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ARTICLE

The Effect of Game-based Intervention on Postural Control and Motor Performance in Children with Intellectual Impairment

Ebrahim Ebrahimi[1], Fariba Mohammadi[2]*, Neginsadat Tabatabaei[3], Somayeh Mozafari[1]

[1] Department of Corrective Exercise & Sport Injury, Faculty of Physical Education and Sport Sciences, Allameh Tabataba'i University, Tehran, Iran.
[2] Department of Sport Medicine, Sport Sciences Research Institute, Tehran, Iran
[2] Faculty of Physical Education, ImamReza International University, Mashhad, Iran

*Corresponding Author: Fariba Mohammadi. Email: mohammadi.ssrc@gmail.com
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ABSTRACT: Intellectual impairment is one of the most common mental disorders associated with impaired balance and impaired motor performance. The aim of this study was to investigate the effectiveness of game-based intervention on postural control and motor performance in children with intellectual impairment. The population of this study was all of the intellectual impaired girls of Tehran and Mashhad City, and sample consisted of 20 educable intellectual impaired girls, who were healthy physically and voluntarily participated in this research. The subjects were randomly divided into two equal experimental and control groups (n=10). The experimental groups had six weeks of game-based intervention with two sessions per week. During this period, the control group control group engaged in the routine activities of the physical education class. The Timed Up and GO and Stork tests were done as pre-posttest, respectively. Data were analyzed through descriptive and analysis of independent T-test. The findings showed that the implementation of the six-week exercise program led to improvements in static balance (P=0.001) and motor performance (P=0.001) of the participants in the game group compared to the control group. The findings of the study underline the importance of early, structured interventions for children with mild intellectual disabilities, particularly those based on game. Such interventions not only improve motor performance and balance but also contribute to overall physical, cognitive, and social development. Given the positive impact of game-based interventions, they should be integrated into rehabilitation and educational programs for children with intellectual disabilities to support their development and improve their quality of life.

KEYWORDS: Intellectual impairment, Postural control, Motor performance, Game

1 Introduction

A decrease in intelligence quotient from the average level, along with weakness in adaptive behaviors, leads to the emergence of a type of disability called intellectual disability (Luckasson et al., 2002). Individuals with intellectual disabilities are divided into three groups: educable (with an IQ of 50 to 75), trainable (with an IQ of 30 to 49), and custodial (with an IQ below 29) (Glencross et al., 2021). The prevalence of intellectual disability worldwide is estimated to be between 1 to 3 percent, with the majority being reported as mild(educable) intellectual disability (Hickey & Cotts, 2024). This disorder leads to cognitive and social problems in children and creates serious limitations in their participation in group and sports activities

(Ehrman et al., 2023). Children with mild intellectual disabilities, compared to their typically developing peers, have lower scores in physical fitness and balance (Jefferson-Buchanan, 2022) and have deficiencies in fundamental movement skills such as grasping, throwing, running, jumping, and rolling, which are essential for their overall development and quality of life (Özkan & Kale, 2023). They are approximately 2 to 4 years behind typically developing children in motor performance (Sedaghati et al., 2022). The importance of early interventions and structured opportunities for the development of fundamental movement skills (FMS) has been clearly emphasized, as these interventions can help facilitate skill learning and enhance quality of life (Dobell et al., 2020). Additionally, recognizing the specific differences in motor proficiency among children with varying degrees of intellectual disabilities can aid in the development of targeted sports programs (Özkan & Kale, 2023). Focusing on fundamental motor skills in children with intellectual disabilities is essential for enhancing their physical, cognitive, and social development, and identifying and implementing effective interventions to improve motor abilities and balance in these children is of great importance (Rasyid et al., 2024).

One of the innovative approaches in the rehabilitation of children with intellectual disabilities is the use of game-based interventions. Game, in addition to being entertaining, is considered an effective tool for improving the motor skills and balance (Aminikhah & Daneshmandi, 2024; Daneshjoo et al., 2021). These interventions, by creating a motivating environment, help develop their motor and balance skills without pressure and stress (Yalfani et al., 2023). Some research show that play-based activities are feasible and effective for disabled children, and positively impact the development of bilateral coordination, and physical strength in children with intellectual disabilities by improving neuromuscular coordination (Ebrahimi et al.; Nair et al., 2022). Additionally, rhythmic games, which are part of many play-based activities, can improve attention and memory, which are cognitive skills essential for learning and effectively performing motor skills (Javan et al., 2014). Despite the existing evidence regarding the positive effects of game on the development of motor skills, few studies have specifically addressed the impact of game-based interventions on the postural control and motor performance of children with educable intellectual disabilities. Since this group of children has special needs and is cognitively and physically different from other children, it is essential that educational and rehabilitation interventions are designed to align with their needs. In this regard, the present study examines the effect of game-based interventions on improving postural control and motor performance in children with intellectual impairment.

2 Methods

2.1 Participants

The present study was of a quasi-experimental type with a pre-test-post-test design with a control group. The statistical population consisted of 20 girls with intellectual disabilities aged 7-12 years from Tehran and Mashhad cities, with an IQ of 50-70, who were purposefully selected and divided into two groups: a game-based intervention group (N= 10) and a control group (N= 10). The main criterion for selecting individuals in the study was their intelligence quotient, determined through the examination of their medical records, which is the most important indicator and distinguishing feature of these individuals from one another. After the initial selection, the intelligence quotient of the subjects was determined based on the Wechsler intelligence scale. Additionally, considering the necessity for the complete perception and understanding of physical exercises by the participants and that more than 50% of individuals with intellectual disabilities are educable (Moore et al., 2016), the selection was made from among the educable individuals with intellectual disabilities.

2.2 Measurement and Tools

Initially, the parents of the participants signed a written consent form for conducting this research. The researcher maintained the confidentiality of these individuals' information, and if it became necessary to publish photos of the participants, they obtained written consent and covered their faces. Then, they completed the information collection form through which age, weight, height, medical history or medications taken, and the presence of any injuries were determined. The inclusion criteria for the present study included an age range of 7 to 12 years, an IQ between 50-70, no history of genetic, cardiac, or neurological diseases based on their medical records, and no hearing or visual impairments (McConaughy & Salzberg, 1988). The exclusion criteria for the present study included participation in sports programs outside the research plan, irregular attendance and participation in training sessions, injuries, and inability to continue the study.

2.3 Implementation Method

In the first step, the demographic information of the samples was recorded. The Timed Up and Go test and the Stork balance test were performed on the participants in order, and the data from these tests were recorded as pre-tests for each individual. Then, the experimental group participated in the game-based intervention for 6 weeks, totaling 12 sessions. This intervention was designed based on balance games and combined with motor skills exercises (Hrysomallis & Goodman, 2001; Yalfani et al., 2023). These exercises, examples of which are presented in Table 1, were provided by the researchers of the present study in the form of various competitive or cooperative games. The training program was such that the experimental group performed the game-based intervention for one hour under the supervision of the physical education teacher, who was also a member of the present research group, while the control group engaged in the routine activities of the physical education class, which included unorganized and merely entertaining ball games and some physical activities aimed at improving fitness factors such as flexibility exercises and rhythmic exercises. After the completion of 6 weeks, all tests were repeated, and the results of the tests at this stage were recorded as post-test data.

Motor performance assessment test

In this study, the Timed Up and Go (TUG) test was used to assess motor performance. The participant had to rise from an armless chair without using their hands, walk a distance of 8 feet (2.44 meters), return, and sit back down on the chair. The participant was asked to perform this test with greater speed and skill without running, and the total time was recorded as the participant's score. Good validity and reliability have been reported for this test (Salb et al., 2015).

Postural control assessment test

To measure postural control, the Stork test was used in the following manner: the subject stands on one leg, places the other foot next to the knee of the first leg, keeps their hands on their hips, and upon the starting signal, tries to remain in balance for as long as possible without any changes in the specified conditions. The score of this test is equal to the longest time (in seconds) from when the individual stands on one leg until they lose their balance. The best score is considered after performing the movement three times. The test taker cannot use their hands to maintain balance. If balance is lost at the start, the individual will be given another chance. Each participant performed this test 3 times, and the average of their 3 performances was considered their final record. Good validity and reliability have been reported for this test (Lahtinen et al., 2007).

Table 1. Table 1. Examples of selected games

Game	*Description*
towel scrunches + running	*Two pieces of cloth are placed in front of each student and she scrunches the cloth towards herself by plantar flexion of her ankle. When the cloth gets close to the person, she stands quickly and runs a certain distance. The person who does this first is considered the winner.*
Pick and drop Game +hopping	*Students sit in a circle form on the floor and a paper napkin is placed on one side of the first person. Then it should be picked using the claws of the feet in such a way that the feet are in the plantar flexion and dropped on the other side which is previously specified for the next person to lift it with their feet. When everyone's turn is over, they get up together and do hopping and the game is repeated again.*
Bottle rolling game + horizontal jumping	*A bottle is placed under the feet of each student and the students walk a certain distance together by holding each other's hands and using the soles of their feet and rolling the ball on the ground. Then, holding the bottles, they all do a horizontal jump together at the coach's whistle.*
Walking game on toes +sliding	*Students are asked to walk on their toes to reach the next person's station. The next person slides a certain distance to reach the next station. They are repeated as one among the stations. Then the tasks are replaced.*
One-leg hopping + horizontal jumping	*It is the same game as hopping, but in such a way that a distance is chosen and with the sound of the whistle, a student should pass a certain distance faster and correctly without placing her foot on the ground, then at the end of the path, he/she performs a horizontal jump. The first person and the person who jumped the longest distance are both declared as winners.*
carrying the ball between the legs+galloping	*Students are placed in designated stations. Then the first student is told to place a ball between his legs and carry it to the next person. The next person walks the distance in a galloping way and they repeat as one among the stations. Then the tasks are replaced.*
Kneeling game + sliding and galloping	*The same game of arm wrestling but with feet. Two students of the same weight were placed opposite each other in such a way that the person's thigh on the right side collides with the person's thigh on the left side, and after the whistle, people without lifting a part of their body should try to make the opposite person's or opponent's thigh closer to the ground. Then, with the coach's announcement, the loser must follow the winner who is galloping to the marked line in a sliding way. On the way back, the duties of two people change.*

2.4 Data analysis

In this research, descriptive statistics were used to describe the variables, and inferential statistics were used for data analysis. Initially, the Shapiro-Wilk test was used to examine the normality of the data distribution. The independent t-test was used to compare the variables between groups. Data analysis was conducted at a significance level of 95% and an alpha level of less than or equal to 0.05 using SPSS software version 27.

3 Results

The demographic information of the present study, which pertains to the age, height, weight, and body mass index of the subjects, is described in Table 2.

Table 2. Demographic characteristics of participants

Data	*Group*	*Mean±SD*	*P-value*
Age	***Game***	10.46±1.81	0.077
	Control	9.85±2.08	
Height	***Game***	145.93±8.17	0.354
	Control	144.25±1.50	
Weight	***Game***	41.13±8.39	0.861
	Control	42.12±4.13	
BMI	***Game***	19.66±4.55	0.554
	Control	19.36±3.44	

The results of the Shapiro-Wilk test indicated that all the research data were normally distributed. The findings showed that the implementation of the six-week exercise program led to improvements in postural control (P=0.001) and motor performance (P=0.001) of the participants in the game group compared to the control group.

Table 3. The Independent Samples t-Test results

Variable	*Group*	*Post-test*	*t*	*P-value*
Postural control	*Game*	4.50±0.32	5.88	0.001*
	Control	2.84±0.87		
Motor Performance	*Game*	5.13±0.89+	-4.23	0.001*
	Control	6.76±0.88+		

* Indicating a significant change from pre-test to post-test

+ Mean and standard deviations scores of TUG test in seconds

5. Discussion and Conclusion

The findings of this study support previous research indicating the positive effects of game-based interventions on motor performance and postural control in children with intellectual disabilities. Specifically, the results demonstrate that structured, game-based activities can significantly improve static balance and motor performance in children with mild intellectual disabilities. These improvements align with the benefits identified in earlier studies that emphasized the importance of early intervention in developing fundamental motor skills (Chadwell et al., 2020). The role of game in enhancing cognitive and physical outcomes in children with disabilities is well-documented (Kokol et al., 2020; Sofo et al., 2021), and our study provides further evidence of its effectiveness in improving motor performance and balance. Children with intellectual disabilities often face significant challenges in the acquisition of motor skills, which are critical for their participation in daily activities, physical education, and social engagement. Improving motor skills

and balance not only enhances their physical abilities but also has far-reaching implications for their cognitive and social development (Lau et al., 2020; Page et al., 2017). Game, especially structured and goal-oriented play, has long been recognized as a powerful pedagogical tool for children with disabilities (Kesumawati et al., 2018). By incorporating games that require balance and coordination into a game-based framework, these interventions can make the learning process more enjoyable and less stressful, leading to better participation and engagement (Zourmand et al., 2024). Several studies have highlighted the role of rhythmic play activities in improving cognitive functions such as attention, memory, and executive functioning—skills that are vital for learning motor tasks (Vazou et al., 2020; Xu et al., 2020). In a study, rhythmic activities incorporated into the game-based program and could have contributed to improvements in attention and memory, which are essential for executing and retaining motor skills (Özkan & Kale, 2023). This suggests that the cognitive benefits of game-based interventions may be as significant as the physical benefits, further supporting their use as an integrated approach to motor and cognitive development in children with intellectual disabilities (Arkhipova & Podshivalova, 2021). Children with mild ID, defined by an IQ score ranging from 50 to 70, exhibit varying levels of motor skills and balance deficits compared to their typically developing peers (Wouters et al., 2020). These deficits are often compounded by challenges in adaptive behaviors, which can lead to difficulties in performing basic motor tasks such as running, jumping, and throwing (Wilson et al., 2020). The importance of improving fundamental motor skills (FMS) in children with ID cannot be overstated (Zhang et al., 2021). Early and sustained interventions targeting these skills can significantly enhance children's physical competence, self-esteem, and willingness to engage in social activities (Wang et al., 2022). By improving balance, coordination, and motor control, children with ID may become more confident in their ability to participate in physical activities and may experience improved social interactions and integration in school and community settings (McKeen, 2013). Concerning this matter, in some studies, it was shown interventions such as Trampoline aimed at enhancing basic motor skills and balance can be effective for children with intellectual disabilities (Giagazoglou et al., 2013; Maiano et al., 2019). Given the importance of balance as a foundational motor skill, these findings suggest that similar interventions may be beneficial in addressing balance deficits in other groups of children with developmental delays or disabilities (Maiano et al., 2019). Additionally, early intervention is crucial for addressing the developmental disparities between children with mild ID and their typically developing peers (Guralnick, 2017). By targeting specific deficits in motor performance and balance through structured game, children can develop the necessary skills to participate more fully in both physical and social activities. As a result, this study underlines the importance of early, structured interventions for children with mild intellectual disabilities, particularly those based on game. Such interventions not only improve motor performance and balance but also contribute to overall physical, cognitive, and social development. Given the positive impact of game-based interventions, they should be integrated into rehabilitation and educational programs for children with intellectual disabilities to support their development and improve their quality of life.

Limitations and Future Directions

Future research must address several limitations, despite the valuable insights this study provides into the effectiveness of game-based interventions for children with mild intellectual disabilities. Firstly, the sample size of this study was relatively small, which may limit the generalizability of the findings. Future studies should include larger and more diverse populations, including children from different socio-economic backgrounds, to better understand the broader applicability of game-based interventions. Additionally, while this study focused specifically on girls, it would be valuable to investigate whether the effects

of game-based interventions differ based on gender. Secondly, this study limited the intervention duration to six weeks and measured the improvements immediately after the program. Future studies should assess the long-term effects of game-based interventions on motor function and postural control. It is possible that improvements may diminish over time if not sustained through follow-up interventions or practice. Finally, although this study focused on a specific group of children with mild intellectual disabilities, it is crucial to consider how these interventions might apply to children with other forms or severities of intellectual disability. While the results of this study are promising for children with educational intellectual disabilities, it would be valuable to explore whether similar interventions could be effective for children with more severe intellectual disabilities or for those with other developmental delays, such as those associated with autism spectrum disorders.

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References

1. 1. Aminikhah, B., & Daneshmandi, H. (2024). The effect of six weeks corrective virtual game on balance and orientation in children with autism: A Randomized Controlled Study. Journal for Research in Sport Rehabilitation, 11(22), 47-59. https://doi.org/10.22084/rsr.2024.28293.1707
2. Arkhipova, S., & Podshivalova, M. (2021). Development of Psychomotor Functions in Preschool Children with Intellectual Disabilities through the Means of Correctional Eurhythmics. Journal of Educational Psychology-Propositos y Representaciones, 9.
3. Chadwell, M. R., Roberts, A. M., & Daro, A. M. (2020). Ready to teach all children? Unpacking early childhood educators' feelings of preparedness for working with children with disabilities. Early Education and Development, 31(1), 100-112.
4. Daneshjoo, A., Mousavi Sadati, S. K., & Pourahmad, F. (2021). Effect of Corrective Exercise vs Corrective Games on Upper Crossed Syndrome in Female Students. Physical Treatments-Specific Physical Therapy Journal, 11(1), 13-24.
5. Dobell, A., Pringle, A., Faghy, M. A., & Roscoe, C. M. (2020). Fundamental movement skills and accelerometer-measured physical activity levels during early childhood: A systematic review. Children, 7(11), 224.
6. Ebrahimi, E., Mozafari, S., & Zolghadr, H. Effects of corrective games on the improvement of musculoskeletal abnormalities; A systematic review. Journal of Guilan University of Medical Sciences, 0-0.
7. Ehrman, J. K., Gordon, P. M., Visich, P. S., & Keteyian, S. J. (2023). Clinical exercise physiology: exercise management for chronic diseases and special populations. Human Kinetics.
8. Giagazoglou, P., Kokaridas, D., Sidiropoulou, M., Patsiaouras, A., Karra, C., & Neofotistou, K. (2013). Effects of a trampoline exercise intervention on motor performance and balance ability of children with intellectual disabilities. Research in developmental disabilities, 34(9), 2701-2707.
9. Glencross, S., Mason, J., Katsikitis, M., & Greenwood, K. M. (2021). Internet use by people with intellectual disability: Exploring digital inequality—A systematic review. Cyberpsychology, Behavior, and Social Networking, 24(8), 503-520.
10. Guralnick, M. J. (2017). Early intervention for children with intellectual disabilities: An update. Journal of Applied Research in Intellectual Disabilities, 30(2), 211-229.
11. Hickey, E., & Cotts, K. G. (2024). Intellectual disability. Care of Adults with Chronic Childhood Conditions: A Practical Guide, 481-505.
12. Hrysomallis, C., & Goodman, C. (2001). A review of resistance exercise and posture realignment. The Journal of Strength & Conditioning Research, 15(3), 385-390.

13. Javan, A. T., Framarzi, S., Abedi, A., & Nattaj, F. H. (2014). Effectiveness of rhythmic play on the attention and memory functioning in children with mild intellectual disability (MID). International Letters of social and humanistic sciences, 6, 9-21.
14. Jefferson-Buchanan, R. (2022). Teaching fundamental movement skills through play-based pedagogy. Journal of Physical Education, Recreation & Dance, 93(8), 28-33.
15. Kesumawati, S. A., Rahayu, T., & Rahayu, S. (2018). Game model to increase fundamental movement skills in children with mild intellectual disability. International Conference on Science and Education and Technology 2018 (ISET 2018),
16. Kokol, P., Vošner, H. B., Završnik, J., Vermeulen, J., Shohieb, S., & Peinemann, F. (2020). Serious game-based intervention for children with developmental disabilities. Current pediatric reviews, 16(1), 26-32.
17. Lahtinen, U., Rintala, P., & Malin, A. (2007). Physical performance of individuals with intellectual disability: a 30 year follow up. Adapt Phys Activ Q, 24(2), 125-143. https://doi.org/10.1123/apaq.24.2.125
18. Lau, P. W. C., Wang, G., & Wang, J. J. (2020). Effectiveness of active video game usage on body composition, physical activity level and motor proficiency in children with intellectual disability. Journal of Applied Research in Intellectual Disabilities, 33(6), 1465-1477.
19. Luckasson, R., Borthwick-Duffy, S., Buntinx, W. H., Coulter, D. L., Craig, E. M. P., Reeve, A., Schalock, R. L., Snell, M. E., Spitalnik, D. M., & Spreat, S. (2002). Mental retardation: Definition, classification, and systems of supports. American Association on Mental Retardation.
20. Maiano, C., Hue, O., Morin, A. J., Lepage, G., Tracey, D., & Moullec, G. (2019). Exercise interventions to improve balance for young people with intellectual disabilities: a systematic review and meta‐analysis. Developmental Medicine & Child Neurology, 61(4), 406-418.
21. McConaughy, E. K., & Salzberg, C. L. (1988). Physical fitness of mentally retarded individuals. In International Review of Research in mental retardation (Vol. 15, pp. 227-258). Elsevier.
22. McKeen, P. (2013). The impact of motor skill training on balance, hand-eye coordination and reaction in a group of adults with autism and an intellectual disability.
23. Moore, G., Durstine, J. L., Painter, P., & Medicine, A. C. o. S. (2016). Acsm's exercise management for persons with chronic diseases and disabilities, 4E. Human Kinetics.
24. Nair, M. S., Kulkarni, V. N., & Shyam, A. K. (2022). Combined effect of virtual reality training (VRT) and conventional therapy on sitting balance in patients with spinal cord injury (SCI): Randomized Control Trial. Neurology India, 70(Suppl 2), S245-S250.
25. Özkan, Z., & Kale, R. (2023). Investigation of the effects of physical education activities on motor skills and quality of life in children with intellectual disability. International Journal of Developmental Disabilities, 69(4), 578-592.
26. Page, Z. E., Barrington, S., Edwards, J., & Barnett, L. M. (2017). Do active video games benefit the motor skill development of non-typically developing children and adolescents: A systematic review. Journal of Science and Medicine in Sport, 20(12), 1087-1100.
27. Rasyid, W., Bakhtiar, S., Komaini, A., Andika, H., & Zakaria, J. B. (2024). The Influence of Play and Conventional Approaches on the Basic Movements of Children Aged 9-10 Years. International Journal of Human Movement and Sports Sciences, 12(1), 44-49.
28. Salb, J., Finlayson, J., Almutaseb, S., Scharfenberg, B., Becker, C., Sieber, C., & Freiberger, E. (2015). Test–retest reliability and agreement of physical fall risk assessment tools in adults with intellectual disabilities. Journal of Intellectual Disability Research, 59(12), 1121-1129. https://doi.org/https://doi.org/10.1111/jir.12216
29. Sedaghati, P., Daneshmandi, H., & Zolghadr, H. (2022). The effect of motor interventions on improving the balance of the intellectual disability: a review of literature. The Scientific Journal of Rehabilitation Medicine, 11(4), 488-503.
30. Sofo, S., Ramos, A., Thompson, E., Krebs, C. E., & Bard, S. M. (2021). Preservice Teachers' Experiences and Conceptions of Appropriate and Inappropriate Instructional Practices in Elementary Physical Education. International Journal of Social Sciences & Educational Studies, 8(3), 166-128.

31. Vazou, S., Klesel, B., Lakes, K. D., & Smiley, A. (2020). Rhythmic physical activity intervention: exploring feasibility and effectiveness in improving motor and executive function skills in children. Frontiers in psychology, 11, 556249.
32. Wang, T., Qian, Y., Zhong, T., & Qi, J. (2022). Associations between fundamental movement skills and moderate-to-vigorous intensity physical activity among Chinese children and adolescents with intellectual disability. International Journal of Environmental Research and Public Health, 19(20), 13057.
33. Wilson, P., Ruddock, S., Rahimi‐Golkhandan, S., Piek, J., Sugden, D., Green, D., & Steenbergen, B. (2020). Cognitive and motor function in developmental coordination disorder. Developmental Medicine & Child Neurology, 62(11), 1317-1323.
34. Wouters, M., Evenhuis, H. M., & Hilgenkamp, T. I. (2020). Physical fitness of children and adolescents with moderate to severe intellectual disabilities. Disability and Rehabilitation, 42(18), 2542-2552.
35. Xu, C., Yao, M., Kang, M., & Duan, G. (2020). Improving physical fitness of children with intellectual and developmental disabilities through an adapted rhythmic gymnastics program in China. BioMed research international, 2020(1), 2345607.
36. Yalfani, A., Bak, S., & Asgarpoor, A. (2023). The Effect of Eight Weeks of Selected Corrective Games on the Balance, Proprioception, and Changes in the Arch of the Foot in Adolescent Girls With Pronation Distortion Syndrome [Research]. Physical Treatments - Specific Physical Therapy, 13(2), 113-126. https://doi.org/10.32598/ptj.13.2.559.1
37. Zhang, L., Zhu, X., Haegele, J. A., Wang, D., & Wu, X. (2021). Effects of a one-year physical activity intervention on fundamental movement skills of boys with severe intellectual disabilities. Research in developmental disabilities, 114, 103980.
38. Zourmand, G., Pavlović, R., & Taheri, M. (2024). The Effect of School games on Motor skills Development in Children with Autism. Annals of Applied Sport Science, 12, 0-0.