

# The Relation between Sedentary Behavior and Physical Activity and Junior High School Adolescents Nutritional Status in Purwosari Health Center Surakarta

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**Keywords:** Sedentary behavior, physical activity, nutritional status

**Abstract:** Nutrition is more than a pathological condition; there is excessive fat accumulation from normal body function needs. Factors causing overweight include genetic, environmental, psychological, physiological, eating patterns, physical activity, economy, and sedentary behavior. Based on the results of the 2016 obesity examination in Surakarta, the highest number was in Purwosari Public Health Center, which was 445 people, and the results of 2017 overweight screening obtained obesity data in four junior high schools with 92 students. The prevalence of overweight and obesity in adolescents aged 13–15 years in Surakarta (10.9%) was above the provincial prevalence (9.5%); moderate sedentary behavior 3–5.9 hours (57.1%) was above the average in Central Java; and physical activity (26.5%) was classified as less active. This study aims to analyze the relationship between sedentary behavior and physical activity and overweight status in adolescents in junior high school Purwosari Public Health Center Surakarta. The study belongs to quantitative observation with cross-sectional approach. The research population is junior high school students (ages 13–15 years) in the area of Purwosari Community Health Center as many as 520 students. The study sample was 107 students selected using proportionate random sampling. Data was analyzed using chi-square test. The results showed that there was a relation between sedentary behavior ( $p = 0.032$ ) and physical activity ( $p = 0.023$ ) and nutritional status in adolescents in junior high school in the area of Purwosari Public Health Center, Surakarta City.

## 1 INTRODUCTION

Overweight is more a pathological state, where there is excess fat accumulation than is needed for normal body function. Overweight that occurs in adolescents, resulting in teenagers having less confidence (Marmi, 2013). The Qur'an Surah Al-A'raaf verse 31 mentions the command to eat and drink is not excessive manner, meaning that it is not to exceed the limit and it is proportional (balanced) in eating and drinking.

WHO (World Health Organization) states that in 2016, more than 340 million children and adolescents aged 5–19 years are overweight or obese. According

to Riskesdas data (2013), overweight status of adolescents in Indonesia aged 13–15 years is 10.8% (8.3% fat and 2.5% obese). Meanwhile, the nutritional status of adolescents aged 13–15 years in the province of Central Java has overweight prevalence according to BMI / Age at the provincial level of 9.5% (7.1% overweight and 2.4% obese) and Surakarta (10.9%), which were above the provincial prevalence.

Factors causing overweight include genetic, environmental, psychological, physiological, developmental factors, dietary patterns (nutrient intake), physical activity, and economy (Sutanto,

2010). Another cause is sedentary behavior. It is a relaxed behavior that is often carried out such as watching TV, surfing the internet, playing mobile phones, doing assignments with a computer, playing games, but not including bedtime (Ministry of Health, 2013).

The average proportion of sedentary behavior in Central Java is in the category of 3–5.9 hours (43.2%), while that in Surakarta is above the Central Java average (57.1%). Besides sedentary behavior, other physical activities also need more energy, such as walking, running, and exercising (Haskell et al., 2007). The proportion of physical activity is classified as "less active" in Central Java is 20.5%; while the data found in Surakarta (26.5%) is above the Central Java average.

Based on the data from the Surakarta City Health Office, from the number of obesity examinations in 2016 at seventeen health centers, the highest number of obesity was in Purwosari Health Center (445 people). The results of a preliminary study conducted through nutritional screening in four junior high schools at Purwosari Health Center in 2017 revealed that 92 students are overweight. Based on these, it is necessary to conduct research that discusses "The Relation between Sedentary Behavior as well as Physical Activity and Nutritional Status in Adolescents in Junior High School in Purwosari Public Health". This study aims to analyze the relation between sedentary behavior and physical activity and nutritional status in adolescents in junior high school in the area of Purwosari Public Health Center, Surakarta City.

## 2 SUBJECTS AND METHODS

The research is a quantitative observation with a cross-sectional approach. This study was conducted in May-June 2018. The population were adolescents (ages 13-15 years) totaling 520 students consisting of State Junior High School 2 Surakarta are 244 students, Regina Pacis Junior High School Surakarta are 169 students, and Al-Mu'ayyad Junior High School Surakarta are 107 students. The sample of this study was 107 students, which were selected using proportionate random sampling technique. The primary data were obtained from filling out questionnaires, namely ASAQ questionnaire (Adolescent Sedentary Activity Questionnaire) and PAQ-A questionnaire (Physical Activity Questionnaire of Adolescent). Univariate analysis was employed to describe the variables studied by calculating the frequency distribution. Bivariate

analysis is useful to determine the relation between the independent variables (sedentary behavior and physical activity) and the dependent variable (nutritional status) using Chi-Square statistical test with a significant level of  $\alpha = 0.05$  (95% confidence level).

## 3 RESULTS

### Characteristics of Respondents

The characteristics of the respondents analyzed included gender, age, school origin, genetic history with nutritional status, and family history with nutritional status.

Table 1. Frequency Distribution of the Respondents' Characteristics

Characteristics of Respondents	Total	
	n	%
<b>Sex</b>		
Male	41	38,3
Female	66	61,7
<b>Age</b>		
13 year	94	87,9
14 year	10	9,3
15 year	3	2,8
<b>Mean</b>	13,17	
<b>Std.Dev</b>	0,43	
<b>Min-Max</b>	13 – 15	
<b>Origin School</b>		
2 State Junior High School Surakarta	50	46,7
Regina Pacis Junior High School Surakarta	35	32,7
Al-Mu'ayyad Junior High School Surakarta	22	20,6
<b>Genetic History With Overweight Status</b>		
Yes	71	66,4
No	36	33,6
<b>Family History With Overweight Status</b>		
Father	29	40,9
Mother	38	53,5
Both	4	5,6

Based on Table 1 that included a total number of 107 students, it is known that the majority of the respondents was female, as many as 66 students

(61.7%). The highest number of age group who took part in the study was 13 years, as many as 94 students (87.9%). Based on the grouping of school origins, the respondents whose numbers most participated in this study were State Junior High School 2 Surakarta which was as many as 50 students (46.7%). Most of the respondents had a genetic history with Overweight status that came from parents or grandparents, namely as many as 71 students (66.4%). The family history with overweight status came from mothers, namely 38 students (35.5%).

### Univariate Analysis

Univariate analysis was used to describe the characteristics of the respondents, sedentary behavior, physical activity, and nutritional status. The results of the analysis are presented in table form as follows:

Table 2. Respondents' Frequency Distribution Based on Sedentary Behavior, Physical Activity, and Nutritional Status

Research Variable	Frequency (n)	Percentage (%)
<b>Sedentary Behavior</b>		
High (> 8 hours/day)	53	49,5
Low (≤ 8 hours/day)	54	50,5
<b>Physical Activity</b>		
Low (≤ median 56)	56	52,3
High (> median 56)	51	47,7
<b>Nutritional Status</b>		
Obesity	23	21,5
Fat	34	31,8
Normal	50	46,7
<b>Total</b>	<b>107</b>	<b>100</b>

Frequency distribution is based on sedentary behavior, in that more respondents have low sedentary behavior, as many as 54 students (50.5%). Meanwhile, in terms of physical activity, more respondents, 56 students, had low physical activity (52.3%). The frequency distribution based on nutritional status shows that the majority of respondents achieved normal status, as many as 50 students (46.7%) and obese, as many as 34 students (31.8%).

The variable of sedentary behavior consists of 11 behaviors grouped in 5 dimensions filled by respondents for 7 days (a week). The following is a table of dimensions of sedentary behavior:

Table 3. Dimensions of Sedentary Behavior

Dimensions of Sedentary Behavior	Frequency (n)	Percentage (%)
<b>Small Screen Recreation(SSR)</b>		
High (>2 hours/day)	92	86
Low (≤2 hours/day)	15	14
<b>Education</b>		
High (>2 hours/day)	43	40,2
Low (≤2 hours/day)	64	59,8
<b>Travel</b>		
High (>2 hours/day)	43	40,2
Low (≤2 hours/day)	64	59,8
<b>Culture Activities</b>		
High (>2 hours/day)	72	67,3
Low (≤2 hours/day)	35	32,7
<b>Social Activity</b>		
High (>2 hours/day)	99	92,5
Low (≤2 hours/day)	8	7,5

Based on the dimensions of sedentary behavior in Table 3, the most frequently done by respondents is the Social Activity dimension with a high category (> 2 hours / day), by 99 students (92.5%).

The activities included relaxing by using mobile phone (for example calling). In addition to the Social Activity dimension, respondents also often carry out various activities in more than 2 hours / day (high category), namely in the Small Screen Recreation (SSR), done by 92 students (86%), and Culture Activity dimensions by 72 students (67.3%).

### Bivariate Analysis

Bivariate analysis showed the results of statistical tests of the relation between sedentary behavior and nutritional status. The following table shows the relation between sedentary behavior and nutritional status:

Table 4. Relation between Sedentary Behavior and Nutritional Status

Sedentary Behavior	Nutritional Status						Total	p-value	Pearson Correlation
	Obese		Fat		Normal				
	n	%	n	%	n	%			
High	14	26,4	21	39,6	18	34	53	0,032	0,223
Low	9	16,7	13	24,1	32	59,2	54		

Based on Table 4, overweight and obese respondents had more high-risk behaviors (> 8 hours / day), which were 14 students (26.4%) and 21 students (39.6%), respectively. Meanwhile, respondents with normal nutritional status were more likely to carry out low sedentary behavior (≤8 hours / day), which was 32 students (59.2%).

Based on the results of statistical analysis, the p-value is 0.032 (p-value <0.05). Thus, H0 is rejected, which shows that there is a relation between sedentary behavior and overweight status in adolescents in the Junior High School Purwosari Public Health Center Surakarta. While the Pearson Correlation (r) shows the value of 0.223, meaning that the closeness level of the relationship is weak, that is, between the coefficient intervals of 0.200-0.399. The following table shows the relation between physical activity and nutritional status:

Table 5. The Relation between Physical Activity and Nutritional Status:

Physical Activity	Nutritional Status						Total	p-value	Pearson Correlation
	Obese		Fat		Normal				
	n	%	n	%	n	%			
Low	17	30,4	19	33,9	20	35,7	56	0,023	0,265
High	6	11,8	15	29,4	30	58,8	51		

Based on Table 5, obese and fat respondents had more low physical activity, done by 17 students (30.4%) and 19 students (33.9%), respectively. Meanwhile, respondents with normal nutritional status had more high physical activity, done by 30 students (58.8%).

Based on statistical tests obtained, the p-value was 0.023 (p-value <0.05), then H0 is rejected, which shows that there is a relation between physical

activity and nutritional status in adolescents in junior high school Purwosari Public Health Center Surakarta. While the Pearson Correlation (r) value was 0.265, meaning that the closeness level of the relation is weak, that is between the coefficient intervals of 0.200-0.399.

## 4 DISCUSSION

### Relationship between Sedentary Behavior and Nutritional Status

The results of this study indicate that the percentage of students who are overweight (obese and fat) in performing high-risk behaviors (> 8 hours / day) is greater than students who perform sedentary-random behavior (≤8 hours / day) (66%). Based on the results of statistical analysis, the p-value is 0.032 (p-value <0.05), H0 is rejected, which shows that there is a relation between sedentary behavior and nutrition status in adolescents in the Junior High School Purwosari Public Health Center Surakarta. Meanwhile, the Pearson Correlation (r) value was 0.223, meaning that the closeness level of the relationship is weak, that is, between the coefficient intervals of 0.200-0.399.

This research is in line with the research of Kurdaningsih (2016), in Yogyakarta State High School, concluding that there is a relation between sedentary lifestyle and overweight incidence (p-value <0.001). The results of the Stettler et al., (2002) study shows that adolescent sedentary behavior is one of the risk factors that can cause adolescents to experience degenerative diseases, diabetes mellitus, obesity, and daily disorders (insomnia, dizziness and aging). The incidence of overweight reduced the energy expenditure in the body.

Besides, the addition of food intake often occurs while doing sedentary behavior. Studies conducted by NHANES III show that there is a positive relation between the increasing food intake and the length of time watching television, which is one of sedentary behaviors (Brown, 2011). This is in line with Waters' theory, et al. (2010), which states that children with growth period tend to have high sedentary behavior.

The results of this study indicate that the Social Activity dimension in the high category (> 2 hours / day) is the most frequent activity done by respondents with overweight status (fat and obese) and normal nutritional status, that was 99 students (92.5%). Teens who sit idly playing their mobile phone released lower energy. If this condition continues, it can cause obesity. Therefore it is necessary to exercise to create

an energy balance in the body and facilitate the process of fat oxidation, thereby minimizing the chances of obesity (Amini et al., 2016). Research Lowry et al. (2002) and Gomez et al., (2007) also found that watching TV > 2 hours / day causes the risk of obesity and overweight. This SSR (Small Screen Recreation) activity can affect body weight and metabolism if done in the long term.

The results of the study showed that the sedentary behavior of respondents was included in the high category (> 8 hours / day), so it is important to reduce sedentary behavior, especially in Social Activity activities (playing with mobile phone). Counter measure can be taken by doing hobbies and playing/practicing musical instruments. Adolescents (middle and high school) have a longer school duration and shorter interaction. Besides, they prefer to stay at home to play electronic devices and books (Roemling, C and Qaim M, 2012).

Therefore, there is a need for changes (reduction of time) related to sedentary behavior in several ways, especially when staying at home. The time for watching television can be reduced by limiting the screen time (TV or computer) to children, such as no more than 2 hours / day. Another alternative is making the children's room free of TV and internet or not placing them in their room (Cheung, L., 2012).

High sedentary behavior can also be influenced by a lack of parental supervision of children's television viewing time and a lack of knowledge about the benefits of exercise. One strategy that can be done to reduce the prevalence of sedentary behavior in over nutritional status of the students is by increasing their physical activity (Waters, et al., 2010).

Another solution is to encourage children to do more physical activity outside the home such as cycling, jogging, and jumping rope. These can strengthen their heart and lungs. In addition, adolescents are also encouraged to walk or ride more frequently, especially in close proximity than using two-wheeled vehicles (motorcycles). This is in line with the research of Kurdaningsih et al., (2016) which states that teenagers who go to school or go close by walking or cycling are not at risk of becoming overweight and obese.

## **The Relationbetween Physical Activity and Nutritional Status**

The results of this study indicate that the percentage of students who are overweight (obese and fat) in carrying out low physical activity (64.3%) is greater

than students who do high physical activity. Based on the results of the statistical analysis, the p-value is 0.023 (p-value <0.05). Thus, H<sub>0</sub> is rejected, showing that there is a relation between physical activity and nutrition status in adolescents in junior high school Purwosari Public Health Center Surakarta. Meanwhile, the Pearson Correlation (r) value was 0.265, meaning that the closeness level of the relation is weak.

This result is in line with the research of Huriyati, E., et al (2004), who concluded that there is significant relationship between physical activity and the occurrence of obesity in junior high school adolescents in Yogyakarta City and Bantul Regency. The results of this study support the theories and hypotheses arguing that physical activity is related to the state of being overweight.

The relation between physical activity and the incidence of overweight is related to the imbalance of energy usage. The rest of the energy in the body due to a person's low physical activity will change to body fat and then associated with overweight (Atkinson, 2005).

This study is in line with the research of Ortega et al. (2007) that children and adolescents with low levels of physical activity are more at risk of overweight or obesity and have a higher risk of greater waist circumference. This is reinforced by the results of other studies that show that children who do not routinely do sports or physical activity have a chance of over nutrition risk of 1.35 times compared to children who regularly exercise (Sartika, 2011).

Therefore, children with overweight status, especially obesity, tend to have low activity. According to Brown (2011), based on NHANES I, II, and III data, a decrease in physical activity can increase the prevalence of over nutrition in children compared to increased energy intake. Physical activity depends on the type, frequency, intensity and duration (Almaeida and Blair, 2002). The more physical activity carried out, the more energy needed by the body, thereby more nutrient intake is needed (Irianto, 2014).

Parenting patterns in physical activity affect that in children. According to Brown (2011), a strategy that parents must have in increasing children's physical activity may include providing good examples of physical activity that involves the children; encouraging children to do physical activities at home, at school, and when they are with friends; limiting the duration of children taking non-physical activity.

Frequent daily physical activity is a factor preventing from the increase of body weight and

abdominal adiposity in children (Abril et al., 2013; De Bourdeaudhuij et al., 2013 in Lee, S.T et al., 2015). Strong et al., (2005) recommend physical activity for children aged 5-18 years, that is to do moderate to weigh physical activity at least 60 minutes every day. Hence, it is necessary to improve the habits of physical activity in adolescents, by way of routinely exercising every weekend with the family. Physical activity in adolescents is significant in creating healthy lifestyle that will continue to their adulthood.

The National Physical Activity Guidelines in Australia and the World Health Organization (WHO) have recommended physical activity that can be carried out for children and adolescents with ages ranging from 5-17 years, including physical activity at moderate intensity for 60 minutes every day (basketball, soccer, swimming, weight lifting, cycling, dancing, tennis, climbing stairs, etc.) as well as physical activities that can strengthen muscles and bones, at least 3 times a week (WHO, 2018).

Meanwhile, according to the Ministry of Health (2018), the duration of physical activity carried out regularly at least 30 minutes a day can nourish the heart, lungs, and other body organs. The more time used for physical activity, the more benefits obtained. Further, physical carried out every day regularly within 3 months will produce good results.

Therefore, children's awareness of physical activity is influenced by the family and school environment. Hence, physical activity needs to be increased at home and at school, both in terms of frequency and duration, especially by children who are overweight and obese. Physical activity can be done by exercising. Teenagers can do anykinds of exercise according to their favor and the time they have.

Similarly, teachers have authority over the students' activities at school, for example by giving at least 1 lesson to exercise to increase students' physical activity. Basically, it is very important for individuals to maintain ideal body weight to optimize their health status. Therefore, school-based intervention is an alternative to overcome obesity in children.

## 5 CONCLUSION

There is a relation between sedentary behavior and over nutrition status in adolescents in junior high school in Purwosari Surakarta Public Health Center work area (p-value = 0.032). There is a relation between physical activity and overweight status in

adolescents in junior high school in the area of Purwosari Public Health Center, Surakarta City.

For teens, they are recommended to do more activities outside the home, such as jogging and jumping rope. And it is recommended to walk or ride more often, especially in close quarters, rather than using two-wheeled vehicles (motorcycles). Teenagers should help parents more in doing household chores rather than lingering in front of the cellphone screen. And they should also make changes related to sedentary behavior by limiting or setting a time limit in doing activities, such as watching TV, using a computer / laptop (surfing the internet) more than 2 hours / day, as well as playing with cellphones, etc. It should be carried out by particularly those who are obese to further increase physical activity, both in terms of frequency and duration. They should perform physical activities at moderate intensity for 60 minutes every day (such as basketball, soccer, swimming, lifting weights, cycling, dancing, tennis, etc.), and do physical activities that can strengthen their muscles and bones at least 3 times a week (such as running or jogging, jumping rope, push-ups, aerobics, lifting weights, martial arts, sports with racquets, etc.). Besides, they can do any kind of sports that they like and then adjust the activities to the time they have.

At schools, primary prevention can be done by conducting health promotion about healthy lifestyles in adolescents and their parents. The school can work with related parties, such as local health centers to weigh and routinely measure the height of the students every 6 months. This way, they can monitor the growth and weight gain of students on a regular basis through the School Health Unit program. The school can provide education on the importance of modification of physical activity as well as encouraging the students to increase it.

For health centers, it is best to supervise the School Health Unit in monitoring nutritional status regularly. The next researchers can do further research on other factors (such as knowledge, pocket money, peer support, etc.) that relate to the incidence of overweight and overweight and obesity status in junior high school adolescents with more research subjects.

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