

Body posture and academic performance of fifth-year students at a school in Chiclayo 2024

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Abstract: The study aligned with the Sustainable Development Goal (SDG) 3, related to health and well-being, and aimed to analyze the relationship between body posture and the academic performance of fifth-year high school students in Chiclayo. It was a basic research study with a quantitative approach and a non-experimental cross-sectional design. The sample consisted of 90 students selected using a formula for finite populations, employing a questionnaire of 15 questions per variable as a data collection instrument. The results showed a significant correlation between body posture and academic performance, with sufficient evidence to assert that improvements in posture could be associated with better school performance. Therefore, this finding fulfilled the general objective of the study, emphasizing the importance of posture in academic performance. In conclusion, it was recommended to implement educational programs focused on correcting and improving students' body posture, highlighting its positive impact on both learning and overall well-being.

Keywords: Academic performance, Education, Learning, Questionnaire, School ergonomics.

1. Introduction

In the educational environment, it is crucial to address how body posture affects the academic performance of students. This aspect is fundamental for health, especially during the school years, as motor skills and postural habits are developed that will influence adulthood. The study on posture and its impact on students at a school in Chiclayo will help to understand the relationship between posture and learning; it also aligns with Sustainable Development Goal 3: Health and well-being, highlighting the relevance of posture for physical well-being and the prevention of musculoskeletal problems.

Rita and Ricardo [1] indicated that 16.6% of students in Brazil exhibited hyperkyphosis, 27.9% hyperlordosis, and 33.2% scoliotic posture. Lluen [2] showed that 41% of university students in Lima had moderate ergonomic risks and 28% had low risk. Luque [3] mentioned that 40% of students in Puno experienced back pain, 28% sat on hard surfaces, 12% did not engage in physical activity, 48% used cell phones for classes, 84% did homework in their rooms, and 8% consumed only two meals a day. Herencia [4] found in Chiclayo that 70.53% exhibited both alterations, demonstrating the association between temporomandibular disorders and body posture.

In this project, an emblematic Educational Institution was chosen as the research center, which included both primary and secondary levels, located in the province of Chiclayo. This institution was considered the largest state school in Peru, encompassing approximately 4,000 students. Méndez and Cabeza [5] identified several causes: prolonged physical inactivity during school hours, limited financial resources for ergonomic improvements, a lack of qualified personnel in this field, potential resistance to change from the administration and teachers, as well as outdated infrastructure.

Failing to address this issue exposes students to health and safety risks, such as musculoskeletal injuries, chronic fatigue, and stress, which could negatively impact their academic and work performance. Additionally, absenteeism and staff turnover could increase, generating additional costs and compromising the school's reputation, which would affect its ability to attract and retain students and qualified personnel, negatively impacting educational quality.

The problem formulation poses the question: What is the relationship between body posture and academic performance of students in Chiclayo? The research was fundamental as it seeks to identify the relationship between the variables and promote the health and comfort of students, benefiting academic satisfaction in school. Regarding social relevance, it benefited students by providing key recommendations to reduce injuries and improve performance.

Similarly, the general objective was established to analyze the relationship between body posture and the performance of students in Chiclayo. The following specific objectives were presented: to determine the relationship of body posture in the cognitive dimension of students in Chiclayo, to determine the relationship of body posture in the affective dimension of students in Chiclayo, and to determine the relationship of body posture within the behavioral dimension of students in a school in Chiclayo.

Galmes-Panades, et al. [6] in their article, surveyed a school in Spain where they evaluated 849 primary school students. As a result, they found that low back pain (LBP) was more frequent in girls, among taller students, those who sat poorly at their desks, and those who walked to school.

Błaszczyk and Fredyk [7] in their research, observed 18 girls between childhood and adolescence in Poland. They found that stability control in girls aged 11 to 13 was in accordance with their developmental pace.

Taifa [8] in her research, surveyed 478 university students in India, using the Six Sigma methodology with ergonomic principles as an instrument. She determined that students were prone to high risks of developing musculoskeletal disorders (MSDs) due to prolonged use of poorly designed furniture.

Lima, et al. [9] in their research, conducted a scoping review on postural education programs for children and adolescents at the University of Portugal. Although follow-up results were inconsistent, they highlighted the importance of measuring the effectiveness of these programs in young children to promote healthy habits.

Rojas [10] in his research, observed and evaluated ergonomic posture in primary students and its relationship with back pain at an educational institution in Lima. He argued that inadequate posture among students, due to unadapted school furniture, caused musculoskeletal pain in the lumbar and cervical regions.

Luque [3] in his research, surveyed twenty-five fifth-grade students from an educational institution in Puno. He found a significant association between postural attitude and academic performance.

Uscamayta [11] in his research, surveyed thirty students from the Sixth Cycle of Physical Therapy and Rehabilitation at a university in Pueblo Libre. He discovered a moderate positive relationship between posture and study habits, as well as between postural ergonomics and study habits.

Machaca [12] surveyed 114 students from an educational institution in Juliaca. He pointed out that the incorrect use of backpacks by many students was significantly related to serious alterations in the spine in most situations.

Regarding the variables, Pavilack and Alstedter [13] argued that poor posture causes wear on muscles and joints, generating unhealthy movements and pain. Meanwhile, Hernández and Arreola [14] stated that academic performance is related to the level of knowledge demonstrated by the student in assessments. The research hypothesis was proposed that there is a relationship between body posture and the performance of students at a school in Chiclayo in 2024.

2. Method

This research was classified as basic, with a quantitative research approach. It was based on a non-experimental and cross-sectional design, utilizing a correlational level.

The first variable presented was body posture, in which Morente [15] conceptualized body posture as a dynamic concept, present throughout our lives. He pointed out the balance of certain muscle groups that allowed for a firm and upright position, even if it was rigid and inflexible. Additionally, Kendall [16] described it as the composition of all joints and the position they adopted at all times, adding that it was a method of non-verbal communication.

The variable had its dimensions: Kendall, et al. [17] defined postural attitude as the dynamic process that allowed the necessary adaptability to organize ourselves efficiently and comfortably around our needs. Guerrero [18] defined the dimension of postural hygiene as the norms or measures that an individual could adopt for the correct learning of their postural activities acquired throughout life.

The second variable presented was academic performance, where Tadese, et al. [19] defined it as the result of the teaching-learning process, highlighting that the outcome was explained multifactorially, as there were various causes contributing to academic performance. On the other hand, Ballotpedia [20] mentioned that academic performance was the performance of students in relation to many factors and was the measure of performance in various academic subjects.

Specific dimensions were addressed, such as the cognitive dimension, where Shumway Cook and Woollacott [21] referred to it as the mental processes and the awareness a person had about their body posture, involving the perception and knowledge of correct posture, as well as the ability to correct it. Additionally, the affective dimension was related to body posture, emotions, and mood. Posture influenced how a person felt emotionally and vice versa. According to Ekman and Friesen [22] an upright posture was associated with confidence, while a slouched posture was linked to discouragement.

Finally, the behavioral dimension, according to Bandura [23] referred to observable behaviors related to body posture, that is, the actions and postural habits that a person performed consciously or unconsciously during their daily activities.

It is necessary to understand the concepts of population and sample. According to Moreno, et al. [24] the population is a set of members who share common aspects such as race, age, education, among others. In this case, we will focus on the student population of the school in Chiclayo. Quispe, et al. [25] stated that it is necessary to know and calculate well the participants and the minimum amount needed to conduct a study of the target population, as this depends on the distribution of the resources needed. The sample will allow for a global reach since, primarily due to economic reasons, it is not possible to conduct a direct study of the entire population. Thus, in our research, sampling will be a simple random probabilistic sampling technique chosen among the units of analysis, which in this case are the classrooms.

Regarding the study population, it is composed of 117 students in their fifth year of secondary education at an educational institution. To ensure the validity of the data, certain inclusion criteria have been established. Students enrolled in the fifth year of secondary education, aged between 16 and 18 years, and with an attendance rate of 80% or higher during the school year were considered. Additionally, it was necessary for the students to give their consent to participate in the study, or for their parents or guardians to grant it in the case of minors.

On the other hand, students who were not in their fifth year of secondary education or who did not meet the minimum attendance percentage were excluded. Those who did not give their consent or who presented physical or psychological conditions that hindered their effective participation in the study were also excluded.

Regarding the sample, it was calculated using the formula for finite populations, ensuring representativeness with a 95% confidence level and a 5% margin of error, resulting in a sample of 90 students. A simple random probabilistic sampling was employed, where each student in the population had the same probability of being selected, thereby ensuring the impartiality of the process. This

technique was chosen due to the need to obtain a representative sample without having to include all 117 students from the population.

Based on the work, the technique used was the survey, as a quantitative technique for data collection. According to La Nuez and Fernández (2014, cited by Feria [26]), the survey is a useful tool for collecting information that each individual fills out themselves.

In the data collection instruments, questionnaires specifically designed for each of the study variables were used, created by the researchers and structured according to the defined indicators for each variable. The first survey was aimed at assessing the variable of body posture, while the second focused on the variable of academic performance. Both surveys consisted of 15 closed questions, using a Likert scale, which would allow for understanding the responses generated by the students. In this sense, Acosta (2016, cited by Feria [26]) stated that the questionnaire is an instrument created for data collection.

The validity was assessed by 5 experts, achieving a general V-AIKEN of 0.80 for each questionnaire. A pilot test was applied to 20 individuals. Therefore, to evaluate reliability, the Cronbach's alpha method was used, obtaining a value of 0.809 for the body posture variable and a value of 0.941 for the academic performance variable, making these instruments reliable. In this way, a detailed analysis of body posture and academic performance of the students from a school in Chiclayo was conducted.

The data collection was organized in Excel and processed using the SPSS program (version 25) and Jamovi, the latter specifically for obtaining the reliability of the studies conducted with Cronbach's alpha.

For the execution of the research, the confidentiality of the respondents was respected, and at all times, its development followed the regulations of the current guide from César Vallejo University. Four moral principles applicable in research with human beings were identified. The first, consideration for persons (autonomy), acknowledged individuals' ability to make decisions and was directly applied in the informed consent process, which was crucial before anyone could participate in a study. The second, beneficence, referred to the researchers' duty to act for the benefit of participants, implying that research should have a defined objective and that risks to participants should be justified by potential benefits. The third principle, non-maleficence, meant avoiding causing harm or detriment to participants, including not only physical risks but also emotional or social risks. Finally, the principle of equity referred to treating all individuals equally and without discrimination, meaning that researchers should ensure that participant selection was impartial and that everyone had equal opportunities to participate in the research. Additionally, compliance with APA 7th edition standards was considered useful for properly organizing citations and references.

3. Results

Table 1.
Normality of the Body Posture Variable.

Kolmogorov-Smirnov ^a		
	gl	Sig.
,093	90	,055

In Table 1, with a sample size of 90 and a significance (confidence level) of 0.055, the null hypothesis (H0) states that the body posture variable follows a normal distribution. Since the significance is greater than 0.05, H0 is not rejected, which means there is sufficient evidence to assert that the body posture variable follows a normal distribution.

Table 2.

Normality of the Academic Performance Variable.

Kolmogorov-Smirnov^a		
	gl	Sig.
0.093	90	0.055

In Table 2, with a sample size of 90 and a significance (confidence level) of 0.071, the null hypothesis (H0) states that the academic performance variable follows a normal distribution. Since the significance is greater than 0.05, H0 is not rejected, which means there is sufficient evidence to assert that the academic performance variable follows a normal distribution.

Table 3.

Correlation of the Cognitive Dimension with the Body Posture Variable.

		Cognitive dimension	Body Posture
Cognitive dimension	Pearson Correlation	1	0.400
	Significance (two-tailed)		<0.001
	N	90	90
Body Posture	Pearson Correlation	0.400	1
	Significance (two-tailed)	<0.001	
	N	90	90

In Table 3, the two-tailed significance is less than 0.001, which suggests that we can reject the null hypothesis (H0) with a high degree of confidence and that there is sufficient evidence to assert that there is a significant relationship between the cognitive dimension and body posture. Furthermore, the Pearson correlation between the cognitive dimension and body posture is 0.400, indicating a moderate positive correlation between the two variables. Therefore, as the cognitive dimension improves, body posture also tends to improve.

Table 4.

Correlation of the Affective Dimension with the Body Posture Variable.

		Affective dimension	Body Posture
Affective dimension	Pearson Correlation	1	0.362
	Significance (two-tailed)		<0.001
	N	90	90
Body Posture	Pearson Correlation	0.362	1
	Significance (two-tailed)	<0.001	
	N	90	90

In Table 4, the two-tailed significance is less than 0.001, which suggests that we can reject the null hypothesis (H0) with a high degree of confidence and that there is sufficient evidence to assert that there is a significant relationship between the affective dimension and body posture. Furthermore, the Pearson correlation between the affective dimension and body posture is 0.362, indicating a moderate positive correlation between the two variables. Therefore, as the affective dimension improves, body posture also tends to improve.

Table 5.

Correlation of the Behavioral Dimension with the Body Posture Variable.

		Behavioral dimension	Body Posture
Behavioral dimension	Pearson Correlation	1	0.855
	Significance (two-tailed)		<0.001
	N	90	90
Body Posture	Pearson Correlation	0.855	1
	Significance (two-tailed)	<0.001	
	N	90	90

In Table 5, the two-tailed significance is less than 0.001, which suggests that we can reject the null hypothesis (H_0) with a high degree of confidence and that there is sufficient evidence to assert that there is a significant relationship between the behavioral dimension and body posture. Furthermore, the Pearson correlation between the behavioral dimension and body posture is 0.855, indicating a strong positive correlation between the two variables. Therefore, as the behavioral dimension improves, body posture also tends to improve significantly.

Table 6.
Correlation of the Academic Performance with the Body Posture Variable

		Academic Performance	Body Posture
Academic Performance	Pearson Correlation	1	0.746
	Significance (two-tailed)		<0.001
	N	90	90
Body Posture	Pearson Correlation	0.746	1
	Significance (two-tailed)	<0.001	
	N	90	90

In Table 6, the significance is extremely low (< 0.001), suggesting that the null hypothesis can be rejected. This demonstrates that there is sufficient evidence to assert that there is a significant relationship between body posture and academic performance of fifth-year students at a school in Chiclayo. Additionally, the Pearson correlation between the body posture variable and the academic performance variable is high at 0.746. Therefore, these results indicate that improvements in body posture may be associated with better academic performance in this group of students.

4. Discussion

The first specific objective is to determine the relationship between body posture and the cognitive dimension of students in Chiclayo, based on the theory of Pavilack and Alstedter [13] who argue that poor posture causes wear on muscles and joints, leading to unhealthy movements and pain. The research observes that a significant percentage of respondents show regular and poor levels in the cognitive dimension, highlighting the need to improve these capabilities among students, especially those with deficient cognitive levels. The data indicates a significant relationship between the cognitive dimension and body posture, suggesting that improving posture could have a positive impact on cognitive abilities. The moderate correlation between these variables indicates that as the cognitive dimension improves, so does body posture. These results coincide with the findings of Luque [3] who in his research with twenty-five fifth-grade students in Puno found a significant association between postural attitude and academic performance. Similarly, they are consistent with the study by Uscamayta [11] who discovered a moderate positive relationship between posture and study habits in students of the Sixth Cycle of Physical Therapy and Rehabilitation in Pueblo Libre. The observed relationship may be explained by the fact that proper posture not only improves physical health but can also influence students' concentration and focus, which in turn positively impacts their academic performance. Additionally, correct posture can reduce physical and mental stress, contributing to a better cognitive state and a greater ability to face academic and personal challenges.

The second specific objective is to determine the relationship between body posture and the affective dimension of students in Chiclayo, based on the theory of Hernández and Arreola [14] who assert that academic performance is related to the level of knowledge demonstrated by the student in evaluations. The research observes that a significant percentage of respondents present regular and poor levels in the affective dimension, emphasizing the need to enhance affective well-being among students, particularly those with deficient affective levels. The data indicates a significant relationship between the affective dimension and body posture, suggesting that improving posture could have a positive impact on affective well-being. The moderate correlation between these variables indicates that as the affective dimension improves, so does body posture. The results partially coincide with the findings of

Błaszczyk and Fredyk [7] who observed that stability control in girls aged 11 to 13 in Poland was consistent with their developmental rhythm. Furthermore, the results align with the observations of Lima, et al. [9] who highlighted the importance of measuring the effectiveness of postural education programs in children and adolescents to promote healthy habits, although they found inconsistent results. The observed relationship may be explained by the fact that proper posture not only improves physical health but can also influence students' self-esteem and confidence, which in turn positively impacts their affective well-being. Additionally, correct posture can reduce physical and mental stress, contributing to a better emotional state and a greater ability to face academic and personal challenges.

The third specific objective is to determine the relationship between body posture within the behavioral dimension of students in a school in Chiclayo, based on the theory of Hernández and Arreola [14] who assert that academic performance is related to the level of knowledge demonstrated by the student in evaluations. The research observes that a significant percentage of respondents present regular and good levels in the behavioral dimension, emphasizing the need to continue improving these capacities among students, especially those with deficient behavioral levels. The data indicates a significant relationship between the behavioral dimension and body posture, suggesting that improving posture could have a positive impact on students' behaviors. The strong correlation between these variables indicates that as the behavioral dimension improves, so does body posture significantly. These results coincide with the findings of Galmes-Panades, et al. [6] who found that lower back pain was more frequent in students who sat poorly at their desks and walked to school, and with those of Taifa [8] who determined that university students were at high risk of developing MSD due to prolonged use of poorly designed furniture. These findings underscore the importance of considering body posture as an influencing factor in students' behaviors. The observed relationship can be explained by the fact that proper posture not only improves physical health but can also influence students' discipline and behavior, which in turn positively impacts their academic and social performance. Both investigations converge on the importance of correct posture for the overall well-being of the student, highlighting the need for interventions that promote healthy postural habits in educational environments.

The general objective is to analyze the relationship between body posture and the performance of students in Chiclayo, based on the theory of Pavlack and Alstedter [13] who argue that poor posture causes wear on muscles and joints, leading to unhealthy movements and pain. The research demonstrates that there is sufficient evidence to assert that there is a significant relationship between body posture and academic performance of fifth-year students at a school in Chiclayo. Additionally, the high correlation between body posture and academic performance indicates that improvements in body posture may be associated with better academic performance in this group of students. These results align with the findings of Rojas [10] who observed that inadequate posture among students, due to unadapted school furniture, caused musculoskeletal pain in the lumbar and cervical areas at an educational institution in Lima. Similarly, they coincide with the observations of Machaca [12] who pointed out that the incorrect use of backpacks by many students was significantly related to serious alterations in the spine at an educational institution in Juliaca. These findings underscore the importance of considering body posture as an influencing factor in students' academic performance. The observed relationship can be explained by the fact that proper posture not only improves physical health but can also influence students' concentration and focus, positively impacting their academic performance. Likewise, correct posture can reduce physical and mental stress, contributing to a better cognitive state and a greater ability to face academic and personal challenges.

5. Conclusions

In the general objective of the study, the relationship between body posture and the performance of students in Chiclayo was determined. The results indicated a significant correlation between body posture and academic performance, with sufficient evidence to assert that improvements in body posture were associated with better academic performance among fifth-year students at a school in Chiclayo.

In the first specific objective, the relationship between body posture and the cognitive dimension of students in Chiclayo was determined. It was concluded that the data indicated that a significant percentage of respondents exhibited regular and poor levels in the cognitive dimension, highlighting the need to improve these capabilities among students, especially those with deficient cognitive levels. Therefore, it was suggested that factors such as the implementation of educational programs and physical exercises aimed at improving posture, as well as continuous monitoring of student progress, could have significantly influenced the results.

In the second specific objective, the relationship between body posture and the affective dimension of students in Chiclayo was analyzed. It was concluded that the data indicated that a significant percentage of respondents exhibited regular and poor levels in the affective dimension, underscoring the need to improve affective well-being among students, particularly those with deficient affective levels. Furthermore, the moderate correlation between the affective dimension and body posture suggested that improving posture could have a positive impact on affective well-being.

As the third specific objective, the relationship between body posture within the behavioral dimension of students in a school in Chiclayo was determined. It could be concluded that the findings showed that a significant percentage of respondents presented regular and good levels in the behavioral dimension, highlighting the need to continue improving these capabilities among students, particularly those with deficient behavioral levels. The strong correlation between body posture and the behavioral dimension suggests that improving posture could have a positive impact on students' behaviors.

Regarding the methodological recommendations, the studied population could be extended to several educational centers in Chiclayo, where a biometric analysis of the students participating in the surveys could also be conducted, and their academic performance evaluated before and after implementing ergonomic programs.

Transparency:

The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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