

Comparison of the Effectiveness of Brain Gym and Educational Games on the Improvement of Social Skills in 8-10 Year-Old Students

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ABSTRACT

Objective: The present study aimed to compare the effectiveness of Brain Gym and educational games on improving the social skills of 8-10 year-old students with a two-month follow-up study.

Methods and Materials: The present study was a quasi-experimental research with a pre-test, post-test, and two-month follow-up design, including a control group and two experimental groups. The research population consisted of all 8-10 year-old female students in Ahvaz, among whom 120 were selected as the research sample. Nine students were excluded from the study due to irregular attendance at the educational sessions. In this study, the Matson Social Skills Questionnaire was used to assess social skills at three time points: before the intervention, after the intervention, and during the two-month follow-up. The Brain Gym group underwent 20 sessions, with sessions held twice a week for 20 minutes each. The educational games group participated in an 8-week program, with sessions held twice a week for 30-45 minutes each. The control group did not receive any intervention.

Findings: The results of the Bonferroni post-hoc test showed no significant difference between the effects of Brain Gym and educational games on improving the social skills of 8-10 year-old students ($p > 0.05$). However, there was a significant difference between the post-test scores and the pre-test scores for each intervention ($p < 0.01$).

Conclusion: Overall, the results of this study indicate that interventions involving Brain Gym and educational games can be beneficial methods for improving the social skills of elementary school students.

Keywords: Brain Gym, educational games, social skills, students.

1. Introduction

In the world of creation and the universe, all beings are in motion and evolving. However, unlike other creatures, humans must strive for both physical and psychological development, as the body and mind influence each other. The body not only carries the mind but can also be a means to strengthen it (Andi et al., 2019). Childhood is one of the most sensitive and crucial periods for personality development, playing an essential role in learning various skills throughout other stages of life (Domitrovich et al., 2017). According to UNICEF reports, the level of stress and anxiety among children in schools in third-world countries is one and a half times higher than in developed countries. Steiner attributes such crises to the lack of emotional-social skills development and the instability of emotions in children, which serves as a significant barrier to the development of social perception (Factor et al., 2021). Social skills are a set of learned acceptable behaviors that enable individuals to interact effectively with others and avoid inappropriate social reactions (Hu et al., 2021). The primary goal during elementary school is to nurture children's talents, referring to the potential abilities of students (Kulkarni & Khandale, 2019).

Social skills are effective methods for achieving positive outcomes from interactions with others (Masten et al., 2010). Previous research has shown that children's ability to interact positively and adequately with others from an early age is a key factor in positive adjustment (Baniasadi, 2024; Scharfstein et al., 2011). Interestingly, social skills in early childhood are associated with school adjustment during childhood and adolescence, as well as work competence in adulthood, and they play a role in these areas (Witzel & Mize, 2018). Focusing on social skills to improve children's academic performance has been successful (Domitrovich et al., 2017). One of the characteristics influenced by physical activity is the improvement of social skills (Sajedi & Barati, 2014).

Modern sports are not just simple activities; they enhance the brain's complex abilities in various areas, including learning, coordination, agility, proper functioning, and decision-making (Kulkarni & Khandale, 2019). Brain Gym is a set of movements aimed at connecting the body and mind, stimulating the use of both hemispheres of the brain through physical and mental strategies, and improving and enhancing cognitive functions for learning. It is part of kinesiology and results from applied neuroscience research that studies body movements and their connection to brain function. It also allows for the stimulation and activation of an individual's cognitive processes (Dennison, 2010). The

Brain Gym program is implemented through the PACE process, which stands for Positive, Active, Clear, and Energetic, four essential characteristics that prepare students for integrated brain learning. The selected exercises are fundamentally used to maintain balance in daily life while observing rhythm and timing (Grosse, 2013; Kumari et al., 2024). The benefits of Brain Gym include reducing emotional stress, enhancing mental clarity, improving relationships, and creating a learning and working environment filled with calmness and joy. These improvements in language skills and memory, due to reduced stress and enhanced learning and work performance, make individuals more enthusiastic, creative, and efficient, leading to a greater sense of well-being (Ningrum et al., 2018). These simple movements often result in significant improvements in areas such as attention, memory, physical coordination, responsibility, attitude, and academics, including reading, writing, and mathematics (Grosse, 2013).

One of the enjoyable and constructive activities for everyone, especially for children and adolescents, is play. Through play, children, accompanied by excitement, practice life in the future world. Games are considered a powerful scientific and cultural expression that provides a platform for group cooperation, collaboration, and skill development (Najdi & Sheikh, 2012). During play, characteristics such as precision, memory, imagery, orderliness, agility, and skill, among others, develop and flourish in children (Effendy et al., 2019). In recent years, innovative educational games have been used to achieve more effective learning at higher levels (Domitrovich et al., 2017). Educational games can be utilized by teachers as a useful and efficient medium in both formal and informal settings. The ultimate goal of these games is not merely entertainment or filling leisure time; rather, these games, while creating enjoyable and exhilarating moments for participants, provide experiences close to first-hand experiences, leading to faster and more lasting learning. Play influences physical, emotional, mental, educational, moral, personality, and social development and also has diagnostic and therapeutic value (Witzel & Mize, 2018). Educational games enhance individuals' mental flexibility, which increases adaptability to different situations and fosters a desire for progress and positive changes in thinking (Battistella & Wangenheim, 2016).

Students are among the most sensitive segments of society, and many of them will be future managers and planners. The mental health of society depends on their psychological well-being (Andi et al., 2019). A lack of social

skills can hinder the ability to establish and maintain satisfying relationships with friends, and a lack of close relationships is associated with low self-esteem. Individuals advance by learning from their environment, leading to better life experiences, and the formal process of learning and education begins in elementary school, where students seriously enter the realm of learning and utilizing their brain's talents and capabilities (Baniyadi, 2024; Karna & Stefaniuk, 2024; Masten et al., 2010). Given that Brain Gym is simple and can be performed alongside classes with easy and entertaining movements, and that these exercises are fundamentally used to maintain balance in daily life while observing rhythm and timing, and considering that educational games in presenting the aspects of fun and entertainment in learning create a positive trend toward learning, fostering cooperative learning, developing leadership skills, respecting others' opinions, and encouraging cooperation, while also promoting a positive attitude toward learning, reducing tension related to traditional learning, deepening the understanding of learned topics, and transferring the effects of learning to other subjects. Considering the complexity of social relationships in today's societies and the transition from traditional to modern life, which highlights the necessity of socialization, the need to address children's social characteristics and related factors is increasingly felt. Therefore, given these issues, the present study aims to compare the effectiveness of Brain Gym and educational games on improving students' social skills with a follow-up period.

2. Methods and Materials

2.1. Study Design and Participants

The present research is a quasi-experimental study using a pre-test-post-test design with a two-month follow-up. Participants were divided into three groups: Brain Gym, educational games, and a control group to compare the effects of Brain Gym and educational games relative to the control group.

The research population included all 8-10-year-old female students in Ahvaz during the 2022-2023 academic year who were selected based on inclusion criteria. A multi-stage cluster random sampling method was used among the available samples. For sampling, participants were selected from elementary schools for girls in Ahvaz, and in the next stage, from their classes. After reviewing the conditions, 120 students who were physically and mentally healthy were selected and included in the study, which was conducted

through reviewing students' health records and consulting with school counselors. Nine students were excluded from continuing the exercises due to irregular attendance in educational sessions. Children were randomly assigned to the experimental and control groups. After reviewing and evaluating the inclusion criteria and obtaining parental consent, participants were assigned to one of three groups: Brain Gym (38 participants), educational games (38 participants), and control (38 participants).

The research was conducted as follows: participants were informed that this study was designed to compare the effectiveness of Brain Gym and educational games on improving their social skills. Additionally, the selection of participants for participation or non-participation in any phase and at any stage of the study was entirely voluntary, and they could choose not to attend further sessions if they were unwilling to participate. After the orientation session, written informed consent was obtained from the parents. The participants in the intervention groups then received the assigned intervention, and they were asked to complete the questionnaire. The groups were assessed before and after exposure to the independent variables and again, for follow-up purposes and to examine the persistence of the effects of the Brain Gym and educational games interventions, they were reassessed after a period without training. The results of the pre-test, post-test, and follow-up were compared.

2.2. Measures

2.2.1. Social Skills

To measure social skills, the Matson Social Skills Questionnaire, consisting of 56 questions designed to assess social skills, was used. This scale includes various dimensions (appropriate social skills, non-social behaviors, aggression and impulsive behaviors, superiority, overconfidence, peer relationships). This questionnaire is based on the Likert scale (never = 1 point, rarely = 2 points, sometimes = 3 points, often = 4 points, always = 5 points) (Masten et al., 2010).

2.3. Intervention

2.3.1. Brain Gym

The implementation of Brain Gym in the experimental group was conducted as follows: before the intervention, participants were given a complete explanation of the correct execution of the selected Brain Gym skills. The number of Brain Gym sessions for the experimental group was 20

sessions, based on research precedent, and these sessions were held twice a week on Saturdays and Tuesdays. Some movements, such as the brain button movement and the groin stretch, had to be performed with both sides of the body. In all 20 sessions, the selected movements were repeated and modeled by the experimenter, with participants following along. In the first session, the experimenter stood in front of the child, explained how to perform one of the Brain Gym movements, and asked the child to imitate the movements. This process continued until all the movements described in the table below were completed, after which the session ended. The face validity of these exercises was confirmed by faculty members from Razi University and Shahid Rajaee University. Before the main exercises, "preparatory" movements were performed to warm up and prepare the participants. These movements served as a prelude to the main exercises. The first four movements in the attached figure are the preparatory movements, while the remaining movements are the selected main exercises.

Session 1: Hydration and Brain Buttons Movement

Participants are instructed to drink enough water before beginning the exercises to ensure proper hydration. This is followed by the Brain Buttons movement, where participants place one hand on their navel and use the other hand to rub the area just below the collarbone, on the left and right sides of the sternum. While performing this movement, they are encouraged to visualize drawing a figure-eight pattern on the ceiling with an imaginary brush attached to their nose, or to follow a vertical line connecting the wall to the ceiling with their eyes.

Session 2: Cross Crawl and Hook-Ups

In this session, participants practice the Cross Crawl exercise. They stand and alternately bring their right elbow towards their left knee and then switch, bringing the left elbow towards the right knee. This movement is repeated several times. Next, participants perform the Hook-Ups, where they cross their left foot over their right foot, clasp their hands in front of them with fingers interlocked, and pull their hands inward towards their chest. This position is held for 1 to 2 minutes.

Session 3: Groin Stretch and Balance Buttons

Participants perform the Groin Stretch by standing with their legs apart, keeping the right foot pointed to the side and the left foot facing forward. They bend the right knee while exhaling and straighten it while inhaling. This is followed by the Balance Buttons exercise, where participants use two fingers of one hand to touch the hollow behind one ear while placing the other hand on their navel, breathing deeply to

allow energy to flow upwards. The exercise is repeated on the opposite side after one minute.

Session 4: Earth Buttons and Positive Points

The Earth Buttons exercise involves participants placing two fingers under their lower lip and the palm of the other hand below their navel, breathing deeply to direct energy to the body's center. This is followed by the Positive Points exercise, where participants gently press the area above their eyebrows, between the hairline and the eyebrows, applying enough pressure to stimulate the points.

Session 5: Space Buttons and Lazy Eights

In this session, participants place two fingers above their upper lip, just under the nose, and the palm of their other hand on the sacrum (lower back). They hold this position for one minute while breathing deeply to encourage energy flow along the spine. This is followed by the Lazy Eights exercise, where participants draw a horizontal figure-eight (∞) three times with each hand and then with both hands together.

Session 6: The Owl and Active Arm

Participants perform the Owl exercise by grasping their opposite shoulder with one hand and turning their head towards that shoulder while applying firm pressure to the shoulder muscles. They take a deep breath, lower their chin towards their chest, and allow their muscles to relax before repeating on the other side. Next, participants perform the Active Arm exercise by raising one arm beside their ear and slowly massaging the arm's muscles with the other hand while taking deep breaths.

Session 7: Foot Flex and Calf Stretch

The Foot Flex exercise involves crossing one foot over the other and gently pressing and massaging the sensitive points around the ankle, calf, and behind the knee. This is repeated on the other leg. In the Calf Stretch exercise, participants lean forward while exhaling and press one heel gently into the ground. They then lift the knee while inhaling and stretch the calf muscles, repeating this movement three times on each leg.

Session 8: Energy Yawn and Thinking Cap

Participants are guided through the Energy Yawn, where they simulate a yawn, placing their fingertips on tense spots along their jaw. They are encouraged to take a deep, relaxing, and audible yawn while gently massaging the jaw to release tension. Following this, they perform the Thinking Cap exercise, where they gently massage the edges of their ears from top to bottom three times, avoiding this exercise if pregnant or suffering from low blood pressure.

Session 9: Elephant Trunk Movement

The final session introduces the Elephant Trunk movement, where participants bend their knees, bring their head close to one shoulder, and draw a large horizontal figure-eight in the air with their hand, moving their upper torso from the ribs. The movement is tracked by following the path of the fingertips and is repeated with the opposite hand.

2.3.2. Educational Games

The implementation of educational games was as follows: after the pre-test, the experimental group engaged in 8 weeks of two 35-45 minute sessions per week on Sundays and Wednesdays, focusing on one game. The independent variable included games such as 1) "Give me your hand," 2) "Complete the picture," 3) "Playing house," 4) "Drawing with closed eyes," 5) "Thank you," 6) "Two wrists, one wrist," 7) "Clay play," 8) "Finding objects," 9) "Finding geometric shapes."

Table 1

Repeated Measures ANOVA for Social Skills Subscales in the Brain Gym Group

Variable	Group	Sum of Squares	Df	Mean Square	F	Sig	Effect Size
Social Skills	Control	37.423	2	18.712	0.721	0.490	0.020
	Brain Gym	441.964	2	220.982	6.200	0.003	0.147

The results of the Bonferroni post-hoc test for pairwise comparisons indicated a significant difference between the pre-test and post-test in the Brain Gym group, but no significant differences were observed between the pre-test and follow-up, or between the post-test and follow-up. In the control group, no significant differences were observed across the different stages. Based on these results, it can be

Table 2

Pairwise Comparisons in Different Measurement Stages Using Bonferroni Test in Control and Brain Gym Groups

Variable	Group	Stage (I)	Stage (J)	Mean Difference	SD	Sig
Appropriate Social Skills	Control	Pre-test	Post-test	0.081	0.518	1.000
		Follow-up		0.649	0.70	0.529
		Post-test	Follow-up	0.568	0.554	0.938
	Brain Gym	Pre-test	Post-test	-1.351	0.673	0.156
		Follow-up		-0.865	0.416	0.134
		Post-test	Follow-up	0.486	0.493	0.990
Non-Social Behaviors	Control	Pre-test	Post-test	0.162	0.402	1.000
		Follow-up		-0.297	0.790	1.000
		Post-test	Follow-up	-0.459	0.764	1.000
	Brain Gym	Pre-test	Post-test	-1.081	0.457	0.071
		Follow-up		-0.784	0.470	0.312
		Post-test	Follow-up	0.297	0.401	1.000
Aggression and Impulsive	Control	Pre-test	Post-test	0.000	0.677	1.000

2.4. Data analysis

For data analysis, the Shapiro-Wilk test, ANOVA, Tukey's post-hoc test, and one-way repeated measures ANOVA were used. The significance level for all calculations was set at $p < 0.05$. The calculations were performed using SPSS software version 25.

3. Findings and Results

In this study, the Shapiro-Wilk test was used to examine the assumption of normality for the distribution of data. The Shapiro-Wilk values for the components and the overall concentration score for each group were assessed at three stages: pre-test, post-test, and follow-up. To examine the assumption of homogeneity of variance in the error components and overall concentration score among the groups, Levene's test was used. The sphericity assumption, or the equality of the error covariance matrix, was evaluated and confirmed using Mauchly's test.

concluded that a course of Brain Gym was effective in improving the social skills of students. Additionally, the social skills subscales were individually examined. The Bonferroni post-hoc test results further confirmed that there were no significant differences between any stages in the control group.

Behaviors	Brain Gym	Follow-up		0.297	0.601	1.000
		Post-test	Follow-up	0.297	0.552	1.000
Superiority, Overconfidence	Brain Gym	Pre-test	Post-test	-0.622	0.452	0.539
		Follow-up		-0.892	0.429	0.135
		Post-test	Follow-up	-0.270	0.394	1.000
	Control	Pre-test	Post-test	0.378	0.414	1.000
		Follow-up		0.243	0.341	1.000
		Post-test	Follow-up	-0.135	0.338	1.000
Peer Relationships	Brain Gym	Pre-test	Post-test	-1.027	0.454	0.090
		Follow-up		-0.676	0.327	0.137
		Post-test	Follow-up	0.351	0.275	0.627
	Control	Pre-test	Post-test	0.486	0.471	0.925
		Follow-up		0.811	0.312	0.060
		Post-test	Follow-up	0.324	0.410	1.000
Brain Gym	Pre-test	Post-test	-1.000	0.260	0.001	
	Follow-up		-0.703	0.297	0.071	
	Post-test	Follow-up	0.297	0.274	0.853	

The results of repeated measures ANOVA showed that educational games led to a significant improvement in

students' social skills, while no significant difference was observed in the control group (Table 3).

Table 3

Repeated Measures ANOVA for Social Skills Subscales in the Educational Games Group

Variable	Group	Sum of Squares	Df	Mean Square	F	Sig	Effect Size
Social Skills	Control	37.423	2	18.712	0.721	0.490	0.020
	Educational Games	5164.703	2	2582.351	105.245	0.001	0.745

Pairwise comparisons using the Bonferroni test for differences across the pre-test, post-test, and follow-up stages in the control and educational games groups are shown in Table 4. The results indicated that in the educational games group, there were significant differences between the pre-test and post-test, pre-test and follow-up,

and post-test and follow-up. However, no significant differences were observed across the stages in the control group. Based on these results, it can be concluded that a course of educational games effectively improved students' social skills. Additionally, the social skills subscales were individually examined.

Table 4

Pairwise Comparisons in Different Measurement Stages Using Bonferroni Test in Control and Educational Games Groups

Variable	Group	Stage (I)	Stage (J)	Mean Difference	SD	Sig
Social Skills	Control	Pre-test	Post-test	0.892	1.035	1.000
		Follow-up		1.405	1.150	0.698
		Post-test	Follow-up	0.514	1.348	1.000
	Educational Games	Pre-test	Post-test	-16.216	1.434	0.001
		Follow-up		-11.595	1.005	0.001
		Post-test	Follow-up	4.622	0.956	0.001

The results of the ANCOVA showed that there was a significant difference between the groups at the follow-up

stage, but no significant difference was observed in the post-test (Table 5).

Table 5

ANCOVA for Social Skills in Pre-test and Follow-up Stages

Variable	Stage	Sum of Squares	Df	Mean Square	F	Sig	Effect Size
Social Skills	Post-test	2638.432	2	1319.216	2.762	0.068	0.049
	Follow-up	4281.099	2	2140.550	4.015	0.021	0.069

To determine the source of the difference in the follow-up stage between the groups, the Bonferroni post-hoc test was used (Table 6). As shown in Table 8, the comparison between groups at the follow-up stage revealed a significant

difference only between the control group and the educational games group, while no significant difference was observed between the Brain Gym and educational games groups.

Table 6

Pairwise Comparisons in the Follow-up Stage Using Bonferroni Test

Group	Brain Gym	Educational Games
Control	0.132	0.023
Brain Gym	---	1.000

4. Discussion and Conclusion

Our findings indicated that a course of Brain Gym could improve children's social skills. The study results showed that educational games had a positive impact on the social skills of the participants. These findings are consistent with other studies in this field (Kulkarni & Khandale, 2019; Masten et al., 2010; Ningrum et al., 2018). Brain Gym, a form of educational kinesiology, can reduce behavioral problems while enhancing self-control and successful performance, particularly in children with learning disabilities (Grosse, 2013; Kumari et al., 2024). Moreover, Brain Gym, as a type of perceptual-motor exercise, can enhance motor, cognitive, and social skills. By relying on perceptual-motor education approaches, individuals can improve their performance by integrating more information from visual and motor sources (Sajedi & Barati, 2014). Additionally, Brain Gym helps in guiding and counseling to ensure that the left and right brain hemispheres function optimally, leading to improvements in emotional intelligence, logic, and socialization (Scharfstein et al., 2011). However, unlike our study, some studies in this area did not demonstrate the benefits of Brain Gym. Originally designed for children, especially those with cognitive impairments, these reasons could explain the inconsistencies between positive results and those from other studies. In our study, the comparison was made between the Brain Gym group and a control group that did not engage in any physical activity, whereas Hu et al. (2021) compared the Brain Gym group with a standard exercise group. If they had included a

control group that did not participate in any intervention, they might have observed the positive effects of Brain Gym (Hu et al., 2021). Based on developmental theories regarding the role of movement and motor activities in integrated human development, it seems that the proper use of motor programs tailored to the structural and psychological characteristics of humans, especially during childhood, can prepare individuals for life in a social environment while ensuring physical and mental health (Effendy et al., 2019). Among these motor activities for children, Brain Gym movements balance brain activity and impact children's development, facilitating learning and leading to social growth and improved communication skills (Kulkarni & Khandale, 2019). These exercises can enhance motor, cognitive, and social skills and facilitate social development. Overall, participation in any form of physical activity can facilitate social growth in children. By engaging in Brain Gym, children can improve social skills, peer relationships, non-social behaviors, and superiority, leading to constructive responses to others' behaviors. As a result, Brain Gym can provide a foundation for children's socialization and reduce their stress and anxiety (Ningrum et al., 2018). Social development is influenced by various factors, including family, school, peer groups, television, gender, race, socio-economic status, and motor activities, which may either accelerate or slow down social development (Andi et al., 2019). Teachers should carefully select games to match the student's awareness level and skills while aligning them with the subject matter because students gain confidence when they acquire the necessary

skills. This, in turn, can contribute to improving social skills (Masten et al., 2010). Appropriately designed games and motor programs aligned with human structural and psychological characteristics, especially during childhood and adolescence, can prepare individuals for life in a social environment while ensuring physical and mental health (Hu et al., 2021). Given the discussion above, it can be concluded that well-designed educational games can achieve various educational objectives and improve social relations among elementary school students. Elementary school teachers can utilize games and programs to achieve positive outcomes, filling leisure time purposefully and engaging in activities that foster participation, improved relationships with others, and a sense of responsibility in students. Additionally, they can create a sense of joy and reduce fatigue. For example, role-playing and drawing with closed eyes can help develop interpersonal relationships, socialization, empathy, and self-esteem.

5. Limitations & Suggestions

One limitation of this study is the relatively small sample size, which may affect the generalizability of the findings. Additionally, the study was conducted within a specific cultural and educational context, which might limit the applicability of the results to different settings. Another limitation is the reliance on self-reported measures for assessing social skills, which may introduce bias due to social desirability or inaccurate self-assessment. The lack of a long-term follow-up to assess the persistence of the observed effects is also a limitation that could be addressed in future research.

Future research should consider using larger and more diverse samples to enhance the generalizability of the findings across different populations and contexts. Longitudinal studies are recommended to evaluate the long-term effects of Brain Gym and educational games on social skills development. Additionally, future studies could incorporate objective measures, such as behavioral observations or peer assessments, to complement self-reported data and provide a more comprehensive evaluation of social skills. Investigating the impact of these interventions on different age groups or in various educational settings could also yield valuable insights.

The findings of this study suggest that incorporating Brain Gym and educational games into the school curriculum could be an effective strategy for enhancing social skills in children. Educators and school counselors

should consider integrating these activities into daily routines to promote social development and improve students' emotional well-being. Additionally, training teachers in the proper implementation of these interventions could maximize their effectiveness and ensure that students benefit fully from these approaches. Schools could also collaborate with parents to reinforce these practices at home, creating a supportive environment for children's social and emotional growth.

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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed in this article.

References

- Andi, P., Dharma, K. K., Purwanto, E., Firdaus, R., & Loriana, R. (2019). The intervention of Brain Gym in increasing the quality of life on The elderly. *Asian Community Health Nursing Research*, 1(1), 30-35. <https://doi.org/10.29253/achnr.2019.12812>
- Baniasadi, T. (2024). The Effects of a School-based Intervention on the Social and Adaptive Skills among Children with ADHD. *Iranian Journal of Neurodevelopmental Disorders*, 3(1), 1-9. <https://maherpub.com/jndd/article/view/45>
- Battistella, P., & Wangenheim, C. G. (2016). Games for Teaching Computing in Higher Education - A Systematic Review. *IEEE*

- Technology and Engineering Education (ITEE) Journal*, 9(1), 8-30. http://www.gqs.ufsc.br/files/2020/02/ITEE-Games-for-Teaching-Computing-in-Higher-Education_Vdraft.pdf
- Dennison, P. (2010). *Brain Gym Teacher's Edition The Companion Guide to Brain Gym: Simple Activities for Whole-Brain Learning*. Edu-Kinesthetics, Inc. <https://www.amazon.com/Brain-Gym-Teachers-Paul-Dennison/dp/0942143027>
- Domitrovich, C. E., Durlak, J. A., Staley, K. C., & Weissberg, R. P. (2017). Social emotional competence: An essential factor for promoting positive adjustment and reducing risk in school children. *Child development*, 88(2), 408-416. <https://doi.org/10.1111/cdev.12739>
- Effendy, E., Prasanty, N., & Utami, N. (2019). The effects of brain gym on quality of sleep, anxiety in elderly at nursing home care case Medan. *Open Access Macedonian Journal of Medical Sciences*, 7, 2595-2598. <https://doi.org/10.3889/oamjms.2019.397>
- Factor, R., Rea, H., Dahiya, A., & Albright, J. (2021). An Initial Pilot Study Examining Child Social Skills, Caregiver Styles, and Family Functioning in the PEERS for Program for Young Autistic Children and their Caregivers. *Research in Developmental Disabilities*, 121(2), 41-52. <https://doi.org/10.1016/j.ridd.2021.104152>
- Grosse, S. J. (2013). Brain gym in the pool. *International Journal of Aquatic Research and Education*, 7(1), 72-80. <https://doi.org/10.25035/ijare.07.01.07>
- Hu, B. Y., Li, Y., Wang, C., Wu, H., & Vitiello, G. (2021). Preschool teachers' self-efficacy, classroom process quality, and children's social skills: For kindergarten and first grade students at risk for emotional and behavioral disorders. *Journal of School Psychology*, 86, 78-99. https://www.researchgate.net/publication/348169895_Preschool_teachers'_self-efficacy_classroom_process_quality_and_children's_social_skills_A_multilevel_mediation_analysis
- Karna, W., & Stefaniuk, I. (2024). The Influence of Peer Relationships on the Social Development of Children with Autism Spectrum Disorder. *Iranian Journal of Neurodevelopmental Disorders*, 2(4), 10-18. <https://doi.org/10.61838/kman.jnidd.2.4.2>
- Kulkarni, C., & Khandale, S. R. (2019). Effect of brain gym exercises on the attention span in young adults. *International Journal for Advance Research and Development*, 4(4), 71-75. <https://www.ijarnd.com/manuscripts/v4i4/V4I4-1159.pdf>
- Kumari, P., Deepa, S., & Vijayalakshmi, B. (2024). Effect of brain gym and web-based cognitive training intervention on visual attention span and working memory in children with dyslexia. *Journal of Research Administration*, 6(1).
- Masten, A. S., Desjardines, C. D., McCormick, C. M., Kuo, S. I., & Long, J. D. (2010). The significance of childhood competence and problems for adult success in work: A developmental cascade analysis. *Development and Psychopathology*, 22(3), 679-694. <https://doi.org/10.1017/S0954579410000362>
- Najdi, S., & Sheikh, R. E. (2012). Educational games: Do they make a difference. *Procedia - Social and Behavioral Sciences*, 47, 48-51. <https://doi.org/10.1016/j.sbspro.2012.06.612>
- Ningrum, A. P., Huda, A., & Praherdhiono, H. (2018). Brain Gym Video Model for Improving the Beginning Writing Abilities of the Autistic Students. *Journal of Icsar*, 2(2), 175-179. <https://doi.org/10.17977/um005v2i22018p175>
- Sajedi, F., & Barati, H. (2014). The effect of perceptual motor training on motor skills of preschool children. *Iranian Rehabilitation Journal*, 12(1), 14-17. <https://www.sid.ir/fa/Journal/ViewPaper.aspx?ID=577788>
- Scharfstein, L. A., Beidel, D., Smis, V. K., & Finnell, L. (2011). Social skills deficits and vocal characteristics of children with social phobia or Asperger disorder: A comparative study. *Journal of abnormal child psychology*, 39, 865-875. <https://doi.org/10.1007/s10802-011-9498-2>
- Witzel, B., & Mize, M. (2018). Meeting the needs of students with dyslexia and dyscalculia. *Journal of State*, 1(27), 31-39. <https://files.eric.ed.gov/fulltext/EJ1166703.pdf>