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Original Article

THE EFFECT OF GAME-BASED KARATE TRAINING ON THE LEARNING OF BASIC TECHNIQUES AND ENJOYMENT OF PHYSICAL ACTIVITY IN CHILDREN

O EFEITO DO TREINAMENTO DE KARATÊ BASEADO EM JOGOS NO APRENDIZADO DE TÉCNICAS BÁSICAS E NO PRAZER DA ATIVIDADE FÍSICA EM CRIANÇAS

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RESUMO

O objetivo deste estudo foi investigar o efeito do treinamento de caratê baseado em jogos na aprendizagem de habilidades básicas de caratê e no interesse das crianças pelo esporte. A população estatística desta pesquisa incluiu todas as jogadoras de caratê do sexo feminino, com idades entre 6 e 8 anos, na cidade de Sowmeh Sara, Irã, e vinte participantes foram selecionados aleatoriamente e divididos em dois grupos experimentais e de controle, com 10 em cada grupo. O grupo experimental praticou o treinamento de caratê baseado em jogos por oito semanas. O programa de treinamento foi projetado com base nos princípios da fase fundamental do modelo canadense de desenvolvimento de longo prazo de atletas (LTAD) para o esporte de caratê. A Escala de Desfrute da Atividade Física em Crianças foi utilizada para medir o interesse das crianças na atividade física, e o teste da faixa amarela de caratê foi usado para medir a aprendizagem de tarefas básicas de caratê. O teste ANCOVA foi utilizado para a análise de dados, utilizando o software SPSS 24, com um nível de significância de 0,05. Os resultados mostraram que não houve diferença significativa na aprendizagem de habilidades básicas de caratê, mas um efeito significativo foi observado no desfrute das crianças no grupo experimental em relação à atividade física (sig<0,001). Portanto, pode-se concluir que o treinamento de caratê baseado em jogos pode ajudar as crianças a aprender habilidades básicas de caratê tanto quanto o método tradicional e também aumentar seu desfrute na atividade física de maneira mais eficaz.

Palavras-chave: Caratê, Treinamento baseado em jogos, Crianças, Atividade física

ABSTRACT

The purpose of this study was to investigate the effect of game-based karate training on learning basic karate skills and karate children's interest in physical activity. The statistical population of this research included all 6 to 8-year-old female karate players in Sowmeh Sara city, Iran and twenty subjects were randomly selected and divided into two experimental and control groups of 10. The experimental group practiced game-based karate training for eight weeks. The training program was designed based on the principles of the Fundamental stage of the Canadian model of long-term development of athletes (LTAD) for karate sport. Physical activity enjoyment scale in children was used to measure children's interest in physical activity and karate yellow belt test was used for measurement of learning basic karate tasks. ANCOVA test was used for data analysis using SPSS 24 software at a significance level of 0.05. The results showed that there was no significant difference in the learning of basic karate skills, but a significant effect was seen in the enjoyment of children in the experimental group for physical activity (sig<0.001). Therefore, game-based karate training can help children learn basic karate skills as much as the traditional method, and also increase their enjoyment in physical activity more effectively.

Keywords: Karate, Game-based training, Children, Physical activity

Introduction

Practicing martial arts professionally is considered a positive learning milieu for children and youngsters. As an example, the research among the members of European union of physical education association (EUPEA) shows that most of the countries under investigation taught martial arts as a part of their extracurricular P.E courses; because they believed that doing martial arts can enhance pedagogical chances for students and it will increase their physical and psychological health[1]. Therefore, participating in martial arts can be a good replacement for normal physical activities specifically for children because they consider learning martial arts to be more interesting than other types of physical activities. Some children even grow fonder

when they watch movies and animations within which actors do karate, Kungfu or other varieties of martial arts. An interesting measure was taken by some instructors, psychologists and activists in the field of improving life standards using martial arts at the time of encountering youngsters who have social problems and criminal records and it may help them adapt better with the environment preventing them from joining gangs[2,3]. In terms of children with special needs Adibsaber et al[4] conducted a research showing that practicing karate may alleviate cliché behaviors in autistic children.

Grzywacs et al[5] reported that practicing karate has a positive effect on children's behavior without any meaningful differences between genders. Doing karate can develop children's personality and it can cause positive physical activities and growth. Therefore, it is suggested that karate and other forms of martial arts are selected as a part of P.E programs in school. Morales et al[6] conducted a research on the development of martial arts in teenagers claiming that the said has an effect on the growth of children and teenagers. Games and sports can differentiate human's physical behaviors. Games allow children and teenagers to have more physical readiness and skills in different sports[7]. Eather et al[8] showed that game-based activity can improve fundamental movement skills which are signifiers of health and improvement in physical activities. Considering physiological and psychological health of students, and choosing the best GBA is very hard because of the asymmetry in the findings.

Yogi et al[9] showed that exercising judo-based activities in a daily basis may help the learning of basics of Judo along with achieving other physical educational goals for 7-year-old boys and girls. But there was no effect seen on children's motivation and eagerness for physical exercises. The mentioned activities are physiological advantageous because the repetitive metabolic exercises help participants to have higher physical ability. Reviewing previous literature shows that there are discussions about the ways of teaching basics of karate to children. There are documents that shows systematic use of physical games helps children's mental function and health. Sports can be considered as a means of physical growth in children[10]. Sport content and assigning home works accordingly helps children to maximize their physical agility[11].

Games are unique chances to acquire experiences in the long run. Moreover, by designing fighting martial arts, the culture of martial arts will be transferred to the game; bravery, justice, beneficence and compassion of martial arts can be reflected on the game[12]. Experts of field believe that children under ten must not participate in any organized sport. It seems that in order to procure the pre-requisites of professional karate we have to encompass karate driven games so that peripheral learning takes place for this age-group and we can move towards pedagogical and physical aims of karate. This concept is the second phase of LATD, meaning that karate is compatible with basic movements; based on this model all of the exercises of karate kids between 6 and 8 are fun and the improvement of features such as agility, balance, coordination and basic movements is the goal[13]. Based on the literature review it seems that the effectiveness of the practical ways of the enjoyment and involvement of the children has not been investigated yet.

Methodology

The current research adopts a quasi-experimental approach involving both pre-test and post-test assessments. The study population comprises female karate enthusiasts in the age group of 6 to 8 from Sowmeh Sara township in Guilan province. The sample selected for this study includes 20 girls which have the pre-requisites of the study.

Within this stage an announcement was put for the research and the participants were selected based on their personal information via questionnaires; their height, weight and age was assessed and those did not meet the requirements (had problems with age and physical difficulties) were deleted, in the end 20 of the participants who had the requirements were selected randomly from 2 gyms, the mentioned were divided into experimental and control group. At the beginning the consent of the participants were gathered for taking part in the research; a complete description of the study including the goal of the study, time, methodology, and practices was explained to their parents. The experimental group engaged in karate driven exercises (Sundays and Tuesdays) for 8 weeks, and each session was 45 minutes long.

The exercises in the second phase of the study were designed based on the longitudinal development of LTAD; based on this model the goal of the exercises within the age range of this study include enhancing stamina (agility, balance, coordination and speed) and RTJ meaning running, throwing and jumping, the other aims included posture and physical readiness.

Children were encouraged to participate in a range of games and exercises and the chance of practicing the skills was given to them. A fun practicing environment with prefabricated models were used so that children's motivation was kept for participation. Based on LTAD model, at this phase of the study the basic morale of karate, general rules of matches, guards, postures, foot movements, correct breathing, and respecting the opponent was taught and the noteworthy point is that all of the mentioned were devised with the help of fun activities[14].

Game-based practices with the use of instruments such as loop, ball or needle's foam was devised. Exercises like moving over the loop, touching the ball with feet, picking and throwing the ball, jabbing, moving on squares and defending against strikes with foams were practiced. The control group only practiced karate and the complementary exercises were not part of their syllabus.

After 8 weeks a test was taken from both groups for assessing the children's passion for physical activities; the implemented questionnaire was that of Rose et al[14]The mentioned questionnaire is a Likert scale 25 itemed test which has 5 options for each question and is devised to evaluate children's eagerness for:
A) Liking of games and sport B) Liking of physical exertion and exercise C) Liking of vigorous physical activity D) Peer acceptance in games and sports E) Importance of exercise. The reliability of the study was confirmed by Rose and colleagues and it was reported to be more than 0.7 Moreover, the validity of the study was calculated via the use of data driven from this study and Cronbach alpha test was used which yielded 0.811 and was approved. The skill tests of karate including Chudan Tsuki, Mae Geri, Gedan Barai, Jodan Uke and Zenkutsu Dachi were used based on the yellow belt exams of karate and they were ranked by an expert. The evaluation

and performed techniques were based on Kata represented by Karate Federation and this skill test was investigated and approved by several experts and coaches; in previous studies the same methods were used to evaluate karate skills by Bozanic and Beslija in 2010[15].

Results

Based on the results of the study Kolmogorov Smirnoff test was used to assess the normality of the results. SPSS software was used and the probability of 0.5 was the result of the test.

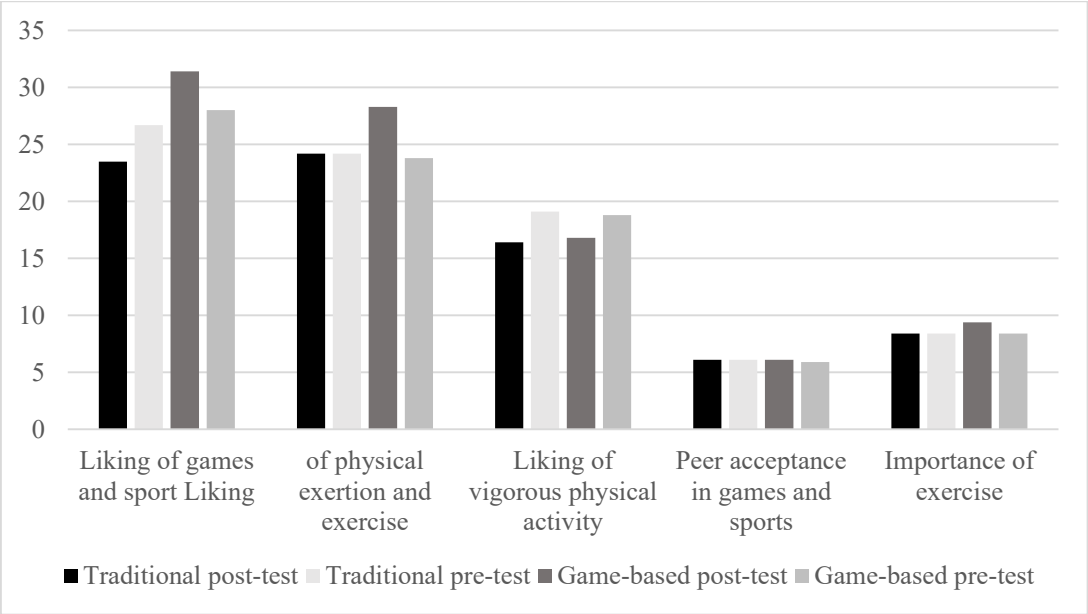

Figure 1: Baragraph children's score in the index related to their eagerness for physical activity
Source: authors

Based on the table above children's scores in 5 categories portrays the amount of their eagerness for physical activity and it shows growth in the experimental group. In reception of the cooperation both groups are the same. It is shown in Figure 1.

Table 1- The effect of game-based instruction on 6 to 8-year-old karate children

Groups	variables	Pre-test		Post-test	
		Mean	Standard Deviation	Mean	Standard Deviation
Mae Geri	*Game-based*	6.72	0.67	7	0.64
	Traditional	6.65	0.87	7.17	0.64
Chudan Zuki	*Game-based*	6.9	0.77	7.27	0.63
	Traditional	6.72	0.91	7	0.64
Gedan Barai	*Game-based*	7.05	0.48	7.27	0.67
	Traditional	6.7	0.46	7.07	0.46
Jodan Uke	*Game-based*	7.07	0.57	7.22	0.59
	Traditional	6.45	0.72	6.8	0.70
Zenkutsu Dachi	*Game-based*	6.85	0.85	7	0.75
	Traditional	6.9	0.78	7.02	0.69

Source: authors

As it is obvious from Table 1 the average of karate tests has not changed meaningfully within the experimental group between pre and posttest.

Table 2 -ANCOVA Analysis

Source	sum of square III	df	mean square	F	Sig
Corrected model	[a]821.431	2	615.712	125.039	0.012
Tracking	51.122	1	71.243	12.385	0.112
Pre-test	124.825	1	124.605	21.518	0.925
group	765.350	1	665.550	331.908	0.875
error	78.771	17	4.051	125.039	
Total	10662.012	20			
Total corrected	1085.120	19			

Source: authors

Within the first line of table 2 the moderated model is placed which is the sum of linear squares without considering the base distance M. it seems that the sigma is a large number therefore the model is not acceptable. There is no meaningful change in the group (sigma is less than 0.001) and therefore the hypothesis is rejected.

Table 3-Standard Deviation and Average of the student's scores on the pre-test and post-tests related to enjoyment of the students

Variable	Group	Pre-test		Post-test	
		Mean	Standard deviation	Mean	Standard deviation
Liking of games and sport	*Game-based*	28	2.66	31.4	1.71
	traditional	26.7	2.16	23.5	2.06
Liking of physical exertion and exercise	*Game-based*	23.8	2.25	28.3	1.49
	traditional	24.2	1.98	24.2	1.98
Liking of vigorous physical activity	*Game-based*	18.8	2.82	16.8	2.57
	traditional	19.1	2.88	16.4	1.77
Peer acceptance in games and sports	*Game-based*	5.9	0.99	6.1	0.87
	traditional	6.1	0.87	6.1	0.87
Importance of exercise	*Game-based*	8.4	0.51	9.4	8.4
	traditional	8.4	0.84	8.4	8.4

Source: authors

As it is obvious in table 3 the average of the participants in the index related to game-based education in pre-test and post-test shows that the number has a meaningful increase, contrasting to the control group within which there is no meaningful increase in the mentioned and index thereto.

Table 4. Regression Covalence and Leven's test

Regression Covalence		**SS**	**Df**	**F**	**Sig.**
	*(pre-test) * (group*)	18.317	1	5.808	0.135
Leven's test	**Df1**	**Df2**		F	**Sig.**
	1	18		7.066	0.116

Source: authors

As it is obvious from table 4, F Coefficients are not meaningful for control group and the pretests. Therefore, the meaningfulness of regression coefficients cannot be seen in dependent variables. We can conclude that there is a correlation between regression coefficients. Considering the fact that one of the conditions of running ANCOVA Covariance is the equality of variance between two groups therefore, Leven's test was conducted and the result thereto can be seen in the following. Considering the amount for sigma which can be seen at the end of the table, it seems that the hypothesis for the equality of variance is rejected because sigma equals 0.988; therefore, the hypothesis is rejected

Table 5-ANCOVA Analysis

Source	**sum of square III**	**df**	**mean square**	**F**	**Sig.**	**Eta Partial Squared**
Corrected model	512.712	2	510.712	126.239	0.000	0.937
Tracking	71.143	1	71.143	17.585	0.001	0.508
Pre-test	123.625	1	123.625	30.558	0.000	0.643
Group	865.550	1	865.550	213.948	0.000	0.926
Error	68.775	17	4.046			
Total	146612.000	20				
Corrected total	1090.200	19				

Note: a. R Squared = 0.937(Adjusted R Squared = 0.929)

Source: authors

Within the first line of table 2 the moderated model is placed which is the sum of linear squares without considering the base distance (μ)**.** It seems that considering the amount of Sigma the model presented is permissible. There is a meaningful difference in this line: sigma equals 0.001 and therefore the hypothesis is confirmed.

The effect size for each e of the variables can be seen in partial eta squared within covariance analysis. The column's amount shows its effectiveness on dependent variables, and the higher the amount the effectiveness will be more. The amount of partial eta squared equals the division of factor analysis to the sum of them.

Table 6. Bonferroni test

		mean difference	Standard deviation of the error	**Sig.[b]**	95% confidence interval for the difference	
					lower bound	upper bound
experiment	*evidence*	*13.175	0.795	0.000	11.489	14.860
evidence	*experiment*	*-13.175	0.795	0.000	-14.860	-11.489

Source: authors

As it is obvious from the table, after the intervention the amount of children's satisfaction has a meaningful increase averaging 13.17; in other words, the game-based instructions have enhanced their eagerness and satisfaction.

Discussion

The present study was conducted to investigate the effect of game-based karate training on learning the basics of karate techniques. The results of this study show that the amount of learning regarding the basics of karate techniques were enhanced in both groups. Although there was no meaningful difference between the post-test of the control and experimental group showing that the intervention did not affect the learning of the afore-mentioned.

Yogi et al contradicted the findings of this research claiming that the basics of Judo movements, like skill and body movement improved after game-based training but the amount of enjoyment did not change which is interestingly the opposite of the findings of the present research[9]. Within this research there is no meaningful difference between the eagerness of the control group from the pre-test and post-test but the experimental group shows a meaningful increase in this regard, therefore the amount of eagerness has increased due to interventions. Previous studies also showed that game-based training of karate can improve physical, socio-psychological and intuitive aspects of children due to the variety within its movements[16,17]. But it seems that more research is needed to investigate the effect of game-based training on learning the basics of karate. Studies conducted by Pinto et al; Andermo; Erickson; Gao, reported that physical activity has positive effect on physical readiness like cardio-respiratory readiness, muscular strength, coordination and the skill of children[18,19,20].

It is noteworthy that the commencement of childhood is the critical period for acquiring and developing movement-based skills[21]. Considering LTAD model, one of the goals of the first three steps is active start and training the fundamentals meaning " the development of fundamental movements and skills needed for sports" which allows the children to move with confidence; due to the amusement prevalence and elongated cooperation in this milieu it has high importance instead of rivalry and development of technical skills[22].

Considering the fact that learning karate and its skills are considered a toiling task, pre-requisites like coordination are expected for their development within short periods of time; therefore, it can be construed that lack of a meaningful in the variable of karate learning is a signifier of elements like shortness of practice period, hardness of karate skills. The results of tests on children's interest towards karate has shown that the game-based instructions enhanced eagerness for physical activity (including eagerness for sports and games, propensity for physical exercises, willingness for regular physical activity, cooperation acceptance inside games, and the perceived importance of the sports); the average of experimental group has been

much higher than the control one in this regard. Obviously the afore-mentioned shows that game-based instruction has enhanced children's willingness for learning karate.

Kuzu and Ural claimed[23] that when instructions and games are combined the learning period becomes more amusing and learner's motivation for learning increases. Wang and Huan concluded that the use of martial arts games can enhance the pedagogical effects very much and it also improves the learner's enthusiasm and willingness for martial arts[12]. More studies like that of Nazario and Viera; Riberio-Silva et al; and Vallence et al concluded that children who take part in organized sports score better in all of the athletic fields required, than their counterparts[24,25,26]. Moreover, Vandrope et al claimed that children who do repeated sports from the age of 6 and/or 7 show better kinesthetic cooperation compared to their peers[27]. The advantages of simultaneous games at the time of learning sport is encouragement for problem solving along with enjoyment and satisfaction[28]. Mostly when we are talking about teaching and learning people are reluctant because the process is repetitive and boring, particularly, in the case of martial arts like karate the seriousness of the sport along with its rules and regulations might become hard for children who have started practicing it. Therefore, implicit learning seems to be a proper alternative which can entail enjoyment within the process of pedagogy[29].

Many children take part in an organized sport as a way of acquiring physical and social skills; as it is obvious sports may help children's physical and nervous development[30]. Recent studies have found a meaningful relation between real competence and perceived competence; children may have certain views about their competence while their competence can be different from their thoughts. Legear et al claimed that the positive intuitions in preschool years are a window of opportunity for learning skills[31,32].

Conclusion

Karate has a varied syllabus; therefore, children would become distraught during its acquisition process; games which are created based on martial arts can solve the mentioned caveats. Children react well to games and they will not understand that they are forming a skill. Acquiring fundamental skill helps children to internalize the mentioned for the rest of their life[23]. Traditional teaching method is boring and this fact is the reason behind the children's reluctance for learning martial arts. In the target population of this study meaning the children aging between 6 and 8 which is determined based longitudinal growth of the fundamentals the techniques must not be taught directly and the FUN aspect is the most important entity; the FUN in **FUN**damental shows its importance. Also, the results of our pre-test showed that games which are designed for teaching karate improve fundamental movements in early ages and the mentioned includes learning techniques which are learnt traditionally and their enjoyment would be heightened too. Generally, game-based instructions can become an auxiliary method of teaching for teachers for the acquisition of desired instructional goals.

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