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DIFFERENCES OF THE EFFECT OF AEROBIC SPORTS ON COGNITIVE FUNCTION BETWEEN SMOKING AND NON-SMOKING STUDENTS AT DAYA UTAMA SMA, BEKASI 2017

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Abstract. In Indonesia, there are 20% of adolescents aged 13-15 years who smoke. The results of a survey conducted by Global Youth Tobacco in 2009 revealed that three out of ten children aged 13-15 years in Indonesia (30.4%) already smoked, and (19.4%) started smoking at the age of 10 years. Based on data from the 2017 Daya Utama High School counseling vulnerability map, it is known that of the 216 male students in Class X – XII, 35 of them have smoking cases in the school environment, and have academic achievements that are less than the KKM, for this reason, it is necessary to think about efforts to improve the cognitive function of students so that academic achievement can be improved. One of these efforts is exercising. The purpose of this study is to provide preventive and coaching efforts to adolescents to avoid smoking and increase physical/sports activity. The technique of assessing students' cognitive abilities uses the Backward Forward Digit Span method, which is to assess short-term memory for 3 days with methods test and posttest. Research results Based on the results of the T test on smokers and non-smokers for 3 measurements, pre-test and post-test, the statistical test results obtained a Pvalue = 0.000, meaning that at 5% alpha it can be concluded that there is a significant difference between pre- and post-test cognitions. on smoking students and non-smoking students in the first, second and third day measurements. From the results of this study, it is recommended that the smoking ban continue to be enforced and pursued because the impact of smoking is not only physically damaging to the body but also reduces cognitive abilities, which will also affect learning achievement.

Keywords: backward forward digit span; short-term memory.

INTRODUCTION

In Indonesia, 20% of adolescents aged 13-15 years are active smokers WHO (2009). The results of a survey conducted by Global Youth Tobacco in 2009 revealed that three out of ten children aged 13-15 years in Indonesia (30.4%) already smoked, and (19.4%) started smoking at the age of 10 years, WHO (Sime, 2019), Smoking in schools is a phenomenon that is often encountered, one of which is in New Zealand, although the ban on smoking in schools has been carried out, students still find smoking in the school environment (Lovato et al., 2010); (Thomas, McLellan, & Perera, 2013). While in Bekasi City in 2015 data was obtained that 30% of the 194,907 high school students equivalent were active smokers, KPAD (Gomez et al., 2015); (Müller et al., 2016). Above problems, it is necessary to think about efforts to improve the cognitive function of students so that academic achievement can be improved. One of these efforts is exercising.

METHODS

Quasi-experimental design quasi-experimental is a study that tests an intervention on a group of subjects with or without a comparison group but is not randomized to include subjects in the treatment or control group. Saryono (2013). The research design used is the Non-equivalent control group design, which is almost the same as the pretest-posttest control group design, only in this design the experimental group and control group are not chosen randomly. The study used quantitative data with pre and post tests. In the design of this study, researchers intervened in groups of smokers and non-smokers. The effectiveness of the treatment was assessed by comparing the pre-test and post-test (Cope, 2015).

The design scheme of pre and post test without control group is as follows:

1. Smoker
2. Group Non Smoker Group

Description :

X : 12 minute running aerobic intervention

A1 : Cognition scores in smokers and non-smokers before getting a running aerobics intervention.

A2 : Cognition scores in smokers and non-smokers after getting a running aerobics intervention.

RESULTS AND DISCUSSION

A. ANALYSIS TEST

Descriptive analysis is a method of analysis by describing or describing the data that has been collected as it is without making conclusions that apply to the public or generalizations. In this study, trials were conducted on 70 respondents with the criteria of 35 smokers and 35 non-smokers with age characteristics between 13-18 years and the same treatment was carried out, namely low-impact aerobics such as running with the following results:

Table 1. Age Characteristics of Respondents

Variable	N	Mean	Median	SD	Min	Max
Respondent Age	70	16.37	16.50	0.705	15	17
Variable	**N**	**Mean**	**Median**	**SD**	**Min**	**Max**
Respondent Age	70	16.37	16.50	0.705	15	17

Table 2. Differences in Aerobic Mileage Running for 12 minutes on Smokers and Non-Smokers

No	Variable Distance Running	Days 1		Day 2		Days 3		N	%
		F	%	F	%	F	%		
1.	**Smoker**								
	400 meters	5	14.3	1	2.9	3	8.6	35	100
	600 meters	29	82.9	32	91.4	28	80.0		
	2000 meters	1	2.9	2	5.7	4	11.4		
2.	**Non-Smoker**								
	2000 meters	20	57.1	14	40	16	45.7	35	100
	2400 meters	8	22.9	14	40	2	5.7		
	3000 meters	7	20.0	7	20	17	48.6		

B. UNIVARIATE ANALYSIS

The smoking behavior of respondents was analyzed using a questionnaire from the Glover Nilsson Smoking Behavioral Questionnaire (GN-SBQ).

Table 3. Distribution of behavioral descriptions of smoking students at SMA Daya Utama Bekasi

Category	Smoker	%	Non-	%
< 12 Mild **(mild)**	3	8,58	35	100
12-22 Moderate **(Medium)**	5	14.3	-	
23-33 Strong **(High)**	24	68,6	-	-

>33 Very Strong (**Very High**)	3	8,5 8	-	-
TOTAL	**35**	**10 0%**	**35**	

Table 4. Results of Measuring Cognitive Ability Pre & Post Aerobic Running on Smoking Students at SMA Daya Utama

Category of assessment of cognitive function (weighted score table)	**Day I**		**Day II**		**Day III**	
	Pre	**Post**	**Pre**	**post**	**Pre**	**Post**
0 – 5 (Low)	19	9	9	7	3	2
6 – 11(Medium)	16	26	26	25	30	17
12 – 17(High)	-	-	-	3	2	16
TOTAL	**35**	**35**	**35**	**35**	**35**	**35**

Table 5. Cognitive Measurement Results Pre & post Aerobic running in Non-Smoker students at SMA Daya Utama

	Day I		**Day II**		**Day III**	
Category	**Pre**	**Post**	**Pre**	**Post**	**Pre**	**Post**
0**– 5 (Low)**	6	-	3	-	-	-
6 – 11 (Medium)	29	31	29	26	24	7
12 – 17 (Height)	-	4	3	9	11	28
TOTAL	**35**	**35**	**35**	**35**	**35**	**35**

C. BIVARIATE ANALYSIS

Table 6. Results of Different Test Scores for Pre Test and Post Test Aerobic Running on the Effect of Cognitive Function on Students Smoking

Paired Samples Test
Paired Differences

				95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Smoker Cognition First Day Pre Test - Post Test	-1.371	731	.124	-1.623	-1.120	-11.098	34	000
Smoker Cognition Second Day Pre Test - Post Test	-1,314	1,231	.208	-1,737	-891	-6.315	34	.000
Third day Smoker's Cognition Pre Test -Post Test	-3.001	1.668	-8.615	34	.282 -3.001	000	Information:	
					-.1.856			

n

Table 7. Results of the Difference between Pre Test and Post Test Aerobic Running Scores on the Effect of Cognitive Function on Non-Smoker Students

Paired Samples Test								
	Paired Differences					T	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Non Smoker Cognition First Day Pre Test - Post Test	-2.429	1.577	-9.110	34	.267 -2.970 -.1.887	000	Cognition	of
Non Smoker Second Day Pre Test - Post Test	-1.800	1.907	.322	-2.455	-1.145	-5.585	34	000
Cognition Non-Smoker Third day Pre Test - Post Test	-2.629	1.457	.246	-3.129	-2.128	-10.674	34	.000

D. Age description of SMA Daya Utama respondents, both smokers and non-smokers.

Based on the research results, the average respondent was 16.37 years old with a median value of 16.50 years, the standard deviation of the respondent's age was 0.705 and the maximum age was 17 years. This condition implies that smokers and non-smokers at SMA Daya Utama, Bekasi are teenagers who are still in their productive period (Cope, 2015);

(Moraschini, 2016); (Cavalca et al., 2013). This condition implies that smokers and non-smokers at SMA Daya Utama, Bekasi are teenagers who have good physical work ability (fitness). Where that age is a productive age with activities that produce something positive or good and teenagers in this condition have good physical fitness to carry out daily activities, especially in the teaching and learning process at school. Activities and sports can affect the cognitive function of respondents.

E. Description of Running Aerobic Mileage Ability in Daya Utama High School Students, both smokers and non-smokers .

The results of measuring the aerobic running mileage for 12 minutes which lasted for three days, smoking students had shorter running distances compared to non-smokers (Sutfin et al., 2011), smokers students only able to complete the average distance of 600 meters as many as 31 students and only 4 students who were able to complete the distance of 2000 meters on day 3, while the non-smoking students on average were able to run a distance of 2000 meters as many as 16 students, and 17 students able to run a distance of 3000 meters on day 3, these results indicate that non-smoking students have a better physical fitness condition than non-smokers (Sabanayagam & Shankar, 2011), so non-smoking students are able to complete a longer running distance in 12 minutes. in the learning process and the acquisition of final grades.

F. Overview of smoking behavior on SMA Daya Utama students, both smokers and non-smokers

From the results of the above study, it can be concluded that the factors of friends and smoking environment can affect the desire to smoke, smoking activity is what is needed for most students, namely 68.57% because can increase their self-confidence, this must be watched out for by the school because the effect will be able to affect other friends, even 3 students or 8.57% expressed their desire to immediately smoke when they come home from school, and even though at school there are rules not to smoke. allowed to bring, store or even smoke, but

They are looking for opportunities to smoke outside the school building, this is very worrying because students who are addicted to smoking have a score that is less than the minimum completeness criteria determined by the school.

G. The effect of aerobic exercise on cognitive function between smokers and non-smokers at SMA Daya Utama Bekasi.

The results showed that there was a difference in the mean value between the pre and post cognitive ability measurements, there was an effect of running aerobics on cognitive function in smoking students with three measurements (Moore, Dickson-Deane, & Galyen, 2011). Statistical test results obtained a P value 0.000. Meanwhile, for non-smoking students with three first, second, and third measurements in the pre-test and post-test (Lorensia, Muntu, Suryadinata, & Septiani, 2021); (Habibi et al., 2018), the statistical test results

obtained a Pvalue 0.000, it can be concluded that physical exercise, one of which is running, can affect students' cognitive abilities. used as a basic reference in the program of organizing exercise or sports at school (Gopalan, Bakar, Zulkifli, Alwi, & Mat, 2017), because with physical sports, one of which is running can help improve cognitive function abilities, and of course it can also stimulate concentration in learning so that it can improve student achievement.

Table 8. Post aerobics Running on students

Differences	results who	aerobics		
		of	cognition	Table
smokers	Pre	5.09	7.03	9.26
	Post test	6.46	8.34	11.69
Non smoker	Pre test	7.09	9.60	11.31
	Post test	9.51	11.40	13.94

Based on Table 8, it shows the average result or mean value of the results of the first day of pre-test cognition in smokers 5.09, and 7.09 in Non-smokers, the second day of the pretest on smokers showed the mean value of 7.03 and non-smokers 8.34, while the results of the third day of cognition assessment for smokers were 9.26 and non-smokers 11.31, it can be concluded that the average value of cognition assessment in smokers gets a value lower scores and non-smokers have higher scores. So from the results of this study, it can be a reference for schools to be stricter in enforcing smoking bans and even cracking down on every smoking student because this can affect their cognitive abilities, so it is feared that it will also affect their learning concentration and reduce their academic achievement.

The results of the post test assessment of cognition on the first day for smokers have an average of 6.46 and 9.51 for non-smokers, on the second day the average cognition value for smokers is 8.34 and for non-smokers 11.40, on the third day the average value for smokers' cognition obtained a value of 11.69 and for non-smokers 13.94, from these results it can be concluded that in smokers the post-test cognition assessment results are lower than non-smokers, by doing sports one of which is running during the learning process, it is expected to be able to improve students' cognitive abilities so as to

stimulate also concentrate on studying.

From the results of this cognitive assessment, it is clear that smoking can affect a person's cognitive abilities, one of which is in the form of short-range memory abilities, so this should be a concern because adolescents are assets that should have a soul with a higher level of fitness and higher cognitive abilities. so that it is expected to produce high achievements in various fields.

CONCLUSIONS

Based on the results of the study, the conclusions that can be drawn in this study are as follows:

1) The results showed the characteristics of the respondents were on average 16 years old and had aerobic ability to run an average of 1457 meters for 12 minutes, students who smoked were only able to do aerobics running with the distance of 600 meters was 31 people (88.6%), this is lower than the distance that was able to be done by non-smoking students who were able to do aerobics running with a distance of 2000 meters as many as 20 people (57.1%). 2) There is an effect of cognitive function on pretest and post-test aerobic running for 12 minutes on smoking and non-smoking students at SMA Daya Utama. 3) There is a difference in the Mean value in the assessment of cognitive abilities between smoking and non-smoking students in both the Pre-test and Post-test. 4) Smoking students have a mean or average value of cognitive ability that is lower than the ability of cognitive scores in non-smokers, so it can be concluded that smoking can affect cognitive scores resulting in decreased concentration which affects academic achievement.

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