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Improving Fitness Levels of Teenagers Online Game Addicts with High Intensity Interval Training

Rini Yuniarti [1], Aniek Puspitosari [2*]

Politeknik Kesehatan Kementerian Kesehatan Surakarta Indonesia, Occupational Therapy Study Program

ABSTRACT

Teenagers addicted to online games tend to have low fitness levels. The most effective exercise to increase fitness levels is High-Intensity Interval Training (HIIT) because it is carried out in a short time, is flexible, and causes less injury to the musculoskeletal system. HIIT is a cardiorespiratory exercise that uses aerobic principles to increase fitness levels, especially at the maximum volume of oxygen (VO2max). This study aims to determine the effect of High-Intensity Interval Training on the fitness level of teenagers who are addicted to online games. This research is quantitative research that uses the Pre-Experimental Design type one group pretest-posttest. The sampling technique used is purposive sampling with the number of respondents as many as 25 people. The instrumen used in this research is the Harvard step test. The High-Intensity Interval Training intervention was conducted in 8 sessions for 4 weeks. The data analysis method used is the paired samples t-test. Research respondents based on age were dominated by the late adolescent category (52%), based on the BMI classification dominated by the normal category (60%). The results of the paired samples t-test test obtained sig. 0.000 which means the value of sig. <0.05, it can be concluded that the High-Intensity Interval Training (HIIT) intervention has an effect on the fitness level of teenagers who are addicted to online games.

Keywords: Adolescent, Exercise, Occupational therapy

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CORRESPONDENCE

Aniek Puspitosari

puspitosarimph@gmail.com

INTRODUCTION

Advances in science and technology in this day and age are developing very rapidly and bringing about diverse changes in society. These changes can be enjoyed from children to the elderly. Many of the latest technologies that have emerged such as smartphones and laptops are designed to be more sophisticated to make it easier for people to reach information from several parts of the world that can be accessed using the internet. The current pandemic situation requires most people to be able to access the internet because all activities are carried out online starting from the learning system, work, and other activities are also carried out from home (Rangkuti et al., 2021).

The current generation can be called the post-millennials generation because they can access the internet very easily. The ease of internet access makes online games spread among the public. Online games such

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as Mobile Legend, Arena of Valor, Clash of Clans, Fortnite, Dota 2 and Player Unknown's Battle Ground are entertainment activities that are independent of culture, age and gender (Novrialdy, 2019). Teenagers are the most common age group who experience problems in using online games. This happens because there are still many teenagers who do not understand the dangers of online game addiction (Strittmatter et al., 2015). Adolescents are in the age range of 10-19 years. Adolescence is a transitional period from children to adulthood. At this time adolescents will experience various changes both from the physical, psychological aspects, individual roles or social roles in the family, school and society (Sawyer et al., 2018). Adolescents are more susceptible to online game addiction because adolescence is in a period of instability and easily fall into experimenting with new things (Jordan & Andersen, 2017). Research results at CS Mott Children's Hospital in the United States show that 86 percent of adolescents are addicted to online games and spend too much time playing online games (Republika, 2020). In Indonesia, almost 6% of adolescents have severe online game addiction and more than 22% have moderate online game addiction. The total number of teens with severe and moderate online gaming addiction is almost 30% (Rangkuti et al., 2021). Male adolescents are more likely to experience online game addiction than female adolescents. This happens because male adolescents tend to use online games with higher intensity and consider that online games are entertainment with the challenges contained in online games (Jiang, 2014).

Excessive online gaming activities can have a negative impact on adolescents in terms of health, psychological aspects, academic aspects, social aspects, and financial aspects (King & Delfabbro, 2019). In the health aspect, online game addiction has a very dangerous impact on health, namely exposure to radiation light that can damage the nerves of the eyes and brain, decreased heart health due to staying up 24 hours, kidney and stomach disorders due to frequent sitting, lack of drinking, and forgetting to eat. Teenage online game addicts also have a weak immune system due to lack of physical activity. Teenagers who lack physical activity or exercise tend to have low fitness levels (Mannikko et al., 2015).

Fitness level is an individual's ability to perform daily activities without experiencing excessive fatigue and still have energy reserves to perform activities at other times properly (Aji, 2017). Fitness level is needed as a support for adolescents to be able to carry out daily activities optimally. Adolescents who have high fitness levels will avoid the possibility of injury when doing heavier physical activities or sports. A high fitness level is the initial capital for adolescents to complete productivity activities effectively and efficiently. Fitness level also affects the quality of human resources as expected (Murson et al., 2019).

Online gaming addicts tend to have low fitness levels. This makes them easily tired when doing high-intensity activities such as running, swimming, soccer, jumping rope, or carrying heavy loads (Prosch, 2018). Low fitness levels can also be influenced by foods such as junk food and contemporary drinks such as boba. Another factor that contributes to low fitness levels is the Covid-19 pandemic which forces individuals to do all activities from home such as school, work, shopping, and all other activities are carried out online so that they do not do physical activity. This condition makes most people become bored and get rid of boredom by playing online games (Astuti, 2021). Low fitness levels have a considerable impact on adolescents because they are unable to perform their life roles optimally. Adolescents are also unable to perform strenuous activities resulting in disruption of daily activities.

One way to increase the fitness level of adolescents is by doing physical activity or exercise regularly and correctly (Ramirez-Velez et al., 2016). Physical activity has many health benefits and is an important component of life today as it improves physical fitness and reduces cardiometabolic risk (Lunt et al., 2014). Efforts

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that can be made to increase the fitness level of teenage online game addicts can be done with high-intensity interval training. High-intensity interval training is an exercise that consists of several stages in a short or medium duration with high intensity and each stage is interspersed with rest periods or training with low intensity. This exercise makes the respiratory muscles stronger, the respiratory workload is within reasonable limits and not excessive so that it has a strong endurance and is not prone to fatigue (Windiastoni & Haritsah, 2019). The advantages of this method are that the training time is shorter, flexible, and causes less injury to the musculoskeletal system so it is recommended in adolescence (Nugraha & Berawi, 2017).

A preliminary survey conducted by researchers in Kedondong Village, Demak District, Demak Regency found that 90% of teenagers play cellphones. After in-depth observation, it turned out that 95% of male teenagers installed more than one type of online game application such as Mobile Legend, PUBG, and Free Fire. An interview with one of the teenagers showed that the teenager played games 6 times a day, and once played for approximately 1 hour. The intensity of playing online games is high enough to make these teenagers almost never do sports activities. Besides playing online games, teenagers fill their free time by watching television and sleeping. Here the researcher is interested in inviting adolescents to switch from playing online games to more useful activities such as doing physical activities to maintain body fitness. The reason for doing this research is to find out how physical activity, especially high-intensity interval training (HIIT), affects the fitness levels of teens who are addicted to online gaming.

METHOD

The research design in this study is a type of quantitative research, namely Pre-experimental type one group pretest-posttest design. The population in this study were all male adolescents in the RW I area of Kedondong Village, Demak District, Demak Regency, Central Java, totaling 26 people. The sampling technique used in this study was purposive sampling technique with inclusion criteria set by the researcher, namely (1) Internet Addiction Test (IAT) score of at least 31, (2) No history of respiratory disease, (3) No physical mobility barriers, (4) Willing to be a sample. In this study using primary data collection techniques and conducted directly on the sample. Primary data with IAT instruments and the Harvard Step Test to measure VO2 Max endurance ability. The instrument used in this study, the Harvard step test, is a physical fitness test performed by moving up and down the bench. This test aims to determine fitness level indicators seen from VO2 Max endurance. Interpretation of harvard step test measurements is divided into five categories, namely scores> 90 included in the very good category, 80-89 included in the good category, 65-79 in the moderate category, 50-64 moderate, and <50 less. The data analysis technique uses the Paired T-Test. Data normality test with Shapiro Wilk. This study has obtained a certificate of ethical feasibility from the Health Research Ethics Commission of the Surakarta Ministry of Health Polytechnic with number LB.02.02/1.1/ 6319 /2024.

RESULTS AND DISCUSSION

Research data collection was carried out in August-October 2024. The number of samples in this study amounted to 25. HIIT intervention was carried out with a training frequency of 8 times with a duration of approximately 35 minutes. The procedure for implementing the intervention was carried out in accordance with the High-Intensity Interval Training (HIIT) module that had been given to the research respondents. HIIT intervention consists of 8 types of exercises namely bodyguard, courage, daily burn, frost, fundamentals, hero, instant dungeon, and spectacular me.

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Table 1. Frequency Distribution of Sample Characteristics

Characteristic	n	%
Stages of Adolescense		
Preadolescene (10-13 year)	5	20
Early Adolescense (13-15 year)	7	28
Middle Adolescense (15-19 year)	13	52
Body Mass Index (BMI)		
Underweight (<18.5)	7	28
Normal (18.5-25.0)	15	60
Overweight (25.1-27.0)	3	12
Obesity (>27.0)	0	0

Table 2. Mean Fitness Levels

Mean Pretest	Mean Posttest	Delta
53.80	64.68	10.88

Table 3. Fitness Levels Category

Category	Pretest		Posttest	
	n	%	n	%
Very Good	0	0	0	0
Good	0	0	1	4
Adequate	3	12	13	52
Poor	18	60	8	32
Very Poor	7	28	3	12

Table 1 shows that the characteristics of the sample based on age classification are dominated by the late adolescent category or the age group 16-19 years and the BMI classification is dominated by the normal category.

Table 2 shows that the average fitness level of teenage online game addicts before and after the High-Intensity Interval Training (HIIT) intervention has a difference of 10.88 in the average pre-test score of 53.80 to 64.68 for the post-test score.

Table 3 shows that the fitness level category during the pre-test was dominated by the moderate category (60%), while during the post-test it was dominated by the moderate category (52%).

Table 4. Fitness Level Categories Based on Sample Characteristics

Characteristic	Fitness Level Categories									
	Pretest					Posttest				
	K	S	C	B	SB	K	S	C	B	SB
Stages of Adolescense										
Preadolescene	0	4	1	0	0	0	2	2	1	0
Early Adolescense	3	3	1	0	0	1	2	4	0	0
Middle Adolescense	4	8	1	0	0	2	4	7	0	0
Body Mass Index										
Underweight	2	5	0	0	0	0	2	5	0	0
Normal	2	10	3	0	0	0	6	8	1	0
Overweight	3	0	0	0	0	3	0	0	0	0
Obesity	0	0	0	0	0	0	0	0	0	0

Infromation: K = Very Poor B = Good
S = Poor SB = Very Good
C = Adequate

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Table 4 shows that there are changes in fitness levels at pre-test and post-test based on the characteristics of the respondents. The level of fitness level based on age at the pre-test was 7 respondents in the poor category, 15 respondents in the moderate category, 3 respondents in the sufficient category, and there were no respondents in the good to very good category. The post-test results were 3 respondents in the poor category, 8 respondents in the moderate category, 13 respondents in the sufficient category, 1 respondent in the good category, and no respondents in the excellent category.

The level of fitness level based on Body Mass Index (BMI) at pre-test there were 7 respondents in the poor category, 15 respondents in the moderate category, 3 respondents in the sufficient category, and there were no respondents in the good to very good category. The post-test results were 3 respondents in the deficient category, 8 respondents in the moderate category, 13 respondents in the sufficient category, 1 respondent in the good category, and there were no respondents in the excellent category.

Tabel 5. Normality Test Result

	Saphiro-Wilk		
	Df	**Sig. (p)**	**Information**
Pretest	25	0.248	Normal
Posttest	25	0.162	Normal

Tabel 6. Statistic Test Result

	Paired Sample T-Test	
	n	**Sig. (2-tailed)**
Pretest-posttest	25	0.000

Table 5 shows that the results of the data normality test on the pre-test and post-test have a value of Sig. (ρ) > 0.05 which means the data is normally distributed.

Table 6 shows that the results of parametric output using the Paired Samples T-Test test before and after the High-Intensity Interval Training (HIIT) intervention obtained sig. 0.000 which means the sig value. <0.05, it can be concluded that the hypothesis is accepted.

The results of hypothesis testing using paired samples t-test found that the sig value. 0.000 or ρ <0.05. This is also supported by the difference in mean or different mean before and after the intervention of 10.88 so that it can be concluded that there is an effect of High-Intensity Interval Training (HIIT) on the fitness level of teenage online game addicts.

The provision of HIIT intervention for four weeks has a significant effect in increasing adolescent fitness levels (Prastiwi, 2020) and HIIT is more effective in increasing VO2 Max (Ghurri et al., 2015). HIIT intervention has an effect on adolescent cardiorespiratory (Windiastoni & Haritsah, 2019), besides that HIIT is useful for improving the physical abilities of teenagers during the Covid 19 pandemic (Zulkarnain et al., 2021).

Teenage online game addicts tend to have low fitness levels because they rarely do sports or physical activity. The way to increase the fitness level of adolescents is with HIIT training. This exercise can be done in a short time, is flexible, and has less injury effect on the musculoskeletal system so it is effectively given to adolescents (Nugraha & Berawi, 2017). HIIT training is suitable for adolescent online game addicts because adolescents are productive age so they need good endurance. This can be done by maintaining fitness and health. HIIT training if done regularly and continuously will make the heart muscle work stronger so that the resting

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pulse rate becomes lower (Windiastoni & Haritsah, 2019).

The intervention in this study was conducted for 4 weeks with a frequency of 2x/week. The HIIT exercises provided consisted of 8 types of exercises namely bodyguard, courage, daily burn, frost, fundamentals, hero, instant dungeon, and spectacular me. Each type of exercise consists of several movements. The main movements of HIIT training are push-ups, squats, sit-ups, punches, lunges, high knees, climbers, planks, jumping jacks, and leg raises. The movements of this exercise can increase fitness levels by spurring the heart to work harder. This will make lung functional capacity and alveoli efficiency cause oxygen exchange and distribution to increase (Windiastoni & Haritsah, 2019). During the rest period high-intensity training will make the muscles perform metabolic waste and changes in intensity will increase VO2max.

HIIT training can increase fitness levels by increasing mitochondria in skeletal muscle, and increasing oxygen uptake in the lungs (Fleg, 2016). This exercise trains the body to work at a high level for a short period of time in order to push or exceed the anaerobic threshold before returning to an aerobic state. HIIT training can increase stroke volume when the ventricles are contracting because venous return and heart muscle contraction work optimally. This makes the heart muscle contract more strongly and produces more stroke volume. In addition to increasing stroke volume this exercise can also increase heart rate. An increase in heart rate and stroke volume will make cardiac output also increase. The increase in stroke volume, heart rate, and cardiac output after HIIT intervention has a significant effect in increasing the fitness level of teenage online game addicts.

The role of occupational therapists in this study is to help adolescent online game addicts in health management. Activities can be done by providing physical activities such as push-ups, sit-ups, planks, jumping jacks, and other movements that are effective for increasing fitness levels. Increasing fitness levels will make adolescents realize that physical activity is very important in welcoming adolescent life in the future. Occupational therapists can provide education about the negative impact of online game addiction so that adolescents are able to reduce the intensity of playing online games and more often do sports or physical activity. It is hoped that after this study, adolescents who are addicted to online games will be more concerned about fitness and health so that they can do strenuous activities without experiencing significant fatigue.

CONCLUSION

The provision of HIIT intervention affects the fitness level of teenage online game addicts. The intervention provided in the form of exercises to increase VO2max with the types of exercises bodyguard, courage, daily burn, frost, fundamentals, hero, instant dungeon, and spectacular me. The effect of HIIT in increasing fitness levels is due to several activities contained in the intervention such as push-ups, squats, sit-ups, punches, lunges, flutter kicks, front kicks, and high kness. The exercises performed can increase leg hand muscle strength, physical fitness, burn calories, improve body balance, endurance, maintain physical fitness, and increase endurance.

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