

**Physical Activity As A Predicting of Lower Body Mass Index****Dedy Apriliansyah¹, Nugroho Susanto^{2✉}, Hesti Yuningrum³**Post Graduate of Public Health, Faculty of Health Science, University of Respati Yogyakarta, Yogyakarta, Indonesia¹Lecturer of Public Health, Faculty of Health Science, University of Respati Yogyakarta, Yogyakarta, Indonesia²³**Article History**

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Mass Index**Abstract**

The study aims to determine predicting factors main increasing physical activity on weight loss for students. The factors influence obesity is low physical activity, related lifestyle due to technology development. Physical activity for adolescents is a strategy to prevent non-communicable diseases through weight loss mechanisms. The study design is were used a cross sectional design. The sample size is 115 samples. Sampling was collected by systematic random sampling. The study research variables include physical activity variables divided into two indicators are learning activities and recreational activities. BMI variables divided weight and height. Data analysis was carried out by analyzing linear regression tests to see predictions of increased physical activity. Average of physical activity 743.21 ± 505.37 , and BMI is 22.30 ± 4.89 . Learning activities had a dominant impact on BMI compared to body weight and height. Increasing activity for 209 minutes have been predicting weight loss 1 kilo in a week. Increasing physical activity for 236 minutes every day can reduce BMI by 1 point. The Learning physical activity significantly reduces body weight and BMI but does not significantly reduce body height. Physical activity for 209 minutes every day can predict weight loss of 1 kilogram in a week.

How to Cite

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INTRODUCTION

World Health Organization (WHO) estimated in 2016 that 1.9 billion people in the world aged >18 years who were overweight and obese, as 2021 estimated 650 million people. In 2021 were estimated around 350 million children will be obese (Manetti 2016). In Indonesia of 2018 estimated the incidence of obesity 31.1% (Harbuwono et al. 2018) (Bejarano et al. 2022). The factors influence obesity is low physical activity, low activity caused obesity (Cisek-Woźniak, Mruczyk, and Wójciak 2022). The low physical activity related changes of lifestyle due to technology development caused obesity (Tiusanen et al. 2022). Low of physical activity caused children are not doing physical activities such as running, jumping, and doing other movements. These activities have been replaced with games that involve less body movement, such as playing the computer, watching television, using a smartphone for a long time without having to do physical activity (Gualdi-Russo, Rinaldo, and Zaccagni 2022).

Based previous study that the learning physical activity averaged 27.7 ± 24.8 hours (Tiusanen et al. 2022). Previous Study (Tiusanen et al. 2022) that average BMI is 25.1 ± 4.1 kg/m². Study (Gualdi-Russo et al. 2022) that average BMI is 22.5 ± 3.8 . Physical activity for adolescents is a strategy to prevent non-communicable diseases through weight loss mechanisms. Study (Cisek-Woźniak et al. 2022) shown that average BMI 28.07 kg/m². The incidence of children with overweight is 5.7% and obesity is 3.5% (Bejarano et al. 2022). Body movements produced by skeletal muscles that expend energy include everyday physical activities such as work, play, and household chores, and anything involved in recreational activities. Based previous study (Suhartono and Astiarani 2022) with article review shown that increase BMI significant decreasing serum vitamin D level.

The technological advances that adolescents full time for playing computers, smartphones and also watching TV resulting in low of physical activity. This situation caused increasing in overweight and obesity. Previous study (Gwinnutt et al. 2022) concluded that physical exercise improves body weight. Study (Hao et al. 2022) that physical activity loses weight ($\beta = -0.11$, $P < 0.01$), physical activity significantly reduced BMI ($\beta = 0.57$, $P < 0.01$). Factors such as stress, anxiety, depression are factor related BMI. Based previous study (Dewi, Tenggara, and Hasan 2021) shown that stress, depression and anxiety factors are significant increasing obesity $p < 0.001$.

Problem solved effort to reduce obesity can

be done by increasing physical activity, especially for adolescents as an effort to burn fat in the body. Preventive efforts to reduce the impact of obesity on ongoing diseases such as cardiovascular disease are carried out with physical activity, especially for adolescents. Study (Lavie, Ross, and Neeland 2022) that physical activity decreased lose weight in a long time through could cardiovascular disease prevented. Study a few countries such as America, Poland, Belarus state that physical activity significantly reduces body weight (Król et al. 2022) (Wijayatunga et al. 2022). The study aims to determine predicting factors main increasing physical activity on weight loss for students.

METHODS

The study design is were used a cross sectional design. The study population is active students carrying out lectures at Respati University, Yogyakarta. The sample size is 115 samples. Sampling was collected by systematic random sampling. The variable in this study were physical activity and Body Mass Index. The study research variables include physical activity variables divided into two indicators are learning activities and recreational activities. Body Mass Index variables divided weight and height. Measurement of physical activity was carried out by adopting the Global Physical Activity Questionnaire (GPAQ) instrument. Body weight measurement using digital scales. Measurement of body mass index by measuring the ratio of height and weight. The instruments for occurred physical activity using the Global Physical Activity Questionnaire (GPAQ) questionnaire. The instrument to measure Body weight using GEA digital weight scales and measuring height with a stadiometer. Includes a physical activity questionnaire consisting of 16 statements. The distribution data normal were analysis with one sample kolmogorov-smirnov test. Data were analysis with Data were analysis by linear regression tests to see predictions of increased physical activity.

RESULTS AND DISCUSSION

The study was conducted on 115 research subjects who include in inclusion and exclusion criteria of the study. Based on the characteristics of variables as shown in the following table 1.

Based on table 1, that shown that the average of physical activity variable is 743.21 ± 505.37 , for the learning indicator the average was 583.13 ± 358.73 , and recreation was 159.21 ± 292.96 . Based on the Body Mass Index variable, that the avera-

ge BMI is 22.30 ± 4.89 and average height 158.45 ± 7.08 , average of body weight 56.02 ± 13.19 . To find out the relationship between physical activity variables and BMI as shown in **Table 1.** below.

Table 1. Description of Variable Characteristic Physical Activity and Body Mass Index

Variable	Total (n)	Mean \pm SD Frekuensi (%)
Physical Activity	115	743.21 \pm 505.37
Learning	115	583.13 \pm 358.73
Recreation	115	159.21 \pm 292.96
BMI	115	22.30 \pm 4.89
Body High	115	158.45 \pm 7.08
Body weight	115	56.02 \pm 13.19

For analysis prediction physical activity were predicting lower Body weight with regression analysis show **Table 2.**

Table 2. shows that learning activities significantly contribute to body weight and BMI, while learning activities have no impact on height. Recreational activity has no significant impact on body weight, height and BMI. Based on the total physical activity score, it was found that physical activity was significantly contributed BMI, but had no significant effect on body weight and height. Based on the contribution of regression analysis, it was found that learning activities had a dominant impact on BMI compared to body weight and height. Study was predicting that increasing activity for 209 minutes per day can predict a weight loss of 1 kilo in a week. Increasing physical activity for 236 minutes every day can reduce BMI by 1 point.

Based physical activity variable that point of learning activity average 583.13 ± 358.73 and point recreational activity average 159.21 ± 292.96 . Low physical activity caused to increasing protein levels in blood due related low of weak combustion in the body. This situation caused high rates of obesity, especially in adolescents. The Study in accordance state of WHO 2021 report (Manetti 2016) that 350 million children will be obese. Student activities are more frequent in watching television or playing games, which causes low activity compare higher activity for student.

Previous study (Tiusanen et al. 2022) that physical activity average 27.7 ± 24.8 hours per week can significantly reduce BMI. Physical activities and sports can be done at home by watching videos. Physical activities using tools such as skipping ropes, barbells or treadmill. Study (Jerome et al. 2022) shown that in women and men, physical activity significantly reduces BMI for women $p = 0.013$ and for men $p = 0.014$.

The study was showed that the average BMI was 22.30 ± 4.89 . The Study compare with other study that lower average BMI (Tiusanen et al. 2022) was 25.1 ± 4.1 kg/m², but with (Cisek-Woźniak et al. 2022) higher average BMI was 28.07 kg/m². The study showed that the average BMI was lower when compared to previous studies. This situation related sample this study collage. Other situation compare higher average BMI caused sample study subject with risk of disease.

The study conducted on children by (Bejarano et al. 2022) that children with overweight estimated were 5.7% and obesity were 3.5%. Study (Sembiring, Rosdewi, and Yuningrum 2022) that 27.0% of subjects who are obese caused whose physical activity is low classified. Subject with obesity related mal food consumption, but low activity. Previous study shown that low activity main factors contributed for obese. Study addressed that obese related low physical activity.

Based on predicting analysis shown that physical activity 209 minute every day during week predict could weight loss of 1 kg. The study equivalent with previous (Tiusanen et al. 2022) that physical activity 27.7 ± 24.8 hours per week could significantly reduce BMI. The student physical activity caused energy burning in muscles related be reducing mass in the muscles. The physical activity every day for energy burning such as work, play, and household chores, and anything involved in recreational activities. This study in accordance with other study (Gwinnutt et al. 2022) concluded that physical exercise improves body weight. The study (Hao et al. 2022) shown that who conducted study in China that physical activity can reduce body weight ($\beta = -0.11$, $P < 0.01$). physical activity significantly reduced BMI ($\beta = 0.57$, $P < 0.01$). The study (13) that increasing physical activity for 3 months can reduce BMI 1.6 kg/m².

Table 2. Relationship between Physical Activities with Body Mass Index

Variable	Body Weight			Body Hight			BMI		
	R2	Beta (β)	p	R2	Beta (β)	p	R2	Beta (β)	p
Learning	0,044	-0,209	0,012	0,000	0,009	0,461	0,56	-236	0,006
Recreation	0.001	0,024	0,400	0,016	0,125	0,092	0,000	-0,016	0,433
Total activities	0,018	-0,133	0,078	0,006	0,080	0,198	0,031	-0,176	0,030

The Weight loss or weight gain could be seen from two approach such as input and output aspects. The input aspect is more focused on food consumption and output aspect the utilization of muscle components for energy burning. In food consumption important aspect is high consumption of energy related increase mass in muscles. The previous study (Nymo et al. 2022) that high energy consumption and low activity caused increased body weight $p < 0.001$. Consume healthy and nutritious vegetables and fruit, reduce consumption fast food or instant food and reduce consumption of drinks containing soda. Previous study that no significant relationship between eating behavior and nutritional status in toddlers. Study (Izhar 2020) shown that consumption of fast food significantly increases body weight. This situation requires early monitoring of nutritional status so that early prevention efforts of disease (N Susanto 2020). In output aspect, through the energy burning system gives an illustration that physical activity can burn fat in the body.

The previous study (Specht, Heitmann, and Larsen 2022) shown that low physical activity significantly increased BMI by 3.4 cm (95% CI: 2.8;4.0). The study (Drenowatz et al. 2022) conducted school students showed that low physical activity significantly increased body weight $\beta = -0.008$; $R^2 = 0.241$. The Study (Jerome et al. 2022) that physical activity is significantly related to BMI in adolescents $p = 0.012$. Study (Jensen et al. 2022) that training in learning / cognitive activities significantly reduces body weight by up to 13% $p = 0.042$. The Study (Cisek-Woźniak et al. 2022) that there is a significant relationship between physical activity and body weight $p = 0.000$.

Body weight loss is more effective with output system related lipid burning for fat component in the muscles through physical activity. The Previous study (Bejarano et al. 2022) who conducted on children that physical activity significantly reduced obesity (aOR=0.53, CI: 0.15, 1.81) and reduced body weight (aOR=0.75, CI: 0.33, 1.70). The study (Ługowska, Kolanowski, and Trafialek 2022) conducted on children that the incidence of overweight can be reduced through physical activity. The Study (Król et al. 2022) conducted in Poland that walking physical activity can reduce body weight $p = 0.000$. The Study (Wijayatunga et al. 2022) conducted in the United States that physical activity significantly reduced body weight by 8.3 kg (95% CI = -15.20,-1.40).

The technological development addressed are a factor that increased body weight, especially for adolescents. The technology developed make teenagers spend more time sitting for hours playing computers, smartphones and also watching TV, re-

sulting in a lack of physical activity such as playing soccer or doing other sports activities. Adolescents with physical activity that long times and continues have been negative impacted on health. In other hand characteristic factors are also important related health problems (Susanto et al. 2022).

The Preventive Efforts to improve body weight normal status conditions. It's situation efforts one of prevent disease conditions from developing in a worse direction. Body weight gain is a risk factor for various diseases, especially non-communicable diseases such as hypertension, cholesterol and cardiovascular disease. This situation in line previous study (Gualdi-Russo et al. 2022) that the average BMI is 22.5 ± 3.8 . Physical activity for adolescents is a strategy to prevent non-communicable diseases through weight loss mechanisms. Study (Lavie et al. 2022) that physical activity caused weight losing in a long time which can prevent cardiovascular disease. Preventive efforts are an important factor in reducing the disease risk (N Susanto 2020). The body weight main factor caused various diseases related to blood circulation such as cholesterol, gout and hypertension. The Study (Nugroho Susanto 2020) conducted cholesterol that cholesterol is related to the incidence of gout.

CONCLUSION

The study concluded that learning physical activity significantly reduces body weight and Body Mass Index but does not significantly reduce body height. Physical activity for 209 minutes every day can predict weight loss of 1 kilogram in a week.

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