Literatur Review: Relationship Between Physical Activities, Eating Habits, Body Image, Nutritional Status With Adolescent Achievement

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ABSTRACT

The Nutritional Status Monitoring (NSM) 2017 percentage data shows severely underweight and underweight school students and adolescents aged 16-18 years based on the BMI/U index in Indonesia was 0.9% severely underweight and 3.0% underweight. Meanwhile, the percentage of nutritional status of adolescent girls aged 12-18 years is 1.2% severely underweight, 3.5% underweight, 75.8% normal, 15.1% overweight, and 4.3% obese. The Ministry of Education data from the 2017/2018 academic year regarding Vocational High Schools (VHS) learning achievement in 34 provinces throughout Indonesia, it was recorded that there were 13,665 of 4,899,136 students who doing remedial. According to the WHO data in 2005, adolescent nutritional status is influenced by physical activity, eating habits, and body image, which will have an impact on adolescent learning achievement. This research aimed to examine articles related to the relationship between physical activity, eating habits, body image, nutritional status, and achievement in adolescents. This research is a literature review type with scoping review method. The keywords namely physical activity, eating habits, body image, nutritional status, and achievement of academic adolescents. Research articles/data were obtained through Google Scholar, DOAJ, and Springer. 11 research articles fit the inclusion criteria. From the analysis, it was found that physical activity, eating habits, body image, and nutritional status had a relationship with adolescent achievement.

Keywords: Adolescent, eating habits, nutritional status, physical activity

INTRODUCTION

The World Health Organization (WHO) says nutrition is the main pillar of health and well-being throughout the life cycle. Adolescence is a time of rapid changes in cognitive, physical growth, and behavior or psychosocial (1). Adolescents are called vulnerable for several reasons. First, the rate of growth and development of the body requires more nutrients and energy. Second, lifestyle changing and eating habits require adjustments to energy and nutrient intake. Third, pregnancy, sports exercise, and alcohol drug addiction increase the need for nutrients and energy (2).

The Nutritional Status Monitoring (NSM) 2017 percentage data shows severely underweight and underweight school students and adolescents aged 16-18 years based on the BMI/U index in Indonesia was 0.9% severely underweight and 3.0% were underweight. Meanwhile, the nutritional status of adolescent girls aged 12-18 years in Indonesia, according to the BMI/U index is 1.2% severely underweight, 3.5% underweight, 75.8% normal, 15.1% overweight, and 4.3% obese (3).

Based on Riskesdas data of South Kalimantan Province in 2018 shows that the nutritional status of adolescents aged 16-18 years in South Kalimantan Province according to the BMI/U index was 2.63% severely underweight, 9.67% underweight, 75.62% normal, 8.91% overweight, and 3.17% obese. Following Riskesdas data from South Kalimantan Province at Banjar Regency in 2018, the prevalence of adolescent's nutritional status aged 16-18 years according to the BMI/U index was 2.79% severely underweight, 12.47% underweight, 70.52% normal, 11.05%
overweight, and 3.18% obese. This shows that there are still nutritional status problems in adolescents aged 16-18 years in South Kalimantan Province (4).

The learning achievement of adolescents in Vocational High Schools (VHS) is still at a low level. The Ministry of Education data from the 2017/2018 academic year regarding VHS learning achievement in 34 provinces throughout Indonesia, it was recorded that there were 13,665 of 4,899,136 students who doing remedial (5). According to the WHO data in 2005, adolescent nutritional status is influenced by 4 factors; lifestyle factors such as physical activity, alcohol, and smoking. The second factor is the lack of food caused by psychological and socio-economic factors. The third factor is pregnancy, and the fourth factor is infectious diseases and other health problems. Adolescent nutritional status will affect their learning achievement (6). Based on this background, it is necessary to conduct a literature review to analyze more deeply the relationship between physical activity, eating habits, body image, nutritional status and achievement in adolescents.

METHOD

This research is a secondary research level with scoping review type. Scoping review is a systematic literature review method using predetermined steps. Article selection uses the protocols and filters defined in advance. Scoping reviews are usually conducted on a broader research topic. The article selection strategy refers to the PECOT component, where the Population is adolescents aged 12-21 years, Exposure to factors related to achievement, namely physical activity, eating habits, body image, nutritional status, Comparisons to nonexistent studies, Outcomes about the relationship between physical activity, eating habits, body image, nutritional status with adolescent achievement, and Time from 1 January to 31 October 2020.

Table 1. The proportion of the number of articles based on keywords and search engines

<table>
<thead>
<tr>
<th>Keywords</th>
<th>Search engine</th>
<th>(N) Articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aktivitas Fisik</td>
<td>Google Scholar</td>
<td>366</td>
</tr>
<tr>
<td>Kebiasaan makan</td>
<td>Google Scholar</td>
<td>226</td>
</tr>
<tr>
<td>Eating habits</td>
<td>DOAJ</td>
<td>293</td>
</tr>
<tr>
<td>Citra tubuh</td>
<td>Google Scholar</td>
<td>245</td>
</tr>
<tr>
<td>Body image</td>
<td>DOAJ</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Springer</td>
<td>10</td>
</tr>
<tr>
<td>Status Gizi</td>
<td>Google Scholar</td>
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<tr>
<td>Prestasi Remaja</td>
<td>Google Scholar</td>
<td>181</td>
</tr>
<tr>
<td>Adhivement academic</td>
<td>DOAJ</td>
<td>74</td>
</tr>
</tbody>
</table>

Article searches are carried out using search engines, including Google Scholar, Springer, and DOAJ. The keywords used in the journal collection are physical activity, eating habits, body image, nutritional status, and learning achievement in adolescents. The identification results from search engines obtained as many as 1,816 search results data. After the journals were screened caused on uninccluded criteria, there were obtained 11 articles suitable for review.

Data synthesis aims to group similar extracted data according to the results measured to answer the research objectives. Research journals that match the inclusion criteria are then collected and a summary of the journal is made including the name of the researcher, year of publication of the journal, research title, method and summary of results or findings. The summary of the research journal is entered into a table sorted alphabetically and the year of publication of the journal.
RESULTS AND DISCUSSION
Characteristics of Included Articles
1. Self-esteem and academic performance relationship amongst the second-year undergraduate students of Universiti Kebangsaan Malaysia, Kuala Lumpur Campus
   This study was authored by Yanti Rosli, Hidayatulfathi Othman, Ismarulyusda Ishak, Syarif Husin Lubis, Nur Zakiah Mohd Saat and Baharudin Omar in 2012 which aims to look at the relationship between self-esteem and academic achievement of second year undergraduate students at the Faculty of Health Sciences and Faculty of Medicine, UKM in academic year 2010/2011. This research is located at the Faculty of Health Sciences and
Faculty of Medicine, University of Kebangsaan Malaysia. The design of this research is cross-sectional. The number of samples in this study were 110 male respondents and 110 female respondents. Data analysis used the Pearson correlation and Spearman's correlation to link self-esteem, stress and body image with academic achievement. The results of this study show that body image (p<0.05, r=0.016) and self-esteem (p<0.0005, r=0.32) are related to academic achievement (7).

2. Energy Intake, Protein Intake, Breakfast Practices, and Student Performance at SMP Negeri 7 Kendari (Tingkat Asupan Energi, Protein, Kebiasaan Makan Pagi dan Prestasi Belajar Siswa SMP Negeri 7 Kendari)

This study was authored by Laode Muhamad Sety and Darisman Paeha in 2013 which aims to determine the level of energy intake, protein and breakfast habits with student achievement at SMP Negeri 7 Kendari, Kendari City. This research is located at SMPN 7 Kendari. The research design is cross-sectional. The number of samples in this study were 72 students with a sampling technique using proportional stratified random sampling. Data analysis used the chi-square test. The research results obtained showed that the 2 variables studied had a relationship with student achievement at SMP Negeri 7 Kendari, namely the level of energy intake (p <0.05) and breakfast habits (p <0.05). The level of protein intake did not show a significant relationship with learning achievement (p> 0.05) of students of SMP Negeri 7 Kendari, Kendari City (8).

3. The Association of Nutritional Intake and Academic Performance in SMA Negeri I Metro Students (Hubungan Antara Asupan Gizi Dengan Prestasi Belajar Pada Siswa SMA Negeri I Metro)

This study was authored by Rizki Pratiwi Amalia and Eka Trismiana in 2014 which aims to measure the relationship between nutritional intake and learning achievement in students of SMA Negeri I Metro in 2014. This research is located at SMA Negeri 1 Metro. The design of this research is cross-sectional. The population in this study were all 237 students of class XI SMA Negeri I. The number of samples in this study were 148 respondents. Data analysis using chi square. The results showed that there was a significant relationship between nutritional intake and learning achievement in SMA Negeri I Metro students in 2014, p=0.007(9).

4. Relationship between Students at SMA Negeri 1 Padang's Nutrition Status and Academic Achievement in the Academic Year 2013/2014 (Hubungan Status Gizi dengan Prestasi Belajar pada Siswa –Siswi SMA Negeri 1 Padang Tahun Ajaran 2013/2014)

This research was authored by Steffi Olivia Padriyani, Delmi Sulastri, Nur Afrainin Syah in 2014 which aims to look at the relationship between nutritional status and student achievement at SMA Negeri 1 Padang. This research is located at SMA Negeri 1 Kota Padang. The number of samples in this study were 87 students with a sampling technique using systematic random sampling. Data processing was done by Pearson chi-square test. The results of this study were that there was no relationship between nutritional status and academic achievement, p>0.05 (10).

5. Analyzing multiple relationships between psychological, social, and family factors and the academic success of female high school students in Isfahan

This research was authored by Saeideh Mahzoonien and Zahra Yousefi in 2017 which aims to investigate the relationship between psychological factors (self-esteem, attachment style, and body image), family factors (family relationships), social factors (teacher-student relationships), and academic achievement secondary school students in Isfahan. The design of this research is cross-sectional. The population of this study were all high school students.
for the 2013-2014 academic year in Isfahan. The number of samples in this study were 210 respondents. Data analysis used descriptive and inferential statistics (Pearson correlation). The results of this study indicate that there is a relationship between body image (p=0.003) and social factors (p=0.027) with academic achievement. Meanwhile, the family factor (p=0.111) showed that it was not related to student academic achievement (11).

6. Dietary Habits Are Associated with School Performance in Adolescents
   This study was authored by So Young Kim, Songyong Sim, Bumjung Park, Il Gyu Kong, Jin-Hwan Kim, and Hyo Geun Choi in 2016 which aims to identify the relationship between eating habits and achievement. This research is located in South Korea. The design of this research is cross sectional. The population in this study were all grade 7-12 students in South Korea. The sample in this study was 359,264 respondents. Data analysis used ANOVA to determine the factors that influence academic achievement and the chi-square test to determine the relationship between the frequency of eating types of food and the regularity of eating times with academic achievement. The results of this study indicate that there is a relationship between the frequency of eating, the type of food (p<0.001) and the regularity of eating times (p<0.001) with academic achievement (12).

7. The association between students' academic performance and nutritional state at SMK Negeri 1 Polewali (Hubungan status gizi dengan prestasi belajar pada siswa di SMK Negeri 1 Polewali)
   This research was authored by Nursiah Yaco and Urwatil Wusqa Abidin in 2018 which aims to determine the relationship between nutritional status and learning achievement in young students at State Vocational High School 1 Polewali, Polewali District, Polewali Mandar Regency. The theory used in this study is the theory from Ristiyati in 2014. This research is located at Polewali 1 State Vocational High School, Polewali District, Polewali Mandar Regency. The population in this study were students of State Vocational High School 1 Polewali with a total of 328 students. The size of the research sample taken was calculated using the simple random sampling formula and the number of samples used was 77 students. Data analysis was performed using the chi-square test. The results of this study indicate that there is a relationship between nutritional status and learning achievement in young students at Polewali 1 State Vocational High School, Polewali District, Polewali Mandar Regency with a p value=0.025 (13).

8. The Association of Physical Activity and Sleep Quality with Cognitive Learning Results in the Human Coordination System (Hubungan Kualitas Tidur dan Aktivitas Fisik Dengan Hasil Belajar Kognitif Sistem Koordinasi Manusia)
   This research was authored by Titan Sulistia, Refirman Djamahar, Sri Rahayu in 2018 which aims to measure the relationship between sleep quality and physical activity with cognitive learning outcomes in the material of the human coordination system. The theory used is from Gregory et al in 2012. This research is located at SMAN 21 Jakarta. The sample in this study used simple random sampling and obtained as many as 125 students of class XI IPA. Data analysis used the Kolmogorov Smirnov to determine the normality of the data distribution and the Bartlett test to determine the variance of the data. To determine the strength of the correlation between the independent variable and the dependent variable, Pearson Product Moment is used. The results of this study indicate a positive and significant relationship between sleep quality and cognitive learning outcomes in the material of the human coordination system. While physical activity shows a negative and significant relationship with cognitive learning outcomes of human coordination system material (14).
9. Students in vocational high schools and their dietary habits in relation to academic performance (*Faktor Gizi dan Prestasi Belajar Siswa Sekolah Menengah Kejuruan*)

This research was authored by Nurlaili Handayani, Muhammad Dawam Jamil, Ika Ratna Palupi in 2020 which aims to analyze the relationship between nutritional factors which include energy and nutrient intake (carbohydrates, protein, fat, iron, vitamin C, and zinc), breakfast habits, and nutritional status with academic achievement in SMK students in Sleman, DIY. The research locations were at SMKN 2 Depok, SMKN 1 Seyegan, and Muhammadiyah Prambanan Vocational School. The population is all students at Public and Private Vocational Schools in Sleman, DIY. Sampling technique used purposive sampling with a sample size of 100 students, consisting of 26 students at SMKN 2 Depok, 31 students at SMKN 1 Seyegan and 43 students at SMK Muhammadiyah Prambanan. Data analysis used descriptive statistics and chi-square test. The results showed that there was no relationship between the level of energy and nutrient intake and nutritional status with learning achievement (p>0.05) but there was a significant relationship between breakfast habits (p=0.010) and learning achievement (15).

10. The influence of eating habits on the academic performance of university students

This research was authored by Peter R. Reuter, Bridget L. Forster and Sierra R. Brister, in 2020 which aims to explain the relationship between eating habits in college students and academic achievement. The research location is in the United States. The sample in this study amounted to 557 respondents. Data analysis used the JMP software program with a standard least squares regression. The results showed that eating habits (p>0.05) had no relationship with academic achievement. While the breakfast variable (p <0.0001) is related to academic achievement (16).

11. Examining the Effects of Snack Consumption, Exercise, and Nutritional Status on Student Achievement at Pharmaca Private Vocational High School, Medan (*Analisis Dampak Konsumsi Jajanan, Aktivitas Fisik, Dan Status Gizi Terhadap Prestasi Belajar Siswa di SMK Swasta Pharmaca Medan*)

This research was authored by Syafleni, Asriwati, Anto J. Hadi in 2020 which aims to analyze the impact of consumption of snacks, physical activity, and nutritional status on student achievement at SMK Swasta Pharmaca Medan. The theory used in this study is a modification of Michael J. Gibney et al, Unicef, Indonesian Ministry of Health, Ministry of Education and Culture. The location of this research was carried out at the Pharmaca Private Vocational School in Medan. The population in this study were all students of class XI and class XII at Pharmaca Private Vocational High School Medan with a total of 179 students. The sampling technique used proportional random sampling and obtained a sample of 64 students. Data analysis used the Chi Square test and logistic regression. The results of this study show that consumption of snacks (p=0.004), physical activity (p=0.048), nutritional status (p=0.001), is related to student achievement at SMK Private Pharmaca Medan (17).

Factors Associated with Adolescent Achievement

1. Physical Activity

According to Sulistia’s et.al, there is a significant negative relationship between physical activity and achievement (r = -0.259; p = 0.004). That is, students who have low physical activity, the cognitive learning outcomes obtained will be high and vice versa. This is caused by the physical activity obtained by the majority of students is low, because most students use their time to study and other activities. According to Gregory, et al, 2012 in Sulistia et al 2018 explained that good physical activity is associated with increased activity of the frontal cortex, insula, gyrus cingulate and parahippocampal gyrus. With good changes in these brain areas, it
can affect the neurophysiological changes in the brain and contribute to cognitive function of the brain (14).

In the 2020 research by Syafleni shows that there is a relationship between physical activity and achievement (p=0.048). The results of Syafleni et al's research found that 26 respondents routinely carried out high-intensity sports, fitness, or recreational (exercise) activities. A total of 17 did high-intensity sports, fitness or recreational activities 3 times a week. Ground playing and exercising are included in physical activities that require more energy than other activities, so if a child plays or exercises more it is no longer for the child but causes the child's physical fatigue, which ultimately reduces the child's motivation to learn and lowers his achievement. In addition, another activity related to children's learning is sleeping at night. The higher the proportion of time for sleeping, the less the proportion of time for studying at home. The more time spent studying, the less time spent sleeping. The more time spent studying, the better learning achievement will be achieved (17).

Based on the results that have been reviewed in 2 research articles that discuss physical activity, it is found that physical activity is one of the factors related to learning achievement. the physical activity in question is exercising in physical education lessons, running, playing football, cycling, walking. This is because good physical activity can affect the acquisition of high learning outcomes, namely physical activity that is not excessive and not also below average (14). In line with WHO in 2005 stated that one of the lifestyles of adolescents is a lack of physical activity. This can lead to the results of adolescent learning achievement at school (6).

2. Eating Behavior

According to Laode et.al, there is a relationship between energy intake and breakfast habits and achievement (p <0.05). Lack of energy from food causes a person to lack the energy to move, work and carry out activities, people become lazy, feel weak, work productivity and learning achievement decrease. Malnutrition at a young age can affect mental development, thereby decreasing the ability to think. Breakfast affects brain intelligence, especially student memory. Absence this hunger that students have will make students more focused on the material provided by the teachers, can have good knowledge and understanding of the lesson (8).

Sety and Paeha it showed that there is a relationship between energy intake and breakfast habits and achievement (p <0.05). According to Almatsier 2009 in Sety and Darisman 2013, lack of energy from food causes a person to lack the energy to move, work and carry out activities, people become lazy, feel weak, work productivity and learning achievement decrease. Malnutrition at a young age can affect mental development, thereby decreasing the ability to think. Sintha 2001 in Sety and Darisman 2013 stated that breakfast affects brain intelligence, especially student memory. Absence this hunger that students have will make students more focused on the material provided by the teachers, can have good knowledge and understanding of the lesson (8).

Kim, et.al showed that there was a relationship between the frequency of eating types of food (p<0.001) the regularity of eating times (p<0.001) with achievements. Snacks during school breaks can prevent hunger during the day which results in disruption of brain function. Sweet foods consist of refined carbohydrates or sugars which can reduce the frontal, limbic and hippocampal systems involved in learning, memory and cognition (12). Sufficient fruit and vegetable intake supplies valuable micronutrients, such as vitamins C and E and minerals needed for brain metabolism. Consuming high fruits and vegetables of 4 or more servings/day or > 350 g/day. Consuming milk also have beneficial for the neurocognitive functions of memory, alertness, planning and hearing due to better glucose resistance in the brain and the positive effects of bioactive peptides, colostrinin, proline-rich polypeptides, lactalbumin, vitamins B12, calcium and probiotics. Regular breakfast can reduce consumption of unhealthy foods.
addition, breakfast also provides energy and nutrient intake all day. Therefore, breakfast can reduce obesity and lack of energy in the morning.

In addition, Amalia showed that there was a relationship between nutritional intake and learning achievement in students of SMA Negeri I Metro in 2014 (p=0.007). Learning is not only influenced by cognitive intellectual abilities, but also influenced by non-cognitive factors such as emotions, motivation, personality and as well as environmental influences. Adolescence is an age that is very easily influenced by any social friends and the mass media, especially advertisements that attract the attention of teenagers about fast food / ready-to-eat food which causes nutritional needs not to be met (9).

3. Body image

Rosli et.al, showed that there is a relationship between body image and achievement (p<0.05). Students who develop and succeed academically have a more critical view of themselves. The results of this study also show that the achievement of women with good body image is higher than that of men (p<0.05). This is because men with low body image often think they are too thin, while women with low body image think they are too fat. Lack of muscle is the main cause of body dissatisfaction in men, whereas in women low body image is influenced by body weight, social comparison, and appearance when talking to friends (7). Puberty in adolescents has a major impact on social adjustment, mental health, psychology, and healthy living behavior. If changes in their physique are in accordance with their wishes, social adjustment, mental health, psychology, and healthy lifestyle behaviors can help them achieve their achievements (11).

4. Nutritional status

According to Yaco et.al, there was a relationship between nutritional status and learning achievement in young students at State Vocational High School 1 Polewali, Polewali District, Polewali Mandar Regency with p = 0.025. Students with good nutritional status have a good score of 42.82%, based on the chi square test by comparing nutritional status and learning achievement with a limiting value (p < 0.05), indicating a significant relationship between nutritional status and learning achievement. This is because students who have good nutritional status with good academic achievement are more numerous than children who have poor nutritional status. Imbalance between intake needs or adequacy will cause nutritional problems, both in the form of problems of excess nutrition and malnutrition. The problem of malnutrition in adolescents will have a negative impact on the level of public health, for example, a decrease in learning achievement and a decrease in physical fitness (13).

Syafleni et.al, shows that nutritional status (p=0.001) is related to student achievement at the Pharmaca Private Vocational School in Medan. Nutritional status directly affects immunity, cognitive development, growth, and body stamina. In adulthood, nutritional status is closely related to health, stamina and maximum work capacity. Someone who is deficient in one or more nutrients can cause deficiency diseases. Only mild deficiencies can lead to decreased ability to function, although sometimes it is not realized (17).

The results of the review conducted, there are 2 research articles which state that there is no relationship between nutritional status and achievement. Handayani, et.al, stated that there was no relationship between nutritional status and academic achievement (p>0.05). This is due to differences in learning achievement measurement methods. Learning achievement in this study was seen from the scores of practical exams in vocational subjects, which distinguished it from similar research which measured learning achievement based on the average value of educational report cards/books (15).

Padriyani also stated that there was no significant relationship between nutritional status and academic achievement (p=0.882). This is because the factors studied were only nutritional status and did not consider other factors. That is, nutritional status is not become a factor in the...
success of student achievement. This study shows that there are factors other than nutritional status that are related to achievement, namely the work of the father and mother, factors of intelligence, memory, motivation, family environment, school and community (10).

Based on the 4 research articles reviewed, it can be concluded that there is a relationship between nutritional status and academic achievement. This is because the problem of malnutrition in adolescents will have a negative impact on the level of public health, one of which is a decrease in academic achievement. A good nutritional status often cannot be fulfilled by a child due to external factors such as the economy and internal factors such as the psychological condition of adolescents. This is in line with WHO theory in 2005 which states that the effects of nutritional deficiencies in adolescents have short- and long-term effects such as osteoporosis and academic achievement (6).

**CONCLUSION**

The physical activity variable is related to achievement because good physical activity can affect the acquisition of high learning outcomes, such as neither excessive nor below average physical activity. The eating habits variable is related to achievement because certain types of food and breakfast can help improve brain function and also improve learning achievement. The body image variable is related to achievement because if an adolescent physical appearance is suited to their urge, it will help their achievement. The nutritional status variable is related to achievement because malnutrition condition will have an impact on adolescent achievement.

Students are expected to be able to do physical activities such as jogging, cycling, swimming, and others for a minimum of 60 minutes (accumulative) each day. Maintain eating habits by following balanced nutrition guidelines and getting used to breakfast from 6 am to 9 am so that the brain becomes fresh and ready to study. It is also hoped that students will be able to change perceptions about their body image by increasing their self-confidence and not comparing themselves with others, and students will pay more attention to their nutritional status by regularly monitoring their weight and height to know their nutritional status.

Related institutions such as the health service office and schools, especially from the high school itself can work together to provide education about adolescent nutrition, healthy food menus, the importance of doing physical activity for health, and measuring the height and weight of adolescents. School counseling guidance can also provide self-confidence and motivation so that students can think positively and always be grateful for their body shape. In addition, the youth and sports service office is expected to arrange competitions or events such as leisure walks especially for school students in all cities and districts to increase student’s physical activity.

**REFERENCES**