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Editorial

Physical Exercise and Motor Development: Current State of Research and Future Directions

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Editorial

The preschool period is regarded as a crucial phase in the holistic development of an individual's personality [1]. Therefore, the influence of physical activity (PA) on the motor development of preschool children has significant implications for public health [2]. Nowadays, children spend up to half of their waking time in a sedentary position [3]. Such a sedentary lifestyle with hypokinesia and improper nutrition results in obesit which is increasingly prevalent among children and is currently one of the major public health problems [4-6]. That is why numerous health organizations have become involved in promoting PAs due to the many health benefits it has on motor and physical development, aerobic capacity, blood lipid levels, glucose metabolism, and overall psychological health [7,8].

Numerous studies have shown that children with better motor status spend significantly more time in PA and less time in a sedentary position than children with weaker motor performance [9]. Motor status includes motor abilities (MA) as well as movement skills (MS). Lopes et al. emphasize that MA of children are now more evaluated than their MS, although the acquisition of skills is very important for children. That is why many authors emphasize the importance of developing MS in early childhood for further participation of children in sports and Pas [10-12].

The authors emphasize the importance of engaging in physical activity, especially at an early age because recent research has shown that physical inactivity in childhood negatively affects motor learning and hinders further development of MS [13,14]. Early detection and intervention can significantly reduce problems that arise due to delayed motor development. That is why more and more authors are investigating the impact of exercise on the motor development of children [2,15,16]. However, it is unclear which type of PA provides the best benefits in the motor development of children, specifically which activity and to what extent it will impact the development of MA and MS in preschool children.

Based on the recent systematic reviews that examined the impact of PA on the motor development of preschool children, positive effects of physical exercise (PE) interventions on the motor status of preschool children have been established [2,17,18]. The review study by Zeng et al. included 10 randomized controlled trials on the relationship between PAs and motor status of preschool children. The majority of studies (8 out of 10, 80%) showed a clear positive effect of PA on motor status [2]. Similar

results were achieved in other studies[17,18]. It is noticeable that structured PE and MS-enhancing programs dominated in the studies. MS-enhancing programs may have an important role in helping children attain motor skill proficiency while structured PE programs are based on different sports [17]. Therefore, it is not possible to determine precisely which PA within structured PE had the most influence on the motor status of children. Other programs can also be found in the literature, such as games-based, music and movement lessons aerobic-based interventions gymnastics yoga lessons as well as specific programs such as SKIP Get Movin with Mighty Moves Nintendo Wii, etc. However, although these PAs programs have positive effects on motor development, it is still unclear which programs will have the best effects and on which MA and MS, so they should be compared [18-24]. Despite many studies on this topic, it remains unclear what the optimal dose-response of physical exercise should be in terms of intensity and duration to achieve desired effects.

We have seen that there are many types of PAs that can affect the development of MA and MS in children. Some authors believe that the most effective activities are those that involve different types of movements and provide different levels of challenge for the child's motor system [2,14]. When it comes to the development of MS, it is generally believed that for the development of locomotor skills, activities such as running, jumping, climbing, walking, playing with a ball, and playing games that involve movement are useful, while for the development of object control skills, activities such as throwing, catching, running with a ball, playing games that require object control such as badminton, tennis, basketball, or soccer can be useful. All of these activities also help develop various MA such as balance, coordination, speed, strength, and endurance [25]. For this reason, some authors have recently emphasized the importance of the FMS program for preschool children [17]. On the other hand, the guidelines of the National Association for Sport and Physical Education (NASPE; USA) recommend activities consisting of aerobic and strength exercises for children of this age [26]. When it comes to the amount of PA, the World Health Organization (WHO) promotes PA and provides guidelines that recommend that children 3-5 years engage in at least 3 hours, while children 5-7 years engage in at least 60 minutes of moderate- to high-intensity PA daily [27]. This should be taken into account when designing physical education programs for preschool children.

In conclusion, while it is established that PE interventions have a beneficial impact on the motor development of children, and enhance their MA and MS, there remains a dearth of research in this field. Therefore, further research should determine which types of training give the best results and on which motor abilities and skills. Also, what is the dose-response relationship between PE and motor performance of children? We hope that researchers will find a way to translate science into practice, and that more studies will examine various types of exercise with precisely measured intensity and duration of exercise programs.

References

1. Bala G (2002) Strukturalne razlike motoričkih sposobnosti dečaka i devojčica u predškolskom uzrastu (Structural differences in motor abilities of boys and girls in preschool age). Pedagoška stvarnost, 48(9-10): 744-752.
2. Zeng N, Ayyub M, Sun H, Wen X, Xiang P, et al. (2017) Effects of physical activity on motor skills and cognitive development in early childhood: A systematic review. Biomed Res Int, 2760716.
3. Colley RC, Garriguet D, Adamo KB, Carson V, Janssen I, et al. (2013) Physical activity and sedentary behavior during the early years in Canada: a cross-sectional study. Int J Behav Nutr Phys Act 10(1): 1-9.
4. Ekelund U, Luan J, Sherar LB, Esliger DW, Griew P, et al. (2012) International Children's Accelerometry Database C. Moderate to vigorous physical activity and sedentary time and cardiometabolic risk factors in children and adolescents. Jama 307(7): 704-712.

5. Veijalainen A, Tompuri T, Haapala EA, Viitasalo A, Lintu N, et al. (2016) Associations of cardiorespiratory fitness, physical activity, and adiposity with arterial stiffness in children. Scand J Med Sci Sports 26(8): 943-950.
6. Kumar S, Kaufman T (2018) Childhood obesity. Panminerva Med 60(4): 200-212.
7. Butcher J (1983) Socialization of adolescent girls into physical activity. Adolescence 18(72): 753.
8. Roth K, Ruf K, Obinger M, Mauer S, Ahnert J, et al. (2010) Is there a secular decline in motor skills in preschool children? Scand J Med Sci Sports 20(4): 670-678.
9. Wrotniak BH, Epstein LH, Dorn JM, Jones KE, Kondilis VA (2006) The Relationship between Motor Proficiency and Physical Activity in Children. Pediatrics 118(6): 1758-1765.
10. Lopes L, Santos R, Coelho-e-Silva M, Draper C, Mota J, at al. (2021) A narrative review of motor competence in children and adolescents: what we know and what we need to find out. Int J Environ Res Public Health 18(1): 18.
11. Stodden DF, Goodway JD, Langendorfer S J, Roberton MA, Rudisill ME, et al. (2008) A Developmental Perspective on the Role of Motor Skill Competence in Physical Activity: An Emergent Relationship. Quest 60(2): 290-306.
12. Certain LK, Kahn RS (2002) Prevalence, correlates, and trajectory of television viewing among infants and toddlers. Pediatrics 109(4): 634-642.
13. Banjevic B, Aleksic D, Aleksic Veljkovic A, Katanic B, Masanovic B (2022) Differences between Healthy-Weight and Overweight Serbian Preschool Children in Motor and Cognitive Abilities. Int J Environ Res Public Health 19(18): 11325.
14. Lubans DR, Morgan PJ, Cliff DP, Barnett LM, Okely AD (2010) Fundamental movement skills in children and adolescents. Review of associated health benefits. Sports Medicine, 40(12), 1019–1035.
15. Alwasif N (2013) The effect of a sports Program on the Motor abilities of preschool children. TAIE 3(3): 67-77.
16. Bellows LL, Davies PL, Courtney JB, Gavin WJ, Johnson SL, et al. (2017) Motor skill development in low-income, at-risk preschoolers: A community-based longitudinal intervention study. Journal of Science and Medicine in Sport, 20(11), 997-1002.
17. Wick K, Leeger-Aschmann CS, Monn ND, Radtke T, Ott LV, et al. (2017) Interventions to promote fundamental movement skills in childcare and kindergarten: a systematic review and meta-analysis. Sports Medicine 47: 2045-2068.
18. Loras H (2020) The effects of physical education on motor competence in children and adolescents: a systematic review and meta-analysis. Sports 8(6): 88.
19. Fisher A, Boyle JM, Paton JY, Tomporowski P, Watson C (2011) Effects of a physical education intervention on cognitive function in young children: randomized controlled pilot study. BMC Pediatrics 11(1): 97.
20. Katanić B, Veljković AA, Stojiljković N, Stanković S, Mitić P (2022) Effects of a 12-week aerobic training program on the cognitive and motor abilities of preschool children. Facta Universitatis, Series: Physical Education and Sport 19(3): 223-232.
21. Aleksić Veljković A, Katanić B, Masanovic B (2021) Effects of a 12-weeks yoga intervention on motor and cognitive abilities of preschool children. Front Pediatr 9: 799226.
22. Brian A, Goodway JD, Logan JA, Sutherland S (2017) SKIPing with teachers: An early years motor skill intervention. Physical Education and Sport Pedagogy 22(3): 270-282.

23. Bellows LL, Davies PL, Anderson J, Kennedy C (2013) Effectiveness of a physical activity intervention for Head Start preschoolers: a randomized intervention study. Am J Occup Ther 67(1): 28-36.

24. Salem Y, Gropack SJ, Coffin D, Godwin EM (2012) Effectiveness of a low-cost virtual reality system for children with developmental delay: a preliminary randomised single-blind controlled trial. Physiotherapy 98(3): 189-195.

25. Gallahue DL, Donnelly FC (2003) Developmental physical education for all children. Human Kinetics, Illinois, USA.

26. US Department of Health and Human Services (USDHHS) (2008). Physical activity guidelines for Americans. Washington, DC: US Department of Health and Human Services, USA.

27. Guan H, Zhang Z, Wang B, Okely AD, Tong M, et al. (2020) Proportion of kindergarten children meeting the WHO guidelines on physical activity, sedentary behavior and sleep and associations with adiposity in urban Beijing. BMC Pediatrics 20(1): 1-9.