Journal of Clinical and Basic Research
Online ISSN: 2538-3736

# The effect of maternal cooperative supervision on physical fitness indices of overweight and obese girls in home-based exercise programs

Mahdis Hasani [1], Vahid Monfared [2], Leila Sheikhi [3], Motahareh Hasani [4], Kambiz Karimzadeh Shirazi [5], Majid Rahimi Far [6]*

1. Faculty of Physical Education and Sports Sciences, University of Tehran, Tehran, Iran
2. Skeletal Biology Laboratory, College of Health, Oregon State University, Corvallis, OR 97331, United States of America
3. Food and Beverages Safety Research Center, Urmia University of Medical Sciences, Urmia, Iran
4. Department of Nutrition, School of Health, Golestan University of Medical Sciences, Gorgan, Iran
5. Department of Public Health, School of Health, Yasuj University of Medical Sciences, Yasuj, Iran
6. School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran

* Correspondence: Majid Rahimi Far. Department of Health Education and Health Promotion, School of Public Health, Shahid Beheshti University of Medical Sciences, Tehran, Iran. Tel: +989174589768; Email: majid.rahimifar@yahoo.com

## Abstract

**Background:** This research examined how maternal cooperative supervision influenced physical fitness indices in overweight or obese children enrolled in home-based exercise programs.

**Methods:** This study employed a 6-week randomized controlled trial, enrolling a total of 210 children (Age range = 10 to 12 years; body mass index (BMI) ≥ 85th percentile) acquired through a cluster sampling method from six distinct schools in Yasuj, Iran. The recruited children were randomly assigned to one of two equally sized groups (n = 105 per group): Passive maternal supervision (Monitoring exercise adherence) or active maternal participation (Joint exercise sessions). Outcome data were collected at three intervals: Pre-intervention (Baseline), intra-intervention (Weeks 3 and 6), and post-intervention. The evaluation of physical fitness was conducted using standardized tests (Sit-and-reach, a 1-mile run, and push-up/pull-up). Concurrently, physical activity (PA) levels and sedentary behaviors were quantified through the International PA Questionnaire (IPAQ) and checklists completed by the mothers. The statistical analysis involved the application of paired t-tests for within-group comparisons and independent t-tests for between-group comparisons. The threshold for statistical significance was established at a p-value of less than 0.05.

**Results:** The cooperative supervision group exhibited significantly greater improvements in several key fitness indices when compared to the control group, including flexibility (26.34 ± 5.2 cm versus 17.77 ± 5.2 cm), muscular strength (5 ± 2 pull-ups), endurance (4 ± 1 push-ups), and cardiorespiratory capacity (1.40-minute 1-mile run time) (All $p < 0.05$). Behaviorally, over 70% of the children successfully shifted from a sedentary to an active lifestyle. This change was supported by a reduction in daily screen time (2.5 ± 0.8 hours/day) and an increase in active commuting, where post-intervention walking rates doubled. It is noteworthy that at baseline, 77% of the participants presented with musculoskeletal abnormalities, with lumbar hyperlordosis being the predominant condition, a factor that influenced their initial PA engagement.

**Conclusion**: The substantial role of maternal engagement in home-based exercise programs is evident in the marked improvements observed in the physical fitness of children classified as overweight or obese. This finding strongly supports the efficacy and necessity of adopting family-centered intervention models in pediatric weight management. For subsequent investigations, it is recommended to incorporate objective measures of PA and rigorously assess the long-term maintenance of these outcomes across varied demographic groups.

**Article Type:** Research Article

**Article History**

Received: 15 June 2025
Received in revised form: 20 September 2025
Accepted: 29 September 2025
Available online: 30 September 2025
DOI: 10.29252/JCBR.9.3.6

**Keywords**

Physical education and training
Pediatric obesity
Maternal supervision
Home-based exercise
Musculoskeletal health



## Highlights

**What is current knowledge?**

- Childhood obesity and overweight rates are rising globally and IPA is a major factor.
- Interventions involving families and schools are among the most effective methods to boost children's PA and physical fitness.

**What is new here?**

- This research shows that maternal cooperative participation in exercise with their children is more effective than simply supervising them in improving physical fitness measures among overweight and obese girls.
- These results emphasize that maternal active participation at home can serve as a powerful, cost-effective, and practical approach to increase children's PA and decrease sedentary habits.

## Introduction

A primary objective of the World Health Organization (WHO) for the year 2030 is to significantly decrease premature mortality resulting from non-communicable diseases (NCDs) (1). However, insufficient physical activity (IPA) remains a major, modifiable risk factor for several NCDs, including stroke, diabetes, and various cancers (1,2). IPA has been recognized as a global health pandemic, with reports indicating that a substantial proportion of adults fail to meet established PA guidelines (Ranging from 17.0% in Southeast Asia to 43.3% in the Americas) (3). Although initial research largely focused on adult populations, evidence now suggests that IPA is even more prevalent among children and adolescents (4). Furthermore, obesity and overweight are critical risk factors for chronic diseases, and their global prevalence is rising sharply (5). Children and adolescents who are struggling with obesity frequently engage in MVPA at levels substantially below international recommendations. Therefore, implementing effective interventions is imperative to help this population achieve the necessary PA thresholds (6).

Multiple determinants contribute to PA levels observed in overweight or obese children and adolescents. Crucial positive influences include establishing an active lifestyle and adopting healthy eating habits prior to adolescence, underscoring the necessity of early-life behavioral integration (7). Moreover, PA levels are also impacted by ecological factors, the availability of social support for PA, and access to sports equipment (8). Research consistently demonstrates that the implementation of regular exercise programs, provided they are of appropriate level and intensity, yields favorable effects on anthropometric measures, physical fitness, and cardiovascular health in this population. Consequently, this approach remains the most widely utilized and efficacious strategy for managing obesity in children and adolescents (9).

Physical fitness is a multifaceted construct defined by an individual's ability to successfully engage in PA, encompassing several distinct components, such as muscular strength, muscular endurance, flexibility, and cardiorespiratory capacity. These elements are profoundly linked to an individual's overall health status and outcomes. Specifically, cardiorespiratory capacity denotes the efficiency with which the cardiovascular and respiratory systems function during sustained physical exertion, whereas muscular strength is the capacity to execute tasks requiring force against resistance. These two are among the key dimensions that fundamentally define physical fitness (10). Physical fitness offers distinct insights into an individual's body fitness, encompassing their capacity for performance, growth, and the potential development necessary for various critical activities in the daily lives of children and youth. Furthermore, it is a predictor of maintaining an active lifestyle in adulthood (11). A primary strategy for enhancing the performance and physical fitness of children with overweight and obesity involves implementing a comprehensive healthy lifestyle program. This program should incorporate a focus on social and behavioral factors alongside interventions promoting healthy eating without necessarily restricting energy intake and designing enjoyable PA sessions with appealing content, all while actively engaging parents, employed not only as a method for reducing body weight in this population (12). Family-based interventions aimed at enhancing children's PA levels are essential, primarily because the supportive role of parents is fundamental; parental and peer encouragement, in turn, influences children's PA behaviors and contributes to increased time spent on activity at home (13). Consequently, effective interventions must be strategically developed to target the PA of children who are overweight or obese, ultimately facilitating an improvement in their physical fitness indices. A prior study demonstrated and emphasized the significant efficacy of maternal (Or family) involvement in enhancing both the level of PA and the physical fitness of overweight or obese children (14). Given the paucity of comparable findings and the critical importance of exercise for this population, the present study was undertaken to evaluate the impact of active maternal participation in an exercise program on the PA levels and physical fitness of such children.

## Methods

### Study design and participants

The study received ethical approval (IR.YUMS.REC.1396.87) from the Medical Ethics Committee of Yasuj University of Medical Sciences and Health Services. Prior to the commencement of the study, written informed consent was secured from all participating parents and the students themselves.

A multi-stage cluster sampling methodology was implemented, with randomization occurring at the school level. Initially, the roster of public schools in Yasuj was partitioned into six distinct regions. In the first stage, one school was randomly chosen from each of these six regions, thereby establishing the six required clusters. Subsequently, these six schools were assigned to either the intervention or control groups using a simple random allocation procedure. Following selection, the weight and height of all 1,215 students in the fourth, fifth, and sixth grades (Aged 10-12 years) were measured to calculate their respective body mass index (BMI) values.

A total of 236 students were initially categorized according to the Centers for Disease Control and Prevention (CDC) growth chart percentiles. Students falling between the 85th and 95th percentiles were defined as overweight, and those exceeding the 95th percentile were classified as obese (15). Following preparatory training sessions involving both mothers and daughters, 26 families declined participation. Consequently, the final sample consisted of 210 students and their mothers who provided informed consent and were subsequently randomly allocated into two distinct intervention groups, each comprising 105 participants. In the supervision or control group (Group 1), maternal involvement was restricted to a supervision function; they did not directly participate in the sports program. Their principal role was to document the nature and quality of their child's PAs in alignment with the proposed intervention protocol. These activities were tracked and recorded daily using designated checklists. Conversely, mothers in the cooperative or case group (Group 2) assumed an expanded role. Beyond tracking and reporting their child's PA, they were also required to perform the prescribed exercises alongside their children at home, providing cooperative supervision.

The researcher developed checklists for maternal supervision drawing upon existing literature concerning family support mechanisms and child oversight strategies. Both the quality of supervision and the mothers' level of satisfaction were subsequently evaluated using a 5-point Likert scale ranging from 1 (Completely agree) to 5 (Completely disagree) (16).

Both groups were engaged in three instructional and practical sessions delivered over a six-week period. These sessions, conducted for both mothers and students in a home-based setting, covered several core topics. The content included key definitions pertaining to PA and fitness, the various dimensions and overall importance of physical fitness, factors that contribute to childhood overweight and obesity, and instruction on correct exercise techniques. Following the completion of these sessions, participants in both groups were provided with a training package that contained the comprehensive program plan and an associated practical manual. Eligibility criteria for participation mandated the absence of specific pre-existing diseases and to demonstrate a clear willingness to engage in the assigned sports programs.

### Measurement of physical activity

Demographic and background information was extracted from school health records, encompassing personal and family characteristics, cultural and sports backgrounds, and relevant medical history. The PA levels of both children and mothers were assessed using the International PA Questionnaire (IPAQ). This instrument, composed of eight items, quantified weekly time spent in sedentary behavior, ambulation, and various PAs. Additionally, data were recorded for mean TV watching weekly, the specific types of PAs performed, and mean sleep duration. The quantitative PA results were ultimately expressed as metabolic equivalent of task (MET)-minutes per week (17,18).

### Anthropometric assessment

Weight was accurately recorded using a Seca digital scale (Germany), precise to 100 grams. Participants were weighed in light clothing and without shoes, following maximal exhalation. Height was assessed via a wall-mounted stadiometer while the student maintained a fully upright stance, with feet together, ensuring that the back of the head, shoulders, and hips were in contact with the measuring surface. Posture was evaluated utilizing the New York test, which systematically examines 13 distinct body positions. Additionally, a checkerboard served as a screening tool for the detection of potential musculoskeletal abnormalities. Finally, calipers were employed to precisely measure knee and ankle alignment, facilitating the accurate diagnosis of lower limb deformities (19).

### Assessment of physical fitness factors

Flexibility was determined through the application of the sit-and-reach test, while cardiorespiratory capacity was quantified using the 1-mile run test. Furthermore, muscle strength and endurance were comprehensively evaluated by administering the pull-up and push-up tests (20).

### Educational planning

The educational methodology was structured according to the WHO planned approach to health education, which comprises six sequential steps (21). Step one involved identifying the target study population, justified by existing evidence that childhood overweight and obesity constitute significant challenges within this specific cohort. In step two, the PA levels for both the students and their mothers were quantified using both demographic surveys and the IPAQ. Step three concentrated

on establishing both general and specific educational objectives that were directly informed by key physical fitness indices. Step four involved the development of a 42-day sports intervention. Both children and their mothers received direct instruction on the exercises, which was supplemented by a detailed, illustrated booklet. In step five, the implementation phase commenced with a pre-test assessment of key fitness indices, including flexibility, muscular endurance, muscular strength, and cardiorespiratory capacity. These identical indices were subsequently assessed in a post-test following the completion of the intervention period. Finally, step six focused on evaluating the significance of the intervention. This was achieved by comparing the collected data from both groups before and after the program's execution.

### Statistical analysis

Statistical analyses were executed using SPSS software, version 20, and structured across distinct phases. The descriptive component focused on summarizing the demographic characteristics of the participants, employing established measures, such as frequency tables, means, and standard deviations (SDs). In the analytical phase, various inferential statistical tests were applied to the quantitative data, with selection based on the data's distribution. These tests included paired-samples t-tests, independent-samples t-tests, analysis of variance (ANOVA) tests, Pearson's correlation coefficient, and the Chi-square ($\chi^2$) test. The level of statistical significance was predetermined as $p < 0.05$.

## Results

The demographic characteristics of the study participants are given in Table 1.

The cooperative supervision group of girls demonstrated significantly greater post-intervention improvements in all measured physical fitness indices (Including muscular strength, muscular endurance, flexibility, and cardiorespiratory capacity) compared to the control group (Table 2).

**Table 1.** Characteristics of the participants based on the differences between the supervision and cooperative supervision groups

| Variables | Total (n=210) | Supervision (n=105) | Cooperative supervision (n=105) |
|---|---|---|---|
| Age (Year) (%) | | | |
| 10 | 21.4 | 14.3 | 28.6 |
| 11 | 41 | 41.9 | 40 |
| 12 | 37.6 | 43.8 | 31.4 |
| Parents' education level (%) | | | |
| Mother | | | |
| Diploma and sub-diploma | 64.7 | 62.4 | 59.7 |
| Associate's degree and above | 35.3 | 37.6 | 40.3 |
| Father | | | |
| Diploma and sub-diploma | 35.7 | 36.8 | 35.3 |
| Associate's degree and above | 64.3 | 63.2 | 64.7 |
| BMI % ($kg/m^2$) | | | |
| Overweight | 66.1 | 65.9 | 67.2 |
| Obese | 33.9 | 34.1 | 32.8 |
| Amount of weekly physical activity at home (%) | | | |
| Child (Pre-intervention) | | | |
| Sitting and playing | 21.5 | 21.9 | 21 |
| A combination of sitting and standing game | 73.3 | 74.3 | 72.3 |
| Moving and active | 5.2 | 3.8 | 6.7 |
| Child (Post-intervention) | | | |
| Sitting and playing | 0 | 0 | 0 |
| A combination of sitting and standing game | 24.3 | 26.7 | 21.9 |
| Moving and active | 75.7 | 73.3 | 78.1 |
| Mother (Pre-intervention) | | | |
| Sitting and working | 17.6 | 23.8 | 11.4 |
| A combination of sitting and standing activities | 71.9 | 69.5 | 74.3 |
| Moving and active | 10.5 | 6.7 | 14.3 |
| Mother (Post-intervention) | | | |
| Sitting and working | 0 | 0 | 0 |
| A combination of sitting and standing activities | 35.2 | 47.6 | 22.9 |
| Moving and active | 64.8 | 52.4 | 77.1 |
| Watching TV and computer weekly (MET/min) | | | |
| Child (Pre-intervention) | 2059.4 | 787.5 | 1271.9 |
| Child (Post-intervention) | 1228 | 534.8 | 963.2 |
| Daily sleep comparison weekly (MET/min) | | | |
| Child (Pre-intervention) | 2129.4 | 1033.2 | 1096.2 |
| Child (Post-intervention) | 1171.8 | 693 | 478.8 |
| Night sleep comparison weekly (MET/min) | | | |
| Child (Pre-intervention) | 5239 | 2642 | 2597 |
| Child (Post-intervention) | 5316 | 2649 | 2667 |
| How does the child go to school? | | | |
| With car | 53.4 | 63.8 | 42.9 |
| Walking and alone | 6.2 | 1.9 | 10.5 |
| On foot with the family | 40.4 | 34.3 | 46.7 |
| n = (%) | | | |

BMI: Body Mass Index; MET: Metabolic Equivalent of Task; Min: Minute

A statistically significant difference was identified in the mean observation results ($P < 0.05$), with post-intervention mean flexibility being markedly higher than baseline values. Following the intervention, mean performance measures were recorded as 5 repetitions for the Barfix test (Muscle strength), 4 repetitions for the swimming test (Muscular endurance), and a reduction of nearly 1.40 minutes in the two 1600-meter running tests (Cardiorespiratory capacity). Furthermore, the mean score for the flexibility board test (Flexibility) in the cooperative supervision group was 23 cm (SD = 6 cm) post-intervention (Table 2).

In the cooperative supervision group, a significant majority of the children, exceeding 90%, initially exhibited low-to-moderate PA (LMPA), which was characterized by frequent sedentary behavior, such as engaging in unmoving games. Post-intervention, a substantial proportion, over 70% of these children, transitioned to participation in active, moving games. The overall prevalence of overweight and obesity in the entire study population was 19.4% (With overweight at 12.8% and obesity at 6.6%). Regarding participant demographics, 145 students held the first or second birth rank within their families. Educational data indicated that 135 fathers and 74 mothers possessed a university education. Furthermore, only 20% of these students reported having specific sports skills in a particular field, while 60% had a history of participating in science Olympiads. Finally, more than 60% of the students were the result of consanguineous marriages, indicating that their parents were related.

Pre-intervention data revealed that approximately 25% of students in the cooperative supervision group utilized active transportation (Walking) to commute to school, with this proportion more than doubling post-intervention. Notably, no students in either group used a bicycle for school commuting at any time point. Mothers in the cooperative supervision group were programmatically required to engage in shared physical exercise with their children. Regarding overall PA, over 80% of the children initially exhibited LMPA pre-intervention, primarily engaging in sedentary behaviors. However, post-intervention, more than 70% of the children transitioned to active behaviors. Consequently, a statistically significant difference was observed in the children's overall PA levels when comparing pre- and post-intervention measurements ($P < 0.05$).

The study findings concerning sedentary behavior in the home setting, specifically the amount of time children spent engaging in activities, such as watching TV and using computers, indicated a daily duration of approximately 2.5 hours. Concurrently, the time mothers spent watching TV was documented at nearly 3 hours, a duration that was both comparable to and slightly exceeded that observed in their children.

Based on the investigation, a substantial majority of subjects (77%, n = 180) presented with musculoskeletal abnormalities, experiencing at least one of the 13 disorders under scrutiny. In contrast, only 23% (n = 56) exhibited a typical state. Among those identified with aberrations, a smaller proportion (42%) showed three or fewer types of abnormalities, while the majority (58%) displayed more than three types. Prioritizing the prevalence of musculoskeletal abnormalities among students revealed that lumbar depression exhibited the highest incidence, whereas knee bracing was the least common disorder identified (Table 3).

**Table 2.** Comparison of the physical fitness index evaluation test results (In terms of repetitions, time, and centimeters) in the supervision and cooperative supervision groups pre- and post-intervention

| Physical fitness | Group | Mean (SD) pre-intervention | Mean (SD) post-intervention | Mean (SD) differences pre- and post-intervention | T | P-Value |
|---|---|---|---|---|---|---|
| Flexibility | Cooperative supervision | 17.77±5.2 | 26.34±5.2 | 8.57±2.83 | 14.601 | < 0.001 |
| | Supervision | 17.82±5.6 | 20.76±5.5 | 2.93±2.76 | | |
| Muscular endurance | Cooperative supervision | 8.52±4.9 | 15.68±6.8 | 7.16±4.09 | 8.126 | < 0.001 |
| | Supervision | 9.71±4.98 | 13.01±5.4 | 3.30±2.63 | | |
| Muscle strength | Cooperative supervision | 3.00±1.95 | 7.91±2.9 | 4.90±1.70 | 9.963 | < 0.001 |
| | Supervision | 3.65±2.44 | 6.01±2.6 | 2.36±1.98 | | |
| Cardiorespiratory endurance | Cooperative supervision | 15.04±1.1 | 13.24±0.6 | -1.79±0.68 | -7.354 | < 0.001 |
| | Supervision | 14.26±0.7 | 13.30±0.7 | -0.86±1.09 | | |

SD: Standard Deviation
Paired and independent T-tests
Analysis Of Variance (ANOVA) test, Correlation Coefficient
Chi-square

**Table 3**. Frequency and prevalence of musculoskeletal abnormalities in overweight and obese children

| Rank | Ranking of abnormalities in the study | Prevalence percentage |
|---|---|---|
| 1 | Lordosis | 59.7 % |
| 2 | Wry neck | 39.8 % |
| 3 | Uneven shoulders | 38.1 % |
| 4 | Forward head | 34.7 % |
| 5 | Kyphosis | 30 % |
| 6 | Genu valgum | 27.5 % |
| 7 | Anterior tilt | 18.6 % |
| 8 | Scoliosis | 13.9 % |
| 9 | Genu varum | 11.4 % |

## Discussion

The principal outcome of this study demonstrates that maternal cooperative supervision effectively enhances children's PA levels and physical fitness indices. These indices are considered robust predictors of sustained PA engagement in children. Specifically, participants in the cooperative supervision group-where mothers and children exercised together-exhibited a significant increase in PA and meaningful improvements in their physical fitness metrics. This aligns with prior research indicating that adolescent girls are a priority group for PA improvement, and analyses confirm that parental presence plays a crucial role in boosting the PA of this demographic (15). Conversely, the findings of a study by Mora-González demonstrated that, following their intervention, there was a significant improvement in the participants' cardiorespiratory capacity indices, but no comparable changes in muscle strength indices. This difference in outcomes may be attributable to the disparity in intervention design, as the present study involved a 6-week, home-based exercise program featuring maternal participation - a component absent in Mora-González's research (16). Furthermore, the results contrast with those of the study by Timothy Brusseau, which evaluated a 6- and 12-week PA intervention among preschool children in Utah; that research reported no significant difference in outcomes between the two comparison groups pre- and post-intervention, thus failing to support the hypothesized benefits of the program (17). Sigmundová's study revealed a robust correlation between parental and child PA levels, a relationship that was particularly pronounced on weekends. This association was also stronger among same-sex parent-child dyads. These results align with the findings of the current study, bolstering the evidence for the efficacy of cooperative interventions involving mothers and daughters (18). Furthermore, research focusing on elderly individuals suggests that physical fitness levels are predictable based on fundamental PA engagement. Additionally, there is a significant and persistent link between changes in physical fitness indices and corresponding shifts in PA levels (19). In a related investigation, Antonio García-Hermoso et al. conducted an 8-week school-based sports program involving 170 children aged 8 to 10 years from three public schools in Chile. This intervention resulted in a significant improvement in the children's cardiorespiratory capacity when comparing post-intervention measures to baseline, which further corroborates the results obtained in our current study (20). The findings from Stanisław's study lend support to the results of the current investigation. Minor deviations between our observations and the aforementioned research can be plausibly attributed to the difference in the age range of the students examined (21). Furthermore, as highlighted by one systematic review, the child's comprehensive daily and nocturnal behaviors (Including home-based PA, watching TV, and diurnal and nocturnal sleep patterns) are crucial. A factor such as maternal cooperative supervision of the child's PA is particularly influential and contributes to the program's effectiveness, largely because mothers typically spend a significant amount of time with their children at home (22). A cross-sectional study demonstrated that adherence to a structured PA schedule correlated with a reduction in screen time among the examined children. This finding underscores the significant role of the mother in maintaining this regimen during both weekdays and holidays (18). Furthermore, parental involvement in PA frequently serves to enhance their children's intrinsic motivation to participate in active behaviors. Children tend to emulate the behaviors demonstrated by their parents. The results of this study specifically show that a parental deficit in PA is directly related to lower activity levels in their children. Furthermore, research by Travis E. Dorsch emphasizes that parents represent one of the most significant influences for promoting and inspiring children's engagement in PA and exercise, thereby forging a deep and critical link (23).

The American Academy of Pediatrics (AAP) recommends that the mean duration of sitting and sedentary behavior for children of both sexes be limited to less than 120 minutes (Two hours) per day (24). It is important to note a significant correlation between the amount of time parents and children spend engaging in screen watching, with the latter being heavily influenced by parental attitudes (25). Furthermore, the findings of Muna J. Tahir's study are consistent with the results of the current research (26).

In our research, the absence of bicycle use among children for commuting to school suggests that a cycling culture remains undeveloped and may have even deteriorated compared to earlier periods. Historically, limited road infrastructure and lower rates of car ownership necessitated greater reliance on bicycles. Nevertheless, a pertinent intervention implemented in California schools, as researched by Abby C. King and collaborators, yielded noteworthy outcomes, resulting in a near-doubling of the percentage of students who cycled to school (27). This context is further supported by prior research indicating that young individuals dedicate only minimal time to MVPA, contrasting with the substantial duration spent in sedentary activities. This aligns with and corroborates our present findings, confirming that such widespread sedentary behavior constitutes a primary factor contributing to the elevated BMI documented in this cohort of children (28).

Consistent with global research, our study corroborates the escalating prevalence of overweight and obesity among children in diverse nations (29,30). Furthermore, our findings align with established literature indicating that most children exhibit at least one musculoskeletal abnormality, with the highest prevalence rate specifically observed in the lower back cavity (31).

Limitations of this study include the brevity of the intervention period and the restriction of data collection to a single gender.

## Conclusion

Regular PA generally enhances physical fitness indices in children who are overweight or obese. Furthermore, the involvement of a supportive factor, such as maternal participation in sports exercises at home, may elevate a child's PA levels through mechanisms of persuasion and encouragement. These present findings require confirmation through additional high-quality randomized clinical trials. Moreover, there is a clear need for future research to investigate the long-term effects of maternal cooperative supervision on key physical fitness indices.

## Acknowledgement

We would like to thank the participating students, their families, and the school staff for their cooperation and assistance throughout the duration of this study. Furthermore, we wish to formally acknowledge the support provided by Yasuj University of Medical Sciences, specifically for granting the necessary ethics approval and offering essential administrative assistance.

## Funding sources

The study was conducted without the support of external financial resources, as no specific grant was secured from any public, commercial, or non-profit funding agencies.

## Ethical statement

The study received ethical authorization (IR.YUMS.REC.1396.87) from the Medical Ethics Committee of Yasuj University of Medical Sciences and Health Services. Prior to the commencement of the research, written informed consent was secured from all participating students and their parents.

## Conflicts of interest

No conflict of interest.

## Author contributions

Conceptualization: M.R. and M.H.; Methodology: M.H. and V.M.; Validation: M.H. and M.R.; Investigation and Data curation: M.H. and M.R.; Writing-Original draft preparation: V.M. and L.SH.; Writing-Review and Editing: L.SH. and M.H.; Visualization: M.R. and M.H.; Supervision: K.K.SH.; Project administration: M.H. and M.R.

All authors have read and agreed to the published version of the manuscript.

## Data availability statement

The datasets generated during and/or analyzed during the current study can be obtained from the corresponding author upon reasonable request.

## References


1. Devaux M, Lerouge A, Ventelou B, Goryakin Y, Feigl A, Vuik S, et al. Assessing the potential outcomes of achieving the World Health Organization global non-communicable diseases targets for risk factors by 2025: is there also an economic dividend? Public Health. 2019;169:173-9. [View at Publisher] [DOI] [PMID] [Google Scholar]
2. Azadnajafabad S, Mohammadi E, Aminorroaya A, Fattahi N, Rezaei S, Haghshenas R, et al. Non-communicable diseases' risk factors in Iran; a review of the present status and action plans. J Diabetes Metab Disord. 2021;23(2):1-9 [View at Publisher] [DOI] [PMID] [Google Scholar]
3. Qiu H, Cao S, Xu R. Cancer incidence, mortality, and burden in China: a time-trend analysis and comparison with the United States and United Kingdom based on the global epidemiological data released in 2020. Cancer Commun. 2021;41(10):1037-48. [View at Publisher] [DOI] [PMID] [Google Scholar]
4. Azadnajafabad S, Mohammadi E, Aminorroaya A, Fattahi N, Rezaei S, Haghshenas R, et al. Non-communicable diseases' risk factors in Iran; a review of the present status and action plans. J Diabetes Metab Disord. 2021;23(2):1-9 [View at Publisher] [DOI] [PMID] [Google Scholar]
5. Chooi YC, Ding C, Magkos F. The epidemiology of obesity. Metabolism. 2019;92:6-10. [View at Publisher] [DOI] [PMID] [Google Scholar]
6. Ten Velde G, Plasqui G, Dorenbos E, Winkens B, Vreugdenhil A. Objectively measured physical activity and sedentary time in children with overweight, obesity and morbid obesity: a cross-sectional analysis. BMC Public Health. 2021;21(1):1558 [View at Publisher] [DOI] [PMID] [Google Scholar]
7. Vandoni M, Codella R, Pippi R, Carnevale Pellino V, Lovecchio N, Marin L, et al. Combatting Sedentary Behaviors by Delivering Remote Physical Exercise in Children and Adolescents with Obesity in the COVID-19 Era: A Narrative Review. Nutrients. 2021;13(12):4459. [View at Publisher] [DOI] [PMID] [Google Scholar]
8. Park J, Ten Hoor GA, Baek S, Baek S, Lee J-y, Lee H. Social ecological barriers for healthy eating of obese children and their caregivers in low-income families in South Korea. Ecol Food Nutr. 2021;60(4):525-41. [View at Publisher] [DOI] [PMID] [Google Scholar]
9. Bülbül S. Exercise in the treatment of childhood obesity. .Turk Pediatri Ars. 2020;55(1):2-10. [View at Publisher] [DOI] [PMID] [Google Scholar]
10. True L, Martin E.M, Pfeiffer K, Siegel S, Branta C, Haubenstricker J, et al. Tracking of physical fitness components from childhood to adolescence: A longitudinal study. Meas Phys Educ Exerc Sci. 2021;25(1):22-34. [View at Publisher] [DOI] [Google Scholar]
11. Fühner T, Kliegl R, Arntz F, Kriemler S, Granacher U. An update on secular trends in physical fitness of children and adolescents from 1972 to 2015: a systematic review. Sports Med. 2021;51(2):303-20. [View at Publisher] [DOI] [PMID] [Google Scholar]
12. Morano M, Robazza C, Bortoli L, Rutigliano I, Ruiz MC, Campanozzi A. Physical activity and physical competence in overweight and obese children: An intervention study. Int J Environ Res Public Health. 2020;17(17):6370. [View at Publisher] [DOI] [PMID] [Google Scholar]
13. Rhodes RE, Quinlan A, Naylor P-J, Warburton DE, Blanchard CM. Predicting personal physical activity of parents during participation in a family intervention targeting their children. J Behav Med. 2020;43(2):209-24. [View at Publisher] [DOI] [PMID] [Google Scholar]
14. Perez-Sousa MA, Olivares PR, Garcia-Hermoso A, Gusi N. Does anthropometric and fitness parameters mediate the effect of exercise on the HRQoL of overweight and obese children/adolescents? Qual Life Res. 2018;27(9):2305-12. [View at Publisher] [DOI] [PMID] [Google Scholar]
15. Laird Y, Fawkner S, Niven A. A grounded theory of how social support influences physical activity in adolescent girls. Int J Qual Stud Health Well-being. 2018;13(1):1435099. [View at Publisher] [DOI] [PMID] [Google Scholar]
16. Mora-Gonzalez J, Esteban-Cornejo I, Cadenas-Sanchez C, Migueles JH, Molina-Garcia P, Rodriguez-Ayllon M, et al. Physical fitness, physical activity, and the executive function in children with overweight and obesity. J Pediatr. 2019;208:50-6. [View at Publisher] [DOI] [PMID] [Google Scholar]
17. Brusseau TA, Hannon J, Burns R. The effect of a comprehensive school physical activity program on physical activity and health-related fitness in children from low-income families. Journal of Physical Activity and Health. 2016;13(8):888-94. [View at Publisher] [DOI] [PMID] [Google Scholar]
18. Sigmundová D, Badura P, Sigmund E, Bucksch J. Weekday-weekend variations in mother-/father-child physical activity and screen time relationship: A cross-sectional study in a random sample of Czech families with 5-to 12-year-old children. Eur J Sport Sci. 2018;18(8):1158-67. [View at Publisher] [DOI] [PMID] [Google Scholar]
19. Smith JJ, Eather N, Weaver RG, Riley N, Beets MW, Lubans DR. Behavioral correlates of muscular fitness in children and adolescents: a systematic review. Sports Med. 2019;49(6):887-904 [View at Publisher] [DOI] [PMID] [Google Scholar]
20. García-Hermoso A, Hormazábal-Aguayo I , Fernández-Vergara O, González-Calderón N, Russell-Guzmán J, Vicencio-Rojas F, et al. A before-school physical activity intervention to improve cognitive parameters in children: The Active-Start study. Scand J Med Sci Sports. 2020;30(1):108-16. [View at Publisher] [DOI] [PMID] [Google Scholar]
21. Czyż SH, Toriola AL, Starościak W, Lewandowski M, Paul Y, Oyeyemi AL. Physical Fitness, Physical Activity, Sedentary Behavior, or Diet-What Are the Correlates of Obesity in Polish School Children? Int J Environ Res Public Health. 2017;14(6):664. [View at Publisher] [DOI] [PMID] [Google Scholar]
22. Yuksel HS, Neşe Şahin F, Maksimovic N, Drid P, Bianco A. School-Based Intervention Programs for Preventing Obesity and Promoting Physical Activity and Fitness: A Systematic Review. Int J Environ Res Public Health. 2020;17(1):347. [View at Publisher] [DOI] [PMID] [Google Scholar]
23. Dorsch TE, King MQ, Tulane S, Osai KV, Dunn CR, Carlsen CP. Parent education in youth sport: A community case study of parents, coaches, and administrators. J Appl Sport Psychol .2019;31(4):427-50. [View at Publisher] [DOI] [Google Scholar]
24. American Academy of Pediatrics. Committee on Public Education. Children, adolescents, and television. Pediatrics. 2001;107(2):423-6. [View at Publisher] [DOI] [PMID] [Google Scholar]
25. Joseph ED, Kracht CL, Romain JS, Allen AT, Barbaree C, Martin CK, et al. Young Children's screen time and physical activity: Perspectives of parents and early care and education center providers. Glob Pediatr Health. 2019;6:2333794X19865856. [View at Publisher] [DOI] [PMID] [Google Scholar]
26. Tahir MJ, Willett W, Forman MR. The association of television viewing in childhood with overweight and obesity throughout the life course. Am J Epidemiol. 2019;188(2):282-93. [View at Publisher] [DOI] [PMID] [Google Scholar]
27. Rodriguez NM, Arce A, Kawaguchi A, Hua J, Broderick B, Winter SJ, et al. Enhancing safe routes to school programs through community-engaged citizen science: two pilot investigations in lower density areas of Santa Clara County, California, USA. BMC Public Health. 2019;19(1):256. [View at Publisher] [DOI] [PMID] [Google Scholar]
28. Jones MA, Skidmore PM, Stoner L, Harrex H, Saeedi P, Black K, et al. Associations of accelerometer-measured sedentary time, sedentary bouts, and physical activity with adiposity and fitness in children. J Sports Sci. 2020;38(1):114-20. [View at Publisher] [DOI] [PMID] [Google Scholar]
29. Szczyrska J, Jankowska A, Brzeziński M, Jankowski M, Metelska P, Szlagatys-Sidorkiewicz A. Prevalence of Overweight and Obesity in 6-7-Year-Old Children-A Result of 9-Year Analysis of Big City Population in Poland. Int J Environ Res Public Health. 2020;17(10):3480. [View at Publisher] [DOI] [PMID] [Google Scholar]
30. Ogden CL, Fryar CD, Martin CB, Freedman DS, Carroll MD, Gu Q, et al. Trends in obesity prevalence by race and hispanic origin-1999-2000 to 2017-2018. JAMA. 2020;324(12):1208-10. [View at

Publisher] [DOI] [PMID] [Google Scholar]
31. Karimian R, Karimian M, Hadipour M, Heyat F, Janbozorgi A. The prevalence of children's postural abnormalities and its association with sport activity. J Adv Biomed Sci. 2016;6(1):106-12. [View at Publisher] [Google Scholar]

**Cite this article as:**
Hasani M, Monfared V, Sheikhi L, Hasani M, Karimzadeh Shirazi K, Rahimi Far M. The effect of maternal cooperative supervision on physical fitness indices of overweight and obese girls in home-based exercise programs. *JCBR.* 2025;9(3):6-12. http://dx.doi.org/10.29252/JCBR.9.3.6