

An Analysis of Physical Activity, VO₂ Max, and Daily Activity of Senior High School Students and West Java PPLP (Training Center) Students

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Abstract: Physical activity is one of the things that affect one's fitness. Lack of physical activity and low levels of fitness in adolescents at the senior high school level have an impact on their low fitness levels at the college level. The presence of athletes at the senior high school level or at the pre-teaching program (PPLP) is interesting and therefore research on the level of physical activity and VO₂ Max between senior high school students and PPLP students in West Java was conducted. The sample in this study consisted of 46 high school students (average age, height and weight) and 46 PPLP students (average age, height and weight). The samples' physical activity was identified through the International Physical Activity Questionnaire (IPAQ) whereas VO₂ Max was identified using 2.4 KM Cooper test. This research is descriptive, so there was no treatment and the data retrieval was only conducted once. Overall, male students possessed the average Body Mass Index (BMI) of 21.80 ± 3.79 . The average score of physical activity of male students during high school is 1520.80 ± 1444.50 and at TPB 2330.00 ± 1800.77 . High school students' VO₂ Max is average. The level of physical activity of PPLP students is higher than that of senior high school students; VO₂ Max is similar to the results of physical activity—it is higher in PPLP students. However, the additional data in this study shows that the high school students have longer duration of playing games online and sitting done than PPLP students. On the other hand, PPLP students have a higher duration of sleep than high school students have.

1 INTRODUCTION

Indonesia is currently preparing to enjoy demographic bonuses in which the number of people with productive ages is far more than the non-productive ages. This can really be a bonus if only our productive age community is truly productive. Literally, productive means having a good level of fitness, physical and psychological health, which in turn, will support a person to be able to work longer without experiencing significant fatigue. The current development forms new habits for us and the existence of various technologies facilitate someone to unconsciously have less physical activity.

The examples of the positive effects of physical activity include bone health, reducing the risk of

obesity, preventing cardiovascular disease, and improving physiological health (Sarah et al., 2013). The danger of low physical activity is increasingly widespread. WHO revealed that the lack of physical activity became one of the biggest causes of death, following high blood pressure and smoking (Baumann, 2005). From childhood to mature age, having physical activity is important so as to overcome the lack of movement in children and adolescents in order to facilitate the prevention of the risk of lifestyle diseases that are increasingly prevalent in children and adolescents (Telama et al., 2005). Our physical level of activity can be a key determinant of the life quality in the future. Lack of physical activity will increase the risk of heart disease, breast cancer, diabetes mellitus, high blood pressure, osteoporosis, anxiety and depression

(Harold et al, 2013). The 2009 Centers for Disease Control and Prevention (CDC) and WHO reported an increase in the prevalence of cardiovascular and metabolic diseases such as high blood pressure, stroke, obesity, and diabetes mellitus in children and adolescents. Several related studies have succeeded in identifying the factors that cause obesity in children and adolescents, including the consumption of foods that contain excessive high calories and less physical activity levels (Rivera et al., 2009).

Other impacts of physical activity do not only affect physical factors but also other factors. Ecological factors are generally used to examine physical activity carried out in certain places (Sallis et al., 2006). Other factors include socio-ecological factors, where participation factors in physical activity research are generally aligned with intrapersonal, interpersonal, organizational, environmental and local regulatory factors in the place (Sallis et al., 2006). Participation in sports and physical activity has various benefits for adolescents, including increasing the ability to learn, physical health, mental health, cooperation, discipline, leadership and socialization (Field, Diego, and Sanders, 2001). Indeed, a person's level of physical activity is influenced by many factors, one of which is life habit, especially with the current changes in the school curriculum and playing habits which are responsible for students' lack of movements. Games played by the children to adolescents have even shifted toward the digital ones. This has become one of the causes of low level of the first-semester students' fitness in ITB (Didi Sunadi, 2017). Data from the Basic Health Research in 2018 shows that the level of physical activity of Indonesian people is classified as moderate. Physical activity became the spotlight in the United States in 2000, when low physical activity resulted in the increase of obesity rate. The data was the basis for America to intensify the promotion of various types of sports in order to increase public interest in sports and increase physical activity.

Improvement in physical activity is the basis to improve one's fitness. The basic component of physical fitness is cardiorespiratory endurance, where maximal oxygen uptake or VO₂ Max becomes the main standard for evaluating it (Baumann, 2005). VO₂ Max is the maximum oxygen volume a person can consume in a matter of minutes and is usually relevant to body mass. Therefore, the VO₂ Max size unit is ml / kg / minute.

The purpose of this study is to determine the extent of differences in physical activity and VO₂

Max of high school students and of pre-teaching program students who are vulnerable to their age in their adolescent category. Then, other items are added, such as daily habits, to determine differences in lifestyle that are the basis for analysing the final results of differences in physical activity and VO₂ Max high of school students and pre-teaching program students.

2 RESEARCH METHOD

In this study, data were collected from 46 high school students and 46 pre-teaching program students. High school students were selected from various regions in West Java, while pre-teaching program students were selected from pre-teaching programs in West Java province (the students come from different regions). The range of age is limited to 14 to 18 years old. In taking physical activity data, the International Physical Activity Questionnaire (IPAQ) was used. The questionnaire is divided into 12 core questions to determine the level of physical activity of a person. Other questions such as the duration of sleep, study, and playing online game were also added in the questionnaire to support the data. The anthropometric testing includes height and weight. The VO₂ Max test used the 2.4 KM cooper test method.

3 RESULTS AND DISCUSSION

3.1 Result

In testing physical activity, the sample were asked to fill in a questionnaire consisting of initial biodata. From the biodata, it can be seen that the average age of high school students is 16.2 years while pre-teaching program students is 15.7 years. Furthermore, from anthropometry tests which obtained data on height, weight, and Body Mass Index (BMI), the average height of high school students' is 168.1 cm while it is 168.4 cm for pre-teaching program students. The next test is IPAQ which produces data called Metabolic Equivalent (METs). There is a significant difference on the high school students' and pre-teaching program students' METs; the high school students' METs is 3520 while the pre-teaching program students' reach 6137. In the questionnaire, there are questions which are aimed to find out the daily activities' samples

such as the duration of sleeping, sitting, and playing online games. From these questions, there are significant differences, especially in the duration of playing online games, which is 112 minutes per day for high school students while it is only 70 minutes for the pre-teaching program students. However, between high school students and pre-teaching program students, there is no significant difference in the duration of sitting and duration of sleep. The duration of sitting for high school students is 294 minutes per day whereas pre-teaching program students have 215 minutes per day. The last set of tests is VO₂ Max, and it was found that high school students get a VO₂ Max score of 37.8 and 49.6 for the pre-teaching program students. These differences fall into the significant category. The data can be seen in the Table 1.

Table 1: Differences of change in each variable in PPLP and Senior High School.

Measurement	PPLP	Senior High School
Age	15.7 (± 1.40)	16.5 (± 1.01)
Height	168.4 (± 9.0)	168.1 (± 6.1)
Weight	62.3 (± 12.1)	58.5 (± 11.1)*
BMI	22.3 (± 7.3)	20.9 (± 3.7)
VO _{2max}	49.6 (± 6.8)	37.8 (± 8.3)*
Total METs	6137.01(±2969.2)	3520.2(±2774.3)*
Sitting Time	214.5 (±103.5)	294.5 (±175.3)
Sleeping Time	466.9 (± 88.4)	455.6 (± 96.4)
Duration of Playing Game Online	70.01 (± 62.93)	113.9 (± 97.1)*

*Significant level at $p < 0.05$

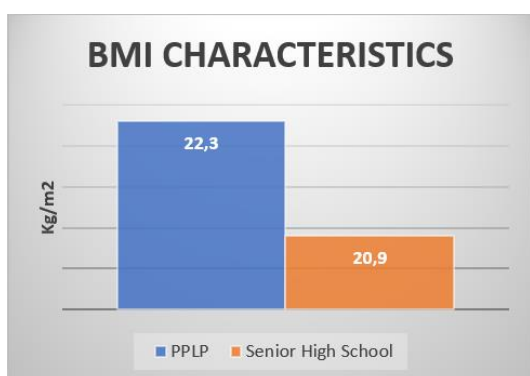


Figure 1: BMI Characteristics

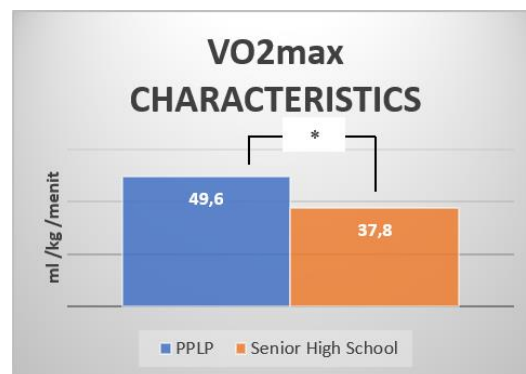


Figure 2: VO₂max Characteristics

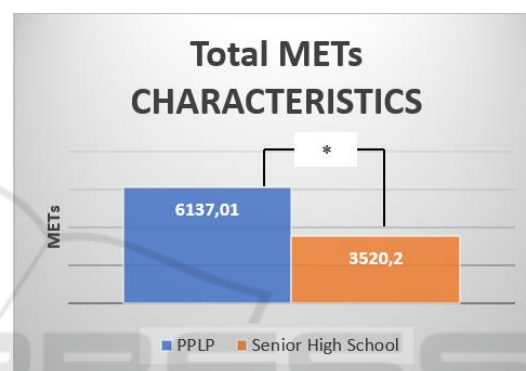


Figure 3: Total METs Characteristics

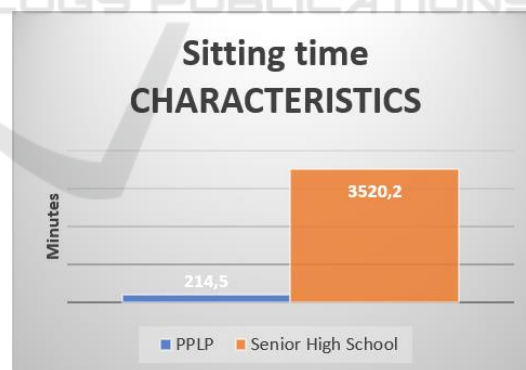


Figure 4: Sitting Time Characteristics

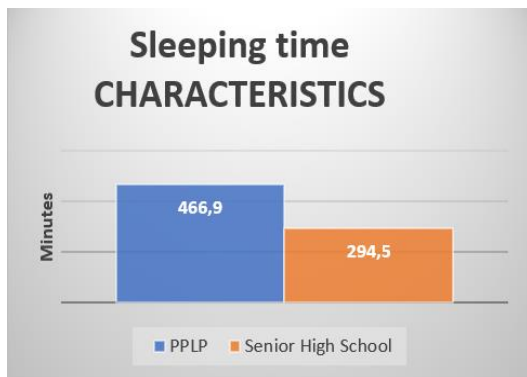


Figure 5: Sleeping Time Characteristics

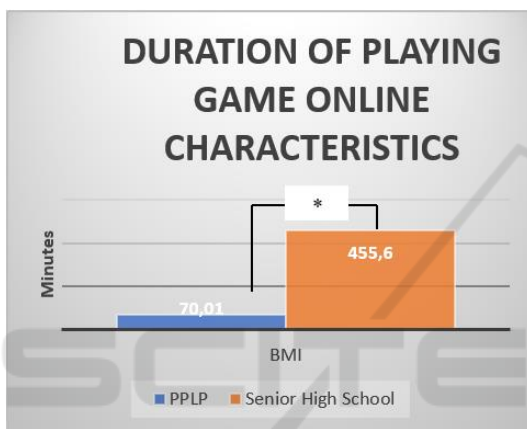


Figure 6: Duration of Playing Game Online Characteristics

3.2 Discussion

Based on the data obtained in this study, it can be concluded that the fitness of pre-teaching program (PPLP) students is higher than that of high school students. That is because the level of physical activity that is significantly different is better for the PPLP group. Basically, PPLP students are early age athletes who still have to attend compulsory training at the high school level, which results in a better level of VO₂ Max. What is interesting in this study is the relationship between their obligations as young athletes and students with their daily activities as a teenager. Therefore, data showing the duration of sleeping, sitting and playing online games are displayed. Research on adolescents is always related to social context, time management habits, and physical education and sports (Eime et al., 2010). When compared with the results of previous studies, the VO₂ Max of PPLP students have no significant difference with early basketball athletes who are still

students. Both of them are still obligated to learn and to become a young athlete. Young athletes still have time to increase their VO₂ Max level when they pass through the youth phase, at their age, when they are focused on improving their technical skills to understand the game's strategy (Carvalho, 2013). In that way, the VO₂Max standard level of PPLP students is still sufficient for their age, but it should be noted that the VO₂ Max threshold at the early age is appropriate to the branch of the sport type itself. Regardless of their status as students, students of athletic sports, especially long-distance running, must have a good VO₂Max given that the athletes will compete with physiological characteristics that require cardiovascular endurance, or much depend on the ability of the athletes' VO₂ Max.

There is no significant difference between the Body Mass Index of high school students and that of PPLP students regardless of the finding which shows that the BMI of PPLP students is higher. This is due to their greater muscle mass. Some young athletes in weight lifting also basically have high BMI characteristics (Anderw, 2006). In line with the results of previous studies in Yogyakarta, there is no significant differences between the BMI of high school students and that of PPLP students (Rahmawati, 2006).

The data show that the duration of sleep of PPLP students is higher compared to that of high school students, whereas the duration of sitting and playing online games is higher in the high school group. That is due to the PPLP group's obligations both as an early age athlete and a student which require them to spend their time on practicing and studying. Therefore, they tend to spend their free time by sleeping. On the other hand, the high school student group mainly spend their time in the classroom and when they have free time, they spent it by playing online games. However, their low level of VO₂ Max is not merely based on their different backgrounds, but it is because the physical activity habits in which they spend too much time sitting and playing online games. Nonetheless, the average of entire sample in this group is neither the twelfth-grade students nor those who run their final year before graduation. The majority of high school focus on preparing students to face the final exam when they are on their last year, by changing the curriculum, even eliminating sports subjects. This is something that needs to be considered especially by the curriculum team at school. The impact of the curriculum change is the low physical activity and low VO₂ Max level. This is in line with the finding of research conducted at ITB in 2017, that freshmen

in the first semester have a lower fitness level than the sophomores. This is because since they are at the twelfth grade until they are at the college, they do not get any subjects related to sports or other heavy physical activity. The existence of this research is expected to be one of the evaluation materials for curriculum in schools or programs in the pre-teaching program.

4 CONCLUSIONS

After analyzing the data, it can be concluded that there are significant differences in body weight, VO₂ Max, level of physical activity, and duration of playing online games. PPLP student groups are higher in body weight, VO₂ Max level, and physical activity level, whereas high school students have higher duration of playing online games. The linkage of data between physical activity and VO₂ Max level shows that the level of physical activity is directly related to VO₂ Max level, even though the level of physical activity is related to the duration of playing online games, those who have a low level of physical activity have a high level of duration of playing game online. It is hoped that the results of this research will be taken into consideration in the preparation of curricula or policies relating to sports and health.

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