

## The Relation of Physical Activity with The Quality of Sleep in Adolescents at The Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta

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### ABSTRACT

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Sleep is a basic human need, where sleep for every human being will be different for adolescents, needing to sleep around 7-9 hours / day. Adolescents are a group at high risk of experiencing problems in their sleep as a result of damage due to physical activity. There are several factors that can cause the quality of sleep is not disturbed, and physical activity is associated with the disruption of sleep quality. Knowing the relationship between Physical Activity and Sleep Quality in Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta. This research is a quantitative study with a cross sectional design, the population in this study was 80 foster children in Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta. The sample in this study using purposive sampling, amounting to 35 respondents. The instrument in this study used the International Physical Activity Questionnaire (IPAQ) and the Pittsburgh Sleep Quality Index (PSQI). Data were analyzed using the Chi-Square test. There are several factors that can cause the quality of sleep to be disturbed, and physical activity is suspected to be associated with disturbed sleep quality. The results showed that there was a relationship between physical activity and sleep quality in Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta. With the results of the correlation test using the Chi-Square test  $p = 0.01$  (value  $< 0.05$ ). That most of the foster children with high activity with good sleep quality were 1 (2.85%) and 25 (71.4%) had poor sleep quality. These results indicate that there is a significant relationship ( $p < 0.05$ ) between physical activity and sleep quality. There is a Relationship between Physical Activity and Sleep Quality in Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta.

## INTRODUCTION

Physical activity is a body movement produced by skeletal muscles that require energy to do it (1). Physical activity according to the Indonesian Ministry of Health (2) is very important for maintaining physical and mental health and maintaining the quality of life to stay healthy and fit throughout the day. Physical fitness that is obtained from physical activity is very influential in work productivity and learning, because regular physical activity helps in thinking, learning, and making decisions (1).

Sleep is one of the basic human needs. The need for sleep is needed after a tired day of activities and the body will automatically respond by giving a signal to rest hardinge & shock, (2001: 65) in (3). The human body has a limit in its activities, if it has reached the limit, the energy in the human body will decrease and humans will feel tired. When experiencing fatigue, a person must sleep to recover his energy so that the body can be optimal for activities the next day. The need for adequate sleep is determined by the quality and quantity of sleep which is influenced by several factors, such as disease, exercise and fatigue, psychological stress, medication, nutrition, environment, and motivation (4).

Sleep is a basic human need, where sleep is an activity that is considered a simple activity and does not require special attention. Sleep needs of every human being will be different for adolescents needing sleep around 8-9 hours / day. The National Sleep Foundation (NSF) recommends 7-9 hours of sleep. The duration of sleep that is fulfilled properly will bring positive benefits for health. During sleep, all vital body functions are reduced, the metabolic rate is lowered, tired body cells are used during activity to be repaired, and energy is restored, John, Sutton, & Webster, (1962: 215) in (3). Conversely, the quality of sleep that is not maintained will have a negative effect on the body. Excess or lack of sleep can both be harmful to health. People who lack sleep have a greater risk of experiencing congestive heart failure, which is a condition where the heart experiences weakness in pumping blood throughout the body, causing an imbalance in the body and will damage other organs (4).

The National Institute of Health concluded that the group at high risk for sleep disorders is adolescents. This is evident because in adolescents there are dramatic changes in sleep-wake patterns including insufficient sleep duration, delayed sleep time, and

differences in sleep patterns on weekdays and weekends, so the quality of adolescent sleep tends to decrease (5). Compared to other age stages, adolescent sleep patterns are also different because at this stage of growth and development there are hormonal changes and shifts in circadian rhythms (4).

From the results of interviews conducted by researchers in October with 11 orphans at the Islamic Orphanage RM Suryowinoto Yogyakarta, there were 11 people. Based on a preliminary study as many as 8 foster children said they felt tired and tired with the dense activities of both at home and academic activities, they said that during the pandemic schoolwork increased and piled up so that sometimes they could not complete assignments on time. Meanwhile, 3 children said that they could sleep well and the activities they did were not busy every day, only when they got pickets at the institution and when they had assignments from school, they felt tired and tired. They said that at 22.30 WIB the majority of them could not sleep because they had to do their assignments, whereas they had to wake up at 03.00 WIB because the activities at the institution would start at 3 am, so they slept for about 5 hours where the sleep needed was 8 hours / day for school. they often feel sleep deprived and cough while studying, doing activities at the institution or during school activities. From the results of the interview it can be concluded that the high activity of the students was not accompanied by adequate or ideal sleep time. From the results of this study, the researcher is interested in further examining the relationship between physical activity and sleep quality in foster children at the Orphanage Orphanage Putri Islam RM Suryowinoto Yogyakarta. The purpose of this study was to determine "the relationship between physical activity and sleep quality in foster children at the Orphanage Princess Islam RM Suryowinoto Yogyakarta".

## **METHOD**

This research is a quantitative study using a cross section design. The instrument in this study used the International Physical Activity Questionnaire (IPAQ) and the PSQI Questionnaire (Pittsburgh sleep quality index). IPAQ consists of 7 questions consisting of strenuous physical activity, moderate physical activity, activities carried out in walking, and activities while relaxing or sitting. Physical activity carried out within the duration of

the last 7 days (7). The IPAQ is suitable for adults between 15 and 69 years of age and is most widely used for population surveillance of physical activity levels. The total value of physical activity can be calculated by (metabolic equivalent) MET minutes / week. Heavy activity duration data were multiplied by MET = 8, moderate activity duration data were multiplied by MET = 4, and low activity duration data were multiplied by MET = 3.3. Then the results will be classified into the criteria for moderate, low and high physical activity. The following is an explanation of each category: High Activity > 3000 MET minutes / week, Moderate Activity > 600-3000 MET minutes / week, Low Activity 600 MET minutes / week. PQSI assessments into good and bad sleep quality covering 7 domains, namely subjective sleep quality, sleep latency, sleep duration, sleep efficiency, sleep disturbances, use of sleeping pills, and sleep dysfunction during the day. The answer to each question has a score of 0-3 and each type of question has a different calculation method.

The population in this study were 80 foster children at the Yatim Putri Islam Orphanage at RM Suryowinoto Yogyakarta. The number of samples in this study using purposive sampling with inclusion and exclusion criteria, amounting to 35 respondents. Data collection in this study using interviews and questionnaires. The independent variable in this study is physical activity and the dependent variable in this study is sleep quality. Data analysis was performed by using the Chi-Square test. Analysis of research data using univariate and bivariate. Univariate analysis was used to describe the characteristics of the respondents. Bivariate analysis used the chi-a-square test with  $\alpha < 0.05$ . Researchers used computer software (SPSS) for data processing and statistical analysis.

## RESULTS AND DISCUSSION

IPAQ has tested its validity and high reliability in 12 countries as physical activity measurement instrument for ages 15-69 years IPAQ assesses a person's physical activity in four domains, namely activity physical activity in leisure, domestic activities and gardening, related physical activity work, physical activity related to transportation. Within each domain is divided into three intensities, among others (7):

1. Walking either at home or at work, or physical activity light intensity, is an activity

that requires physical exertion mild and does not cause a change in its respiratory rate significant.

2. Moderate intensity physical activity, is an activity that requires energy moderate physique and make a person breathe a little faster than usual. Examples include lifting light weights and cycling at regular speed.
3. High-intensity physical activity, is an activity that requires energy physically strenuous and make a person breathe faster than usually. Examples include lifting heavy weights, aerobics, fast cycling. Data from the IPAQ questionnaire presented in MET-minutes (Metabolic Equivalent of Task) per week.

The MET-minutes / week quantification follows the following formula,

- a. MET-minutes / week for walking = 3.3 x walking duration in minutes x running duration in days
- b. MET-minutes / week for moderate activity = 4.0 x duration of moderate activity in minutes x moderate activity duration in days
- c. MET-minutes / week for strenuous activity = 8.0 x duration of strenuous activity in minutes x duration of strenuous activity in days
- d. MET-minutes / week of total physical activity = the sum of MET minutes / week of walking activity + moderate activity + strenuous activity

Based on the results of the analysis of 35 research samples, the following results were obtained:

**Table 1. The frequency distribution of the characteristics the relation of physical activity with the quality of sleep in adolescents at the Panti Asuhan Yatim Putri Islam Rm Suryowinoto Yogyakarta**

Characteristics	Frequency	Percentage (%)
<b>Age</b>		
15 year	12	34.3
16 year	4	11.4
17 year	12	34.3
18 year	7	
<b>Education</b>		
class 8	2	5.7
class 9	5	14.3
class 10	8	22.9
class 11	14	40
class 12	6	17.1
<b>Amount</b>	<b>35</b>	<b>100</b>

The results of the analysis in table 1, can be seen that the age group of respondents at the Islamic Princess Orphanage of RM Suryowinoto Yogyakarta, namely 12 people aged 15 years (34.3%), 4 people aged 16 years (11.4%), 17 years old totaled 12 people (34.3%), and those aged 18 years amounted to 7 people (20%). The results of the analysis in table 4.1 can be seen that the education group of respondents at the Islamic Princess Orphanage of RM Suryowinoto Yogyakarta, namely class 8 totaling 2 people (5.7%), class 9 totaling 5 people (14.3%), class 10 totaling 8 people (22.9%), class 11 amounted to 14 people (40%) and class 12 amounted to 6 people (17.1%). So it can be concluded that the most respondent age group is at the age of 15 and 17 years with a total of 12 people (34.3%) and the education group of the most respondents is class 11, which is 14 people (40%).

**Table 2** Crostabulation of the relationship between Physical Activity With The Quality Of Sleep In Adolescents At The Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta

Physical Activity	Quality Of Sleep				Amount	%	P-value
	Good		Bad				
	F	%	F	%			
Low	1	2.85	0	0.0	1	2.85	0.001
Medium	4	11.4	4	11.4	8	22.9	
High	1	2.85	25	71.4	26	74.2	
<b>Amount</b>	6	17.1	29	82.9	35	100	

Table 2, above shows that foster children who experience low physical activity with good sleep quality are 1 (2.28%), foster children with poor quality are 0 (0.0%), while physical activity in foster children is in the moderate category with good sleep quality, namely 4 (11.4%) and the bad ones, namely 4 (11.4%), for physical activity in foster children who have high activity with good categories, namely 1 (2.85%) and bad categories as many as 25 (71.4%).

The results of the correlation test used the chi-square test p-value = 0.001 (p < 0.05). This shows that Ha is accepted and Ho is rejected, which means that there is a relationship between physical activity and sleep quality at the Islamic Orphanage for Girls at RM Suryowinoto Yogyakarta.

**Physical Activities at the Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta.**

From table 2, it is known that the activities of the foster children at the Orphanage Princess Islam RM Suryowinoto Yogyakarta are low physical activity by 1 respondent (2.85%), moderate physical activity as much as 8 (22.9%) and high physical activity as much as 26 (74.2%). Based on the results of the research in table 4.2, it can be seen that 35

respondents, namely foster children at the Orphanage Orphanage Princess Islam, RM Suryowinoto Yogyakarta, found that most of the foster children with high physical activity had poor sleep quality, as many as 25 respondents (71.4%), whereas Foster children with high physical activity with good sleep quality were 1 respondent (2.85%).

This research is in line with research conducted by (6) regarding the relationship between physical activity and sleep quality in adolescents at SMA Negeri 9 Manado stated that the relationship between the two variables was analyzed using simple logistic regression. One hundred and thirteen (49.1%) students have sufficient physical activity. Meanwhile, 57% of students had a pretty good sleep quality. The regression analysis showed that sufficient physical activity increased the odds of a good sleep quality by 2.5 times. Physical activity is positively related to the quality of sleep for teenage students at SMAN 9 Manado.

Researchers assume that physical activity will cause fatigue so that it affects the quality of sleep in foster children, where according to (4) the human body has a limit in activities, if it has reached its limit, the energy in the human body will decrease and humans will feel tired. When experiencing fatigue, a person must sleep to recover his energy so that the body can be optimal for activities the next day. The need for adequate sleep is determined by the quality and quantity of sleep which is influenced by several factors, one of which is physical activity.

Measurement of physical activity was measured using the International Physical Activity Questionnaire (IPAQ). This questionnaire is the method most frequently used by researchers to study physical activity. Foster children write down the type, frequency and duration of activities that are usually carried out during the week into this questionnaire. Where the IPAQ consists of 7 question items that measure vigorous physical activity, moderate activity, walking activity, sitting activity in a person in the last week then the activity is assessed into 3 criteria high activity, moderate activity, and low activity (7).

The factors that influence a person's physical activity are lifestyle, disease process, culture, energy level, age and gender. According to the theory that fatigue due to physical activity can affect a person's sleep, namely that moderate fatigue can make individuals sleep soundly, while excessive fatigue will cause a shorter REM sleep period. If the



activities carried out are too piled up or too heavy, it will cause sleep disturbances (8). Likewise, according to (9) physical activity is excessive or too high, which is characterized by long-lasting and worsening fatigue. Excessive physical activity can also be described as demoralized, overworked, overworked, boredom, and chronic fatigue. According to (10), moderate physical activity is more effective than strenuous activity in improving sleep quality.

Regular physical activity of moderate intensity - such as walking, cycling, or exercising - has significant health benefits at all ages, the benefits of being physically active outweigh the potential harm (11). The time needed a day for strenuous activity is 8 hours of sleep, 4 hours of heavy work such as lifting water or agricultural work such as hoeing, 2 hours of light work, and 10 hours of very light work. So that if the activity is carried out less or too much, it will interfere with the quality of sleep that is owned (12). According to (13) A person who has regular physical activity will have a healthy and beneficial lifestyle both physically and psychologically such as improving body fitness, helping to sleep better, increasing body power, reducing stress.

### **Sleep Quality at the Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta.**

From table 2, it is known that the quality of sleep for foster children at the Orphanage Putri Islam orphanage at RM Suryowinoto Yogyakarta, namely with good sleep quality as many as 6 respondents (17.1%), and poor sleep quality as many as 29 respondents (82.9%). Based on research that has been conducted from 35 respondents at the Orphanage Princess Islam RM Suryowinoto Yogyakarta, the majority of foster children who do high physical activity have poor sleep quality, namely 25 respondents (71.4%), while foster children with high physical activity with good sleep quality are as much as 1 respondent (2.85%).

This research is in line with (14) entitled physical activity with the quality of sleep of the elderly at the Posyandu for the elderly wulan erma dated Surabaya, this research shows that of the 54 respondents, almost half of 23 respondents (42.6%) have good physical activity and most of the 31 respondents (57.4%) experienced poor physical activity, while nearly half of 15 respondents (27.7%) had good sleep quality and most of

the 39 respondents (72.2%) experienced poor sleep quality. There is a relationship between physical activity and sleep quality in the elderly ( $p = 0.04$ ).

Researchers assume that physical activity will affect sleep quality where fatigue due to high activity can require more sleep to maintain the balance of energy that has been expended. Sleep quality is a person's satisfaction with sleep, so that a person does not show feelings of fatigue, is easily aroused and anxious, lethargic and apathetic (15). Sleep quality. Sleep quality is an individual's ability to maintain sleep during the sleep period to get the right amount of NREM sleep and REM sleep (16). Buysse, Charles, Timothy, Susan, & David (1989) in (17) in their research explained that sleep quality is an important clinical concept for two big reasons, namely the problem of sleep quality is a general and quality problem. Low sleep can be an important symptom of a lot of sleep or medical disorders (17). The factors that affect sleep quality are health status, environment, fatigue, stress, diet and drugs (8). If you don't get enough sleep, it will increase stress, anxiety and lack of concentration in daily activities.

Sleep quality measurement can be measured using the PSQI (Pittsburgh Sleep Quality Index). This questionnaire is the method most researchers use to study sleep quality. The PSQI consists of 19 subjective points that are grouped into 7 scoring components and 5 additional points assessed from roommates. Each point has the same weight on a 0-3 scale with a total score of 21 points, which means the worst quality that can be assessed. The points assessed were about sleep quality, such as subjective assessments of sleep quality, length of time to sleep, sleep latency, daily sleep efficiency, drug use, disturbances experienced during sleep, and the impact experienced the next day. The disorders assessed included pain, urinary frequency, difficulty breathing, snoring, dreams, temperature, and others.

A night's sleep that lasts for an average of 8 hours, consists of 2 types of conditions, namely REM and NREM which alternate 4-6 times. A person who does not have enough REM sleep will show a tendency the next day to be hyperactive, less able to control himself and his emotions, and increase appetite. Inadequate NREM sleep will result in the physical condition being less agile the next day (18). Researchers assume that the quality of sleep for foster children will be good if the sleep duration is around 8 hours / day, do not

experience sleep disturbances, do not have difficulty starting sleep.

Based on table 2, the quality of sleep in most children with poor sleep quality has high physical activity, namely 25 respondents (71.4%). One of the factors that affect sleep quality is physical activity. Based on sleep quality data obtained from questionnaires that have been filled in by respondents, the results of respondents assessed that the quality of their sleep was good, adequate, but there were also those who rated the quality of sleep as poor, respondents also found it difficult to initiate sleep where respondents spent around 5-30 minutes in bed until finally you can fall asleep. The majority of respondents also had less than 5 hours of sleep during the past week. In addition, data was obtained that the majority of respondents experienced disruption of the respondent's activities during the day, such as being sleepy at school or studying at night.

#### **The relationship between physical activity and sleep quality in adolescents at the Panti Asuhan Yatim Putri Islam RM Suryowinoto Yogyakarta.**

This research was conducted on 35 respondents, namely foster children aged 15 years and over and who are willing to become respondents at the Orphanage Orphanage Putri Islam RM Suryowinoto Yogyakarta. The number of foster children with high physical activity had poor sleep quality as many as 25 respondents (71.4%), while foster children with high physical activity with good sleep quality were 1 respondent (2.85%). The results of the correlation test used the chi-square test  $p = 0.001$  ( $p < 0.05$ ). This shows that  $H_a$  is accepted and  $H_o$  is rejected, which means that there is a relationship between physical activity and the quality of sleep at the Islamic Orphanage Princess RM Suryowinoto Yogyakarta.

The results of this study are in line with research conducted (3) in his research which states that there is a significant relationship between physical activity and sleep quality, as well as research conducted by (19) which explains that there is a relationship between physical activity and sleep quality in teenagers in Yogyakarta. Research has also been conducted by (20). Respondents amounted to 38 elderly people. The results of univariate analysis showed that the distribution of active physical activity (57.9%) and less active physical activity (42.1%). The results of the distribution of sleep quality were that the most sleep quality was poor (68.4%), while the quality of sleep was good (31.6%). The

bivariate results showed a significant relationship between physical activity and sleep quality (p-value = 0.012).

Doing physical activity can improve a person's sleep quality. Exercise and fatigue can affect the quality of one's sleep because fatigue due to high activity can require more sleep to maintain the balance of energy that has been expended. People who have done activities and reach fatigue will be able to sleep faster because the slow wave sleep stage (NREM) is shortened (21). In addition, doing physical activity in a regular way is also beneficial in regulating the heart system, blood vessels and body weight, and is an important factor in preventing non-communicable diseases (22). Therefore, physical activity can affect the quality of a person's sleep where if the physical activity is too high, eating will require appropriate sleep in order to restore the energy that has been used. If too high activity is not balanced with good quality sleep, it will have an impact with a decrease in daily activities, weakness, fatigue, decreased endurance, and instability of vital signs, while psychological factors have an impact on depression, anxiety, and difficulty concentration (18).

According to (23) with a study entitled factors that affect sleep quality in asthma patients in RSUD dr. Zainoel Abidin Banda Aceh obtained the results of factors that have a relationship with sleep quality in asthma patients, namely physical illness with (p-value = 0.001), environmental factors with (p-value = 0.001), physical activity and fatigue with (p-value = 0.000), emotional stress with (p-value = 0.001), nutrition with (p-value = 0.000), while substance factors and drugs had no relationship with sleep quality in asthma patients (p-value = 0.524). The conclusion is that there is a relationship between the factors that affect sleep quality in asthma patients.

The benefits of sleep lighten the work of vital organs during a day of activities, repair damaged cells during work, and when waking up, the human body gets energy back to carry out further activities. Sleep is also useful for improving thinking power, improving memory, supporting immune function, and preventing chronic diseases such as diabetes, heart disease, obesity. People who in the long term often lack of sleep means that they damage their body and even the nerves and can cause heart problems. When a person loses sleep for a certain time it can cause damage to concentration, changes in body function,

mental and emotional (4). According to research conducted by (24) excessive work or excessive physical activity and lack of sleep will shorten life because the aging process occurs faster than healthy living. This situation will reduce levels of several hormones and increase free radicals which will accelerate the aging process. Based on various research reports, it turns out that the aging process can be slowed by a lifestyle regulation that consists of several elements of a lifestyle pattern such as sleeping, working, eating, exercise and recreation. It is recommended that all people lead a healthy lifestyle as early as possible from childhood for life. According to research (6) states that sufficient physical activity increases the quality of good sleep by about 2.5 times greater.

## CONCLUSION

The results of poor physical activity were 2.85% low physical activity, 22.9% moderate activity, and 74.2% high activity, for sleep quality, namely 17.1% with good sleep quality and 82.9% poor sleep quality. Based on the results of the study, it can be concluded that from the results of the correlation test using the chi-square test  $p = 0.001$  ( $p < 0.05$ ) this shows that  $H_a$  is accepted and  $H_o$  is rejected, which means that there is a relationship between physical activity and sleep quality at the Orphanage Putri Islam Orphanage RM Suryowinoto Yogyakarta.

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