

# The Impact of BMI on Learning

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DOI: <https://doi.org/10.51244/IJRSI.2026.1304000171>

Received: 16 April 2026; Accepted: 22 April 2026; Published: 12 May 2026

## ABSTRACT

This study investigates the impact of Body Mass Index (BMI) on students' learning outcomes in a 1AB school in the Piliyandala education zone. The research focuses on understanding how physical fitness influences academic performance, attention, and motivation among students. A mixed-method approach was used, including BMI measurements, questionnaires, and structured interviews. The sample consisted of 145 students and 44 stakeholders including teachers, parents, and health officers. The findings reveal that students with higher BMI levels demonstrate better attention and academic performance, whereas underweight students show reduced concentration and increased fatigue. The study also highlights the positive role of physical activities and school-based programs in improving both health and learning outcomes. Overall, a significant relationship between BMI and academic performance is identified.

**Keywords:** BMI, Physical Fitness, Academic Performance, Learning, Attention

## INTRODUCTION

Education is a multidimensional process influenced by cognitive, social, and physical factors. Among these, physical health plays a significant role in determining students' academic success and overall learning outcomes. In recent years, increasing attention has been given to the relationship between students' physical fitness and their academic performance. Body Mass Index (BMI), a widely used indicator of nutritional and health status, is considered an important factor in understanding this relationship.

BMI reflects the balance between weight and height and is commonly used to classify individuals as underweight, normal weight, overweight, or obese. It serves as a simple yet effective measure to assess students' physical fitness levels. According to the World Health Organization, physical fitness encompasses not only bodily health but also mental well-being, which are essential for effective learning and development (WHO, 2010).

Previous research has demonstrated that students with better physical fitness tend to achieve higher academic performance. For instance, studies have shown that physically active students exhibit improved attention, memory, and cognitive functioning compared to their less active peers (Singh et al., 2012). Similarly, physical activities such as sports and exercise contribute to enhanced brain function and classroom engagement, thereby supporting learning processes (Strong et al., 2005).

In contrast, students with low BMI often experience nutritional deficiencies, fatigue, and reduced concentration, which can negatively impact their academic performance. On the other hand, students with high BMI may face physical discomfort and psychological challenges, such as low self-esteem and reduced participation in school activities. These factors can hinder their ability to focus and perform effectively in academic settings.

Within the Sri Lankan educational context, particularly in the Piliyandala education zone, disparities in students' physical fitness levels are evident. Some students actively engage in physical activities, while others face limitations due to environmental, social, and institutional factors. As a result, variations in BMI may significantly influence students' learning outcomes.

Therefore, this study focuses on examining the impact of BMI on students' learning in a 1AB school in the Piliyandala education zone. By analyzing the relationship between BMI and academic performance, attention, and motivation, this research aims to provide valuable insights into how physical health contributes to educational achievement and to highlight the importance of integrating health and education for holistic student development.

### **Research Problem**

In modern education systems, greater emphasis is placed on academic achievement, often neglecting students' physical fitness. As a result, students may experience health issues such as fatigue, low concentration, and reduced motivation. Therefore, the key research problem is: How does BMI influence students' learning outcomes in a 1AB school in the Piliyandala education zone?

### **Objectives of the Study**

- To identify students' BMI levels
- To analyze the relationship between BMI and academic performance
- To examine the effect of BMI on attention and motivation
- To evaluate the role of physical activities in improving learning

### **Research Question**

- What are the BMI levels of students in the 1AB school in the Piliyandala education zone?
- What is the relationship between BMI and students' academic performance?
- How does BMI influence students' attention, motivation, and learning behavior?
- What is the impact of physical activities and school-based programs on students' BMI and learning outcomes?
- What strategies can be implemented to improve students' BMI and enhance their learning performance?

## **LITERATURE REVIEW**

The literature reviewed in the thesis shows that BMI is not only a measure of body size, but also an important indicator of students' physical health and readiness for learning. The review explains that the World Health Organization classifies BMI into underweight, normal weight, overweight, and obesity categories, and presents BMI as a practical tool for assessing student health status. The thesis further notes that poor BMI status, especially undernutrition, is associated with fatigue, poor attendance, weak concentration, and reduced learning capacity, while excessive body weight is linked with long-term health risks and psychosocial problems that may also interfere with school performance.

A central theme in the reviewed literature is the relationship between physical fitness, physical activity, and academic performance. The thesis cites evidence that students with better physical fitness tend to show stronger attention, memory, and classroom engagement. Studies such as Singh et al. (2012) and Strong et al. (2005), as discussed in the thesis, indicate that physically active students generally perform better in school and demonstrate stronger cognitive functioning than less active students. The review therefore suggests that physical fitness contributes directly and indirectly to learning outcomes.

The literature also emphasizes the cognitive benefits of exercise. According to the studies summarized in the thesis, physical activity improves blood circulation to the brain and supports attention, memory, and executive functions. Hillman, Erickson, and Kramer (2008), cited in the thesis, argue that exercise positively affects brain

and cognition, while Donnelly et al. (2016) show that school-based physical activity programs can improve both fitness and academic achievement. This supports the argument that BMI should not be viewed in isolation, but as part of a broader relationship among health, fitness, and educational performance.

Another important area in the review is the role of sports and school activities. The thesis explains that participation in sports and physical education enhances not only physical strength and BMI balance, but also motivation, discipline, teamwork, and social development. It cites Bailey (2006) and CDC guidance to show that school-based physical activity can improve student behavior, engagement, and academic outcomes. The literature therefore identifies sports and structured school activities as important supportive factors in student learning.

The review further discusses moderating and related factors such as age and gender. The thesis notes that physical fitness changes with age and that adolescence is a critical stage for BMI and fitness development. It also highlights that boys and girls may differ in physical fitness patterns and in how BMI relates to learning. The literature presented in the thesis suggests that these demographic factors should be considered when studying the impact of BMI on academic performance.

School environment is another major theme in the literature review. The thesis explains that access to physical education, playgrounds, activity-friendly spaces, and institutional support from teachers and school leadership can influence both fitness and learning engagement. Local and international studies cited in the thesis suggest that when schools provide more opportunities for physical activity, students' physical well-being and classroom performance improve together.

The literature also connects BMI and physical fitness with mental state, attention, and motivation. The thesis discusses evidence showing that physically active students experience lower stress and anxiety and better emotional balance, which in turn supports concentration and learning. Biddle and Asare (2011) and related studies cited in the thesis strengthen the view that physical fitness affects academic performance partly through psychological well-being.

Overall, the literature reviewed in the thesis supports a positive relationship between healthy BMI, physical fitness, and learning outcomes. It consistently shows that students with healthier BMI and better physical activity patterns are more likely to display stronger attention, better classroom participation, and improved academic performance. At the same time, the review identifies a need for more context-specific evidence in Sri Lankan schools, which justifies the present study in the 1AB school in the Piliyandala education zone.

## **METHODOLOGY**

This study adopted a descriptive and correlational research design to examine the relationship between Body Mass Index (BMI) and students' learning outcomes. The research was conducted in a 1AB school in the Piliyandala education zone, focusing on students' physical fitness and academic performance.

The sample consisted of 145 students, along with 44 interview participants including teachers, parents, class leaders, and health officers. A random sampling method was used to select participants in order to ensure representativeness.

Data were collected using multiple methods. BMI was calculated by measuring students' height and weight, while academic performance data were obtained from school records. In addition, a Likert-scale questionnaire was used to gather information on students' attention, motivation, and learning behavior. Structured interviews were also conducted to obtain qualitative insights from stakeholders.

The collected data were analyzed using statistical techniques such as mean, median, standard deviation, and correlation analysis. These methods were used to identify patterns and relationships between BMI and learning outcomes.

## RESULTS AND FINDINGS

The collected data were analyzed using SPSS to examine the relationship between Body Mass Index (BMI) and students' learning outcomes. Descriptive statistics and percentage analysis were used to present the distribution of BMI categories, while correlation analysis was used to identify relationships between BMI and academic performance, attention, and learning behavior.

Table 1: Distribution of Students According to BMI Categories

BMI Category	Frequency	Percentage (%)
Underweight	38	26.2%
Normal Weight	72	49.7%
Overweight	35	24.1%
Total	145	100%

The table shows that the majority of students (49.7%) fall within the normal BMI category, while 26.2% are underweight and 24.1% are overweight. This indicates that although a large proportion of students maintain a healthy BMI, a considerable number of students fall outside the normal range, which may influence their learning outcomes.

Table 2: Academic Performance According to BMI Categories

BMI Category	Mean Score (%)	Standard Deviation
Underweight	58.4	8.2
Normal Weight	71.6	7.5
Overweight	68.9	6.9

The analysis indicates that students with normal BMI have the highest mean academic score (71.6%), followed by overweight students (68.9%), while underweight students show the lowest performance (58.4%). This suggests that maintaining a normal BMI is associated with better academic achievement. The variation in scores also reflects differences in concentration and physical well-being among the groups.

Table 3: Relationship Between BMI and Attention Levels

BMI Category	High Attention (%)	Moderate Attention (%)	Low Attention (%)
Underweight	21%	37%	42%
Normal Weight	48%	39%	13%
Overweight	41%	44%	15%

The table illustrates that students with normal BMI show the highest percentage of high attention levels (48%), whereas underweight students have the highest proportion of low attention (42%). Overweight students also demonstrate relatively high attention levels compared to underweight students. These findings indicate that BMI has a clear influence on students' ability to concentrate and engage in learning activities.

Table 4: Correlation Between BMI and Academic Performance

Variables	Correlation (r)
BMI & Academic Performance	0.62

The correlation coefficient ( $r = 0.62$ ) shows a moderate positive relationship between BMI and academic performance. This indicates that as BMI improves toward a normal range, students' academic performance tends to increase. The result confirms that physical health is an important factor influencing learning outcomes.

Table 5: Impact of Physical Activities on BMI and Learning

Participation Level in Physical Activities	Improved BMI (%)	Improved Academic Performance (%)
High Participation	68%	72%
Moderate Participation	52%	60%
Low Participation	31%	38%

The table shows that students who actively participate in physical activities demonstrate higher improvements in both BMI (68%) and academic performance (72%). In contrast, students with low participation show significantly lower improvements. This highlights the importance of physical activity in enhancing both physical fitness and learning outcomes.

### Overall Interpretation

The SPSS analysis clearly demonstrates that BMI is significantly associated with students' academic performance, attention, and learning behavior. Students with normal BMI consistently perform better, show higher attention levels, and achieve better academic outcomes. Physical activity further strengthens this relationship by improving both BMI and learning performance.

### DISCUSSION

The findings of this study clearly indicate that Body Mass Index (BMI) has a significant impact on students' learning outcomes. The SPSS analysis revealed that students with normal BMI demonstrated higher academic performance and better attention levels compared to underweight students. This finding is consistent with previous research, which highlights that physically fit students tend to perform better academically due to improved cognitive functioning and concentration (Singh et al., 2012).

The results further showed that underweight students experienced lower academic scores and higher levels of fatigue and poor attention. This supports existing literature which states that nutritional deficiencies associated with low BMI can negatively affect brain function, memory, and classroom engagement. Studies have emphasized that poor physical health can reduce students' ability to focus and actively participate in learning activities, ultimately affecting their academic success (WHO, 2010).

In addition, the study found a moderate positive correlation between BMI and academic performance. This aligns with the findings of Hillman, Erickson, and Kramer (2008), who argue that physical fitness enhances brain activity and improves executive functions such as attention and problem-solving. The SPSS results showing higher attention levels among students with normal BMI further confirm that physical health plays a critical role in cognitive development and learning.

The influence of physical activity observed in this study also supports previous research. Students who actively participated in school-based physical activities showed better BMI levels and improved academic performance. This finding is consistent with Donnelly et al. (2016), who highlight that structured physical activity programs in schools contribute to both physical fitness and educational achievement. The role of school environment and physical education in enhancing student performance is therefore strongly reinforced.

Furthermore, the qualitative findings from teachers and parents emphasized that physically active students are more energetic, attentive, and motivated in the classroom. This observation aligns with studies that link physical fitness with improved mental well-being, reduced stress, and higher motivation levels, all of which contribute to better learning outcomes.

Overall, the discussion confirms that BMI is not only a health indicator but also a significant factor influencing students' academic performance and learning behavior. The results of this study are consistent with both local and international literature, emphasizing the importance of maintaining a healthy BMI and promoting physical activity within the school system to support holistic student development.

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## RECOMMENDATIONS

Based on the findings of this study, several recommendations can be proposed to improve students' BMI and learning outcomes. The results clearly indicate that maintaining a healthy BMI plays a significant role in enhancing academic performance, attention, and motivation. Therefore, it is essential to integrate health and education strategies within the school system.

Schools should increase the time allocated for physical education and sports activities in the curriculum. Regular physical activity helps students maintain a healthy BMI and improves their concentration and academic performance. Encouraging daily exercise and structured sports programs can significantly enhance both physical and cognitive development.

It is also recommended that schools implement regular BMI monitoring programs to identify students who are underweight or overweight. Early identification will allow teachers and health professionals to provide appropriate guidance and support to improve students' health conditions.

Another important recommendation is to promote nutrition awareness among students and parents. Schools should organize workshops and awareness programs on balanced diets and healthy eating habits. Proper nutrition is essential for maintaining a healthy BMI and supporting effective learning.

As Sivananathan (2021) noted, parents should systematically discuss with students about their learning problems, their academic progress, and other educational needs. Based on this, there should be strong collaboration between teachers, parents, and health authorities. An integrated approach will help monitor students' health, promote physical activity, and provide emotional and academic support to students with challenges related to Body Mass Index (BMI).

Schools should also improve their physical environment and facilities, such as playgrounds and sports equipment, to encourage active participation in physical activities. A supportive school environment plays a crucial role in promoting students' physical fitness and overall well-being.

Finally, policymakers should consider integrating health-based interventions into educational policies, ensuring that physical fitness is given equal importance alongside academic achievement. This will contribute to the holistic development of students and improve long-term educational outcomes.

## CONCLUSION

This study examined the impact of Body Mass Index (BMI) on students' learning outcomes in a 1AB school in the Piliyandala education zone. The findings clearly demonstrate that BMI plays a significant role in influencing students' academic performance, attention, and learning behavior. Students with normal BMI levels showed better academic achievement and higher levels of concentration, while underweight students experienced fatigue and lower learning efficiency.

The SPSS analysis confirmed a positive relationship between BMI and academic performance, indicating that physical health is closely linked to cognitive functioning and educational success. In addition, the study highlighted the importance of physical activities and school-based programs in improving both BMI and learning outcomes. Students who actively participated in physical activities were more attentive, motivated, and academically successful.

The results of this study are consistent with existing literature, which emphasizes that physical fitness contributes to improved brain function, attention, and overall learning capacity. Furthermore, the findings underline the importance of addressing both undernutrition and overweight conditions among students to ensure balanced development.

In conclusion, BMI is not only a measure of physical health but also a key factor affecting students' academic success. Therefore, it is essential for schools, parents, and policymakers to work collaboratively to promote healthy lifestyles, encourage physical activity, and support students' well-being. Such efforts will contribute to enhancing both educational outcomes and the overall development of students.

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