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Breakfast Habits and Academic Achievement in Adolescent Girls in Tasikmalaya

Dian Saraswati

Universitas Siliwangi,
INDONESIA

Lilik Hidayanti*

Universitas Siliwangi,
INDONESIA

Prima Endang Susilawati

Universitas Siliwangi,
INDONESIA

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Abstract

Background: Skipping breakfast is common among adolescents, and is thought to impact academic achievement.

Aims: This study investigated the difference of academic achievement based on skipping breakfast in adolescent girls in Tasikmalaya.

Methods: This observational study used a cross-sectional study involving 367 subjects chosen by proportional random sampling. The data of skipping breakfast was collected by face-to-face interviews through a questionnaire, while academic achievement data is collected through final semester exam scores. Kruskal Wallis and Mann Whitney were used in statistical analysis.

Result: In this study, the average academic achievement scores of subjects who frequently ate breakfast (87.6) was higher than that of subjects who rarely ate breakfast (85.5). Statistically, the academic achievement differed based on breakfast habits ($p=0.004$). Academic achievement scores also differed based on the educational of mother ($p<0.001$) and occupational status ($p=0.045$).

Conclusion: Subjects who frequently eat breakfast had higher academic achievement scores in school subjects, therefore fulfilling nutritional intake needs to be considered to support academic achievement.

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INTRODUCTION

Adolescence is a critical period for physical and cognitive development, therefore fulfilling nutritional intake is important to support both developments (UNICEF, 2020). Negligence in fulfilling nutritional intake in adolescents causes growth and development failure which has an impact until they are adults (Corkins et al., 2016). Special attention is needed, because adolescence is a period that is vulnerable to nutritional problems such as malnutrition and overnutrition. Adolescent girls tend to have poorer diet quality than adolescent boys (Mumena, 2024), thus affecting their nutritional status (Hidayanti et al., 2023). Nutritional problems that occur in adolescent girls have long-term impacts, not only on their current lives, but also on their future lives and even on future generations (Norris et al., 2022). The quality of diet in adolescent girls not only affects their physical growth, but also their cognitive development and academic performance (Çiftçi et al., 2025).

Academic performance is an indicator of student success in acquiring knowledge and skills at a certain level of education at school. Academic success in school has an impact on future well-being. There are several determining factors why teenage girls often perform poorly in school, such as more involved in domestic work (Gracia et al., 2022), absence from school, lack of concentration in class, emotional concerns, health conditions, and eating habits (Yazew et al., 2024). Nutritional problems due to poor food intake are the main cause that affects the educational process and ultimately impacts academic performance. Changes in eating behaviour that lead to unhealthy eating behaviour often occur during adolescence. Unhealthy eating behaviour commonly practiced by teenagers is skipping breakfasts. Teenagers who have irregular breakfast habits or skip meals in

* Corresponding author:

Lilik Hidayanti, Universitas Siliwangi, INDONESIA. ✉ lilikhidayanti@unsil.ac.id

the morning and afternoon²⁹ are strongly associated with obesity and low academic achievement (Muzaffari et al., 2025; Ober et al., 2021).

Skipping breakfast or not eating in the morning is directly related to decreased memory and concentration, especially in the morning (Adolphus et al., 2016). Moreover, if someone does not eat breakfast, brain performance will decrease due to the long fast at night which continues until morning. Breakfast is thought to improve short-term cognition through mechanisms such as⁵ providing a feeling of fullness and reducing hunger, increasing the supply of energy and nutrients to the central²⁷ nervous system, and increasing the synthesis of brain neurotransmitters (Kawabata et al., 2021). The¹⁰ habit of skipping breakfast is still quite common among teenagers, even though it is known that breakfast is the most important meal and its various benefits have been widely reported (Gao et al., 2021). Worldwide, almost half of teenagers have the habit of skipping meals, especially breakfast (Monzani et al., 2019). In Indonesia, more than 60% of teenagers report skipping breakfast. In Tasikmalaya City, on average, adolescent girls have breakfast 3 times a week (Saraswati et al., 2024). They cite various reasons, including not having enough time to eat, not being accustomed to eating breakfast, and lack of food available (UNICEF Indonesia, 2024).

Research related to factors that influence academic achievement is often conducted on elementary school children (Erer et al., 2025; Howie et al., 2023). In fact, similar research is more needed for adolescents, especially adolescent girls. Young women are still faced with a high prevalence of anaemia, including those living in the city of Tasikmalaya (Rahfiludin et al., 2021). Apart from that, the quality of diet among young women is still considered poor (Hidayanti et al., 2023). Adolescence, including young women, is a transition phase towards adulthood. At this time, the decision to choose and consume food, including breakfast activities, is no longer entirely dependent on parents or family, but rather depends more on their own decisions. Young women are also future mothers, therefore, if they have good knowledge and education, it will have an impact on improving the future generation.²

Previous studies have demonstrated an association between breakfast consumption and academic performance; however, evidence concerning adolescent girls in the Indonesian context, particularly in Tasikmalaya City, remains limited. Therefore, this study was conducted to examine differences in academic achievement according to breakfast habits among adolescent girls in Tasikmalaya City.

METHOD

A cross-sectional design was used in this observational study, as all variables were measured in a single time. The population in this study were active female students registered at 21 public junior high schools spread across 10 sub-districts in Tasikmalaya City. One sub-district is represented by one school, therefore there are 10 schools as research locations. There are six sub-districts that have more than one school, and we chose one school randomly.

Table 1. The Selection of Research Location

No	Sub-districts	Number of schools	Selected ¹⁷ school	Population	Minimum Sample	Final sample (5% added)
1	Tawang	6	SMP 1	570	50	52
2	Cihideung	2	SMP 8	479	42	44
3	Indihiang	3	SMP 13	367	32	34
4	Cipedes	2	SMP 5	424	37	39
5	Kawalu	2	SMP 12	511	45	47
6	Tamansari	2	SMP 21	301	26	27
7	Bungursari	1	SMP 16	193	17	18
8	Purbaratu	1	SMP 17	312	27	28
9	Mangkubumi	1	SMP 14	562	49	52
10	Cibeureum	1	SMP 11	473	41	43
Total				4192	366	384

Based on the calculation of the minimum sample size (366 subjects) and the addition of a 5% non-response rate (18 subjects), 384 subjects were selected by proportional random sampling. Because the population studied was a finite population, we used the Slovin Formula to calculate the sample size with an error rate of 5%. Data from eighteen subjects could not be included in the analysis because five students were absent from school and 12 subjects did not complete the questionnaire. Finally, 367 subjects were included in the data analysis.

Data collection took place between April to December 2024. The Health Research Ethics Committee of the Palangkaraya Ministry of Health Polytechnic has granted research ethics approval with Approval Number: 307/VII/KE.PE/2024 on July 1, 2024. The research subjects were under 18 years old, therefore informed consent was given not only to the subjects but also to their parents or legal guardians. The confidentiality of the subjects' identities and all information provided was strictly maintained throughout the research process.

Breakfast habits, which are the independent variable in this study, were measured using a structured questionnaire. In this study, breakfast was defined as the habit of consuming food in the morning between 5:00 and 9:00 a.m., or before leaving for school. Data were obtained from subjects' answers to the question of how many days in the past week they consumed breakfast. The data were then categorized as never (0 times per week), rarely (≤ 3 times per week), and often (> 3 times per week). Academic achievement is the dependent variable in this study. Data were collected from final semester grade reports in Mathematics, Science, Social Studies, Indonesian, and English. The data obtained from these five subjects were then averaged.

In addition to these two variables, this study also measured demographic variables, including parental education and occupation. Data were collected using a structured questionnaire. Parental education was defined as the last level of formal schooling completed by the subject's parents. Parental education data was then grouped into primary school, middle school, high school, and college. Parental occupation was defined as the daily activities carried out by the subject's parents to earn money. Furthermore, the data was grouped into working and not working.

In univariate analysis, categorical data (parental's education, parental's occupation, and breakfast habits) are presented using a frequency distribution table. Meanwhile, continuous data (breakfast frequency and academic achievement) are presented using mean, standard deviation, median, minimum, and maximum values. In this study, the Kruskal Wallis statistical test and the Mann Whitney statistical test were used to determine differences in academic achievement based on breakfast habits. The significance level of both statistical tests was at p -value < 0.05 . The use of both tests in the bivariate analysis was due to the results of the Kolmogorov-Smirnov test for the academic achievement variable obtained a p -value < 0.05 . These results indicate that the academic achievement variable is not normally distributed.

RESULTS AND DISCUSSION

Results

Of the 367 subjects, all of them followed the study to the end and their data could be analysed. The results show that the majority of fathers' education (55%) and mothers' education (47.4%) is middle school. Most of the subjects' father work (90.5%), but conversely, most of the subjects' mother do not work (74.9%) (Table 2).

Table 2. Demographic Status of Adolescent Girls in Tasikmalaya City

Demographics Status	n	%
Parental' education		
Father		
Primary School	38	10.4
Middle School	62	16.9
High School	202	55.0
College	65	17.7
Mother		
Primary School	44	12.0
Middle School	67	18.3
High School	174	47.4

Demographics Status	n	%
College	82	22.3
Parental' occupation		
Father		
Not working	35	9.5
Work	332	90.5
Mother		
Not working	275	74.9
Work	92	25.1

The average breakfast frequency of the subjects was about three times a week, and half of the participants frequently consumed breakfast (54.5%) (Table 3). Academic achievement based on the average value of five subjects was 86.9, with a median of 87.4, and a range of values between 72 and 96.6. The highest average subject score was Indonesian (87.6), followed by Social Studies (87.5), English (87.4), Science (86.6) and the lowest was Mathematics (85.5) (Table 3).

Table 3. Breakfast habits and academic achievement of adolescent girls in Tasikmalaya City

Variable	n (%)	$\bar{x} \pm SD$	Median (Minimum-Maximum)
Breakfast Habits			
Frequency of Breakfast (x/weeks)		3.4 $\pm$ 2,5	
Breakfast habits			
Never	83(22.6)		
Rarely	84(22.9)		
Often	200(54.5)		
Academic Achievement			
Mathematics		85.5 $\pm$ 6.3	86.0 (44.0-97.0)
Natural Sciences		86.6 $\pm$ 5.5	87.0 (53.0-100.0)
Social Sciences		87.5 $\pm$ 5.6	89.0 (60.0-97.0)
Indonesian		87.6 $\pm$ 5.6	89.0 (59.0-100.0)
English		87.4 $\pm$ 5.6	88.0 (75.0-98.0)
All Subjects		86.9 $\pm$ 4.5	87.4 (72.0-96.6)

The study²² provided bivariate results that the subjects' academic achievement did not differ based on their father's education ($p=0.329$) and¹³ occupation ($p=0.234$). Conversely, the subjects' academic achievement differed based on their mother's education ($p<0.001$), mother's occupation ($p=0.045$), and breakfast habits ($p=0.004$). This study showed that the higher the education of the mother (college level), the greater the average overall academic achievement score (89.0), likewise the average academic achievement score in subjects with working mothers was greater (87.6) compared to mothers who do not work. Subjects who consumed breakfast more frequently had higher average academic achievement scores (87.6), compared to subjects who rarely (85.5) or never (85.5) consumed breakfast (Table. 4).

Table 4. Differences in Academic Achievement Based on Demographic Conditions and Breakfast Habits

Variable	Academic Achievement $\bar{x} \pm SD$	p-value
Parental' education		
Father ^a		0.329
Primary School	86.4 $\pm$ 5.0	
Middle School	86.5 $\pm$ 4.4	
High School	86.8 $\pm$ 4.6	
College	87.9 $\pm$ 4.1	
Mother ^a		<0.001**

Variable	Academic Achievement	p-value
	$\bar{x} \pm SD$	
Primary School	85.0 $\pm$ 4.6	
Middle School	85.7 $\pm$ 5.0	
High School	86.9 $\pm$ 4.1	
College	89.0 $\pm$ 4.2	
Parental' occupation		
Father ^b		0.234
Not working	85.8 $\pm$ 5.4	
Work	87.0 $\pm$ 4.4	
Mother ^b		0.045*
Not working	86.7 $\pm$ 4.6	
Work	87.6 $\pm$ 4.3	
Breakfast habits ^a		0.004*
Never	85.7 $\pm$ 4.7	
Rarely	85.5 $\pm$ 3.8	
Often	87.6 $\pm$ 4.6	

^aderived from Kruskal Wallis; ^bderived from Mann Whitney; *significant at p<0.050; **significant at p<0.001

Discussion

The results showed that most teenagers have a breakfast frequency in the frequent category (54.5%), with a high average academic achievement (86.9). The statistics analysis of this study showed a significant difference ($p < 0.05$) between academic achievement based on breakfast habits, maternal education and maternal occupation. This study found a significant association between breakfast skipping and the average grades in five subjects (Mathematics, Natural Sciences, Social Sciences, Indonesian, and English). These results are in line with research by Feye et al (2023), which showed that there was a statistically significant relationship between skipping breakfast and overall academic achievement, math scores and English scores (Feye et al., 2023). A study in Mianyang City, China, involving middle school children showed that students who frequently ate breakfast performed better in school (Chen et al., 2020). Furthermore, a large study (147,781 elementary and junior high school students) in Jiangsu Province also found that students who frequently skipped breakfast were associated with lower academic performance (Yao et al., 2019).

Breakfast is a term used to describe the morning meal, typically between 5:00 and 9:00 a.m. Morning consumption can contribute approximately 15–30% of a person's total daily nutritional intake (Khusun et al., 2023). Eating in the morning is essential for the body because it provides energy to support activities throughout the day. Eating in the morning also helps prevent fatigue (Spence, 2017). The energy provided in breakfast contributes significantly to the energy supply, as the body has not received any food since the previous evening (Kaoutar et al., 2023). Breakfast is a unique eating habit because it is eaten after an overnight (Gibney et al., 2018). An increase in ghrelin, a hormone that stimulates appetite, can occur when someone skips breakfast. Skipping breakfast prolongs the fasting period, leading to increased ghrelin production (De Souza et al., 2021). In humans, the presence of ghrelin influences the increased sensation of hunger and excessive desire to eat (Anderson et al., 2023). In humans, hunger can reduce emotional control, thereby causing emotional changes (Spettigue et al., 2025). If this condition occurs in students, it will trigger a decrease in enthusiasm for learning and have an impact on decreasing learning achievement (Moller et al., 2022).

Breakfast provides essential nutrients and energy for optimal brain function. Skipping breakfast can reduce the intake of all the nutrients the brain needs, which has been linked to cognitive development and academic achievement (Park et al., 2011). Energy limitations resulting from skipping breakfast can lead to decreased concentration. In students, decreased concentration can cause them to lose focus on learning, resulting in decreased academic performance (Villain et al., 2016). Skipping breakfast is associated with impaired brain function, including decreased information processing and cognitive abilities such as memory, concentration, and focus (Cheng & Rebecca Yew, 2025). Skipping breakfast is thought to leave a person lacking energy for more than

twelve hours and is thought to result in decreased blood glucose levels which are associated with decreased concentration and learning ability (Sawai et al., 2020). Decreased concentration and focus is associated with student's ability to learn and perform academically in school.

In addition to breakfast frequency, breakfast quality also plays a role in academic achievement. Breakfast quality is thought to contribute to children's focus while studying. Consuming unhealthy breakfasts, such as foods high in sugar, can actually reduce children's focus while studying (Martin et al., 2024). Academic achievement is not solely determined by physical condition; enthusiasm, frequency, and motivation to study also play a significant role (Indriasari et al., 2021). Furthermore, the quality and duration of sleep, as well as a child's memory, also play a role. This condition is closely related to the family's socioeconomic (SES) statuses.

The study shows that there are significant differences in the academic achievement of subjects based on the mother's last completed education status, the mother's employment status, and the subjects' breakfast habits. The findings of this study are largely in line with similar studies that examine the relationship between demographic status, including parental education and occupation, and breakfast habits, with academic achievement. The mother's education level influences her child's academic achievement.

This research was in line with the research of Tan, Zhou & Li (2020) (Tan et al., 2020), Abuya (2018) (Abuya et al., 2018), and Huang (Huang et al., 2025) which states that educated mothers have a significant relationship with the academic achievement of the subjects. In addition, research by Lim (2021) also shows that highly educated mothers have a significant correlation with their daughters' achievements compared to mothers with average education (Lim, 2021). Children's personality, handwriting, psychology and intelligence depend on their mother's education (Pezzuti et al., 2025). In a family, a mother who has achieved a higher education can be a source of resilience, inspiration, and energy for her children. This is because mothers are more likely to guide and prepare their children for the better future (Khalid, 2023). Academic achievement is strongly supported by a good home environment. Home environmental qualities such as the availability of books, reading habits, limits on gadget use, and extracurricular activities are better in families with educated mothers (Tan et al., 2020). In families with educated mothers, parents' expectations that their children will have a higher education also increase, thus encouraging an increase in academic performance (Koshy et al., 2019; Wang et al., 2020). In addition, well-educated mothers are better able to recognize educational opportunities and provide targeted support, leveraging their knowledge and resources to benefit their children (Sari, 2026).

Apart from the mother's education, the mother's working status is also related to the subject's academic achievement. This study was also supported by research conducted by Fatema (2024) in Bangladesh (Fatema, 2024), and by Ndoeye and Atchade (2025) in Senegal (Ndoeye & Atchade, 2025) which stated that families with working mothers encourage children to have good academic achievements. Research by Filliz (2016) also stated that unemployed mothers result in low academic achievement in children (Filiz, 2016). Working mothers contribute to the family economy, which ultimately can provide good learning facilities for their children (Azizah et al., 2022). Increased income influences parenting patterns children's cognitive abilities, school achievement and engagement, and behaviour (Cooper & Stewart, 2021). The relationship between education, employment status, and family income all influence maternal involvement in school which then impacts academic achievement (Holmes et al., 2018).

Implications

Breakfast is useful for creating a healthier, more active and more productive life. However, most teenagers do not consume breakfast according to the nutritional content standards for breakfast, therefore education is needed to improve the nutritional quality of breakfast (Woods et al., 2023). Adequate breakfast energy should be 300-500 calories and 6-10 grams of protein. The food intake obtained in the morning is useful as a provision for the body to think, work and carry out activities well. Breakfast has been proven to prevent obesity in adolescents and adults, and breakfast habits are also positively related to adolescents' academic performance (Lundqvist et al., 2019).

Skipping breakfast during adolescence has a negative impact on academic achievement because it reduces learning concentration and increases student absence from school. The lack of

nutrients entering the body after a long fast at night causes a decrease in the ability to concentrate on studying due to feelings of weakness, lethargy, dizziness and drowsiness (Abdullah et al., 2024). Breakfast habits can help improve cognitive function to increase memory, improve academic achievement and increase school attendance.

In Indonesia, two-thirds of adolescent report skipping breakfast (UNICEF, 2024), a significant figure. Given the importance of breakfast habits for supporting students' academic achievement, policies to improve breakfast habits are needed. Policies that support breakfast habits in students should be directed at breakfast quality, with adequate types and nutritional content. The nutritional content of breakfast is expected to reach 20-33% of a child's total nutritional adequacy (Durgannavar & Vijayalakshmi, 2021), and the types of food served should also be varied.

Research contribution

This study provides evidence that breakfast habits are related to academic achievement, especially in adolescent girls.

Limitation

Several limitations are weaknesses of this study. The first limitation is that data on breakfast habits and demographic factors were obtained using a questionnaire, making the data highly subjective. This study also did not measure the content and diversity of breakfast foods. Similarly, nutritional status (BMI), sleep duration, and children's study habits were not measured. The cross-sectional design used in this study makes it impossible to definitively explain the causality of the relationship. Despite these limitations, this study has strengths because it measures other variables predicted to have a more comprehensive relationship, such as demographics.

Suggestions

For further investigation, studies should explore the quality of breakfast to determine the nutritional content such as macronutrients and micronutrients.

CONCLUSION

This study focuses on adolescents and aims to determine differences in academic achievement based on breakfast habits. Students who frequently eat before going to school or known as breakfast were associated with higher academic achievement compared to students who only occasionally or never eat breakfast. In addition, Educated and working mothers are also associated with students' academic achievement. Families should support adolescent girls by providing breakfast and serving as role models for good breakfast behaviour. Further research may consider measuring the factors that influence academic achievement more specifically. Future research should consider using prospective cohort or experimental designs

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AUTHOR CONTRIBUTION STATEMENT

DS is the principal investigator who conceived and designed this study. LH led data collection, data analysis, and manuscript writing. PES reviewed the manuscript and manuscript proof reading.

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AI DISCLOSURE STATEMENT

The authors declare that this research was prepared, researched, written, and edited without the aid of artificial intelligence (AI) techniques.

CONFLICTS OF INTEREST

All authors declare no conflict of interest.

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