The effect of contextual interference and age differences (children-teenagers) on learning selected techniques of wrestling

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Abstract

The aim of this study was to assess the effects of contextual interference and age differences on learning selected techniques of wrestling. Based on the type of exercise (random-blocked) and age difference (children-teenagers), 80 participants unfamiliar with techniques of wrestling were organized in four different exercise groups (children / random, children / blocked, teen / random, teen / blocked). Using a training movie, techniques of flying mare, duck under arms, and rear throw were taught to all training groups. Blocked training groups exercised each technique 24 times a session and for 3 sessions. Random practice groups exercised each technique 8 times and completely randomly for three sessions. Retention and transfer tests were taken twenty-four hours after attending training sessions. Results of two-way ANOVA showed that age was the only significant effect in the retention phase and teenagers showed a better performance in all three techniques. The effect of age on performing flying mare and rear throw was significant in transfer phase implying teenagers’ better performance. Moreover, random training groups performed duck under arm and rear throw significantly better than blocked training groups (P≤ 0.05). It seems that the factor of exerting appropriate body strength that is important for wrestling techniques was the reason of the better performance. In transfer phase non excellence of blocked and random practice was likely due to the complexity of the flying mare technique. According to the results of transfer phase, random training of wrestling techniques is recommended.

Keywords: contextual interference, wrestling, transfer, learning.
Introduction

Shea and Morgan (1979) were the first researchers who discovered the effect of contextual interference on motor learning. They used three methods of throwing obstacles in the form of blocked practice (low contextual interference) and as a random practice (high contextual interference). Although blocked practice method followed a better performance during training, random training methods showed a better performance in retention and transfer tests. After their research, many studies on this phenomenon were done using other tasks. According to the studies, contextual interference at least about learning simple laboratory skills is relatively strong.

Studies on children have shown inefficiency of the random practice in complex tasks on the function of beginner children. For example, Frank, Rink, and Werner (1990) tested three volleyball skills by three training ways of blocked, random and random- blocked to 9-year-old children and did not observed any difference among the 3 training methods. Farrow and Maschet (1997) trained forehand hit of the soil tennis to 8-9 and 10-12 years old children with the dominant and non-dominant hand. According to their results, in forehand hit with the dominant hand older children benefit from random training whereas blocked training was more useful for younger children; as well as, in general, blocked training was more efficient for hit with the non-dominant hand. Pinto zip and Jentai (1995) showed that blocked exercise in bean bag throw among the young children (5-6 years old) was more effective while random exercise was more beneficial for adults. In addition, they recognized that when training amount becomes limited both adults and children benefit from blocked exercise. Piggot and Shapiro (1984) asked 7-year-old children to throw bean bags of different weight toward the target. They found out that children act better under training conditions of the normal contextual interference (random-blocked); as well as, the blocked training group performed better than the random training group. At the end we can point out to the study of AlMustafa (1989). He asked 5.7.11.19-year-old subjects to do a throwing task under the random and blocked practice conditions. In this study, random practice facilitated learning for adults and older children, but younger children had benefited from blocked training. AlMustafa found out that 7-year-old children who had a previous throwing experience benefited more from the random training.

Considering what mentioned above, it can be said that the effect of a learner's characteristics is important and fundamental on training motor skills that can be effective for designing motor skills training. So, since wrestling is a national sport in our country and on the other hand lovers usually begin to like this sport in childhood (8-9) or adolescence (14-15), to investigate the effect of contextual interference on wrestling while regarding beginners' age for the optimal training of wrestling techniques with the aim of making motor learning sciences applicable seems necessary. Therefore, the present article aims to investigate the effect of contextual interference and age differences on learning selected techniques of wrestling.
Review of literature

Motor learning

To improve the performance level is an obvious result of each person's training that can be measured in different ways (i.e. more percentage at basketball free throw or better score in a set of barfix routine moves in gymnastics). However, learning is something more than performance level improvement. Psychologists have recognized that learning as a skillful performance ability evolving during the exercises is useful so that ability improvement leads to the performance improvement. Therefore, the performance improvement is not learning by itself, but indicates the incidence of learning. Motor learning: a collection of processes associated with practice and experience that will lead to relatively permanent changes in skillful performance ability (Schmidt and Rysberg, 2000). It seems that human learning is constantly happening; anything you do today provides a knowledge or ability that impact on the future performance and beyond it. Situations where people are consciously trying to learn motor skills are called "learning experience" (or self-conscious practice). Learning experience happens in different situations at which one or more novice may participate (Schmidt and Rysberg, 2004, quoted from Namazi zadeh & Vaeze Mousavi Zadeh, 2010).

Variability of exercises

Variability of training experiences is one of the exercise features that increases the likelihood of success in the future implementation experiences. Theories of learning motor skills emphasize on effectiveness of exercise variability. In these theories variability of exercise is defined as the moves diversity and variety of contextual features that a novice experiences during (learning) skills. For example, according to the Schmidt's (1975) schematic theory, successful implementation of a skill depends on variability level of the exercise.

When practicing a skill, individuals practice it in a context with identifiable and specific characteristics. According to Jentayl (1987), variable exercises with non-regulatory features should be provided in blocked skills. These features include irrelevant information such as the spectators, type of equipment and ambient sounds, etc. While practicing open skills requires adding experiences that the regulatory features vary from an effort to another. Regulatory characteristics include different information associated with the movement, posture, force, distance, location, angle of the object, and etc.

Contextual interference

Contextual interference refers to an interference that is made by a task exercise in a training situation. According to the theory of Magill (1989), this interference will lead to a better learning. If an individual practices only one skill (blocked exercise), the interference is negligible. On the other hand, when he practices several different skills (but linked together) in a session (random practice), more contextual interference is caused. Most people consider interference as a negative agent and expect that situations with less contextual interference lead to more learning. However Batiq (1979) stated that although low contextual interference results
in a better performance in the learning stage (practice), more contextual interference will lead to an improved performance at the retention and transfer stages (Magill, 2001).

Batig in his early studies showed that factors increasing the difficulty of the task to the subjects, increase retention and transfer, too. According to his results, inter task simplification occurs by intra task interference. Intra task interference is defined as the inconvenience caused by an attempt to keep multiple cases simultaneously in future memory. Batig attributed inter task transition to other similar motion tasks. These findings reveal that if the first tasks are learned under the optimal performance conditions, it is expected that transfer to other task will be more effective. Batig identified two important sources of interference arising during the exercise. One of these factors is the arrangement of the studied or practiced multiple cases. If the same tasks are practiced repeatedly, the task will remain only in memory and interference will be inevitably low. On the other hand, if the exercise includes multi-task switching, the interference will be forcibly high. Another source of interference is the nature of the studied or practiced cases. If cases (or movement tasks), are closely similar, the interference made during the practice will be high due to the increased uncertainty. Very different or distinct cases or tasks cause less interference (Magill, 1989).

**Retroactive learning perspective**

Retroactive retention perspective mostly focuses on disadvantages of blocked training programs rather than advantages of random training. Showkis and Del Ray (1998) suggested that the effect of contextual interference may be due to the task effects not practicing the tasks under the random program. This suggestion is in conflict with Batig (1979) idea since he believed that in creating the contextual interference the context is more effective than tasks. Recently, retroactive retention has been considered widely so that Del Ray and Shea who were pioneers of research on contextual interference and previously followed the expansion hypothesis now are considered as advocates of retroactive retention. Showkis and Snow (1997) found out that transfer effects are stronger; in addition, compared to the retention, the transfer test is a stronger index in studies on the effect of contextual interference. They also stated that doing further studies in real conditions and with transition plans is essential to develop and promote explanation and interpretation power of the retroactive interferences as a valid reason for incidence of the contextual interference.

**Factors affecting contextual interference**

**Features of the task**

After reviewing the contextual interference, Magill and Hall (1990), concluded that some equivocal findings could be due to the nature of the task. They stated that the effects of contextual interference will be more and stronger if tasks are under various motion programs rather than the case with the same motion programs.

Lee and White (1990) suggested that there is a relationship between internal interest and contextual interference. On the other hand, this inconsistency must also be considered through the prism of the task difficulty. As, Shea et al (1990) believed that the amount of exercise should
be remembered. Lee and White (1990) realized that contextual interference may be due to the processes of motivation or attention. Random practice seems to require more effort than blocked exercise particularly in simple and boring tasks. They stated that the effect of contextual interference is more on tasks which are not internally interesting.

According to the findings of Jelsma and Peters (1989), difficult tasks make a certain contextual interference under blocked practice conditions. Herbert and others (1996) supported this conclusion. They observed that the difficulty of sporting skills interacts with contextual interference. As well as, subjects' introduction and familiarity time with the contextual interference is also involved in creating different effects. It seems that blocked practice is effective for novice when they are familiar with the motion because they are creating a fundamental movement pattern and identifying its appropriate signs (Brady, 1998).

Different stages of skill acquisition can also change the effect of contextual interference. Shea et al (1990) made some changes in hierarchical perspective of motion program formation and modified Schmidt's parameters (1975-1988). They recognized that in early stages of the practice one tries to acquire basic motion program structures; modification of parameters during this phase interferes with motion program promotion and goes beyond the individual's information processing capacity.

**Research Hypothesis**

1- The effect of age on retention of doing flying mare technique is significant.

2. The effect of contextual interference on retention of doing flying mare technique is significant.

3- Interaction of age and contextual interference effect on retention of doing flying mare technique is significant.

4- The effect of age on retention of doing duck under arm technique is significant.

5- The effect of contextual interference on retention of doing duck under arm technique is significant.

6- Interaction of age and contextual interference effect on retention of doing duck under arm technique is significant.

7- The effect of age on retention of doing rear throw technique is significant.

8- The effect of contextual interference on retention of doing rear throw technique is significant.

9- Interaction of age and contextual interference effect on retention of doing flying mare technique is significant.

10- The effect of age on transition of doing flying mare technique is significant.

11- The effect of contextual interference on transition of doing flying mare technique is significant.
12- Interaction of age and contextual interference effect on transition of doing flying mare technique is significant.

13- The effect of age on transition of doing duck under arm technique is significant.

14- The effect of contextual interference on transition of doing duck under arm technique is significant.

15- Interaction of age and contextual interference effect on transition of doing duck under arm technique is significant.

16- The effect of age on transition of doing rear throw technique is significant.

17- The effect of contextual interference on transition of doing rear throw technique is significant.

18- Interaction of age and contextual interference effect on transition of doing rear throw technique is significant.

**Methodology**

This study was done via quasi-experimental method. The research project used in this study is shown in the image below:

![Figure 1. Research model](image)

The statistical sample of the research included 80 subjects (free volunteer) aged between 5-18 years old that were selected randomly. Sample subjects were divided into 4 groups randomly. As shown by the figure, participants' age included two levels of 8-9 and 14-15 years old. Based on the type of exercise, the two age level included two levels of 8-9 and 14-15 years old. Based on the type of exercise, the two age level learned selected techniques of wrestling through the two training methods of random and blocked. Age and contextual interference are the independent variables. Age consists of two different age levels of children (8 to 9 years old) and teenagers (14 to 15 years old). Moreover, the effect of contextual interference included both random and blocked practices. Random practice indicates high contextual interference and blocked practice represents contextual interference.
Kolmogorov-Smirnov test was used for normality examination of the data. The two-way ANOVA was used for analyzing the data in retention and transfer stages.

Kolmogorov-Smirnov test was used for normality examination of the variables. Because in this test the amount of probability for all variables (except one) is greater than significance level of 5%, all variables distribution is normal. So, parametric tests were used for data processing. Examination results of the first three hypotheses are presented in tables 1 and 2:

Table 1: Levene's test for homogeneity of variances

<table>
<thead>
<tr>
<th>Retention/flying mare technique</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.67</td>
<td>0.181</td>
</tr>
</tbody>
</table>

According to the results of Levene’s test the assumption of variance homogeneity has been observed.

Table 2: main and interactive effects of age and contextual interference on retention of doing flying mare technique

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>Freedom degrees</th>
<th>Mean of squares</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>2.313</td>
<td>1</td>
<td>2.313</td>
<td>5.214</td>
<td>0.026</td>
</tr>
<tr>
<td>Contextual interference</td>
<td>0.922</td>
<td>1</td>
<td>0.922</td>
<td>2.07</td>
<td>0.155</td>
</tr>
<tr>
<td>Age* Contextual interference</td>
<td>0.044</td>
<td>1</td>
<td>0.044</td>
<td>0.099</td>
<td>0.754</td>
</tr>
</tbody>
</table>

Based on the two-way ANOVA test results we can say:

The effect of age on doing flying mare technique is significant (F = 5.214 and P = 0.026); thus, the first null hypothesis is rejected. So, according to tables (1) and (2) it is clear that teenagers were significantly better than children in doing flying mare technique.

But the effect of contextual interference on retention of doing flying mare technique is not significant (F = 2.07 and P = 0.155). Therefore, the second null hypothesis is confirmed. As well as, interaction of age and contextual interference effect on retention of doing flying mare technique is not significant (F = 0.099 and P = 0.754); thereby, the third null hypothesis is confirmed.

Examination results of hypotheses 4-6 are presented in tables 3 and 4:

Table 3: Levene's test for homogeneity of variances

<table>
<thead>
<tr>
<th>Retention/duck under arm</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.824</td>
<td>0.153</td>
</tr>
</tbody>
</table>
According to the results of Levene test the assumption of variance homogeneity has been observed.

Table 4: Main and interactive effects of age and contextual interference on retention of doing duck under arm technique

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>Freedom degrees</th>
<th>Mean of squares</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>10.26</td>
<td>1</td>
<td>10.26</td>
<td>34.74</td>
<td>0.001</td>
</tr>
<tr>
<td>Contextual interference</td>
<td>0.247</td>
<td>1</td>
<td>0.247</td>
<td>0.835</td>
<td>0.365</td>
</tr>
<tr>
<td>Age* Contextual interference</td>
<td>0.001</td>
<td>1</td>
<td>0.001</td>
<td>0.001</td>
<td>0.977</td>
</tr>
</tbody>
</table>

Based on the two-way ANOVA test results we can say:

The effect of age on retention of doing duck under arm technique is significant (F =34.74 and P =0.001); thus, the null hypothesis 4 is rejected. So, according to tables (3) and (4) it is clear that teenagers were significantly better than children in doing duck under arm technique.

But the effect of contextual interference on retention of doing duck under arm technique is not significant (F =0.835 and P = 0.365). Therefore, the null hypothesis 5 is confirmed. As well as, interaction of age and contextual interference effect on retention of doing duck under arm technique is not significant (F= 0.001 and P=0.977); thereby, the null hypothesis 6 is confirmed.

Examination results of hypotheses 7-9 are presented in tables 5 and 6:

Table 5: Levene's test for homogeneity of variances

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retention/ rear throw</td>
<td>0.36</td>
<td>0.8</td>
</tr>
</tbody>
</table>

According to the results of Levene’s test the assumption of variance homogeneity has been observed.

Table 6: Main and interactive effects of age and contextual interference on retention of doing rear throw technique

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>Freedom degrees</th>
<th>Mean of squares</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>1.64</td>
<td>1</td>
<td>1.64</td>
<td>6.31</td>
<td>0.015</td>
</tr>
<tr>
<td>Contextual interference</td>
<td>0.682</td>
<td>1</td>
<td>0.682</td>
<td>2.615</td>
<td>0.111</td>
</tr>
<tr>
<td>Age* Contextual interference</td>
<td>0.220</td>
<td>1</td>
<td>0.220</td>
<td>0.844</td>
<td>0.362</td>
</tr>
</tbody>
</table>
Based on the two-way ANOVA test results we can say:

The effect of age on retention of doing rear throw technique is significant (F =6.31 and P =0.015); thus, the null hypothesis 7 is rejected. So, according to tables (5) and (6) it is clear that teenagers were significantly better than children in doing rear throw technique.

The effect of contextual interference on retention of doing rear throw technique is not significant (F =2.615 and P = 0.111). Therefore, the null hypothesis 8 is confirmed. As well as, interaction of age and contextual interference effect on retention of doing rear throw technique is not significant (F= 0.844 and P=0.362); thereby, the null hypothesis 9 is confirmed.

Examination results of hypotheses 10-12 are presented in tables 7 and 8:

Two way ANOVA test was used for analyzing the data obtained from the implementation of flying mare technique based on the age and level of the contextual interference.

**Table7: Levene's test for homogeneity of variances**

<table>
<thead>
<tr>
<th>Transition/ flying mare technique</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.30</td>
<td>0.825</td>
</tr>
</tbody>
</table>

According to the results of Levene’s test the assumption of variance homogeneity has been observed.

**Table8: Main and interactive effects of age and contextual interference on transition of doing flying mare technique**

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>Freedom degrees</th>
<th>Mean of squares</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>3.945</td>
<td>1</td>
<td>3.945</td>
<td>8.03</td>
<td>0.006</td>
</tr>
<tr>
<td>Contextual interference</td>
<td>0.87</td>
<td>1</td>
<td>0.087</td>
<td>0.178</td>
<td>0.674</td>
</tr>
<tr>
<td>Age* Contextual interference</td>
<td>0.025</td>
<td>1</td>
<td>0.025</td>
<td>0.051</td>
<td>0.822</td>
</tr>
</tbody>
</table>

Based on the two-way ANOVA test results we can say:

The effect of age on transition of doing flying mare technique is significant (F =8.03 and P =0.006); thus, the null hypothesis 10 is rejected. So, according to tables (7) and (8) (4-1) and (4-2) and graphs (4-2) and (4-4) it is clear that teenagers were significantly better than children in doing flying mare technique.

The effect of contextual interference on transfer of doing flying mare technique is not significant (F =0.178 and P = 0.674). Therefore, the null hypothesis 11 is confirmed. As well as, interaction
of age and contextual interference effect on transition of doing flying mare technique is not significant (F= 0.051 and P=0.822); thereby, the null hypothesis 12 is confirmed.

Examination results of hypotheses 13-15 are presented in tables 9 and 10:

Table9: Levene's test for homogeneity of variances

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition/ duck under arm</td>
<td>1.93</td>
<td>0.134</td>
</tr>
</tbody>
</table>

According to the results of Levene’s test the assumption of variance homogeneity has been observed.

Table10: Main and interactive effects of age and contextual interference on transition of doing duck under arm technique

<table>
<thead>
<tr>
<th></th>
<th>Sum of squares</th>
<th>Freedom degrees</th>
<th>Mean of squares</th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>0.055</td>
<td>1</td>
<td>0.055</td>
<td>0.270</td>
<td>0.605</td>
</tr>
<tr>
<td>Contextual interference</td>
<td>2.93</td>
<td>1</td>
<td>2.93</td>
<td>14.32</td>
<td>0.001</td>
</tr>
<tr>
<td>Age* Contextual interference</td>
<td>0.001</td>
<td>1</td>
<td>0.001</td>
<td>0.002</td>
<td>0.961</td>
</tr>
</tbody>
</table>

The effect of age on transition of doing duck under arm technique is not significant (F =0.270 and P =0.605); thus, the null hypothesis 13 is confirmed.

The effect of contextual interference on transfer of doing duck under arm technique is significant (F =14.32 and P = 0.001). Therefore, the null hypothesis 14 is rejected. So, according to tables (10) and (11) it is clear that groups that used random practice showed a better transition in doing duck under arm technique. As well as, interaction of age and contextual interference effect on transition of doing duck under arm technique is not significant (F= 0.002and P=0.961); thereby, the null hypothesis 15 is confirmed.

Examination results of hypotheses 16-18 are presented in tables 11 and 12:

Table11: Levene's test for homogeneity of variances

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transition/rear throw</td>
<td>2.01</td>
<td>0.067</td>
</tr>
</tbody>
</table>

According to the results of Levene’s test the assumption of variance homogeneity has been observed.

Table12: Main and interactive effects of age and contextual interference on transition of doing rear throw technique
The effect of age on transition of doing rear throw technique is significant ($F = 9.22$ and $P = 0.004$); thus, the null hypothesis 16 is rejected. So, according to tables (11) and (12) it is clear that teenagers were significantly better than children in doing rear throw technique.

The effect of contextual interference on transition of doing rear throw technique is significant ($F = 58.15$ and $P = 0.001$). Therefore, the null hypothesis 17 is rejected. Therefore, groups benefited from random exercise performed the rear throw technique significantly better in the transition stage. As well as, interaction of age and contextual interference effect on transition of doing rear throw technique is not significant ($F = 1.108$ and $P = 0.297$); thereby, the null hypothesis 18 is confirmed.

**Discussion and conclusion**

According to the results, at retention stage only the effect of age on doing techniques of flying mare, duck under arm and rear throw is significant so that teenagers performed better than children.

Since applied techniques in this research for an acceptable performance partially requires body strength particularly at flying mare and rear throw techniques, it seems that because teenagers act well in using this factor for doing techniques they are good at learning these techniques. Furthermore, the number of training efforts of associated techniques can be considered. Since each technique is practiced only 24 times in all training groups, regarding higher processing level of information among teenagers it is expected that they perform better at learning techniques. Finally, some psychological factors may be involved in this issue since at the retention stage subjects were asked to perform the skill in front of 4 referees as the supervisor of their performance. This condition can expose children in stressful situations more than teenagers.

The results of retention phase are in contrast with the results of Shea and Morgan (1979) Farrow and Machset (1997) Pinto zip and Jentyle (1995), Pigot and Shaapro (1984), AlMustafa (1989) and Plok and Lee (1997). On the other hand, results of the present study are consistent with research results of Frank, Rink, and Werner (1990), Good and Magill (1986), Gilbert et al. (2004), Sizo and Hasak (1987), Livich and Jesus (1983), Fishman, Willie (2002), Boyce Del Rey (1990), Kramton et al (1990) and Ulyss, Baton, Fayrod (2005). It should be noted that all the studies mentioned, whether in favor and against, were different with this study in terms of tasks type and participants characteristics.

<table>
<thead>
<tr>
<th>Sum of squares</th>
<th>Freedom degrees</th>
<th>Mean of squares</th>
<th>$F$</th>
<th>Significance level</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>1.60</td>
<td>1</td>
<td>1.60</td>
<td>9.22</td>
</tr>
<tr>
<td>Contextual interference</td>
<td>10.08</td>
<td>1</td>
<td>10.08</td>
<td>58.15</td>
</tr>
<tr>
<td>Age* Contextual interference</td>
<td>0.192</td>
<td>1</td>
<td>0.192</td>
<td>1.108</td>
</tr>
</tbody>
</table>
Results of transition stage showed that at this stage the effect of age is significant only on doing flying mare and rear throw techniques so that teenagers performed better than children. The effect of contextual interference on doing duck under arm and rear throw techniques was significant so that random practice groups were excellent compared to the blocked practice groups.

To justify obtained results at the transition stage followings can be mentioned:

As pointed out at the retention stage, to do techniques like flying mare and rear throw requires optimal use of body strength. For example, at flying mare technique to transfer the opponent weight and at rear throw technique to tolerate the opponent body weight on the upper body and neck while blinking the body strength is required. Whereas, in the case of duck under arm technique since a skilled opponent is in front of the participant the need for exerting physical power is little; thus, a significant age difference was not observed in doing duck under arm technique.

At the transition stage, random practice groups were excellent at doing duck under arm and rear throw techniques while this is not observed for the flying mare technique. Since random practice groups exercised techniques randomly and each time they had to do the asked technique with different mode of the opponent, their adaptability with the new training opponent increased compared to the blocked practice groups. Results of the transition stage were in contrast with findings of Ulysse, Baton and Fayrodo (2005) and Karmtom et al (2004); as well as; the results were consistent with studies of Shea and Morgan (1979), Good and Magill (1986), Polok and Lee (1997), Boyce and Del Ray (1990). It should be noted that referring to type of the task and characteristics of participants in all mentioned studies were not similar to the current research.
References


19.