

MOVEMENT-BASED INTERVENTION IN PRE-SCHOOL EDUCATION: AN EMPIRICAL STUDY ON THE DEVELOPMENT OF BASIC MOTOR SKILLS

Petra Forterova – Katerina Hollasova – Sona Jandova

doi: 10.18355/PG.2025.14.2.06

Abstract

It is important to stimulate the proper motor development of children from an early age. The pre-school period represents a highly sensitive stage during which fundamental movement skills are developed. Various movement programs are used to support this development. The aim of our study was to verify the effectiveness of a program designed by us, focused on fundamental athletic skills, in improving selected motor abilities of pre-school children. The research involved 24 children aged 5–6 years. Selected tests from the *Deutscher Motorik Test (DMT)* and *MOBAK* test batteries were used. Testing was conducted before the application of the intervention program and after six weeks of regular exercise. A positive effect of the proposed six-week athletic movement program for children aged 5–6 years implemented in a kindergarten setting was demonstrated in the tests of 10-meter sprint, standing long jump, deep forward bend, and throwing accuracy.

Key words

Testing, speed, force, technique

Introduction

Motor fitness is a crucial factor for children's health, and this relationship becomes stronger with age. Generally, children with good motor fitness tend to be more physically active and are therefore less prone to obesity and cardiovascular diseases. In addition, they may benefit from better cognitive performance and higher levels of concentration. However, motor performance requires the provision of appropriate stimuli for motor development. Such stimulation is therefore of fundamental importance, especially in childhood. Research indicates that the performance of today's children and adolescents is declining compared to previous generations (Bös et al., 2009).

Athletics ensures a well-rounded development of the individual. In the pre-school period, it focuses primarily on the acquisition and subsequent improvement of fundamental movement skills such as running, jumping, and throwing. It also contributes to the development of motor abilities (Dvořáková et al., 2017).

Various test batteries are used to assess children's motor fitness. The well-known *UNIFIT TEST 6–60* is often employed. Different test batteries are advised for pre-school children (e.g., *PREFIT – Assessing FITness in PREschoolers*, Ortega et al., 2015) and for school-aged children (e.g., *ALPHA – Assessing Levels of Physical Activity*, Ruiz et al., 2010).

Another test battery is the German *Deutscher Motorik-Test (DMT)*, which measures the physical fitness of children and adolescents aged 6 to 18 years using eight simple tasks focused on motor abilities such as endurance, strength, speed, agility, and coordination. It is based on simple locomotor skills such as running, jumping, and balancing (Bös & Schlenker, 2011). The test battery includes a 20-meter run assessing speed abilities and a 6-minute run to evaluate aerobic endurance. Agility and balance are assessed through forward and backward walking on a balance beam, flexibility is measured using the deep forward bend test, and strength is tested through the standing long jump, push-ups (alternating prone and support positions), sit-ups, and lateral two-foot jumps (Valach et al., 2016).

Another test battery aimed specifically at pre-school children is the *Motorische Basiskompetenzen im Kindergarten* (MOBAK KG). It consists of tasks involving object control (fundamental movement skills) and self-movement (basic movement competencies). The object control tasks include throwing, catching, bouncing, and dribbling, while the self-movement tasks comprise balancing, rolling, jumping, and running (MOBAK, 2019). The tests are evaluated using a dichotomous coding system, meaning that the outcome is classified as either success or failure. Each task includes clear standardized criteria for determining success. Each area is assessed separately, and an overall score can then be calculated. Each domain allows for a maximum of 8 points, with a total score of up to 16 points (Scheuer et al., 2021).

Our study focuses on testing a small group of pre-school children with the inclusion of a designed athletic movement program implemented in a kindergarten setting. We aimed to determine whether the proposed and applied program would have an effect on improving selected motor skills in children.

Methods

The study had a quantitative design and was based on the results of motor tests in combination with a qualitative description of the overarm throwing technique and the applied movement program.

A total of 24 children aged 5–6 years from a kindergarten in Prague participated in the research. These children were in their final year of kindergarten before entering primary education. Fourteen children took part in both the pre- and post-testing. These children also participated in all sessions of the movement program. Parents were informed about the testing procedure and signed an informed consent form. The study was approved by the Ethics Committee of the Department of Physical Education and Sport, Faculty of Education, Charles University.

Selected tests from the *Deutscher Motorik Test (DMT)* and *MOBAK* test batteries were used, which were modified to suit preschool-aged children in the observed age category. The following tests were selected: 10-meter sprint, standing long jump, and overarm throwing at a target, which was supplemented by a qualitative description of the throwing technique. The tests were used to assess the level of motor abilities and skills of the children.

In addition, a rating scale was developed for the evaluation of the one-handed overarm throwing technique. The assessment was based on key movement phases. Six specific skills were identified and assigned corresponding point values, with a maximum total score of 5 points.

Rating scale:

1. Correct grip of the ball = 1 point
2. Stride stance with the left foot forward (for right-handed children, and vice versa for left-handed) = 1 point
3. Non-throwing arm extended forward, pointing toward the target = 0.5 point
4. Backswing of the throwing arm = 1 point
5. Sequential movement of the throwing arm in the order elbow–forearm–wrist = 0.75 point
6. Timely release of the ball – correct trajectory = 0.75 point

The research was conducted over a six-week period from March to April 2023. During the first week, pre-testing took place in the morning hours, lasting 60 minutes, and was carried out in a gymnasium located within the same building as the kindergarten. Subsequently, the movement program was implemented, consisting of 10 sessions conducted during the second to fifth week. Each session lasted 45 minutes and was divided into the following parts: introductory, preparatory, main, and final. The introductory part included activities aimed at warming up the body. The preparatory part consisted of stretching, mobilization, dynamic, and toning exercises.

The main part focused on achieving the lesson’s objectives. The final part served to calm down and reflect on the session (Table 1 – a description of the specific activities is provided in the footnote).

The movement program was designed to develop athletic skills that promote the overall versatility of the child. All sessions were conducted indoors in the gymnasium. In the sixth week, post-testing was carried out using the same test battery as in the pre-testing phase.

Table 1: Overview of the movement program sessions, including structure, activities, and time allocation

Lesson	Theme / Motivation	Introductory Part	Time (min)	Preparatory Part	Time (min)	Main Part	Time (min)	Final Part	Time (min)
1	ZOO	Spider	10	Athletic Alphabet	10	Running Game	15	Trainer Says	10
2	Monkeys	Fruit Salad	7	Stretching and Dynamic Exercises	6	Throwing Preparation / Monkeys	15+10	Ball Massage	7
3	Cars	Traffic Light	5	Athletic Alphabet	10	Running Game / Cars	7+15	Relaxation in Supine Position	8
4	Circus	Hands Up	7	Glue + Dynamic Exercises	5	Tightrope Walkers	20	Yoga	9
5	Athletes	Jumping Game	7	Athletic Alphabet	9	Starts from Various	25	Foot Massage with Ball	4
6	Fairy Tale	Who Will Save Me?	7	Glue	5	Giant and Thumbelina / Run Away Before the Ball Hits You	8+15	Abracadabra	8
7	Summer	Little Octopuses	8	Ice Cream Stick + Stretching Exercises	8	Don't Step on the Worms / From Water to Water	10+13	Relaxation and Breathing	6
8	Gingerbread Cottage	Sugar, Coffee, Lemonade	6	Athletic Alphabet	8	Little House, Tree, Mushroom / Starts from Various Positions	7+20	Abracadabra	5
9	Human Body	Reds and Whites	5	Athletic Alphabet	10	Throwing a Ball in a Circle / Ladder	7+18	Ball Massage	5
10	Athletes	Tag Game with Rescue	7	Athletic Alphabet	10	Obstacle Course	25	Relaxation and Breathing	5

- **Spider:** The spider chases the flies; anyone touched by the spider becomes another spider.
- **Fruit Salad:** Children stand in a line on a marked line and count off as banana, strawberry, kiwi, etc. The teacher calls out different kinds of fruit, and the corresponding children run to a cone, circle it, and return. When “fruit salad” is called, all the children run.
- **Traffic Light:** Children move freely within a designated area where balls of three colors are placed. On the signal “traffic light,” each child picks up a ball and groups together in threes according to the colors of a traffic light.
- **Hands Up:** To music, children move within a designated space where paper outlines of right and left hands are placed on the floor. When the music stops and the signal “right” or “left” is given, children find the matching hand outline and place their hand on it.
- **Jumping Game:** Children move around the gym following the teacher and imitate various types of jumps, e.g., two-foot jump forward to squat, small two-foot hops, single-leg jumps, and skipping.
- **Who Will Save Me?:** A chasing game played in a marked area. One child is the tagger (wizard). Anyone touched turns into a “bridge” (reverse tabletop position). They can be freed if another child crawls underneath them.

- **Little Octopuses:** A tag game in which one child is the octopus, moving in a crouched position and catching others by touching them with hands or feet. Caught children become octopuses and join in catching the rest.
- **Sugar, Coffee, Lemonade:** One child stands at a marked line with their back to the others. They chant: “Sugar, coffee, lemonade, tea, rum, boom!” and then turn around. During the chant, the others try to approach as close as possible. When the leader turns, everyone must freeze; those who move must step back a few paces.
- **Glue:** Children stand in a circle and, according to instructions, connect specific body parts with others (e.g., hand to hand, knee to knee).
- **Ice Cream Stick:** Strengthening exercise in a supine position—alternating relaxation and tightening of specific body parts.
- **Monkeys:** Two groups of children throw soft foam balls either within a marked area or over a vertical obstacle.
- **Cars:** Children move around with a hoop in hand (as a steering wheel). On sound or visual cues, they perform assigned movements (red – stand with legs apart; orange – small squats; green – run).
- **Tightrope Walkers:** Balance exercises – various types of walking along a line, rope, bench, or balance beam.
- **Giant and Thumbelina:** Manipulation with balls of different sizes – children pass them around the circle.
- **Run Away Before the Ball Hits You:** Children pass a ball around the circle while reciting a rhyme. On a specific signal, the child holding the ball moves to the center and tries to hit another child with the ball.
- **Don’t Step on the Worms:** Children jump over skipping ropes laid on the floor using different types of jumps.
- **From Water to Water:** Reaction speed exercise – children perform two-foot jumps over a rope laid on the floor, responding to a given signal.
- **Little House, Tree, Mushroom:** Running game – on a signal, children assume predetermined positions: *house* – stand with feet together, arms overhead; *tree* – stand with legs apart, arms out to sides; *mushroom* – squat.
- **Trainer Says:** Reaction and stretching game – children follow the teacher’s commands only when preceded by the phrase “Trainer says.” The exercises focus on stretching movements.
- **Abacadabra:** Stretching exercise – the teacher, playing the role of a wizard, “casts spells” turning children into various positions (e.g., plank, seated forward bend, etc.).

Pre- and Post- Testing

- 1) **10-Meter Sprint** – The task was to cover a distance of 10 meters in the shortest possible time. The start and finish lines were marked on the gym floor. Children started on an auditory signal. Each child performed two attempts, and the better result was recorded. Performances were measured using a stopwatch with an accuracy of two decimal places.
- 2) **Standing Long Jump** – The take-off line was marked on the gym floor. After the jump, the distance was measured from the take-off line to the heel of the nearest foot using a measuring tape. Each child performed two attempts, and the better result was recorded.
- 3) **Throwing a Ball at a Target** – The number of successful hits on a smiley-face target and the quality of the throwing technique were assessed. The throw was performed from a marked line, with the target positioned on a wall at a distance of 1.5 meters from the child and a height of 1.1 meters. Each child had six attempts to hit the target. Performance was evaluated according to the *MOBAK* scoring system for pre-school children. Subsequently, a seventh throw was performed, focusing on the technical execution of the overarm throw, which was assessed using the rating scale developed for this study.

Scoring of Target Hits:

Number of valid/invalid attempts – points:

- 0–2: 0 points
- 3–4: 1 point
- 5–6: 2 points

For the evaluation of the throwing technique, six key elements (skills) of the overarm throw were identified and assigned point values. If the child executed the throw correctly, a maximum of 5 points could be achieved. If any technical deficiencies

occurred, deductions were applied. The sum of points from target accuracy and throwing technique was used for comparison between pre- and post-test results of individual participants.

Statistical Data Analysis

To compare the results between pre- and post-tests in the 10-meter sprint and standing long jump, the Shapiro–Wilk test was used to assess the normality of data distribution. When a normal distribution was confirmed, a paired *t*-test was applied. In cases where normality was not confirmed, the non-parametric Wilcoxon test was used. Due to the small sample size, effect size was also calculated. The data were visualized using box plots.

For the evaluation of the throwing technique, results were visualized using bar charts, and effect size differences were calculated as well.

Results

10-Meter Sprint

The results of the 10-meter run for the observed children are presented in the box plot (Figure 1).

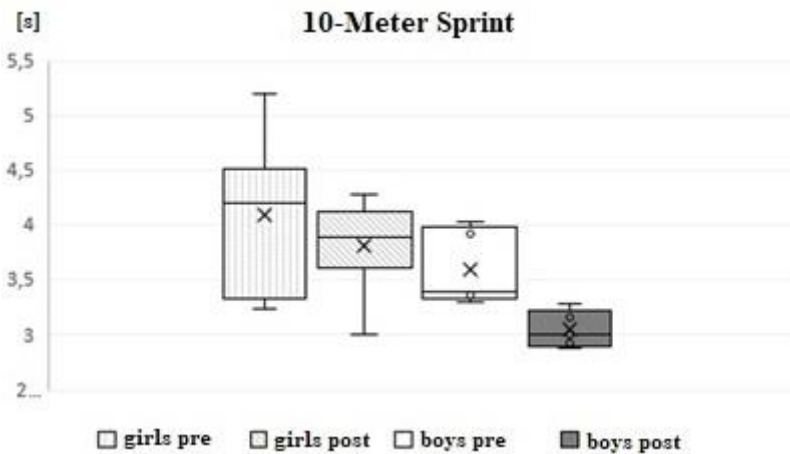


Figure 1: Box plot of the 10-meter Sprint test results

For the comparison of pre-test and post-test results in the 10-meter run, a paired *t*-test was applied. The average time for girls in the pre-test was 4.09 ± 0.67 s, while in the post-test it was 3.82 ± 0.39 s. No statistically significant difference was found between these results ($p = 0.083$). The practical significance of the difference was determined by calculating the effect size, which indicated a medium effect ($d = 0.53$). For boys, the pre-test results were 3.61 ± 0.35 s and the post-test results were 3.05 ± 0.17 s. A statistically significant improvement in performance was observed ($p = 0.004$), which was also supported by the practical significance, showing a very large effect ($d = 2.26$).

Standing Long Jump

The results of the standing long jump for the observed children are presented in the box plot (Figure 2).

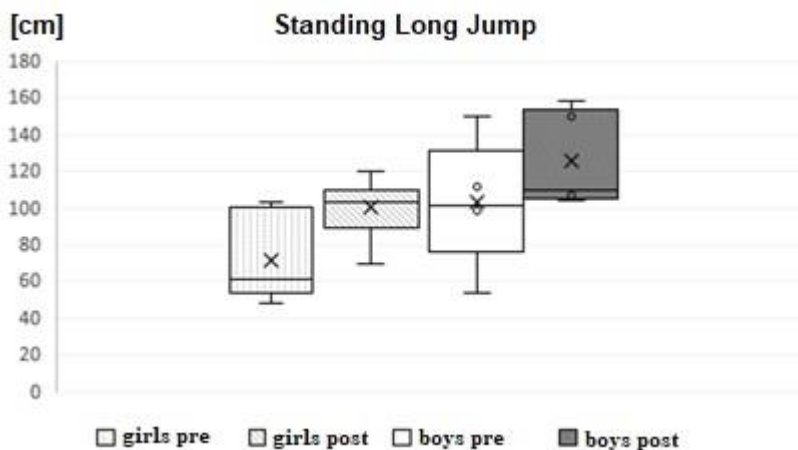


Figure 1: Box plot of the Standing long jump test results

To compare the pre-test and post-test results in the standing long jump, a paired t-test was applied only for the boys. In the pre-test, the boys achieved an average distance of 103.20 ± 34.32 cm, and in the post-test 125.80 ± 25.98 cm. For the girls, the data did not show a normal distribution; therefore, the non-parametric Wilcoxon test was used to assess the differences between the pre-test (mean result: 71.44 ± 23.11 cm) and post-test (mean result: 100.11 ± 15.86 cm) data. A significant improvement was found for the girls ($p = 0.0039$), while for the boys, the improvement was just below the 5% level of significance ($p = 0.0648$). However, the practical significance indicated a large effect ($d = -0.83$).

Throwing a ball at a target

The throwing technique was evaluated based on the combination (sum) of two parameters: target throw accuracy and throwing technique. The point scores of individual children for both the pre-test and post-test are presented in Figure 3. The higher the score (y-axis), the better the throwing technique.

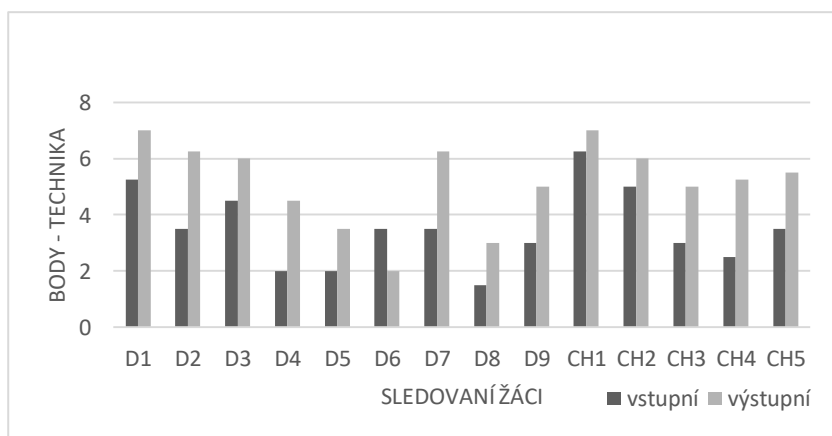


Figure 3: Ball throwing technique in the pre-test and post-test measurements

The results shown in the graph (Figure 3) indicate that only one girl (D6) demonstrated a decline in throwing technique during the second (post-test) measurement. All other participants showed improvement in their technique, which was further confirmed by the calculation of practical significance, where the effect was evaluated as large ($d = 1.5$).

Discussion

The group comparison of results shows that in the first test (the 10-meter run) 12 out of 14 children demonstrated improved performance. A statistically significant difference was found only among boys. We believe this improvement may have been influenced by the implemented exercise program, which contributed to the fact that all boys improved in this test. Running is one of the most natural forms of locomotion for pre-school children and was therefore the most represented activity in various forms throughout the program. In two lessons, the children practiced the semi-high start and other start positions, which may have contributed significantly to the improved results. Among girls, initial testing showed weaker differences, but the improvement in post-test performance was not statistically significant. However, in terms of practical significance, we can conclude that the exercise program had a positive effect on improving 10-meter run performance, thus enhancing the level of speed abilities. According to the literature (Riegerová, Přidalová & Ulbrichtová, 2006; Dvořáková, 2011), the development of speed abilities begins in pre-school age, with improvement occurring as the nervous system matures.

In the standing long jump, all 14 children demonstrated progress in their performance. For boys, the difference between pre-test and post-test mean scores was just below the level of statistical significance. For girls, the difference was statistically significant, indicating a more favorable effect of the exercise program. This improvement can be attributed to the activities included in five lessons focused on jumps and on developing take-off and strength abilities. The lessons involving the athletic drill (athletic ABC) also played an important role, as they included exercises for ankle stabilization and proper take-off technique.

The pre-test results can be compared with data from six-year-old children participating in the *Sazka Olympic All-Around* project. The boys in our study achieved an average distance of 103.20 ± 34.32 cm. In the 2014/2015 school year, boys in the first semester of the *Sazka Olympic All-Around* (2018) achieved an average of 112 cm. In our post-test, the boys reached 125.80 ± 25.98 cm, while the *Sazka Olympic All-Around* second-semester results for six-year-old boys were identical. The study by Dvořáková & Baboučková (2014) focused on children from Prague in 2010 and reported an average performance of 104 cm for boys aged 5–6 years, and 113 cm for those aged 6–7 years.

The girls in our study reached an average of 71.44 ± 23.11 cm in the pre-test. In the *Sazka Olympic All-Around* (2018), girls in the first semester of the 2014/2015 school year achieved an average of 104 cm. In our post-test, the girls averaged 100.11 ± 15.86 cm, while in the *Sazka Olympic All-Around*, the same age group achieved 113 cm. According to Dvořáková & Baboučková (2014), girls aged 5–6 years had an average result of 95 cm, and those aged 6–7 years reached 105 cm. A comparison of these data raises the question of whether children's physical fitness is gradually declining, which would support findings from other studies (e.g., Bos et al., 2009). According to various authors (Giagazoglou et al., 2019; Kavalirova, Čepička & Knappová, 2022; Gümüřdağ, 2019), if pre-school children are provided with sufficient movement stimuli and guided physical activities (targeted intervention programs), their physical literacy increases.

We believe that motor learning played a significant role, as the children gradually learned basic motor skills while simultaneously developing their physical abilities.

Since motor abilities are typically interrelated, it is important for pre-school children to develop all fundamental abilities on a regular basis (Dvořáková, 2011).

In the flexibility test represented by the deep forward bend, 8 out of 14 children improved. During the pre-test, boys demonstrated significantly lower flexibility compared to girls. Some girls achieved identical results in both tests—five of them could touch the ground with their fingertips, and one girl reached only her ankles in both tests, representing the weakest result. Thus, boys achieved greater improvement overall. Within the exercise program, six stretching activities were included, which proved insufficient; more stretching exercises could have been integrated, particularly in the preparatory part, which often emphasized the athletic drill.

The results of the deep forward bend test showed that the exercise program had a highly positive impact on children's flexibility, especially among boys. In the pre-test, none of the boys could touch the ground, whereas in the post-test, 80% of them could. Similarly, Svanhalová (2014) documented improvement in flexibility test results due to regular physical activity in pre-school children.

When evaluating according to the DMT test, the children in our study achieved above-average results in all cases during the post-test (except for one girl) relative to the corresponding norms.

In the target-throwing test, 8 out of 14 children improved. A decline was recorded in only one boy (B2) and one girl (G6), each by one point. The remaining children showed identical results in both the pre-test and post-test, and none of them scored zero points.

We compared the target-throwing results with a study from the Faculty of Education at Trnava University, in which pre-school children were tested between 2019 and 2020. The results were expressed in percentages and not differentiated by age. We therefore compared the percentage of children who achieved the maximum score (2 points). In our pre-test, 21% of children scored 2 points, compared to 30% in the Slovak study. In the post-test, 43% of our participants scored 2 points, while in Klímová's (2021) study, 28% achieved this result.

In the overhand throw technique, 13 out of 14 children improved. One girl showed a decline of 0.5 points in the post-test compared to the pre-test. Throwing at a target is a demanding task for pre-school children, given the developmental stage of their nervous system. To master it correctly, preparatory exercises should be included consistently over time. In our program, ball-handling activities were often incorporated near the end of sessions. It became evident that more attention should be devoted to the timing of the ball release and the correct sequence of throwing arm movement (elbow–forearm–wrist), as these were the most common areas of error.

Despite certain study limitations (particularly the small sample size), it can be concluded that the implemented exercise program had a positive effect on performance in the selected tests. Therefore, regular and systematic physical activity for pre-school children can be considered highly beneficial.

Conclusion

The positive impact of the proposed athletics-based movement program for children aged 5–6 years, implemented over a six-week period in a kindergarten setting, was demonstrated based on pre-test and post-test measurements using selected tests from the *Deutscher Motorik Test (DMT)* and *Motorische Basiskompetenzen im Kindergarten (MOBAK-KG)* test batteries. The tests assessed speed abilities (10 m sprint), lower limb strength abilities (standing long jump), flexibility (deep forward bend), and ball manipulation skills (target throw and overarm throw technique).

The results showed that thanks to the implemented movement program, the children improved both in speed and strength abilities—achieving better results in the 10 m sprint and standing long jump. They also improved in the overarm throw technique. Slavonic Pedagogical Studies Journal, eISSN 1339-8660, ISSN 1339-8660, Volume 14 Issue 2, 2025

Smaller improvements were observed in flexibility and target throwing tests, which may have been due to the relatively low number of activities in the program focusing on these abilities and skills.

It has been shown that conducting such intensively guided physical activities with children is meaningful and has a positive effect on their motor development. During the sessions, the children expressed joy in movement and had the opportunity to experience various athletic skills appropriate for their age.

The program could be implemented in kindergartens; however, thorough preparation is needed, particularly for teaching the overarm throw, which is technically demanding. For this age group, demonstrating the correct execution and using imitation learning are crucial. Furthermore, greater emphasis should be placed on motivation within individual activities. This could help children engage more deeply in the exercises, leading to improved performance and movement execution.

Bibliographic references

Bos, K., & Schlenker, L. (2011). Deutscher Motorik-Test 6–18 (DMT 6–18). *Bildung im Sport: Beiträge zu einer zeitgemäßen Bildungsdebatte*, 337–355.

Bos, K., Schlenker, L., Büsch, D., Lammle, L., Müller, H., Oberger, J., Seidel, I., & Tittlbach, S. (2009). *Der Deutsche Motorik-Test (DMT 6-18)*. Hamburg: Czwalina.

Dvorakova, H. (2011). *Pohybem a hrou rozvíjíme osobnost dítěte*. Praha: Portál.

Dvorakova, H., & Babouckova, V. (2014). *Růst a motorická výkonnost předškolních dětí v roce 2010 a v generačním posunu*. Praha: PedF UK.

Dvorakova, H., Engelthalerova, Z., Dlouhy, M., Hajkova, J., Hronzova, M., Svobodova, I., & Vojtikova, L. (2017). *Tělesná výchova na 1. stupni základní školy* [online]. Praha: Karolinum [cit. 2023-04-08]. ISBN 9788024633534. Available from:

<https://www.proquest.com/legacydocview/EBC/5163295/bookReader?accountid=15618&ppg=2>

Giagazoglou, P., Papadaniil, M., Dampa, A., & Fotiadou, E. (2019). The effects of a movement intervention on motor performance of pre-school aged children. *European Psychomotricity Journal*, 11(1), 39-49 [cit. 2025-06-10]. Available from: https://www.researchgate.net/publication/332107815_The_effects_of_a_movement_intervention_on_motor_performance_of_preschool_aged_children

Gümüşdağ, H. (2019). Effects of Pre-school Play on Motor Development in Children. *Universal Journal of Educational Research*, 7(2), 580–587 [cit. 2025-06-13]. Available from: <https://doi.org/10.13189/ujer.2019.070231>

Kavalírova, G., Cepicka, L., & Knappova, V. (2022). Vliv tříměsíční pohybové intervence na rozvoj vybraných pohybových předpokladů předškolních dětí. *Studia Kinanthropologica*, XXIII (3), 147–157.

Klimova, M. (2021). Pilotní ověření možnosti využití testové baterie MOBAK KG [online]. Brno [cit. 2023-07-10]. Available from: https://is.muni.cz/th/bfdu5/BP_MOBAK_KG_Klimova.pdf. Bakalářská práce. Masarykova Univerzita, Pedagogická fakulta.

Mobak.info [online], 2019. [cit. 2023-07-04]. Available from: <https://mobak.info/en/mobak/>

Ortega, F. B., Cadenas-Sanchez, C., Sanches-Delgado, G., Mora-Gonzalez, J., Martinez-Tellez, B. et al. (2015). Systematic Review and Proposal of a Field-Based Physical Fitness-Test Battery in Pre-school Children: The PREFIT Battery. [online]. *Sports medicine (Auckland)*, roč. 45(4), 533–555. ISSN 0112-1642. Available from: <https://doi.org/10.1007/s40279-014-0281-8>. [cit. 2024-07-02].

Riegerova, J., Pridalova, M., & Ulbrichova, M. (2006). *Aplikace fyzické antropologie v tělesné výchově a sportu: (příručka funkční antropologie)*. 3. vyd. Olomouc: Hanex.

Ruiz, J. R., Castro-Pinero, J., Espana-Romero, V. et al. (2010). Field-based fitness assessment in young people: the ALPHA health-related fitness test battery for

children and adolescents. *British Journal of Sports Medicine* [online]. 45(6), 518–524 [cit. 2024-11-29]. ISSN 0306-3674. Available from: doi:10.1136/bjism.2010.075341
Sazka olympijský víceboj [online], 2018. ČOV [cit. 2023-07-10]. Available from: <http://www.sazkaolympijskyviceboj.cz/>
Scheuer, C., Heck, S., Vlcek, P., & Vrbas, J. (2021). MOBAK Posuzování a rozvoj základních pohybových kompetencí. *Research Gate* [online]. [cit. 2023-07-05]. Available from: https://www.researchgate.net/publication/354778453_MOBAK_Posuzovani_a_rozvoj_zakladnich_pohybovych_kompetenci
Svanhalova, R. (2014). Hodnocení úrovně flexibility u dětí předškolního věku. Bakalářská práce. Olomouc: Univerzita Palackého v Olomouci, Pedagogická fakulta.
Valach, P., Benesova, D., Salcman, V., & Schulz, H. (2016). Kids in Motion DĚTI V POHYBU. Výzkumná studie v rámci mezinárodního projektu Comenius [online]. [cit. 2023-07-04]. ISBN 978-3-936218-29-9. Available from: https://www.researchgate.net/publication/319873885_Kids_in_Motion_DETI_V_PO_HYBU_Vyzkumna_studie_v_ramci_mezinarodniho_projektu_Comenius

prof. PhDr. Soňa Jandová, Ph.D. (corresponding author)
Charles University Prague, Faculty of Education
M.D. Rettigové 4, 116 49 Prague
Czech Republic
sona.jandova@pedf.cuni.cz
ORCID: 0000-0003-4459-5248

PhDr. Petra Fořterová, Ph.D.
Charles University Prague, Faculty of Education
M.D. Rettigové 4, 116 49 Prague
Czech Republic
petra.forterova@pedf.cuni.cz
ORCID: 0000-0002-6529-5087

Katerina Hollasova
Charles University Prague, Faculty of Education
M.D. Rettigové 4, 116 49 Prague
Czech Republic
katerina.hollasova@email.cz
ORCID: no ORCID