

Correcting Pes planus in school-age girls: Evidence from a Children's After-School Club

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Abstract:

Pes planus (flatfoot) is common in school-age children and may impact posture, balance, and movement if left uncorrected. Early, low-cost interventions are important for preventing long-term complications and maintaining proper musculoskeletal development. This study evaluated whether an 8-week program delivered in children's after-school clubs can lead to measurable improvements in the foot arch. Thirty-two school-age girls (mean age: 9.33 ± 0.33 years) with diagnosed pes planus (i.e., flexible) were randomly assigned to an experimental group ($N = 16$, 50%), which received targeted foot exercises, or a control group ($N = 16$, 50%), which followed routine after-school clubs activities. The program was implemented three times per week for eight (consecutive) weeks. Medial longitudinal arch development was assessed before and after the program using the Srdečný's Index Method ($i \leq 1.7$) and the Podo4Foot Cam (RGB) diagnostic tool, which provided precise footprint imaging and arch index calculations. The experimental group showed significant ($p < 0.01$) improvements in the arch index for both feet, accompanied by large effect sizes ($r = 0.60 - 0.62$), suggesting clinically meaningful structural adaptations. No significant changes ($p > 0.05$) were observed in the control group, confirming the specificity of the intervention's effects. Between-group comparisons at post-interventions also revealed statistically significant differences favoring the intervention ($p < 0.01$). These findings indicate that an 8-week, foot-specific corrective exercise program, when incorporated into children's after-school club settings, can effectively enhance medial longitudinal arch development in girls with flexible pes planus. The program's structured yet playful format promotes high adherence, accessibility, and minimal resource requirements. As such, this approach demonstrates strong potential as a preventive and corrective strategy for pediatric musculoskeletal health, contributing to improved posture, gait, and motor function in the school-age population.

Key words: Corrective exercise, flat feet, foot morphology, musculoskeletal health, preventive rehabilitation.

Introduction

Pes planus, commonly known as flatfoot, is a condition characterized by the lowered or absent medial longitudinal arches of the foot. In children, in particular, school-age girls, flatfoot (e.g., flexible) is a frequent musculoskeletal concern that resolves with age as the foot muscles and ligaments strengthen (Sadeghi-Demneh et al., 2015); however, in some cases, the condition persists or progresses, affecting posture, balance, gait mechanics, and even athletic performance (Rakhmatová et al., 2025). Despite being common, *pes planus* is underdiagnosed or undertreated in young girls unless symptoms arise. In school environments where physical activity is encouraged, the structural deficits caused by *pes planus* can lead to pain, fatigue, and functional limitations that may compromise a child's participation in sports and recreational activities (Gad et al., 2023). This is, in particular, concerning given that *pes planus* can contribute to biomechanical dysfunctions that extend beyond the foot, including problems in the knees, hips, and lower back (Şahan et al., 2023; Sawant & Shinde, 2021). The need for early intervention arises from evidence that the foot structure established during childhood strongly influences later motor patterns, balance, and musculoskeletal alignment (Wang et al., 2023). Untreated flexible *pes planus* can evolve into a rigid deformity, altered gait kinetics, and overuse injuries during adolescence and adulthood. These changes not only limit participation in Physical Education but may also predispose children to chronic lower-limb conditions such as patellofemoral pain or lumbar strain. Hence, understanding simple, cost-effective strategies for early correction is crucial for promoting long-term orthopedic health (Böhm et al., 2024).

Pes planus is considered benign, but intervention may be necessary when the deformity is symptomatic or causes functional limitations. Research indicates that conservative management through targeted exercise and orthotic interventions can improve arch height and foot function in children (Dars et al., 2018). Structured physical activity programs, such as those offered in children's after-school clubs, may provide accessible means to implement these interventions (Azor et al., 2025).

Children's after-school clubs represent a promising but underutilized platform for addressing mild musculoskeletal conditions like *pes planus* in children (Marko et al., 2025). These clubs offer structured environments where consistent, supervised exercise can be introduced without placing an additional burden on the school curriculum or families (Jung et al., 2022). Incorporating foot-strengthening and balance-enhancing routines into these clubs can offer dual benefits, enhancing musculoskeletal health while promoting general physical fitness and participation in physical activity (Choi et al., 2017).

From a public health perspective, after-school clubs are ideal for early prevention because they integrate education, recreation, and supervised movement. Unlike clinical physiotherapy, they require minimal resources, making them scalable and sustainable in community and school settings. However, despite their accessibility, few studies have examined the direct biomechanical outcomes of structured corrective exercise within these environments (Böhm et al., 2024). Epidemiological research has estimated the prevalence of *pes planus* in school-age children to range from 7% to 20%, with higher prevalence in younger age groups (Gechevá et al., 2025). *Pes planus* has been shown to correlate with other biomechanical limitations, such as reduced vertical jump and altered gait patterns (Takács et al., 2019). Deficits in foot mechanics, seen in *pes planus*, can increase injury risk and impair postural control, factors that are crucial in childhood motor development (Rakhmatová et al., 2025). Current scientific literature provides limited consensus on the most effective, child-appropriate corrective methods for flexible flatfoot. While orthoses are frequently prescribed, their long-term corrective potential is debated, and compliance among children is often low (Choi et al., 2020). Exercise-based interventions, by contrast, actively engage intrinsic and extrinsic foot musculature, improving proprioception and postural stability. Therefore, establishing empirical evidence for such interventions in naturalistic, school-based contexts, is an urgent research priority (Kim et al., 2026).

Recent advancements in orthotic technology and gait assessment methods are enhancing the precision of diagnosis and treatment for *pes planus*. Digital footprint analysis and 3D gait tracking now allow for more objective evaluation of arch mechanics and treatment progress (Gad et al., 2023; Jung et al., 2023); however, access to such technology remains limited, reinforcing the importance of low-cost interventions.

This research was needed to bridge the gap between laboratory-based clinical studies and community-based physical education practices. While many experimental trials rely on specialized settings and equipment, there is little evidence about the feasibility and effectiveness of integrating corrective protocols into routine children's programs. The present study therefore sought to test whether a short-term, supervised foot exercise program could yield measurable morphological changes when delivered through existing educational frameworks (Martínez-Romero et al., 2025). Although *pes planus* is not life-threatening, its implications for musculoskeletal health and quality of life are far from trivial. School-age girls, in particular, may experience underdiagnosis or underreporting because of cultural and psychosocial factors, complicating the condition's management (Morrison et al., 2020; Khalid et al., 2015). By integrating screening and corrective exercises into settings safe for children, such as after-school clubs, educators (e.g., teachers) can manage this condition and prevent more severe outcomes in adolescence (Marko et al., 2025).

Gender-specific research indicates that girls may respond differently to exercise regimens aimed at correcting *pes planus* because of variations in neuromuscular control, joint laxity, and physical activity preferences (Jia et al., 2024). This highlights the importance of tailored programs that respect both the physiological and psychological needs of school-age girls (Polevoy et al., 2024).

To the best of the authors' knowledge, there is insufficient current knowledge regarding the impact of interventions aimed at improving *pes planus* in school-age girls, in particular, within the children's after-school clubs. The present study aimed at exploring the potential of children's after-school clubs as platforms for addressing *pes planus* in school-age girls. We evaluated whether an 8-week program delivered in children's after-school clubs can lead to measurable improvements in the foot arch. By focusing on populations that are both accessible and at developmental stages responsive to intervention, our study provides important evidence for a low-cost and accessible approach to correcting *pes planus*.

Material & Methods

Participants

The study involved thirty-two school-age girls (100%; mean age: 9.33 ± 0.33 years) recruited from children's after-school clubs in Partizánske (Slovakia). Eligibility criteria included a clinical diagnosis of *pes planus* (flexible), determined through physical examination and digital footprint analysis (Podo4Foot Cam) (RGB) using Srdečný's Index Method ($i \leq 1.7$). Participants ($N = 32$, 100%) were selected using a combination of purposive and snowball sampling methods (Ahmed, 2024), targeting school-age girls, attending children's after-school clubs. All selected participants were disease-free (i.e., healthy), with no history of lower limb injury, musculoskeletal abnormality, or ongoing physiotherapeutic interventions.

After screening, 32 school-age girls (100%) were randomly assigned to two equal groups:

- The experimental group ($n = 16$) participated in a structured, foot-specific corrective exercise program for a duration of eight weeks, integrated into their regular after-school club sessions.
- The control group ($n = 16$) continued with their standard children's after-school clubs and did not receive any targeted program for *pes planus* during the study period.

Both groups were matched in terms of age, height, and weight, as shown in Table 1. The experimental group ($N = 16$, 50%) had a mean age of 9.26 ± 0.40 years, a mean height of 136.60 ± 1.26 cm, and a mean weight of 32.26 ± 2.24 kg. The control group ($N = 16$, 50%) had a mean age of 9.40 ± 0.24 years, a mean height of 136.42 ± 1.82 cm, and a mean weight of 32.46 ± 2.28 kg. At baseline, there was no statistically significant difference between the experimental and control groups in age ($t(30) = -1.20$, $p = 0.239$), height ($t(30) = 0.33$, $p = 0.747$), or weight ($t(30) = -0.25$, $p = 0.804$), confirming group homogeneity and ensuring comparability for subsequent analyses.

Written informed consent was obtained from all participants' legal guardians prior to inclusion in the study. Participation was voluntary, and the study protocol was approved by the Ethics Committee of the Artistic and Pedagogical Council of the Faculty of Performing Arts, Academy of Arts in Banská Bystrica (Approval No. 007, FMU-AU/24) in accordance with the ethical principles of the Declaration of Helsinki (Harriss et al., 2019).

Table 1. Anthropometric data of school-age girls ($N = 32$, 100%)

Anthropometric data	Experimental group ($N = 16$, 50%)	Control group ($N = 16$, 50%)
Age (years; $M \pm SD$)	9.26 ± 0.40	9.40 ± 0.24
Height (cm; $M \pm SD$)	136.60 ± 1.26	136.42 ± 1.82
Weight (kg; $M \pm SD$)	32.26 ± 2.24	32.46 ± 2.28

^N Number, % Percentage, ^{cm} Centimeter, ^{kg} kilogram, ^M Mean, ^{SD} Standard deviation.

Procedure & Measure

This study employed a true experimental design with randomized assignment into two parallel groups: the experimental group ($N = 16$, 100%) receiving a structured, foot-specific corrective exercise program and the control group ($N = 16$, 100%) receiving no such stimulus. The design conformed to methodological standards for controlled trials in Physical Education and health research (Armour & Macdonald, 2012).

The recruitment process was conducted in accordance with ethical guidelines, ensuring voluntary participation, anonymity, and full confidentiality. Participants and their legal guardians were informed about the study's purpose, procedures, and potential risks and benefits. Participants were assured of their right to withdraw at any stage, and all data were anonymized, securely stored, and used solely for research purposes.

A total of thirty-two school-age girls (100%) were randomly divided into two groups. The experimental group ($N = 16$; 50%) received a structured, foot-specific corrective exercise program targeting *pes planus* (S), while the control group ($N = 16$; 50%) received no program and served as a baseline comparator. The duration of the program was eight weeks ($\Delta t = 8$ weeks) for both groups, with pre- and post-assessments conducted during Week 1 (May 5, 2025) and Week 8 (June 28, 2025), respectively.

The program was carried out three times per week on Mondays, Wednesdays, and Fridays, with each session lasting 20 minutes. All sessions were conducted in structured group settings under the direct supervision of the authors. Each session followed a repeatable format that emphasized foot mobility and activation, intrinsic foot muscles, dynamic balance and control, and postural integration, tailored to address the medial longitudinal arch (Table 2). Exercises were demonstrated, corrected, and reinforced with individual feedback to ensure proper execution and avoid injury. Participants in the experimental group also received detailed verbal orientations regarding the objectives, structure, and potential effects of the program on *pes planus*, in order to enhance compliance and understanding.

Table 2. Foot-specific corrective exercise program

Week	Focus	Exercise
1-2	Mobility of foot & Activation	Toe curls with towel
		Marble pick-ups
		Heel raises
		Seated foot doming
		Marching with arch focus
		Short foot exercise
3-4	Intrinsic foot muscles	Toe spreading
		Single-leg balance
		Arch lifts in standing
		Review & combine best 2 exercises from weeks 1-2
5-6	Dynamic balance & Control	Foam balance
		Step-ups with arch cueing
		Ankle alphabet
		Resistance band
7-8	Integration & Posture	Review & combine best 2 exercises from weeks 3-4
		Agility ladder foot drills
		Core-braced toe walks
		Balance on pillow
		Walking lunges with arch cue
		Review & combine best 2 exercises from weeks 5-6

Throughout the 8-week period, the authors monitored all sessions, maintained detailed attendance and observation logs, and ensured that participants (i.e., the experimental group, $N = 16$, 100%) were instructed to report any signs of discomfort, fatigue, trembling, or motor control loss.

Although the study was conceptualized as causal, independent, and experimental, the nature of the outcomes observed over the intervention period allowed the design to be interpreted as impact-driven, dependent, and experimental, highlighting the responsiveness of the medial longitudinal arch (S) to consistent corrective stimuli (Azor et al., 2024).

The control group continued with their standard children's after-school clubs and did not receive any targeted program related to *pes planus* or its correction. This allowed for meaningful comparisons of within-group (pre- vs. post-) and between-group outcomes.

To objectively evaluate changes in the foot, a non-invasive diagnostic tool, the Podo4Foot Cam (RGB) paired with MultiReha[®] software, was used to capture footprints under standardized conditions. (Figure 1).



Figure 1. MultiReha[®] - Diagnostic software [<https://multireha.com>]

The Srdečný's Index Method (Srdečný, 1982) was used to calculate the index (i) using the formula: $i = (w/l) \times 10$, where w is the width of the footprint, and l is the length of the footprint. An index of $i \leq 1.7$ was considered indicative of a normal medial longitudinal arch, while an index $i > 1.7$ was classified as *pes planus*. This method was selected due to its high reliability, ease of use, and relevance in field-based diagnostics for pediatric populations. This experimental setup, with repeated measures taken at two time points (Week 1 and Week 8), allowed for a robust analysis of within-subject (intragroup) and between-group (intergroup) differences, contributing novel insights into the effectiveness of short-term, school-based corrective programs for musculoskeletal health in children.

Statistical analysis

All statistical procedures were conducted using IBM SPSS Statistics Version 24.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated for all variables, including means (M) and standard deviations (SD) (Dong, 2023). Prior to inferential testing, the data were examined for normality using the Shapiro-Wilk Test, which indicated non-normal distributions. Non-parametric tests were selected for the main analysis. Differences within groups (pre- vs. post-) were evaluated using the Wilcoxon Tests, while between-group comparisons (experimental vs. control) at both pre- and post- stages were performed using the Mann-Whitney U-Test (Nahn, 2016; Sedgwick, 2012). These non-parametric tests are appropriate for small sample sizes and non-normal distributions of data.

To assess baseline comparisons, independent-samples t-tests were employed to evaluate group differences in age, height, and weight, given that these variables met assumptions of normality.

The level of statistical significance was set at $p < 0.05$. For all significant results, effect sizes (r) were calculated using the formula $r = Z / \sqrt{N}$, where N is the total number of observations. Effect sizes were interpreted using Cohen's (1988) classification: small ($r = 0.10$), medium ($r = 0.30$), and large ($r = 0.50$). All values are reported with corresponding Z statistics, p values, and effect sizes (r), and presented in compliance with current best practices in sports and health sciences research.

Results

The present study evaluated whether an 8-week intervention delivered in children's after-school clubs could lead to measurable improvements in the foot arch. Quantitative analysis was conducted using the Srdečný's Index Method ($i \leq 1.7$), measured pre- and post-interventions (Week 1 and Week 8), for both the right and left feet. Results are presented as within-group (intragroup, Table 2) and between-group (intergroup, Table 3) comparisons.

In the experimental group ($N = 16$, 50%), Wilcoxon Test revealed statistically significant improvements in arch formation over the 8-week intervention period. The mean i (i.e., index) for the right foot decreased from 1.86 ± 0.08 (Week 1) to 1.60 ± 0.04 (Week 8), yielding statistics of $Z = 3.52$, $p < 0.01$, with a large effect size of $r = 0.62$. For the left foot, the index decreased from 1.88 ± 0.06 to 1.60 ± 0.06 ($Z = 3.50$, $p < 0.01$, $r = 0.60$). These findings indicated that participation in the structured, foot-specific corrective exercise program was associated with significant morphological improvements in the medial longitudinal arch (Table 3).

The control group ($N = 16$, 50%) did not exhibit statistically significant changes between the pre- and post-intervention time points. The *index* for the right foot increased from 1.84 ± 0.10 to 1.86 ± 0.12 ($Z = 1.10$, $p > 0.05$, $r = 0.18$), and the left foot *index* showed non-significant decreases from 1.88 ± 0.06 to 1.82 ± 0.08 ($Z = 0.64$, $p > 0.05$, $r = 0.12$).

Table 3. Intragroup (within) comparisons of school-age girls ($N = 32$, 100%)

Experimental group			
Arch of foot	Pre- (Week 1)	Post- (Week 8)	Wilcoxon Test
Right ($M \pm SD$)	1.86 ± 0.08	1.60 ± 0.04	$Z = 3.52$, $p < 0.01$, $r = 0.62^{**}$
Left ($M \pm SD$)	1.88 ± 0.06	1.60 ± 0.06	$Z = 3.50$, $p < 0.01$, $r = 0.60^{**}$
Control group			
Arch of foot	Pre- (Week 1)	Post- (Week 8)	Wilcoxon Test
Right ($M \pm SD$)	1.84 ± 0.10	1.86 ± 0.12	$Z = 1.10$, $p > 0.05$, $r = 0.18$
Left ($M \pm SD$)	1.88 ± 0.06	1.82 ± 0.08	$Z = 0.64$, $p > 0.05$, $r = 0.12$

^N Number, [%] Percentage, ^{cm} Centimeter, ^{kg} kilogram, ^M Mean, ^{SD} Standard deviation, ^p Value; ^z Value; ^r Effect size; ^{**} Significance (p) < 0.01

At baseline (Week 1), Mann-Whitney U-Tests confirmed no statistically significant differences between the experimental and control groups. For the right foot, the mean *index* was 1.86 ± 0.08 in the experimental group and 1.84 ± 0.10 in the control group ($Z = -0.02$, $p > 0.05$, $r = -0.02$). For the left foot, both groups presented an identical mean value of 1.88 ± 0.06 ($Z = -0.04$, $p > 0.05$, $r = -0.04$), confirming homogeneity at baseline.

However, at the post-test (Week 8), statistically significant differences were observed between the groups in favor of the experimental condition. The experimental group demonstrated a lower *index* for both feet compared to the control group. For the right foot, the post-intervention *index* was 1.60 ± 0.04 (experimental) and 1.86 ± 0.12 (control), with $Z = -4.82$, $p < 0.01$, $r = -0.84$. For the left foot, the corresponding *index* was 1.60 ± 0.06 and 1.82 ± 0.08 , respectively, with $Z = -4.84$, $p < 0.01$, $r = -0.86$. Both comparisons reflected large effect sizes, suggesting strong efficacy of the corrective exercise protocol (Table 4).

Table 4. Intergroup (within) comparisons of school-age girls ($N = 32$, 100%)

Pre- (Week 1)			
Arch of foot	Experimental group	Control group	Mann-Whitney U-Test
Right ($M \pm SD$)	1.86 ± 0.08	1.84 ± 0.10	$Z = -0.02$, $p > 0.05$, $r = -0.02$
Left ($M \pm SD$)	1.88 ± 0.06	1.88 ± 0.06	$Z = -0.04$, $p > 0.05$, $r = -0.04$
Post- (Week 8)			
Arch of foot	Experimental group	Control group	Mann-Whitney U-Test
Right ($M \pm SD$)	1.60 ± 0.04	1.86 ± 0.12	$Z = -4.82$, $p < 0.01$, $r = -0.84^{**}$
Left ($M \pm SD$)	1.60 ± 0.06	1.82 ± 0.08	$Z = -4.84$, $p < 0.01$, $r = -0.86^{**}$

^N Number, [%] Percentage, ^{cm} Centimeter, ^{kg} kilogram, ^M Mean, ^{SD} Standard deviation, ^p Value; ^z Value; ^r Effect size; ^{**} Significance (p) < 0.01

Discussion

The current study provides compelling evidence that an 8-week, structured, foot-specific corrective exercise program implemented within children's after-school clubs can significantly improve the medial longitudinal arch in school-age girls diagnosed with flexible pes planus. The post-intervention reductions in Srdečný's index for both feet in the experimental group, contrasted with the stability of indices in the control group, demonstrate that targeted physical activity can induce structural adaptations in pediatric foot morphology.

These findings align with earlier research that emphasizes the modifiability of *pes planus* in children through conservative, non-surgical interventions. Corrective exercise programs focusing on intrinsic foot muscle strengthening, such as toe curls, short foot exercises, and balance drills, have been reported to enhance foot arch development and biomechanical stability (Abd-Elmonem et al., 2021; Gooding et al., 2016).

This strategy targets muscular deficits and helps to reorganize neuromuscular control essential for arch support (Choi & Lee, 2021). The statistically significant ($p < 0.01$) within-group improvements observed in this study are notable for several reasons. First, the program was low-cost and easily administered in an after-school club setting, making it replicable in diverse educational environments. Second, the use of objective diagnostic tools like the Podo4Foot Cam (RGB) and the Srdečný's Index Method ensured accuracy in monitoring morphological changes over time. Third, the large effect sizes observed ($r > 0.60$) reflect not just statistical significance ($p < 0.01$) but also practical relevance for early intervention efforts.

Recent randomized controlled trials have corroborated the effectiveness of similar short-duration corrective protocols in children. Structured physical activity and orthotic use can yield improvements in foot posture and function in children with *pes planus* (Dars et al., 2018). Complementing these results, another study

reported that interventions addressing muscle imbalance between proximal and distal muscle groups in the lower limb corrected postural deformities such as *pes planus* (Sawant & Shinde, 2021).

These findings extend beyond musculoskeletal correction; they have implications for childhood motor development and injury prevention. Children with *pes planus* have been shown to exhibit impaired balance, altered gait patterns, and reduced proprioception, all of which may hinder participation in physical activity (Gad et al., 2023). By restoring normal foot mechanics, corrective exercises can improve alignment and reduce future risk of overuse injuries or secondary joint complications (Jankowicz-Szymańska et al., 2025).

The school-age girls cohort selected for this study represents a population often overlooked in musculoskeletal intervention programs. Gender-specific research has shown that girls may have higher joint laxity and different neuromotor recruitment patterns compared to boys, making them uniquely responsive to corrective stimuli (Polevoy et al., 2024). By tailoring the program to this group, the study addresses gaps in current practice.

Despite growing interest in orthotic use for pediatric *pes planus*, there is ongoing debate about its long-term efficacy and standardization of prescription criteria (Dars et al., 2018). Several reviews highlight the lack of consistent outcomes because of variability in orthotic design and implementation strategies (Banwell et al., 2014). In contrast, exercise programs, like the one used in this study, are standardized, dynamic, and physiologically engaging, offering a viable alternative or complement to orthotics.

Recent innovations, such as video-based game therapy and exergaming, are being explored for *pes planus* rehabilitation. These approaches utilize interactive platforms to deliver balance and coordination training, increasing motivation and adherence in children (Erten et al., 2023). The effectiveness of these strategies, however, must be weighed against their cost and technological access, particularly in school settings.

Although the observed improvements are promising, the underlying mechanisms remain to be elucidated. Research suggests that strengthening the abductor hallucis and tibialis posterior muscles, key stabilizers of the medial arch, plays an important role in restoring foot posture (Adeeb et al., 2024; Choi & Lee, 2021).

This study is not without limitations. First, the small sample size ($N = 32$, 100%) limits generalizability, though effect sizes were large and statistically robust. Second, follow-up was limited to 8 weeks; therefore, the long-term sustainability of arch improvements remains unknown. Third, while objective tools like the Srdečný's Index Method and Podo4Foot Cam (RGB) provide reliable foot morphology data, no functional outcomes (e.g., gait speed, balance, quality of life) were assessed. While the control group ($N = 16$, 50%) allowed for strong comparisons, the third group using orthotic or hybrid intervention would have enriched the findings.

Future research should incorporate long-term follow-up (e.g., 6-12 months) to assess durability of arch correction and investigate whether structural gains translate into functional improvements. Expanding the sample to include boys and children with varying body mass index could illuminate gender and weight-related differences in response. There is also need to explore multimodal protocols that combine corrective exercise with orthotics, neuromuscular stimulation, or digital platforms (Pizarro-Mena et al., 2022). Broader implementation research within school systems could examine the scalability, cost-effectiveness, and policy impact of integrating such programs into children's after-school clubs.

Conclusions

This study provides strong evidence that an 8-week structured, foot-specific corrective exercise program integrated into children's after-school clubs can significantly ($p < 0.01$) improve the medial longitudinal arch formation in school-age girls with *pes planus*.

The experimental group ($N = 16$, 50%) demonstrated statistically ($p < 0.01$) and clinically significant reductions in the Srdečný's Index Method for both feet, while the control group ($N = 16$, 50%) showed no meaningful changes ($p > 0.05$). These results highlight the modifiability of pediatric foot morphology through consistent, targeted exercises, even within non-clinical, school-based environments.

The program was cost-effective, easily replicable, and delivered in a child-friendly setting under supervision, making it a practical alternative to more expensive interventions like custom orthoses. By focusing on strengthening intrinsic foot muscles and enhancing neuromuscular control, the intervention addresses both structural and functional components of *pes planus*.

Given the lack of standardized protocols for managing *pes planus* in children, in particular, girls, this study fills critical gaps and provides a replicable model for early, accessible intervention. The findings suggest that integrating corrective foot exercises into children's after-school clubs may be a highly effective strategy to support foot health and motor development in children. This approach could be widely adopted as part of preventive pediatric musculoskeletal care, in particular, in educational or recreational contexts.

Conflicts of interest The authors have no conflicts of interest to declare.

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