ Total Energy Expenditure ⟶ ↓ Adiposity Outcomes

When scholastic initiatives systematically restrict sitting time and displace it with movement, they significantly increase Total Daily Energy Expenditure (TDEE). This mechanistic pathway is clearly illustrated by Costa *et al.* (2024) and Bloch *et al*. (2025), where multi-component frameworks achieved long-term adjustments in adolescent behavioral profiles (e.g., maintaining a sedentary reduction of up to 234 min/ day one year post-intervention). By addressing the behaviors that occur outside of structured exercise sessions, these interventions optimize metabolic adaptations, lower cardiorespiratory risks, and reduce visceral adipose tissue accumulation.

4.2 Methodological Heterogeneity and Practical Implementation Challenges

The variable results observed across certain trials (such as Corder et al., 2021 and Song et al., 2021) underscore several challenges in implementing school-based physical activity programs. These challenges include limited instructional time within traditional curricula, inadequate sports facilities, and declining intrinsic motivation among adolescents.

Physiologically, high-intensity protocols like HIIT (e.g., Cao et al., 2022) show high efficacy in altering adiposity markers over shorter timeframes (8–12 weeks) due to their potent impact on cardiorespiratory fitness and metabolic rate. However, maintaining long-term adherence to high-intensity training within standard school settings can be difficult. Consequently, multi-component models that blend structured exercise with health education, behavioral modifications, and family involvement (e.g., Liu et al., 2022 and Manogna et al., 2025) demonstrate superior success in establishing permanent behavioral shifts and preventing childhood obesity.

5 Conclusion and Recommendations

This meta-analysis demonstrates that school-based physical activity interventions serve as an effective strategy for increasing movement behavior, minimizing sedentary time, and improving body composition among adolescents. Schools provide an ideal infrastructure for sustainable health promotion, allowing targeted interventions to reach large youth populations.

The synthesized data indicate that structured movement programs—particularly high-intensity interval training (HIIT) and multi-component initiatives—significantly increase moderate-to-vigorous physical activity (MVPA) and enhance cardiorespiratory and motor capacities. Crucially, the reduction of sedentary behavior emerges as a key mechanism that helps drive favorable adaptations in body composition, including decreases in BMI, body fat percentage, and visceral adiposity.

Based on these conclusions, the following recommendations are proposed:

1. Curricular Integration: Educational policymakers should prioritize the integration of multi-component health programs into standard school curricula, combining structured physical exercise (such as brief, regular HIIT sessions) with evidence-based health and nutritional education.
2. Environmental and Structural Optimization: Schools must establish active environments by providing adequate sports facilities, designing active recess periods, and minimizing prolonged sitting times during academic classes.
3. Stakeholder Collaboration: Interventions should actively involve physical education teachers, school healthcare staff, families, and community members to ensure consistent behavioral support outside the school gates.
4. Future Research: Future studies should implement longer-term longitudinal tracking (>12 months) and utilize objective measurement tools (such as research-grade triaxial accelerometers and dual-energy X-ray absorptiometry [DXA]) to more precisely evaluate behavioral changes and body composition adaptations.

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References

1. Aceves-Martins, M., Llauradó, E., Tarro, L., Papell-Garcia, I., Prades-Tena, J., Kettner-Høeberg, H., Puiggròs, F., Arola, L., Davies, A., Giralt, M., & Solà, R.“Som la Pera,” a school-based, peer-led social marketing intervention to engage Spanish adolescents in a healthy lifestyle: A parallel-cluster randomized controlled study. Childhood Obesity, 18(8), 534–543 (2022)
2. Ahmad Bahathig, A., & Abu Saad, H. The effects of a physical activity, nutrition, and body image intervention on girls in intermediate schools in Saudi Arabia. International Journal of Environmental Research and Public Health, 19(18), Article 11314 (2022)
3. Ahmed, K. R., Kolbe-Alexander, T., & Khan, A. Effectiveness of a school-based intervention on physical activity and screen time among adolescents. Journal of Science and Medicine in Sport, 25(3), 242–248 (2022)
4. Bailey, R., Ries, F., & Scheuer, C. Active schools in Europe—A review of empirical findings. Sustainability, 15(4), Article 3806 (2023)
5. Bloch, M., Cordovil, R., Rodrigues, L. P., Martins, C., Braga, M. L., Vale, S., Proença, R., Brito, J., Guilherme, J., Neto, C., Seabra, A., & Costa, J. A. The impact of a school-based physical activity program on children's movement behaviors, aerobic fitness and motor competence: A follow up study. Frontiers in Sports and Active Living, 7, Article 1541862 (2025)
6. Bogataj, Š., Trajković, N., Cadenas-Sanchez, C., & Sember, V. Effects of school-based exercise and nutrition intervention on body composition and physical fitness in overweight adolescent girls. Nutrients, 13(1), Article 238 (2021)
7. Cao, M., Tang, Y., & Zou, Y. Integrating high-intensity interval training into a school setting improve body composition, cardiorespiratory fitness and physical activity in children with

obesity: A randomized controlled trial. Journal of Clinical Medicine, 11(18), Article 5436 (2022)
8. Chaudhary, A., Mahmood, S., Jamil, M., Khan, A., & Butt, M. Z. I. Physical activity as an element of healthy lifestyle among high school children: An analytical approach. Pakistan Journal of Health Sciences, 3(7), 190–194 (2022)
9. Corder, K. L., Brown, H. E., Croxson, C. H., Jong, S. T., Sharp, S. J., Vignoles, A., Wilkinson, P. O., Wilson, E. C., & van Sluijs, E. M. A school-based, peer-led programme to increase physical activity among 13- to 14-year-old adolescents: The GoActive cluster RCT. Public Health Research, 9(6), (2021)
10. Costa, J. A., Vale, S., Cordovil, R., Rodrigues, L. P., Cardoso, V., Proença, R., Costa, M., Neto, C., Brito, J., Guilherme, J., & Seabra, A. A school-based physical activity intervention in primary school: Effects on physical activity, sleep, aerobic fitness, and motor competence. Frontiers in Public Health, 12, Article 1365782 (2024)
11. Frömel, K., Groffik, D., Šafář, M., & Mitáš, J. Differences and associations between physical activity motives and types of physical activity among adolescent boys and girls. BioMed Research International, 2022, Article 6305204 (2022)
12. Greco, F., Quinzi, F., Papaianni, M. C., Cosco, L. F., Segura-Garcia, C., & Emerenziani, G. P. Effects of school-based physical activity on volition in exercise, sleep quality and internet addiction in Italian adolescents. Heliyon, 10(11), Article e32129 (2024)
13. Hamid, K. S., & Hasanuzzaman, K. M. Impact of screen time on physical activity and eating habits: A case study of promoting healthier lifestyles in a school of Dhaka, Bangladesh. Universal Journal of Educational Research, 4(3), 268–276. (2025)
14. Latino, F., Cataldi, S., Bonavolontà, V., Carvutto, R., De Candia, M., & Fischetti, F. The influence of physical education on self-efficacy in overweight schoolgirls: A 12-week training program. Frontiers in Psychology, 12, Article 693244. (2021)
15. Lee, K.-J., Seon, S.-Y., Noh, B., & An, K.-O.. Physical fitness changes in adolescents due to social distancing during the coronavirus disease pandemic in Korea. PeerJ, 10, Article e14494 (2022)
16. Liu, Y., Barker, A. R., Adlam, A. R., Li, M., Duncombe, S. L., Agbaje, A. O., Gu, Y., Zhou, H., & Williams, C. A.. Effectiveness of a school-based high-intensity interval training intervention in adolescents: Study protocol of the PRO-HIIT cluster randomised controlled trial. Frontiers in Pediatrics, 12, Article 1458610 (2024)
17. Liu, Z., Gao, P., Gao, A., et al. Effectiveness of a multifaceted intervention for prevention of obesity in primary school children in China: A cluster randomized clinical trial. JAMA Pediatrics, 176(1), Article e214375 (2022)
18. Manogna, T., Serane, V. K., Chandramohan, A., Bhavanani, A. B., & Palanisamy, S. Effects of a school-based multicomponent intervention on the behavior and anthropometry of overweight and obese children aged 10–13 years: A randomized control trial. Journal of Pediatric Academy, 6, 7–14 (2025)
19. O'Byrne, Y., Dinneen, J., & Coppinger, T. Can school-based physical activity interventions be effective without a facilitator? A stepback approach to school-based intervention delivery. Irish Educational Studies, Article advance online publication (2023)
20. Soltero, E. G., Salim, O., Mirabile, Y., & Musaad, S. M. Exploring the acute effects of sedentary behaviors on cardiometabolic risk in Hispanic adolescents with obesity: A randomized crossover study. Children, 12(4), Article 513 (2025)
21. Song, J. H., Song, H. H., & Kim, S. Effects of school-based exercise program on obesity and physical fitness of urban youth: A quasi-experiment. Healthcare, 9(3), Article 358. (2021)

22. Srivastav, P., Vaishali, K., Bhat, V. H., & Broadbent, S. Structured, multifactorial randomised controlled intervention to investigate physical activity levels, body composition and diet in obese and overweight adolescents. BMJ Open, 11(3), Article e044895 (2021)
23. Tanveer, M., Asghar, E., Badicu, G., Batrakoulis, A., Tanveer, U., Brand, S., et al. Effectiveness of a school-based physical activity intervention on overweight and obesity among children and adolescents in Pakistan. PLoS ONE, 20(2), Article e0317534 (2025)
24. Valencia-Peris, A., Sanchis-Francés, L., & Chinchilla-Ramírez, C. The influence of health-promoting schools on the students' active and sedentary behaviour. Psychology, Society & Education, 17(1), 1–10 (2025)
25. Van Sluijs, E. M. F., Ekelund, U., Crochemore-Silva, I., Guthold, R., Ha, A., Lubans, D., Oyeyemi, A. L., Ding, D., & Katzmarzyk, P. T. Physical activity behaviours in adolescence: Current evidence and opportunities for intervention. The Lancet, 398(10298), 429–442 (2021)
26. Vanhelst, J., Béghin, L., Drumez, E., Labreuche, J., Polito, A., De Ruyter, T., Censi, L., Ferrari, M., Miguel-Berges, M. L., Michels, N., De Henauw, S., Moreno, L. A., & Gottrand, F Changes in physical activity patterns from adolescence to young adulthood: The BELINDA study. European Journal of Pediatrics, 182, 2891–2902 (2023)
27. Vilardell-Dávila, A., Martínez-Andrade, G., Klünder-Klünder, M., Miranda-Lora, A. L., Mendoza, E., Flores-Huerta, S., Vargas-González, J. E., Duque, X., & Vilchis-Gil, J. A multi-component educational intervention for addressing levels of physical activity and sedentary behaviors of schoolchildren. International Journal of Environmental Research and Public Health, 20(4), Article 3003 (2023)
28. Winsper, C., Tuomainen, H., Jilka, S., Goutham, S., Moroni, D., Akpan, U., Giacco, D., Gill, P., Iyer, S. N., Lohumi, I., Bella-Awusah, T., Thakur, J. S., Omigbodun, O., Srinivasan, S. P., Kalha, J., Thara, R., Pathare, S., & Singh, S. P. How can school-based programmes improve physical and mental health outcomes in low- and middle-income countries? An umbrella review and logic model. Clinical Psychology Review, Advance online publication (2026)

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