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Research Paper: The Effects of Model's Skill Level on Learning a Basketball Skill in Children with Autism

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Abstract

One of the disabilities that has rarely been studied in the field of observational learning is autism. the purpose of this study was to investigate the effects of watching a model video with different skill levels on learning a basketball skill in adolescents with autism. The current study was descriptive and causal-comparative. The participants of this study consisted of 60 adolescents with autism with an age range of 13 to 18 years; they were randomly and equally divided into three groups: The skilled model, the novice model, and the control. The motor task involved a basketball throwing, in which the scores of accurate shoots were measured as the dependent variable. The participants performed the pre-test (including ten throws), the acquisition stage (including 5, 10-throws training sets), and the retention test (including ten throws). Participants in the observation groups watched their respective models for five times before each training set. ANOVA was used to analyze the throwing accuracy scores. The results showed that in the acquisition phase and retention test the group watching novice model video had significantly better throwing scores than the group watching skilled model video and the control group. In addition, in the acquisition phase and retention test the group watching skilled model had significantly better throwing scores than the control group. The results of this study indicated that people with autism could benefit from watching a model video to learn a basketball throwing skill. This result revealed that these people might have the necessary mechanisms to learn new skills through video observation.

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1. Introduction

From the beginning to the end of life, human beings are involved in different types of learning which is continuously associated with humans. In fact, learning forms the basis of human life as well as being involved in an activity; this means acquiring skills or retraining them can be done by practicing. There are various kinds of learning including academic learning, environmental learning, motor learning, etc. Motor learning, the focus of this study, is the basis and origin of subsequent learning (Magill, 2007). Motor skills are an important part of human life, and researchers have always been looking for factors that influence learning and performing motor skills. During the training of skills, trainers are looking for better motor learning and performance, and their awareness of the processes that affect learning is considered to be superior. During the past decades, the motor learning's scientists examined the effects of various techniques and strategies for facilitating the process of motor learning in different age groups. Some of them are included observing a model (Ghorbani & Bund, 2014; Ghorbani et al., 2020; Farsi et al., 2016), motor imagery (Afsanepurak et al., 2012), self-talk (Eskandari Nejad et al., 2015), enhanced expectancies (Ghorbani, & Bund, 2020), and adopting an external focus of attention (Ghorbani et al., 2020).

A famous technique in the literature that has been proven to be effective in learning new motor skills is observing a model or skill demonstration which is also called modeling or observational learning; this is one of the most powerful means of transmitting information about how to perform a motor skill. In fact, it is a process in which a person assimilates the information needed to acquire a skill from watching the actions of others. Observational learning is defined as a process in which a person acquires from watching a person performing a motor skill, watching a person on video, or watching his or her own performance on video. There are two different perspectives regarding the effectiveness of demonstration and modeling in skill learning. Main perspective is based on Bandura's (1977) opinion about modeling and social learning. According to which, when a person observes a model, he or she translates the observed movement information into symbolic memory codes. Then, the image from the memory is used as a guide to perform the skill as well as a criterion for detecting and correcting errors. The second view is based on the perspective of direct visual perception, which was proposed by Scully and Newell (1985). In general, observing movement is effective in creating movement representation by providing clear stimuli related to task performance, and using movement observation for learning difficult skills helps athletes in producing a realistic image of that movement. Although numerous studies have been done on the effects of observational learning in healthy people (Hayes et al., 2013; Larssen et al., 2012; Ste-Marie et al., 2012; Hayes, et al. 2010; Blandin & Proteau, 2000), observational learning in people with different mental and motor disabilities has been less investigated (Dana et al., 2019). For example, one of the disabilities that has rarely been studied in the field of observational learning is autism. Autism spectrum disorder is a broad term used to describe a group of neurodevelopmental disorders (Birchwood & Daley, 2012; Goulardins et al. 2017). These disorders are characterized by communication and social interaction problems. People with autism often exhibit restricted, repetitive, and stereotyped symptoms or behavior patterns (Aqdassi et al. 2021; Gkotzia et al. 2017; Ketcheson et al. 2018; Lourenco et al. 2020; Mohd Nordin et al. 2021). Autism is the third cause of developmental disorders in children after mental retardation and cerebral palsy. It has been shown that people with autism often have motor disabilities (Aqdassi et al., 2021; Gkotzia et al., 2017; Ketcheson et al., 2018; Lourenco et al., 2020; Mohd Nordin et al., 2021). Therefore, it can be expected that the execution and learning of motor skills in people with autism will be associated with challenges. In the field of observational learning in people with autism, little research has been done so far, and it is not clear whether these people have the necessary mechanisms for motor learning through model observation. Therefore, the purpose of this study is to investigate the effects of watching a model video with different skill levels on learning a basketball skill in adolescents with autism. In this study, it is assumed that observing a model in general would lead to better motor performance and learning than no observation. In addition, observing a novice model would result in better motor performance and learning than watching a skilled model.

2. Method

The present study was descriptive as well as causal-comparative. The participants of this study consisted of 60 adolescents with autism with an age range of 13 to 18 years, and they were randomly and equally divided into three groups: The skilled model group, the novice model group, and the control group.

2.1. Motor task

The motor task in the present study included a basketball shooting skill. In order to perform this motor task, a standard basketball ball and a standard basketball backboard were used. In this task, the participants were asked to stand behind the basketball free-throw line and throw the ball towards the basketball hoop. The scoring of this skill was as follows: 2 points were given if the ball landed in the basket, 1 point was given if the ball hit the basket or backboard, and no points were considered otherwise.

2.2. Model videos

A skilled basketball player participated in the present study as the skilled model. This player had more than ten years of experience in official basketball tournaments. To prepare the model training video, the skilled model demonstrated the basketball shooting skill. Then, the demonstration of the skilled model was filmed using a digital camera. Three of his shoots were videotaped and then an individual was asked to choose one of them as his best shoot to be used as the skilled model video in this study. In the novice model, a child with autism with no experience with Basketball demonstrated shoots. He was asked to throw the ball into the hoop for three times. All throws were videotaped. Afterwards we chose one of them as novice model video.

2.3. Procedure

First, by referring to the person's file in the school, a demographic information sheet was completed for each child. The participants were tested individually in the gym. After entering the room, the participant sat on a chair in front of a monitor. In order to familiarize the participants with model video, a video of walking skills was shown to the participant in the form of a video film and the participant was given explanations about the nature of the video. Next, the examiner provided them the basic explanations related to the current study. They were informed that they were to learn basketball throwing skills. To familiarize the participants with the implementation environment of the protocol and the movement task, they were asked to perform the basketball throwing skill twice. In the pre-test, the participants performed the basketball shooting skill ten times without previewing the model video. Then, they participated in the acquisition phase in five training sets, each consisting of ten throws. Participants were given a three-minute break between each training set. Before each training set, children in the observational training groups watched the video related to their group five times consecutively on a 17-inch screen. The participant was informed that they should look carefully at the displayed movement in order to be able to imitate this movement. The participants in the control group also performed the same protocol, but they did not watch the video. One day after the acquisition test, the participants took the retention test, which consisted of ten basketball throws. Before and during the retention test, no model video was observed. All throwing scores were recorded for further analysis.

2.4. Data analysis

In this study, the dependent variable included throwing accuracy in the pre-test, acquisition phase and retention test. One-way ANOVA was run to analyze the throwing accuracy in the pre-test and the retention test. In addition, throwing scores in the acquisition phase were analyzed using ANOVA in 3 (groups) × 5 (sets) with repeated measured on the last factor. Tukey's post hoc test was run as a post hoc test. The level of statistical significance was at $P < 0.05$.

3. Results

Demographic characteristics including age, height, weight, and BMI are given in Table 1.

Table 1
Demographic characteristics of research participants

Groups	Age	Height	Weight	BMI
Skilled model	15.08±2.81	167.96±9.51	61.28±7.17	20.55±1.86
Novice model	15.82±2.14	169.44±7.16	60.11±8.61	21.02±1.66
Control	15.08±2.81	168.58±8.33	59.16±7.70	20.20±1.51

The mean and standard deviation of accuracy scores in the pre-test, acquisition phase, and retention test are presented in Table 2 and Figure 1.

Table 2
Mean and SD of basketball throw scores in pre-test, acquisition phase, and retention test

Groups	Pretest	Acquisition phase	Retention test
Skilled model	0.18±0.28	0.71±0.50	0.67±0.44
Novice model	0.21±0.32	1.02±0.64	0.99±0.60
Control	0.20±0.39	0.42±0.45	0.24±0.35

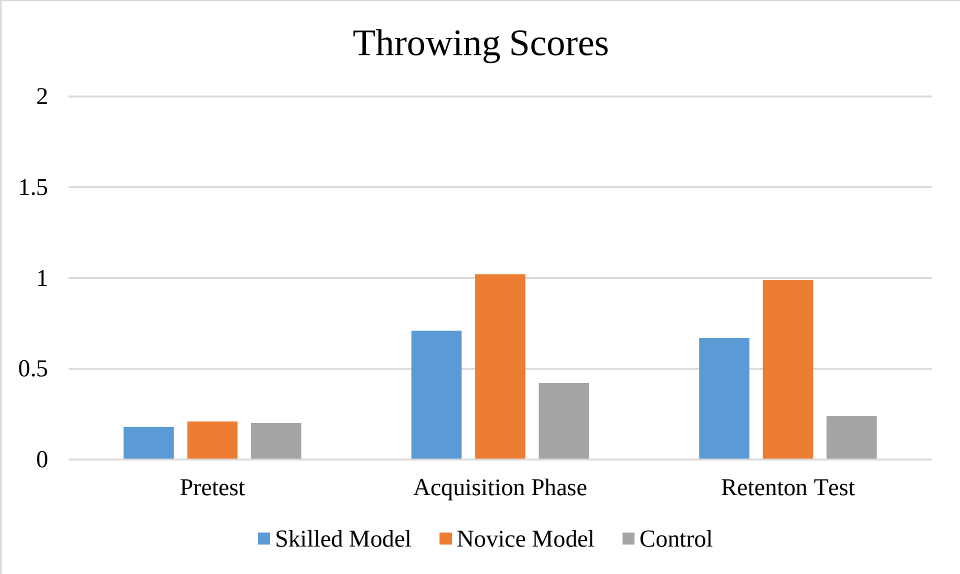

Figure 1. Means of throwing scores across groups and tests

Results of one-way ANOVA showed that all groups had similar throwing scores in the pretest, $F = 0.74$, $p = 0.73$. However, in the acquisition phase, the results of ANOVA revealed that main effect for Group ($F = 5.69$, $p = 0.000$) was significant. Results of Tukey test demonstrated that novice video group had significantly better throwing scores than skilled model video and control groups (both P=0.000). In addition, skilled group had significantly better throwing scores than control group (P=0.000). Moreover, the results indicated that main effect for Block ($F = 3.51$, $p = 0.000$) was also significant, while we observed no significant interaction between Group × Block, indicating that all groups improved their throwing scores during the acquisition phase. Finally, results of one-way ANOVA showed significant differences between groups in the retention test, $F = 6.94$, $p = 0.000$. In this regard, results of Tukey test illustrated that novice model video group had significantly better throwing scores than skilled model video and control groups (both P=0.000). In addition, skilled group had significantly better throwing scores than control group (P=0.000).

4. Discussion

Autism is one of the disabilities that has rarely been studied in the field of observational learning. the purpose of this study was to investigate the effects of watching a model video with different skill levels on learning a basketball skill in adolescents with autism. In this study, it was assumed that observing a model in general would lead to a better motor performance and learning than no observation. In addition, observing a novice model would result in better motor performance and leaning than watching a skilled model.

The results of this study showed that adolescents with autism who had observational training performed significantly better in basketball throwing skill scores in the acquisition phase and retention test than those who did not have observational training. These results indicated that adolescents with autism were able to use the information on movement shown in the model videos and improve their performance in the acquisition phase and retention test. The results of this study confirm our first hypothesis and are indirectly in line with the results of previous studies that investigated the effects of observational learning on mentally retarded children (Dana et al., 2019). The results of this study added new findings to the literature and showed that people with autism would be able to understand model videos and obtain the required information from them to learn the observed skill. In addition, these results indicated that there could be cognitive mechanisms required for observational learning of advanced skills such as basketball throwing in people with autism.

Furthermore, the results of the present study revealed that in the acquisition phase and retention test, watching the novice model was superior to watching the skilled model. The results of this study are consistent with the results of previous studies about the superiority of watching the novice model over the expert model in learning motor skills (Hayes et al., 2013; Larssen et al., 2012; Ste-Marie et al., 2012; Hayes et al., 2010; Blandin & Proteau, 2000; Ghorbani & Bund, 2014; Ghorbani et al., 2020; Farsi et al., 2016). Since a beginner is more prone to make big and frequent mistakes than an expert, an observer has a better chance to recognize these mistakes and learn from them. This means that the observer engages in problem solving with more active methods; therefore, by participating in a number of cognitive activities, the observer is able to discover an error and correct it, which is very important in the learning process (Ghorbani et al., 2020). That is, the novice model is not a good model for what a person should do; however, when a person observes a novice model, he or she probably learns the task by improving error detection and error correction mechanisms. Studies have shown that the learning model increases the cognitive effort during the modeling process (Marie et al. 2012). As a result, the usefulness of the observer's cognitive efforts leads to reproduction and better learning of the observed task. Hence, as a practical implication, it can be suggested that coaches and instructors employ model videos and especially novice model videos as an effective procedure for teaching new motor skills to novices with autism.

5. Conclusion

In summary, the results of this study highlighted that people with autism benefit from watching a model video to learn a basketball throwing skill. This result may indicate that these people have the necessary mechanisms to learn new skills through video observation. Moreover, watching a novice model video would benefit adolescents with autism more than watching an expert model video.

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Conflict of interest

The Authors declare 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.

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