Rahman Institute of Higher Education

Journal of Modern Psychology

Research Paper: Different Effects of KR vs. KP Feedback on Movement Pattern and Accuracy of a Badminton Serve in Children with Autism

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Citation: Baniasadi, T. (2022). Different Effects of KR vs. KP Feedback on Movement Pattern and Accuracy of a Badminton Serve in Children with Autism. *Journal of Modern Psychology*, *2*(4), 18-27. https://doi.org/10.22034/jmp.2023.406021.1063

https://doi.org/10.22034/JMP.2023.406021.1063

Article info:

Received date:
08 Jul. 2022

Accepted date:
25 Sept. 2022

Keywords:
Autism**:** Children, Feedback, KP, KR

Abstract

The present study was designed to examine the effects of two kind of feedback presentation, namely KR and KP, on movement pattern and accuracy of a Badminton serve in children with autism. We used a causal-comparative method in the current study. Sixty children with autism with an age range of 7 to 12 years from special schools were selected based on a convenience sampling method and were randomly and equally assigned into four groups including KR, KP, KR+KP, and control groups. The motor task in the present study included the badminton serve, in which the movement patter and accuracy were measured as the dependent variable. The children participated in the pretest including 10 services, acquisition phase (5 training blocks, each of which included 10 services), and the retention test with 10 services. Respective feedback was provided before each practice block. We used ANOVA to analyze data. The results showed that both KR and KP feedback improve both the pattern and the accuracy of movement better than the condition without feedback. In addition, KP had better effects on the movement pattern and KR had better effects on the movement accuracy. Finally, children who were in the combination group performed better than all the groups in both execution of the movement pattern and service accuracy. Children with autism benefit from feedback to learn novel motor skills, indicating that they may have the necessary mechanisms to learn new skills through feedback.

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1. Introduction

Learning is the ability to skillfully execute a movement that evolves during practice, such that improved ability leads to improved performance. Therefore, performance improvement is not learning in itself, but rather a sign of learning. Motor learning is a set of processes with practice and experience that lead to relatively stable changes in skillful performance. In other words, motor learning is a set of internal processes that are associated with practice and experience and lead to relatively constant changes in the ability or performing skillful behaviors (Schmidt & Lee, 2011; Saeedpour-Parizi et al. 2020, 2021). Increasing the level of performance in various sports activities has been the focus of many researchers. On the other hand, in order to increase performance and learn skills, there are various techniques and strategies before training. Some of these techniques and strategies are included observing a model (Mohammadi et al. 2022; Hazrati et al. 2022; Hashemi Motlagh et al. 2022; Ghorbani & Bund, 2014, 2016; Ghorbani, Ghanati, Dana, & Salehian, 2020; Mokhtari, Shojaei, & Dana, 2007), enhanced expectancies (Ghorbani, & Bund, 2020), and adopting an external focus of attention (Ghorbani, Dana, & Christodoulides, 2020; Ghorbani, Dana, & Fallah, 2019).

In addition, an important factor that is often used by sport coaches to teach sports skills to novices is to provide the leaners with feedback. Feedback is the information that is generally provided to the learner after each attempt or group of attempts according to the movement pattern, movement outcome, or according to the environment and is considered as one of the most important factors affecting the learning of motor skills (Baniasadi, Ranjbari, Khajehaflaton, Neshati & Dana, 2022; Chaharbaghi et al. 2022; Guadagnoli & Kohl, 2001; Williams & Jasiewicz, 2001). In fact, feedback is any sensory information about movement, not just error, which can be provided through a person's internal systems or from an external source such as film, teacher, and audience. Shea and Wulf (2005) stated that, in addition to the guidance hypothesis in understanding the effects of feedback on the performance and learning of motor skills, it is important to examine how feedback interacts with other factors, such as the complexity of the task, the skill level, the focus of attention, and the characteristics of the subjects.

Feedback can be divided into two broad categories, intrinsic (internal) and augmented (external) feedback. Usually, people receive information about different aspects of movement through their different senses. This type of information, which is available to the performer during or after the execution of the movement, is intrinsic feedback. Unlike intrinsic feedback, augmented feedback is information related to movement that is complementary or additional to intrinsic feedback (Butki & Hoffman, 2003; Baniasadi, Ranjbari, Khajeaflaton Mofrad & Dana, 2022; Chaharbaghi, Baniasadi & Ghorbani, 2022). The different dimensions of augmented feedback include knowledge or results (KR) and knowledge of performance (KP). KR has many applications and it seems necessary in learning and implementation to a large extent (Rice & Hernandez, 2006). This type of feedback has a guiding effect on the individual and makes him aware of what corrections to make in his next performance, although it may also create dependence. To help the patient learn a skill, therapists first

give him feedback related to the result, but ultimately, the goal is to develop the patient's internal feedback. KP depends on the type of movement execution, and although this information may be available internally, the augmented feedback helps people to reach the goal more quickly and easily and to compare their performance with the desired goal (Baniasadi, Ranjbari, Abedini, Dana & Ghorbani, 2022; Guadagnoli et al. 2002; Gillespie, 2003; Seyedi Asl et al. 2016; Taghva et al. 2020). It should be mentioned that this type of additional information in the form of KP can help the processes that involve the coordination of perception.

Although many studies have been done on feedback and its effect on motor learning, the focus of these studies has been on healthy people. In order to be able to prescribe an effective method for different people, it is necessary to know how the motor learning hypothesis works in special people such as children with developmental delay, DCD, and cerebral palsy (Eskandarnejad, Mobayen, & Dana, 2015; Khosravi et al. 2023; Seyedi Asl et al. 2021). As well, one of the disabilities that has rarely been studied in the field of mental practice and motor imagery is Autism. Autism Spectrum Disorder is a group of developmental disorders of the nervous system, whose main manifestations include defects in social interactions, communication, as well as repetitive behaviors and limited interests (Aqdassi et al. 2021). In addition to deficits in social skills and stereotyped and repetitive behaviors, autistic children have delays in motor skills. Delays in motor abilities in autistic children are diverse and include delays in sitting, crawling, walking, as well as abnormal stepping, poor postural control, and inability to plan movements (Aqdassi et al. 2021; Gkotzia et al. 2017; Ketcheson et al. 2018). The main manifestation of social deficits in autism includes poor eye contact, lack of emotions or social confrontation, defects in using non-verbal behaviors and lack of age-appropriate communication (Lourenco et al. 2020; Mohd Nordin et al. 2021).

As mentioned earlier, the effects of feedback on learning new motor skills in children with autism have been rarely investigated. Due to the positive effects of feedback on motor learning as well as poor motor skill performance in children with autism, it seems necessary to find factors what facilitate motor performance and leaning in children with autism. Hence, the present study was designed to examine the effects of two kind of feedback presentation, namely KR and KP, on movement pattern and accuracy of a Badminton serve in children with autism. It was hypothesized that both KR and KP would lead to better movement pattern and accuracy than no-feedback control condition. In addition, a combination of KR and KP would lead to movement pattern and accuracy than each one alone in children with autism.

2. Method

We used a causal-comparative method in the current study. Sixty children with autism with an age range of 7 to 12 years from special schools were selected based on a convenience sampling method and were randomly and equally assigned into four groups including KR, KP, KR+KP, and control groups.

2.1. Motor task

The motor task in the present study included the badminton serve. For this purpose, Scott and Fox badminton long service test, which is a standard test, was used. The validity of this test is about 0.84 and its reliability is reported as 0.90. To perform this test, first, we divided the right and end corner of the badminton court into five half circles from the top. The distance between each half circle was five centimeters. Each circle from above has 1, 2, 3, 4, 5 points respectively. When the shuttle is placed in each of the circles, the score of the same circle is recorded for the subject. Due to the fact that there is a standard for the height of the service, a rope with a height of 240 cm is installed at a distance of 420 cm from the net. To evaluate the movement pattern, all serves of each participant were recorded by a digital camera, and then a coach with ten years of coaching experience in badminton was asked to give a score between 1 and 5 to the pattern executed by the participant. Score 1 means poor movement pattern and score 5 means excellent movement pattern.

2.2. Procedure

The demographic information of the children was obtained from their school records. Each participant was tested individually in the school gym. Before implementing the research protocol, children's height and weight were measured using standard tools. Then, the purpose of the study and how to implement it were explained to each participant. Then, the participants performed three services to familiarize themselves with the environmental conditions. Then the participants participated in the pre-test included 10 services. At this stage, they did not receive any feedback. In the acquisition phase, the participants participated in 5 training blocks, each of which included 10 services. Feedback was provided before each practice block. The way of providing feedback was that the participants of the KR group were given the points obtained from the service performance. The participants of the KP group were given feedback by a badminton coach about how they performed the movement and how to improve it. Participants in the combined group were given both KR and KP feedback. Participants in the control group did not receive any feedback during training, but participated in all training blocks. One day later, the retention test was performed with 10 services and no feedback was provided to any of the participants.

2.3. Data analysis

Mean and standard deviation were used to describe the research variables. One-way analysis of variance (ANOVA) was used to analyze the movement pattern and accuracy in the pre-test and the retention test. Repeated measures ANOVA was used to measure the progression of the participants as well as group differences during the acquisition phase. HSD post hoc test was used as a post hoc test. The level of statistical significance was set at $P < 0.05$.

3. Results

First of all, the results showed that mean age of the children was 9.84±1.47 years old. Height and weight of the children were 139.17±10.17 cm and 32.97±5.07 kg, respectively. Finally, BMI of the children was 18.91±1.64. Table 1 and Figure 1 show the mean and standard deviation of

movement pattern scores across the tests and groups.

Table 1

Movement pattern scores across tests and groups

	KR	KP	KR+KP	Control
Pretest	0.39±0.85	0.31±0.57	0.28±0.39	0.35±0.48
Acquisition phase	0.69±1.07	1.55±1.84	2.28±1.58	0.63±0.80
Retention test	0.89±1.14	1.60±1.40	1.90±1.93	0.30±0.55

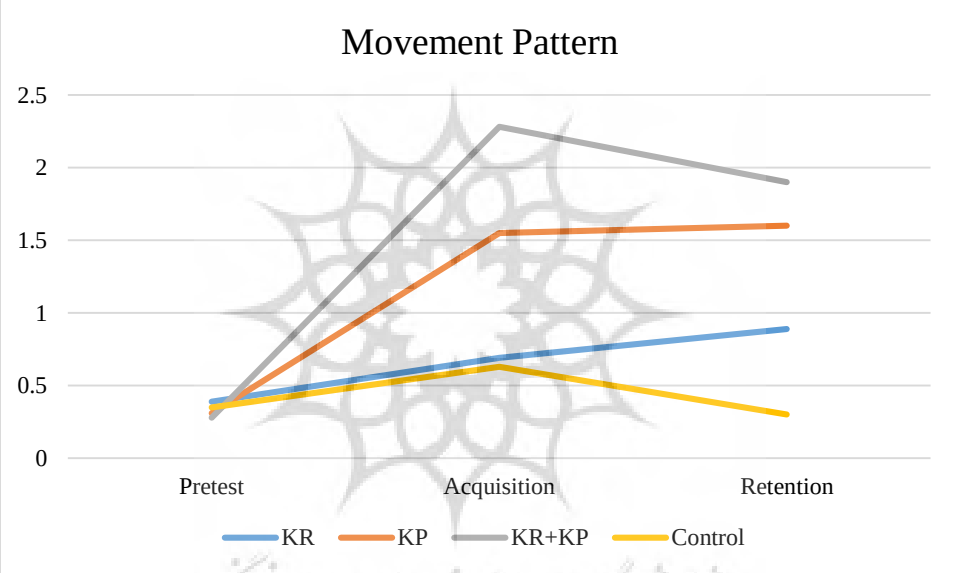

Figure 1. Movement pattern scores across tests and groups

Regarding movement pattern scores, results showed no significant differences between groups in the pretest, $F = 0.27$, $p = 0.932$. During the acquisition phase, main effects for group, $F = 12.94$, $p = 0.000$, and bock, $F = 7.09$, $p = 0.000$, were significant. However, no significant interaction between group and block was observed, $F = 0.54$, $p = 0.481$. Here, the results of HSD test showed that KR+KP group had significantly better movement pattern scores than all other groups (all P=0.000). Also, KP group had significantly better movement pattern scores than KR and control groups (both P=0.000). However, KR group was not significantly different from the control group (P=0.409). In the retention test, the results showed significant differences between groups, $F = 9.22$, $p = 0.000$. Here, the results of HSD test showed that KR+KP group had significantly better movement pattern scores than all other groups (all P=0.000). Also, KP group had significantly better movement pattern scores than KR and control groups (both P=0.000).

Finally, KR group had significantly better movement pattern scores than the control group (P=0.000).

In addition, Table 2 and Figure 2 show the mean and standard deviation of movement accuracy scores across the tests and groups.

Table 2

Movement accuracy scores across tests and groups

	KR	KP	KR+KP	Control
Pretest	0.22±0.38	0.19±0.40	0.30±0.10	0.17±0.27
Acquisition phase	1.39 ±1.22	1.02±1.13	2.01±1.54	0.25±0.40
Retention test	1.49±1.63	1.12±1.52	1.98±1.70	0.36±0.36

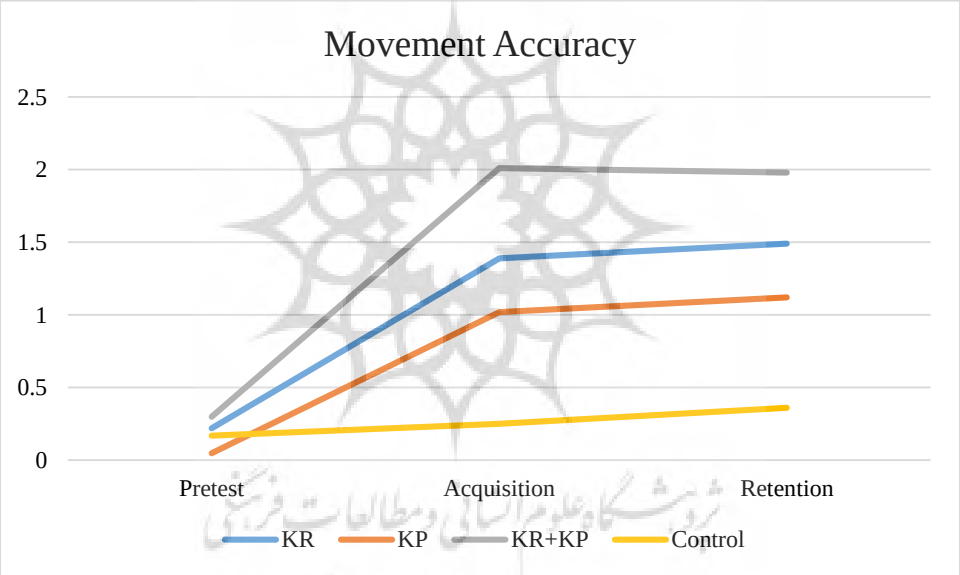

Figure 1. Movement accuracy scores across tests and groups

Regarding movement accuracy scores, results showed no significant differences between groups in the pretest, $F = 0.39$, $p = 0.827$. During the acquisition phase, main effects for group, $F = 18.67$, $p = 0.000$, and bock, $F = 8.69$, $p = 0.000$, were significant. However, no significant interaction between group and block was observed, $F = 0.17$, $p = 0.938$. Here, the results of HSD test showed that KR+KP group had significantly better movement accuracy scores than all other groups (all P=0.000). Also, KR group had significantly better movement accuracy scores than KP and control groups (both P=0.000). Moreover, KP group had significantly better movement accuracy scores than the control group (P=0.000). In the retention test, the results showed significant differences between groups, $F = 12.08$, $p = 0.000$. Here, the results of HSD test

showed that KR+KP group had significantly better movement accuracy scores than all other groups (all P=0.000). Also, KR group had significantly better movement accuracy scores than KP and control groups (both P=0.000). Finally, KP group had significantly better movement accuracy scores than the control group (P=0.000).

4. Discussion

The effects of feedback on learning new motor skills in children with autism have been rarely investigated. Hence, the present study was designed to examine the effects of two kind of feedback presentation, namely KR and KP, on movement pattern and accuracy of a Badminton serve in children with autism. It was hypothesized that both KR and KP would lead to better movement pattern and accuracy than no-feedback control condition. In addition, a combination of KR and KP would lead to movement pattern and accuracy than each one alone in children with autism.

The results of the present study showed that both KR and KP feedback improve both the pattern and the accuracy of movement in children with autism compared to the condition without feedback. This result is significant in itself because it indicates that children with autism can use feedback to improve their motor performance and learning, indicating that they have feedback analysis mechanisms that include error detection and feedback analysis for correcting the improving the pattern and accuracy of the motor skill they have already executed (Aqdassi et al. 2021; Gkotzia et al. 2017; Ketcheson et al. 2018). Therefore, sports coaches and teachers can use feedback to improve the performance and learning of motor skills in children with autism. These results are also consistent with the results of previous studies on typically developing children that showed that feedback plays an important role in motor learning process (Guadagnoli & Kohl, 2001; Williams & Jasiewicz, 2001).

In addition, the results of this study showed that KP had better effects on the movement pattern and KR had better effects on the movement accuracy. These findings seem logical because the children who received KP were able to detect their movement error and because there was constant feedback from the instructor after each movement, they were constantly correcting the movement pattern, and therefore, it can be expected that their movement pattern was better compared to the KR feedback condition. On the other hand, the children who received the KR feedback always tried to get better scores in performing the badminton serve, and after receiving the KR feedback, they tried to adjust and modify their next performance to get a better score than the previous performance. This makes the children perform better in the movement accuracy than the KP feedback group (Butki & Hoffman, 2003; Rice & Hernandez, 2006; Guadagnoli et al. 2002; Gillespie, 2003).

Finally, the results of the present study interestingly showed that the children who were in the combination group (KR+KP feedback) performed better than all the groups in both execution of the movement pattern and service accuracy. This result, which is considered one of the most important results of the current study, shows that the combination of KR and KP feedback can play a very important role in the process

of performance and learning new motor skills in children with autism. When children received both instructor feedback regarding their movement pattern errors and were informed of the movement outcome, they were able to establish a convergence between the movement pattern and the movement outcome, which subsequently led them to both correct the movement pattern and getting a better movement result (Lourenco et al. 2020; Mohd Nordin et al. 2021; Rice & Hernandez, 2006; Gillespie, 2003). Therefore, it can be suggested that sports coaches and teachers use the combination of KR and KP feedback to teach new motor skills to children with autism.

5. Conclusion

In summary, the results of this study reveal that children with autism benefit from feedback to learn novel motor skills, indicating that they may have the necessary mechanisms to learn new skills through feedback. In addition, a combination of KR and KP would be better strategy for learning new motor skills. Therefore, it is suggested that sports coaches and teachers use the combination of KR and KP feedback to teach new motor skills to children with autism.

Acknowledgement

I thank all participants who participated in this study.

Conflict of interests

The Author declares that there is no conflict of interest with any organization. Also, this research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

Aqdassi, L., Sadeghi, S., Pouretemad, H.R., & Fathabadi, J. (2021). A family-based telerehabilitation program for improving gross motor skills in children with high functioning autism spectrum disorder. Journal of Modern Rehabilitation, 15(3), 173-182. Doi: 10.18502/jmr.v15i3.7738

Baniasadi, T., Ranjbari, S., Abedini, A., Dana, A., & Ghorbani, S. (2022). Investigation the Association of Internet Addiction with Mental Health and Physical Activity in Teenage Girls: The Mediating Role of Parental Attitude. *Wmm''' s Haalth llll tt in*, *9*(4), 243-250. doi: 10.30476/whb.2022.96915.1197.

Baniasadi, T., Ranjbari, S., Khajeaflaton Mofrad, S., Dana, A. (2022). Associations between device-measured physical activity and balance performance in children: Mediating role of motor self-efficacy. Biomedical Human Kinetics, 14(1), 252-258. https://doi.org/10.2478/bhk-2022-0031.

Baniasadi, T., Ranjbari, S., Khajeaflaton Mofrad, S., Dana, A. (2022). Associations between device-measured physical activity and balance performance in children: Mediating role of motor self-efficacy. Biomedical Human Kinetics, 14(1), 252-258. https://doi.org/10.2478/bhk-2022-0031.

Baniasadi, T., Ranjbari, S., Khajehaflaton, S., Neshati, A., & Dana, A. (2022). Effects of Physical Activity on Adiposity in Children: Mediating Role of Self-Esteem and Body-Image. *International Journal of Pediatrics*, *10*(12), 17172-17181. doi: 10.22038/ijp.2022.67562.5043.

Butki, B.D., & Hoffman, S.J. (2003). Effects of reducing frequency of intrinsic knowledge of results on the learning of a motor skill.

Perceptual & Motor Skills, 97(2), 569-80. DOI: 10.2466/pms.2003.97.2.569

Chaharbaghi, Z., Baniasadi, T., & Ghorbani, S. (2022). Effects of Teacher's Teaching Style in Physical Education on Moderate-to-Vigorous Physical Activity of High-School Students: an Accelerometer-based Study. *International Journal of School Health*, *9*(3), 143-150. doi: 10.30476/intjsh.2022.95204.1224.

Chaharbaghi, Z., Hosseini, F. B., Baniasadi, T., Moradi, L., & Dana, A. (2022). Impact of Physical Activity on Resilience among Teenage Girls during the COVID-19 Pandemic: a Mediation by Self-Esteem. *Wmm'' s Hlll th llll .. in*, *9*(2), 80-85. doi: 10.30476/whb.2022.94451.1166.

Eskandarnejad, M., Mobayen, F., & Dana, A. (2015). The effect of basketball training on ADHD children's learning skills. Research Journal of Sport Sciences, 3(6), 163-167.

Ghorbani, S., & Bund, A. (2014). Acquisition a Baseball-Pitch through Observation: What Information Is Extracted? American Journal of Sports Science & Medicine, 2(6A), 18-21. Doi:10.12691/ajssm-2-6A-5.

Ghorbani, S., & Bund, A. (2016). Observational learning of a new motor skill: The effect of different model demonstrations. International Journal of Sports Science & Coaching, 11(4), 514-522. Doi:10.1177/1747954116655049.

Ghorbani, S., & Bund, A. (2020). Motivational Effects of Enhanced Expectancies for Motor Learning in Individuals with High and Low Self-Efficacy. Perceptual & Motor Skills, 127(1), 263-274. Doi:10.1177/0031512519892390.

Ghorbani, S., Dana, A., & Fallah, Z. (2019). The effects of external and internal focus of attention on motor learning and promoting learner's focus. Biomedical Human Kinetics, 11(1), 175-180. Doi:10.2478/bhk-2019-0024.

Ghorbani, S., Ghanati, P., Dana, A., & Salehian, M. H. (2020). The Effects of Autonomy Support on Observational Motor Learning. *Iranian Journal of Learning & Memory*, *3*(11), 77-87. Doi:10.22034/iepa.2021.242953.1195

Ghorbani, S., Dana, A., & Christodoulides, E. (2020). *Effects of external focus of attention on learning static balance among girls with ADHD.* Biomedical Human Kinetics, 12(1), 69-74. Doi: Doi:10.2478/bhk-2020-0009.

Gillespie, M. (2003). Summary versus every-trial knowledge of results for individuals with intellectual disabilities. Adaptive Physical Activity Quarterly, 20(1), 46-56. Doi: 10.1123/apaq.20.1.46

Gkotzia, E., Venetsanou, F., & Kambas, A. (2017). Motor proficiency of children with autism spectrum disorders and intellectual disabilities: A review. European Psychomotricity Journal, 9(1), 46-69.

Guadagnoli, M.A., & Kohl, R.M. (2001). Knowledge of results for motor learning: relationship between error estimation and knowledge of results frequency. Journal of Motor Behavior, 33(2), 217-24. doi: 10.1080/00222890109603152.

Guadagnoli, M.A., Leis, B., Van Gemmert, A.W., & Stelmach, G.E. (2002). The relationship between knowledge of results and motor learning in Parkinsonian patients. Parkinsonism Related Disorders, 9(2), 89-95. doi: 10.1016/s1353-8020(02)00007-x.

Hashemi Motlagh, S., BaniAsadi, T., Chaharbaghi, Z., & Moradi, L. (2022). The Effects of Parental Socioeconomic Status on Children' Physical Activity: Mediating Role of Motivation. *International Journal of Pediatrics*, *10*(8), 16538-16544. doi: 10.22038/ijp.2022.63421.4834.

Hazrati, Z., Ranjbari, S., Baniasadi, T., & Khajehaflaton, S. (2022). Effects of Social Support on Participation of Children with ADHD in Physical Activity: Mediating Role of Emotional Wellbeing. *International Journal of Pediatrics*, *10*(10), 16880-16886. doi: 10.22038/ijp.2022.64698.4899.

Ketcheson, L., Hauck, J. L., & Ulrich, D. (2018). The levels of physical activity and motor skills in young children with and without autism spectrum disorder, aged 2-5 years. Autism, 22, 414-423. doi: 10.1177/1362361316683889.

Khosravi M, Seyedi Asl ST, Nazari Anamag A, SabzehAra Langaroudi M, Moharami J, Ahmadi S, Ganjali A, Ghiasi Z, Nafeli M, Kasaeiyan R. 2023. Parenting styles, maladaptive coping styles, and disturbed eating attitudes and behaviors: a multiple mediation analysis in patients with feeding and eating disorders. PeerJ 11:e14880 https://doi.org/10.7717/peerj.14880

Lourenco, C., Esteves, D., Nunes, C., & Liu, T. (2020). Motor proficiency of children with autism spectrum disorder and typically developing children in Portugal. Journal of Physical Education & Sport, 20(3), 1491-1496. DOI:10.7752/jpes.2020.03205.

Mohammadi, H., Nafei, H., Baniasadi, T., & Chaharbaghi, Z. (2022). Accelerometer-Based Physical Activity and Health-Related Quality of Life in Children with ADHD. *International Journal of Pediatrics*, *10*(7), 16362-16369. doi: 10.22038/ijp.2022.63699.4847.

Mohd Nordin, A., Ismail, J., & Kamal Nor, N. (2021). Motor development in children with autism spectrum disorder. Frontiers in Pediatrics, 9, 598276. Doi: 10.3389/fped.2021.598276

Mokhtari, P., Shojaei, M., & Dana, A. (2007). The effect of observational practice on the Badminton volley service learning: The role of self-efficacy. Harakat, 32, 117-131.

Rice, M.S., & Hernandez, H.G. (2006). Frequency of knowledge of results and motor learning in persons with developmental delay. Occupational Therapy International, 13(1), 35-48. doi: 10.1002/oti.206.

Saeedpour-Parizi, M.R., Hassan, S.E., Azad, A. et al. (2021). Target position and avoidance margin effects on path planning in obstacle avoidance. Scientific Reports, 11, 15285. https://doi.org/10.1038/s41598-021-94638-y.

Saeedpour-Parizi, M.R., Hassan, S.E., Baniasadi, T. et al. (2020). Hierarchical goal effects on center of mass velocity and eye fixations during gait. Experimental Brain Research, 238, 2433–2443. https://doi.org/10.1007/s00221-020-05900-0.

Schmidt, R., & Lee, T. (2011). Motor control and learning: a behavioral emphasis. 5th ed. Champaign, IL: Human Kinetics Publishers.

Seyedi Asl ST, Rahnejat A M, Elikaee M M, Khademi M, Shahed-HaghGhadam H, Taghva A. The role of resilience, positive/negative emotions, and character strengths in predicting burnout of military personnel. EBNESINA 2021; 22 (4) :4-13

Seyedi Asl ST, Sadeghi K, Bakhtiari M, Ahmadi SM, Nazari Anamagh A, Khayatan T Effect of Group Positive Psychotherapy on Improvement of Life Satisfaction and The Quality of Life in Infertile Woman. Int J Fertil Steril. 2016, 10(1):105-12. doi: 10.22074/ijfs.2016.4775.

Shea, C.H., & Wulf, G. (2005). Schema theory: a critical appraisal and reevaluation. Journal of Motor Behavior, 37(2), 85-101.

Taghva A, Seyedi Asl S T, Rahnejat A M, Elikaee M M. Resilience, Emotions, and Character Strengths as Predictors of Job Stress in Military Personnel. Iran J Psychiatry Behav Sci. 2020;14(2):e86477. https://doi.org/10.5812/ijpbs.86477.

Williams, L.R., & Jasiewicz, J.M. (2001). Knowledge of results, movement type, and sex in coincidence timing. Perceptual & Motor Skills, 92(3 Pt 2):1057-68. doi: 10.2466/pms.2001.92.3c.1057.