



Contents lists available at [Journal ELORA](#)

JRTI (Jurnal Riset Tindakan Indonesia)

ISSN: 2502-079X (Print) ISSN: 2503-1619 (Electronic)

Journal homepage: <https://jrti.eloracenter.org/jrti>



Flexibility and hand–eye coordination profiles in children aged 10–12 years

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Article Info

Article history:

Received May 26th, 2026

Revised Jun 3th, 2026

Accepted Jun 12th, 2026

Keywords:

Flexibility

Hand–eye coordination

Sit and reach

Throw-and-catch test

Coastal children

ABSTRACT

The development of physical and motor abilities in school-age children plays an essential role in supporting optimal growth and development. This study aimed to determine the profile of flexibility and hand–eye coordination among children aged 10–12 years in the coastal area of Anyer, Banten. This study employed a quantitative descriptive method using a survey approach. The population consisted of children aged 10–12 years living in the coastal area of Anyer, Banten. The sample included 43 children, consisting of 24 girls and 19 boys, selected using purposive sampling techniques. The instruments used were the sit and reach test to measure flexibility and the ball throw-and-catch test to measure hand–eye coordination. Data were analyzed using descriptive statistics in the form of frequencies and percentages. The results showed that the flexibility level of children aged 10–12 years was predominantly categorized as very good, with 27 children (62.79%), followed by good with 11 children (25.58%) and moderate with 5 children (11.62%). In contrast, the hand–eye coordination test revealed that 25 children (58.14%) were categorized as poor, 13 children (30.23%) as moderate, 3 children (6.98%) as very poor, and only 2 children (4.65%) as good. The findings indicate that children living in the coastal area of Anyer generally demonstrate excellent flexibility; however, their hand–eye coordination ability remains relatively low. Therefore, physical education programs should provide more structured visual–motor coordination activities through manipulative games and sports activities to improve children’s motor development.

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Introduction

Motor development during late childhood is a critical phase that supports the acquisition of complex movement skills, physical fitness, and long-term participation in physical activity. Children aged 10–12 years’ experience substantial improvements in neuromuscular control, movement efficiency, and motor coordination, making this developmental period particularly important for assessing physical and motor competence. Previous studies have demonstrated that motor competence is strongly associated with health-related fitness, academic performance, physical activity participation, and psychosocial well-being among school-aged children (Burton et al., 2023; De Meester et al., 2020).

Among the various components of physical fitness, flexibility represents an important indicator of musculoskeletal function and movement quality. Flexibility reflects the ability of joints to move through an

optimal range of motion and contributes to posture control, injury prevention, movement efficiency, and sports performance. Adequate flexibility allows children to execute locomotor and non-locomotor movements more effectively while supporting overall physical development. Recent studies have shown that flexibility is positively associated with fundamental movement skills and physical competence in children ((Burton et al., 2023; De Meester et al., 2020)

Another essential component of motor development is hand–eye coordination, which refers to the ability to integrate visual information with precise hand movements. This skill is fundamental for object-control tasks such as throwing, catching, striking, writing, and manipulating objects. Hand–eye coordination plays a significant role in both daily functioning and sport participation because successful performance requires continuous synchronization between perceptual and motor systems. Previous investigations have reported that children with better hand–eye coordination demonstrate superior object-control skills, reaction performance, and overall motor competence (Latorre Román et al., 2025; Mickevičienė et al., 2015; Sulla-Torres et al., 2025).

Environmental factors are increasingly recognized as important determinants of children's motor development. According to ecological approaches to motor development, opportunities for movement exploration and interaction with the surrounding environment significantly influence the acquisition of motor skills. Children exposed to diverse physical environments tend to demonstrate better motor competence than those with limited movement opportunities. Factors such as playground availability, outdoor activity participation, community characteristics, and natural environmental conditions contribute substantially to motor skill development (Deng et al., 2024; Nanda et al., 2025; Padiál-Ruz et al., 2021; Taylor et al., 2024).

Coastal environments provide a unique context for children's physical activity experiences. Compared with urban settings, coastal communities often offer larger open spaces and greater opportunities for outdoor play, including running, swimming, climbing, jumping, and beach-based recreational activities. These activities may stimulate physical fitness components differently. For example, movement on unstable sandy surfaces requires continuous postural adjustments, muscular activation, and joint mobility that may positively influence flexibility development. However, such activities may not necessarily provide sufficient stimulation for visual-motor skills requiring object manipulation and precise hand responses (Hamed A.F. et al., 2017; Mademli et al., 2021; Rizzato et al., 2024).

Several recent studies have examined motor competence and physical fitness among children. investigated the influence of age, sex, and physical activity participation on motor coordination in primary school students. Reported that combined visual-art and accuracy-based exercises improved motor coordination and reaction time among children. Demonstrated the importance of hand–eye coordination in developing object-control abilities. Similarly, (Behan et al., 2022; Malambo et al., 2022; Piotrowski et al., 2025) identified significant relationships between fundamental movement skills and health-related fitness components, including flexibility. Although these studies have enriched understanding of children's motor development, they have primarily focused on school-based interventions, sports performance, or general physical fitness populations.

A notable gap remains regarding the motor development characteristics of children living in specific environmental contexts, particularly coastal communities. Existing research has largely examined flexibility and hand–eye coordination separately, while limited attention has been given to comparing these components simultaneously within a unique environmental setting. Furthermore, little evidence is available regarding whether coastal lifestyles and activity patterns contribute equally to different dimensions of motor development (Hesselberg, 2015; Rizzo et al., 2020).

Therefore, the novelty of this study lies in examining the disparity between flexibility and hand–eye coordination among children living in a coastal environment. By simultaneously profiling both variables in children aged 10–12 years, this study provides new evidence regarding how environmental exposure may differentially influence components of motor development (Barrea et al., 2025; Fathirezaie et al., 2021; Golding et al., 2014). Understanding these patterns is important for designing targeted physical education and motor intervention programs that address specific developmental needs.

Accordingly, the purpose of this study was to analyze the flexibility and hand–eye coordination profiles of children aged 10–12 years living in a coastal community and to identify potential disparities between these two fundamental components of motor development.

Method

Method

This study employed a quantitative descriptive research design using a survey approach to describe the flexibility and hand–eye coordination profiles of children aged 10–12 years living in a coastal community.

Participants

The population consisted of children aged 10–12 years residing in the coastal area of Anyer, Banten. A purposive sampling technique was applied based on the following inclusion criteria: (1) children aged between 10 and 12 years; (2) residing in the coastal area of Anyer for at least two years; (3) physically healthy and able to participate in physical testing; and (4) obtaining parental consent to participate in the study. Children with musculoskeletal injuries, neurological disorders, or medical conditions that could affect physical performance were excluded from participation. Based on these criteria, 43 children were selected as participants, consisting of 24 girls and 19 boys.

Research Instruments

Flexibility was assessed using the Sit-and-Reach Test, one of the most widely used field tests for evaluating hamstring and lower-back flexibility. Previous studies have reported acceptable validity coefficients ranging from 0.71 to 0.89 and test–retest reliability coefficients above 0.90 for school-aged populations (Behan et al., 2022). Hand–eye coordination was measured using the Ball Throw-and-Catch Test. Participants were instructed to throw a tennis ball against a wall and catch it repeatedly using both hands within a specified time period. The total number of successful catches was recorded as the final score. Previous studies have reported satisfactory reliability coefficients ranging from 0.82 to 0.91 for object-control coordination assessments among children.

Data Collection Procedure

Data collection was conducted in an open field located within the study area. Before testing, participants received standardized instructions and demonstrations regarding the testing procedures. For the Sit-and-Reach Test, participants performed a standardized warm-up and then completed two testing trials. The best score obtained was recorded for analysis. For the Ball Throw-and-Catch Test, participants stood at a predetermined distance of 2 meters from a wall and performed continuous throw-and-catch movements for 30 seconds. Two trials were conducted, and the highest score was recorded.

Data Analysis

The collected data were analyzed using descriptive statistics. Frequencies, percentages, means, and category distributions were calculated to describe the flexibility and hand–eye coordination profiles of participants. The findings were then interpreted according to established normative categories for each instrument.

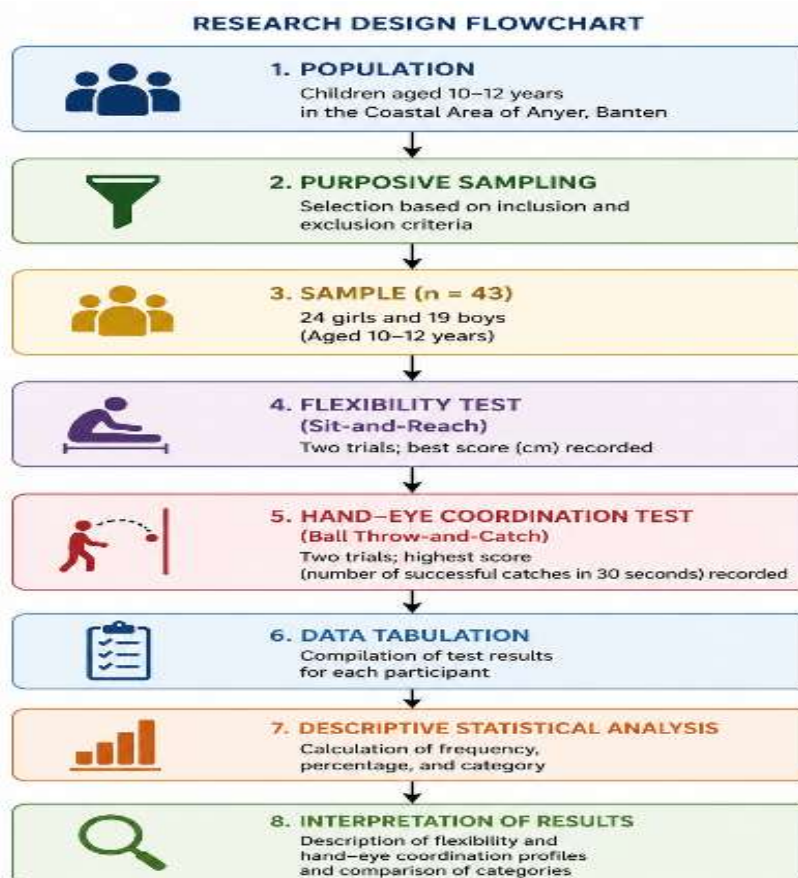


Figure 1 <Research Design Flowchart>

The flowchart presents the sequence of the research procedures, beginning with participant selection through purposive sampling, followed by flexibility and hand–eye coordination testing, data tabulation, descriptive statistical analysis, and interpretation of the results. The process was designed to describe the motor development profile of children aged 10–12 years living in a coastal community.

Results and Discussions

The presentation of the results has been adjusted to follow the journal template format using concise academic language, clear table structures, and integrated discussion to strengthen readability and scientific interpretation. The discussion section also emphasizes the relationship between findings, previous studies, and practical implications in physical education learning. The results showed that the flexibility level of children aged 10–12 years in the coastal area of Anyer, Banten was generally categorized as very good. Based on the sit and reach test results of 43 children, 27 children (62.79%) were categorized as very good, 11 children (25.58%) as good, and 5 children (11.62%) as moderate.

Table 1 <Distribution of Overall Flexibility Test Results>

Category	Frequency	Percentage (%)
Very Good	27	62.79
Good	11	25.58
Moderate	5	11.62
Total	43	100

Source: Research data processed by the authors (2026).

Based on gender, boys demonstrated a higher percentage in the very good category compared to girls. Among girls, 58.33% were categorized as very good, 29.16% as good, and 12.50% as moderate. Meanwhile, among boys, 68.42% were categorized as very good, 21.05% as good, and 10.53% as moderate.

These findings indicate that children’s physical activities in the coastal environment contribute positively to flexibility development. Activities such as playing on the beach, running, swimming, and other outdoor movements likely contributed to the high flexibility levels. The unstable sandy surface also requires the body to work harder in maintaining balance and mobility, which may improve muscle and joint flexibility.

The findings are consistent with Liu et al. (2023), who reported that physical fitness components such as flexibility, coordination, and muscular strength significantly correlate with children’s fundamental movement skills. Similarly, Maulana et al. (2023) stated that flexibility contributes to sports movement skills because flexible body movements allow more efficient and controlled performance.

In contrast to the flexibility results, the hand–eye coordination test results indicated that most children were categorized as poor. Based on the throw-and-catch test, 25 children (58.14%) were categorized as poor, 13 children (30.23%) as moderate, 3 children (6.98%) as very poor, and only 2 children (4.65%) as good.

Table 2 <Distribution of Overall Hand–Eye Coordination Test Results>

Category	Frequency	Percentage (%)
Good	2	4.65
Moderate	13	30.23
Poor	25	58.14
Very Poor	3	6.98
Total	43	100

Source: Research data processed by the authors (2026).

The findings of this study revealed an interesting pattern in the motor development profile of children aged 10–12 years living in a coastal community. While flexibility was predominantly categorized as very good, hand–eye coordination was generally categorized as poor. This disparity suggests that different components of motor development may not develop uniformly and may be influenced by distinct environmental, behavioral, and individual factors. The results indicate that children demonstrated adequate physical capabilities related to joint mobility and muscle extensibility; however, their visual–motor integration skills were comparatively less developed.

The high level of flexibility observed among participants may be associated with the physically active lifestyle commonly found in coastal communities. Children living in coastal environments are often exposed to outdoor activities such as running, walking on uneven sandy surfaces, swimming, climbing, and recreational play, all of

which require continuous movement and substantial lower-body involvement. Previous studies have reported that regular participation in physical activities contributes positively to flexibility development and overall physical fitness among children. Furthermore, flexibility has been identified as an important component supporting movement efficiency, injury prevention, and motor competence. The present findings therefore support previous evidence suggesting that active movement experiences during childhood contribute to improved flexibility outcomes.

However, caution should be exercised when interpreting these findings. Although the participants were recruited from a coastal community, the present study did not directly measure physical activity levels, environmental exposure, or movement behavior. Therefore, it cannot be concluded that the coastal environment itself caused the high flexibility scores. Previous research has demonstrated that flexibility is influenced by multiple factors, including biological maturation, sex differences, nutritional status, body composition, physical activity participation, and previous sport experiences. Consequently, the relatively high flexibility observed in this study may reflect a combination of environmental opportunities and individual characteristics rather than geographical location alone.

The findings of this study are generally consistent with previous investigations reporting positive associations between physical activity participation and physical fitness among children. Found that health-related fitness components, including flexibility, were significantly related to fundamental movement skills. Similarly, (Canli, Canli, Taskin, et al., 2023; Canli, Canli, Taşkın, et al., 2023; Flôres et al., 2025) reported that age, sex, and physical activity participation contribute substantially to motor development among primary school children. Nevertheless, other studies have suggested that environmental factors alone may not fully explain differences in motor competence. Research has shown that socioeconomic status, parental support, access to organized sports programs, and educational opportunities can significantly influence children's physical development. These findings indicate that environmental interpretations should be considered within a broader ecological framework that acknowledges the interaction between biological, social, and behavioral determinants.

In contrast to flexibility, hand–eye coordination was generally categorized as poor among participants. This result suggests that the movement experiences commonly encountered by children in the study area may provide insufficient stimulation for visual–motor integration skills. Hand–eye coordination develops through repeated engagement in object-control activities requiring synchronization between visual perception and motor responses. Activities such as throwing, catching, striking, racket sports, and reaction-based games are known to contribute significantly to the development of coordination abilities. Previous studies have demonstrated that children who frequently participate in manipulative and object-control activities exhibit superior coordination performance compared with children who engage primarily in locomotor activities (Guo et al., 2024, 2025; Wang, 2004; Zhou et al., 2025) The relatively low coordination scores observed in this study may be explained by several alternative factors. First, children may have limited exposure to structured motor learning activities that specifically target visual–motor coordination. Second, variations in physical education quality, availability of sports facilities, and participation in organized sports may influence coordination development. Third, increasing screen time and sedentary behavior among children may reduce opportunities to practice object-control skills in daily life. These alternative explanations highlight the importance of considering behavioral and educational factors rather than attributing the findings solely to environmental characteristics.

The present findings both support and extend previous research on children's motor development. While earlier studies have primarily examined flexibility or coordination separately, this study demonstrates that substantial differences may exist between motor fitness components within the same population. The coexistence of high flexibility and low hand–eye coordination indicates that motor development should be viewed as a multidimensional construct rather than a single unified ability. Children who perform well in one component of physical fitness may not necessarily demonstrate similar competence in other motor domains (D'Anna et al., 2024; King-Dowling et al., 2020; Wu et al., 2021).

From a practical perspective, the findings suggest that physical education programs should adopt a more balanced approach to motor development. While current movement experiences appear sufficient to support flexibility, additional emphasis should be placed on activities that stimulate hand–eye coordination. Throw-and-catch games, reaction drills, target-based activities, ball sports, and racket sports may provide valuable opportunities to improve visual–motor integration and object-control skills among children. Such interventions are particularly important because hand–eye coordination plays a crucial role in both daily activities and sports participation.

Several limitations should be acknowledged when interpreting these findings. The descriptive cross-sectional design does not permit causal conclusions regarding the influence of environmental factors on motor development. In addition, the study did not include comparison groups from inland or urban areas, making it

impossible to determine whether the observed profiles are unique to coastal children. Variables such as socioeconomic status, nutritional status, physical activity participation, screen time, and sport involvement were also not assessed and may have influenced the results. Future studies should incorporate comparative designs, larger samples, and additional explanatory variables to provide a more comprehensive understanding of the factors associated with flexibility and hand–eye coordination development among children.

Conclusions

This study examined the flexibility and hand–eye coordination profiles of children aged 10–12 years living in a coastal community. The findings revealed a notable disparity between the two components of motor development. Most participants demonstrated very good flexibility, whereas hand–eye coordination was generally categorized as poor. These results indicate that different dimensions of motor competence may develop at varying levels within the same population. The present findings should be interpreted descriptively because the study was conducted within a single population and did not include comparison groups from other environmental settings. Therefore, no causal conclusions can be drawn regarding the influence of coastal environments on flexibility or hand–eye coordination development. Nevertheless, the results provide valuable baseline information regarding the motor development characteristics of children in the studied community.

From a practical perspective, the findings highlight the importance of balanced motor development programs in physical education. According to motor development theory, visual–motor integration and object-control skills develop through repeated engagement in manipulative activities that require coordination between perceptual and motor systems. Therefore, physical education teachers are encouraged to incorporate activities such as throwing, catching, target games, and other object-control tasks to provide opportunities for improving hand–eye coordination alongside general physical fitness development. Future studies should employ comparative designs involving children from different environmental contexts and include additional variables such as physical activity participation, nutritional status, socioeconomic background, and sport involvement to better understand factors associated with motor development outcomes.

Acknowledgments

The authors would like to express their sincere gratitude to all parties who contributed to this research, especially the children and communities in the coastal area of Anyer, Banten, who participated in this study. The authors also thank their respective institutions for the support provided during the research process and manuscript preparation.

References

- Barrea, C., Dufour, P., Catherine, P., Charlier, C., Brevers, F., Parent, A.-S., & Rousselle, L. (2025). Neuromotor effects of early-life exposure to a mixture of endocrine disruptors in Belgian preschool children. *Environmental Health : A Global Access Science Source*, 24(1), 11. <https://doi.org/10.1186/s12940-025-01156-9>
- Behan, S., Belton, S., Peers, C., O'connor, N. E., & Issartel, J. (2022). Exploring the relationships between fundamental movement skills and health related fitness components in children. *European Journal of Sport Science*, 22(2), 171–181. <https://doi.org/10.1080/17461391.2020.1847201>
- Burton, A. M., Cowburn, I., Thompson, F., Eisenmann, J. C., Nicholson, B., & Till, K. (2023). Associations Between Motor Competence and Physical Activity, Physical Fitness and Psychosocial Characteristics in Adolescents: A Systematic Review and Meta-analysis. *Sports Medicine (Auckland, N.Z.)*, 53(11), 2191–2256. <https://doi.org/10.1007/s40279-023-01886-1>
- Canli, T., Canli, U., Taskin, C., & Aldhahi, M. I. (2023). Motor Coordination in Primary School Students: The Role of Age, Sex, and Physical Activity Participation in Turkey. *Children (Basel, Switzerland)*, 10(9). <https://doi.org/10.3390/children10091524>
- Canli, T., Canli, U., Taşkın, C., & Aldhahi, M. (2023). *Motor Coordination in Primary School Students: The Role of Age, Sex and Physical Activity*. <https://doi.org/10.20944/preprints202307.0341.v1>
- D'Anna, C., Forte, P., & Pugliese, E. (2024). Trends in Physical Activity and Motor Development in Young People—Decline or Improvement? A Review. *Children*, 11(3). <https://doi.org/10.3390/children11030298>

- De Meester, A., Barnett, L. M., Brian, A., Bowe, S. J., Jiménez-Díaz, J., Van Duyse, F., Irwin, J. M., Stodden, D. F., D'Hondt, E., Lenoir, M., & Haerens, L. (2020). The Relationship Between Actual and Perceived Motor Competence in Children, Adolescents and Young Adults: A Systematic Review and Meta-analysis. *Sports Medicine (Auckland, N.Z.)*, *50*(11), 2001–2049. <https://doi.org/10.1007/s40279-020-01336-2>
- Deng, J., Liu, T., & Long, Z. (2024). Factors affecting outdoor physical activity (OPA) in children and adolescents: A systematic review and meta-analysis. *Heliyon*, *10*(21), e38859. <https://doi.org/https://doi.org/10.1016/j.heliyon.2024.e38859>
- Fathirezaie, Z., Abbaspour, K., Badicu, G., Zamani Sani, S. H., & Nobari, H. (2021). The Effect of Environmental Contexts on Motor Proficiency and Social Maturity of Children: An Ecological Perspective. *Children*, *8*. <https://doi.org/10.3390/children8020157>
- Flôres, F., Soares, D., Silva, A. F., Casanova, N., Almeida, G., Marmeleira, J., & Shabanliyski, D. (2025). Sports participation and sex outweigh the relative age effect in motor competence of school-aged children. *Frontiers in Sports and Active Living, Volume 7-2025*. <https://doi.org/10.3389/fspor.2025.1608680>
- Golding, J., Emmett, P., Iles-Caven, Y., Steer, C., & Lingam, R. (2014). A Review of Environmental Contributions to Childhood Motor Skills. *Journal of Child Neurology*, *29*(11), 1531–1547. <https://doi.org/10.1177/0883073813507483>
- Guo, X., Li, C., Zhang, Z., Silva, A. F., & Clemente, F. M. (2024). Can motor competence be influenced by the type of training interventions preschool children are exposed to? A randomized experimental study comparing sports games and psychomotricity activities. *Frontiers in Psychology*, *15*, 1476297. <https://doi.org/10.3389/fpsyg.2024.1476297>
- Guo, X., Li, C., Zhao, J., Yang, W., Xu, Q., Kawczyński, A., & Clemente, F. M. (2025). Adherence to different types of sports shapes motor competence development in preschool children. *Scientific Reports*, *15*(1), 26130. <https://doi.org/10.1038/s41598-025-07109-z>
- Hamed A.F., A., Bohm, S., Mersmann, F., & Arampatzis, A. (2017). Exercise dynamic stability under unstable conditions increases muscle strength and balance ability in the elderly. *Scandinavian Journal of Medicine & Science in Sports*, *28*. <https://doi.org/10.1111/sms.13019>
- Hesselberg, T. (2015). Exploration behaviour and behavioural flexibility in orb-weaver spiders: A review. *Current Zoology*, *61*, 313–327. <https://doi.org/10.1093/czoolo/61.2.313>
- King-Dowling, S., Proudfoot, N., Cairney, J., & Timmons, B. (2020). Motor Competence, Physical Activity, and Fitness across Early Childhood. *Medicine & Science in Sports & Exercise, Publish Ahead of Print*, *1*. <https://doi.org/10.1249/MSS.0000000000002388>
- Latorre Román, P. Á., Huete, V. S., Atero Mata, E. M., Andrade-Lara, K. E., Párraga Montilla, J. A., Sánchez, J. H., Marín, A. M., Redondo, M. M., Pozas, D. M., Sánchez, J. S., Cabrera Linares, J. C., & Zurita, M. L. (2025). Development of an innovative approach to the assessment of eye–hand coordination in a dual-task context in prepubertal children. *Journal of Experimental Child Psychology*, *254*, 106217. <https://doi.org/https://doi.org/10.1016/j.jecp.2025.106217>
- Mademli, L., Mavridi, D., Bohm, S., Patikas, D. A., Santuz, A., & Arampatzis, A. (2021). Standing on unstable surface challenges postural control of tracking tasks and modulates neuromuscular adjustments specific to task complexity. *Scientific Reports*, *11*(1), 6122. <https://doi.org/10.1038/s41598-021-84899-y>
- Malambo, C., Nová, A., Clark, C., & Musálek, M. (2022). Associations between Fundamental Movement Skills, Physical Fitness, Motor Competency, Physical Activity, and Executive Functions in Pre-School Age Children: A Systematic Review. *Children*, *9*(7). <https://doi.org/10.3390/children9071059>
- Mickevičienė, D., Skurvydas, A., & Karanauskienė, D. (2015). Is intraindividual variability different between unimanual and bimanual speed-accuracy movements? *Perceptual and Motor Skills*, *120*(1), 125–138. <https://doi.org/10.2466/25.PMS.120v14x3>
- Nanda, P., Ndraha, P., & Ginting, S. (2025). The Impact of Outdoor Play on Motor Skill Development in Early Childhood: A Systematic Literature Review. *Journal of Foundational Learning and Child Development*, *1*, 141–156. <https://doi.org/10.53905/ChildDev.v1i03.19>
- Padial-Ruz, R., Puga-González, M. E., Céspedes-Jiménez, Á., & Cabello-Manrique, D. (2021). Determining Factors in the Use of Urban Parks That Influence the Practice of Physical Activity in Children: A Systematic Review. *International Journal of Environmental Research and Public Health*, *18*(7). <https://doi.org/10.3390/ijerph18073648>
- Piotrowski, T., Makaruk, H., Tekień, E., Feleszko, W., Kołodziej, M., Albrecht, K., Grela, K., Makuch, R., Werner, B., & Gąsior, J. S. (2025). Fundamental Movement/Motor Skills as an Important Component of Physical Literacy and Bridge to Physical Activity: A Scoping Review. *Children (Basel, Switzerland)*, *12*(10). <https://doi.org/10.3390/children12101406>

- Rizzato, A., Bozzato, M., Rotundo, L., Zullo, G., De Vito, G., Paoli, A., & Marcolin, G. (2024). Multimodal training protocols on unstable rather than stable surfaces better improve dynamic balance ability in older adults. *European Review of Aging and Physical Activity: Official Journal of the European Group for Research into Elderly and Physical Activity*, 21(1), 19. <https://doi.org/10.1186/s11556-024-00353-8>
- Rizzo, J.-R., Beheshti, M., Naeimi, T., Feiz, F., Fatterpekar, G., Balcer, L. J., Galetta, S. L., Shaikh, A. G., Rucker, J. C., & Hudson, T. E. (2020). The complexity of eye-hand coordination: a perspective on cortico-cerebellar cooperation. *Cerebellum & Ataxias*, 7(1), 14. <https://doi.org/10.1186/s40673-020-00123-z>
- Sulla-Torres, J. A., Chavez-Salas, N. Y., Valverde-Riveros, M. F., Iquira-Becerra, D. A., Rosas-Paredes, K., & Cossio-Bolaños, M. A. (2025). Evaluation of Reaction Time and Hand-Eye Coordination in Schoolchildren Using Wearable Sensor-Based Systems: A Study with Neural Trainer Devices. *Sensors (Basel, Switzerland)*, 25(22). <https://doi.org/10.3390/s25227006>
- Taylor, N., Pringle, A., & Roscoe, C. M. P. (2024). Characteristics of the Outdoor Environment Affording Physical Activity, Motor Competence, and Social Interactions in Children Aged 3–7 Years: A Systematic Review. *Children*, 11(12). <https://doi.org/10.3390/children11121491>
- Wang, J. (2004). A Study on Gross Motor Skills of Preschool Children. *Journal of Research in Childhood Education*, 19, 32–43. <https://doi.org/10.1080/02568540409595052>
- Wu, H., Eungpinichpong, W., Ruan, H., Zhang, X., & Dong, X. (2021). Relationship between motor fitness, fundamental movement skills, and quality of movement patterns in primary school children. *PloS One*, 16(5), e0237760. <https://doi.org/10.1371/journal.pone.0237760>
- Zhou, Z., Zhou, Y., & Shen, H. (2025). Comparing gross motor performance, physical fitness between young children with and without sensory integration dysfunction. *Journal of Exercise Science and Fitness*, 23(4), 313–324. <https://doi.org/10.1016/j.jesf.2025.06.005>