

The Impact of Developmental Gymnastics on Children's Motor Abilities

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Abstract: The aim of this systematic review was to examine the effects of developmental gymnastics on motor abilities in preschool children. The review was conducted in accordance with PRISMA guidelines, with a literature search performed in the PubMed, Scopus, and Google Scholar databases. Out of 142 identified studies, ten met the inclusion criteria, involving children aged 4–7 years and gymnastic interventions focused on strength, balance, coordination, agility, and flexibility. The included studies applied structured training programs with clearly defined duration, frequency, and intensity, as well as standardized motor assessment methods. The findings indicate that developmental, rhythmic, artistic, and creative gymnastics significantly improve gross and fine motor skills, coordination, balance, and overall motor proficiency. Short-term interventions (approximately 8 weeks) improve basic locomotor skills and balance, while longer programs (3–9 months) produce greater gains in strength, coordination, and gymnastic-specific abilities. Combined and age-appropriate gymnastic programs show higher effectiveness. The results confirm that developmental gymnastics is an effective approach for improving motor development in preschool children and can be successfully implemented in preschool and physical education settings.

Keywords— motor development; physical fitness; gymnastics; development

1. INTRODUCTION

Physical activity represents one of the key factors of healthy growth and development in children, as it is directly associated with improvements in physical, psychological, and social health (Strong et al., 2005). Regular movement contributes to the development of motor abilities, strengthening of the organism, and the formation of healthy lifestyle habits that have a long-term impact on quality of life. Numerous studies confirm that organized physical activity positively affects body composition, skeletal health, aerobic fitness, cardiovascular and metabolic parameters, as well as the motor and psychological development of children and adolescents (Bungum et al., 1997; Butcher, 1983; Roth et al., 2010). Motor development represents the foundation of overall child development and occurs through the gradual transformation of basic movements into more complex and voluntary motor patterns, involving continuous interaction between genetic factors and environmental influences (Payne et al., 2011). Childhood is considered a particularly sensitive period for motor development due to intensive physical, cognitive, and emotional changes, and fundamental motor skills form the basis for the later acquisition of more complex sport-specific and life skills (Gallahue, 2003; Reeves et al., 1999; Welzel et al., 2003).

Physical fitness is therefore increasingly viewed as a reliable indicator of children's current health status, as well as a significant predictor of health in adulthood (Cvejić et al., 2013). Modern lifestyles, reduced opportunities for spontaneous movement, and increased time spent indoors contribute to insufficient levels of physical activity among children. Research indicates that a substantial proportion of preschool children do not meet the recommended daily physical activity guidelines, which may have negative consequences for their motor and overall health development (Goldfield et al., 2012). For this reason, the preschool period represents an exceptionally favorable stage for the introduction of planned and systematic forms of physical exercise, particularly those involving more complex movement patterns, such as gymnastic exercises, swimming, rhythmic activities, and balance training (Strong et al., 2005; Stojiljković et al., 2016).

Developmental gymnastics plays an important role in enhancing children's motor abilities, as it is based on fundamental movement forms and enables a gradual transition toward more complex motor structures. Through gymnastic activities such as balance tasks, rolling, jumping, and coordinated movements in space, children develop strength, flexibility, coordination, and body control, thereby creating a solid foundation for further motor and sport-related development (Gallahue et al., 2003). Research further indicates that the level of motor ability development significantly influences the successful performance of gymnastic elements in children of early school age, which additionally emphasizes the need for systematic motor development already during the preschool period (Radanović et al., 2016).

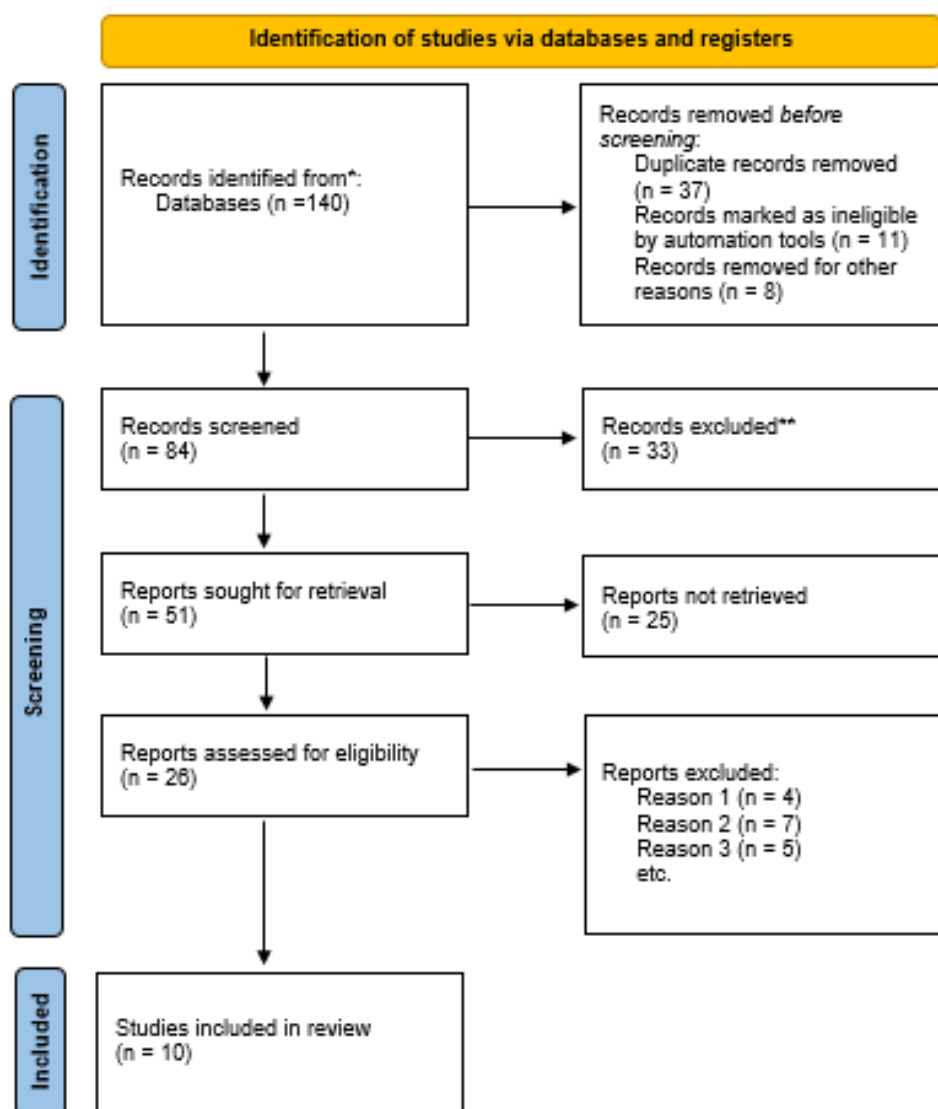
Empirical findings confirm that various physical activity programs have a significant positive effect on the motor fitness of preschool children. Particularly notable are the positive effects of additional kinesiology-based interventions on the development of explosive strength and flexibility, as well as on improvements in the motor, cognitive, and morphological characteristics of

children involved in organized exercise programs (Krneta et al., 2014; Jakšić, 2016). Moreover, interventions aimed at the development of specific motor skills have demonstrated long-term positive effects that persist even after the completion of the programs (Veldman et al., 2017). Based on the above, it can be concluded that developmental gymnastics represents an extremely valuable form of organized physical activity that can significantly contribute to the overall motor development of preschool children. The implementation of planned and professionally guided programs has important practical implications for preschool teachers, educators, parents, and professionals in the field of physical education, as it enables the creation of optimal conditions for healthy and comprehensive child development. The aim of this study is to examine the effects of developmental gymnastics on the motor abilities of children.

2. METHODS

In this review study, a systematic search of relevant scientific literature was conducted with the aim of analyzing the effects of developmental gymnastics on the motor abilities of preschool-aged children. The search process included electronic databases (PubMed, Scopus, and Google Scholar), using the following keywords and combinations of terms: “developmental gymnastics, children, motor abilities, physical fitness and intervention. The initial screening identified a total of 140 scientific articles. After the removal of duplicates and studies that did not correspond to the research question, a detailed analysis resulted in the selection of ten studies that met all inclusion criteria and were included in the final synthesis. The study selection process is presented through an appropriate flow diagram (Figure 1).

Figure 1. PRISMA flow diagram, process for collecting studies for systematic review (Page et al. 2020)



Inclusion Criteria:

Studies were included in the analysis if they:

- Were published in peer-reviewed scientific journals;
- Involved populations of preschool and early primary school-aged children;
- Examined the effects of gymnastics programs on motor abilities;
- Employed clearly defined training protocols;
- Applied valid and standardized methods for assessing motor abilities;

Exclusion Criteria:

Studies were excluded from the review if they:

- Were duplicates across multiple databases;
- Were published in languages other than English or were not available in translation;
- Included exclusively older children, adolescents, or adults;
- Addressed general physical activity without a specific focus on gymnastics;
- Lacked clearly defined methods for measuring motor abilities or did not provide sufficient quantitative data;

3. RESULTS

Table 1 presents an overview of the included studies that analyzed the effects of volleyball programs on the motor abilities of primary school-aged children, including sample characteristics, tested variables, training program features, and key outcomes of motor transformations.

Table 1. A systematic review of the papers included in the research

Author	Sample	Age	Type of intervention/ program	Research findings
Radanović et al., 2025	220 (EG = 99, CG = 121)	5.1 ± 0.83 years	Developmental gymnastics, 36 weeks, 60 min, 2x/week for EG; CG performed standard physical activities	EG showed significant improvements in all locomotor tests of the TGMD-2 with practically meaningful effects (Cohen's $d = 0.6-1.4$); gender differences observed in object control skills
Madić et al., 2018	56	Preschool age (4–6 year)	Developmental gymnastics, 60 min, 2x/week; circuit and station exercises with obstacles; intensity 160–180 bpm	DG group significantly improved in almost all motor fitness parameters (20m dash, obstacle course, long jump, tapping, balance, sit-ups), ES 0.64–1.20; CG showed no significant changes except in long jump and tapping
Simamora et al., 2024	/	Primary school age	Rhythmic gymnastics, structured group activities focused on coordination, balance, and strength	Rhythmic gymnastics significantly enhanced gross and fine motor skills and positively influenced physical, cognitive, social, and emotional development
Yılmaz et al., 2020	Kindergarten	60–72 months	Preschool gymnastics, regular activities; CG without sports activities	Children participating in gymnastics achieved better results in speed, agility, balance, bilateral coordination, strength, upper-extremity coordination, reaction time, and visuomotor control compared to non-participants

Fallah et al., 2015	40 girls (EG = 20, CG = 20)	5–6 years	Pre-level gymnastics, 8 weeks, organized and regular exercises; CG without activity	Pre-level gymnastics significantly improved balance and gross motor skills (locomotor skills: galloping, jumping, leaping) in girls
Culjak et al., 2014	75	7 years	Basic artistic gymnastics, 18 weeks, 3x/week, guided by a qualified instructor	Significant improvement in fundamental motor skills (FMS) and basic gymnastics skills; correlation observed between children's daily activity and successful mastery of FMS and gymnastics skills
Manggau et al., 2020	15	Preschool age	Rhythmic gymnastics, pre-test/post-test design, various engaging movements, guided activities	Post-intervention, children's gross motor skills significantly improved; skill levels progressed from "not developed" / "emerging" to "expected development" / "well developed" in locomotor, non-locomotor, balance, and flexibility tasks
Kezić, et al., 2018	70 (30 girls, 40 boys)	6 years	Rhythmic gymnastics, 6 months, 3x/week, 35 min per session; 20 tests of specific gymnastic skills	Fundamental motor skills significantly influenced the mastery of specific rhythmic gymnastics skills on all apparatuses and learning stages; bilateral coordination, hand coordination, and strength became increasingly important in advanced stages
Šalaj et al., 2019	31	5.59 ± 0.77 years	Artistic gymnastics; comparison of selected vs. non-selected groups	Selected girls demonstrated better locomotor skills than non-selected, while no significant differences were found in manipulative skills; no gender differences in overall motor quotient
Handayani et al., 2022	/	Early childhood	Jalaleota "cheerful creative gymnastics"; basic gymnastic exercises including running, throwing, and catching; qualitative and quantitative evaluation	Motor abilities significantly improved; creative gymnastics positively affected motor skills, movement quality, posture, and musicality in young children

4. DISCUSSION

The results of the reviewed studies confirm that physical activity during the preschool period plays a key role in the development of children's motor abilities, including strength, flexibility, coordination, and balance (Strong et al., 2005; Bungum et al., 1997; Gallahue, 2003). The preschool years are particularly suitable for interventions, as fundamental motor skills are developed during this stage, forming the basis for more complex sports and life skills (Payne et al., 2011; Reeves et al., 1999). Modern lifestyles, reduced opportunities for spontaneous movement, and prolonged time spent indoors contribute to insufficient levels of physical activity in children, which can negatively affect their motor and overall health development (Goldfield et al., 2012). The analyzed studies demonstrate that developmental, rhythmic, and artistic gymnastics have a significant positive impact on motor abilities, although the intensity of effects and focus on specific skills vary.

Radanović et al. (2025) reported that developmental gymnastics, applied twice weekly over 36 weeks, improved all locomotor skills and motor quotients in children, with effect sizes ranging from 0.6 to 1.4. Similarly, Madić et al. (2018) observed comparable results, highlighting that circuit and station exercises with obstacles further enhanced agility and reaction speed. Rhythmic gymnastics, as shown by Simamora et al. (2024) and Manggau et al. (2020), particularly contributes to the development of coordination, balance, and fine motor skills, indicating that this type of gymnastics is more effective for improving finer motor abilities compared to developmental gymnastics, which primarily affects gross locomotor patterns. Yilmaz et al. (2020) and Fallah et al. (2015) demonstrated that regular preschool activities and pre-level gymnastics significantly improved balance and bilateral coordination, whereas developmental gymnastics produced effects on speed and strength across a broader range of tests. Artistic gymnastics, according to Culjak et al. (2014) and Kezić et al. (2018), focuses on mastering complex gymnastic elements and shows strong correlations with fundamental motor skills, with bilateral coordination, hand coordination, and strength

becoming increasingly important in advanced learning stages. Compared to rhythmic gymnastics, artistic gymnastics supports deeper development of specific motor abilities and prepares children for future sports activities, while rhythmic gymnastics emphasizes creativity and social development (Handayani et al., 2022). Research further indicates that creative gymnastics, such as Jalaleota, contributes to multidimensional development, including motor skills, movement quality, musicality, and creativity, which are less pronounced in classical developmental gymnastics (Handayani et al., 2022; Madić et al., 2018). Salaj et al. (2019) showed that selection of children based on motor abilities can further enhance locomotor skill outcomes, while manipulative skills and gender do not significantly influence overall performance. Overall, developmental gymnastics produces strong effects on gross motor skills and total motor quotient, rhythmic gymnastics is more effective for enhancing coordination and fine motor skills, and artistic and creative gymnastics support deeper development of specific skills and creative expression (Radanović et al., 2025; Simamora et al., 2024; Culjak et al., 2014; Handayani et al., 2022). Moreover, the frequency and quality of training remain critical factors – programs conducted 2–3 times per week with professionally guided activities yield significantly better results than sporadic or unstructured sessions (Madić et al., 2018; Kezić et al., 2018).

Intervention effects are not limited to the program duration but have long-term positive consequences for motor, cognitive, and social development in children (Veldman et al., 2017). Children participating in systematic programs show improved agility, strength, balance, and coordination, facilitating the acquisition of more complex sports skills later on (Simamora et al., 2024; Culjak et al., 2014). Comparisons of different types of gymnastics indicate that combining developmental and rhythmic gymnastics can optimize the development of gross and fine motor skills, while artistic and creative gymnastics contribute to higher levels of specific skills and creative expression (Gallahue et al., 2003; Radanović et al., 2016). Applying these insights in preschool settings allows for professionally guided, planned activities that create optimal conditions for the comprehensive motor, cognitive, and social development of children (Strong et al., 2005; Stojiljković et al., 2016; Handayani et al., 2022). In conclusion, systematic and professionally guided gymnastic activity represents an effective and versatile form of physical exercise, whose benefits surpass passive or unstructured movement, providing a solid foundation for future sports and life skills in preschool-aged children (Radanović et al., 2025; Madić et al., 2018; Simamora et al., 2024).

5. CONCLUSION

The analysis of theoretical assumptions and empirical data clearly demonstrates that developmental gymnastics has a significant impact on the transformation of motor abilities in preschool-aged children. The structure of gymnastic programs, which incorporates elements of balance, rolling, jumping, coordinated movements, and body control in space, facilitates the development of strength, flexibility, coordination, and agility. Research findings indicate that regular participation in organized gymnastic activities leads to substantial improvements in both gross and fine motor skills, bilateral coordination, and overall motor quotient. Experimental data confirm that short-term programs, such as eight-week pre-level or creative gymnastics, significantly enhance balance and fundamental locomotor skills, whereas longer programs lasting three to nine months, including developmental and artistic gymnastics, contribute to more advanced development of strength, coordination, and specific gymnastic elements. Combining different types of gymnastics further increases training effectiveness, particularly when activities are tailored to the age and individual abilities of the children. Rhythmic gymnastics demonstrates a stronger impact on fine motor skills and creativity, while developmental gymnastics promotes broader development of gross motor skills and locomotor patterns. Artistic and creative gymnastics support the development of complex motor structures and foster multidimensional growth, including musicality and creative expression. Professionally guided programs with appropriate frequency and intensity significantly enhance the quality of motor transformation, while sporadic activities yield limited results. Long-term interventions show maintenance of acquired motor skills and facilitate the subsequent development of more complex sports abilities. Gymnastic activities contribute to the formation of positive movement habits, which have a lasting impact on health and physical fitness. The integration of creative and rhythmic elements in training increases children's motivation and enjoyment during exercise. Applying these insights in preschool settings enables the optimization of physical education programs and the creation of safe and stimulating environments. Overall, developmental gymnastics represents an effective and versatile method for promoting motor, cognitive, and social development in preschool-aged children. Systematic and planned training enables multiple transformations in morphological-motor and functional components, providing a solid foundation for future sports and life skills. Based on these findings, developmental gymnastics can be considered a reliable tool for supporting the comprehensive psychophysical development of preschool children.

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