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Analysis of Physical Development on the Activity of Grade V Students at elementary school 1 Karangmangu Susukan Lebak Cirebon

Syahfa Azahra[1], Syifa Ummuhani[2], Nurkholis[3]
1,2,3 *Faculty of Teacher Training, University of Muhammadiyah Cirebon, Cirebon, Indonesia*

Abstract

This study aims to analyze the relationship between physical development and the level of learning activity of grade V students at Elementary School 1 Karangmangu. Physical development is a fundamental aspect that affects students' motor, cognitive, and active participation in learning. The research method used is descriptive qualitative with data collection techniques through structured observation, in-depth interviews, and documentation. The research subjects involved 10 students of class V consisting of 5 male students and 5 female students. Data analysis techniques using the Miles and Huberman model include data reduction, data presentation, and conclusion drawn. The results showed that: (1) most students (70%) had physical development in accordance with the age standard of 11-12 years, but there were 30% of students with below-average growth; (2) there is a positive correlation between physical development and learning activity, where students with a proportional posture show more balanced activeness and focus in learning; (3) genetic, nutritional, physical activity, and social environment factors are the main determinants of variation in students' physical development. The novelty of this study lies in the identification of a specific relationship pattern between physical characteristics (height, weight) and the type of learning activity (leadership, hyperactivity, balanced activity) in elementary school students. The implications of the study show the need for collaboration between teachers and parents in monitoring children's physical development and designing learning strategies that are accommodating to the variation in students' physical characteristics.

Keywords: Physical development, learning activeness, elementary school children, adaptive learning

(*) Corresponding Author: syhfaazzahra0404@gmail.com

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INTRODUCTION

Physical development is an important foundation in the growth of elementary school-age children which includes biological changes in muscles, bones, brain, and nervous system (Fikriyah, 2021; Santrock, 2023). In the age range of 10-12 years, the child is in the prepuberty phase which is characterized by significant physical growth

and the appearance of secondary sexual characteristics (Berk, 2023). These physical changes not only impact physical health aspects, but also affect students' cognitive, social-emotional, and activeness development in the learning process (Hurlock, 2022; Papalia & Martorell, 2021). Student learning activity is an important indicator of the success of the educational process in elementary schools. Students who are active in learning show characteristics of high enthusiasm, initiative in the exploration of knowledge, active participation in class discussions, and the ability to collaborate with peers (Andriana et al., 2019; Djamarah, 2021). However, the level of student activity varies greatly and is influenced by various factors, one of which is the condition of physical development (Uno & Mohamad, 2022).

The phenomenon that occurs in the field shows that there is a disparity in physical development between students in the same age group. Initial observations at Elementary School 1 Karangmangu identified that students with larger postures tended to show leadership behavior and social dominance, while students with smaller postures displayed high activity but lacked focus in doing assignments (Qur'ani, 2025). Students with proportional physical development show a balance between activeness and the ability to complete academic tasks (Arum et al., 2024).

This variation in physical development is influenced by multidimensional factors including: (1) genetic or hereditary factors that determine the child's growth potential (Wulandari & Silaen, 2023); (2) nutritional intake and diet that determine nutritional adequacy for optimal growth (Supariasa, 2022); (3) physical activity and exercise that stimulate bone and muscle growth (Mutohir & Ali, 2021); and (4) family socio-economic environmental conditions that affect access to nutrition and health services (Soetjiningsih & Ranuh, 2022).

Research on the relationship between physical development and student learning activity is important because optimal physical development is a prerequisite for children to be able to actively participate in learning activities (Dhika Widarnandhana et al., 2023). Children with stunted physical development tend to have difficulty in the gross and fine motor activities needed for learning (Gallahue et al., 2022). Understanding students' physical developmental characteristics can help teachers design more adaptive and inclusive learning strategies (Tomlinson & Moon, 2023). Learning that considers variations in students' physical development will be more effective in accommodating individual needs (Smidt, 2023). Early identification of students with substandard physical development allows timely intervention from the school and family (Dzaky Satria et al., 2025). Nutritional interventions, physical activity, and health counseling can help overcome growth barriers (Ministry of Health of the Republic of Indonesia, 2023). This research makes an empirical contribution to the development of a holistic education policy, not only focusing on cognitive aspects but also paying attention to the physical and psychosocial aspects of students (Permendikbudristek No. 16 of 2022 concerning Standards for the Process of Primary and Secondary Education).

Based on the above problem identification, this study offers solutions As a solution to the problem, some of these things are, mapping the Physical Development Profile: Conducting systematic measurements and documentation of students' height, weight, and body mass index (BMI) to identify their growth status compared to WHO and Ministry of Health standards (2023). Physical-Activity Correlation Analysis:

Analyzing the relationship between physical characteristics and student learning activity patterns through structured observation during the learning process (Creswell & Creswell, 2023). Identification of Determinant Factors: Exploring the factors that influence variations in physical development through in-depth interviews with teachers, parents, and students to understand the genetic context, nutrition, activity, and social environment (Moleong, 2023). Mentoring Strategy Recommendations: Formulate practical recommendations for teachers and parents in assisting children's physical development and design learning that is responsive to the diversity of students' physical characteristics (Piaget, 2023).

This study aims to describe the physical development conditions of grade V students at Elementary School 1 Karangmangu is reviewed from the parameters of height, weight, and BMI based on the growth standards of elementary school-age children. Analyzing student learning activity patterns in the context of classroom learning is reviewed from the aspects of participation, initiative, collaboration, and focus on academic tasks. Identify the relationship between physical development characteristics and the level of learning activity of students in grade V Elementary School 1 Karangmangu. Investigate the factors that influence the variation in students' physical development including genetic, nutritional, physical activity, and socio-economic environment. Formulate recommendations for strategies for assisting children's physical development and adaptive learning for teachers and parents.

The novelty of this research lies in several aspects: First, this study identifies a specific relationship pattern between the type of physical characteristics (large, small, proportional posture) and the category of learning activity (leadership behavior, hyperactive behavior, balanced behavior) that has not been widely explored in the context of elementary school students in Indonesia (research gap from Andriana et al., 2019; Arum et al., 2024). Second, this study uses a holistic approach by integrating the perspective of physical development theory (Hurlock, 2022; Santrock, 2023), the theory of learning activity (Djamarah, 2021), and the ecological theory of development of Bronfenbrenner (2023) in comprehensively analyzing phenomena. Third, this research was conducted in a specific local context, namely elementary schools in rural areas of Cirebon Regency, which have different socio-economic-cultural characteristics from similar research in urban areas (Fikriyah, 2021; Annisa Rahmadani et al., 2025). Fourth, this research not only identifies problems but also formulates practical solutions based on empirical findings that can be implemented by education stakeholders (teachers, principals, parents, local governments).

LITERATURE REVIEW

Physical Development of Elementary School Children

Physical development is a process of biological change that includes growth in body size, muscle strength, motor coordination, and the maturity of organ systems (Santrock, 2023; Berk, 2023). In elementary school-age children (6-12 years old), there is relatively stable physical growth with an average height increase of 5-7 cm and weight of 2-3 kg per year (Hurlock, 2022).

Eka Winarsih (2021) explained that physical development includes improving the body's biological abilities including the growth of muscles, bones, nervous system, and endocrine glands. Qur'ani (2025) adds that the prepuberty phase (10-12 years) is

characterized by accelerated growth and the appearance of different secondary sexual characteristics between males and females.

Rosita et al. (2023) and Hasmarlin & Hirmaningsih (2019) identified the characteristics of physical development during puberty: in girls including bone growth, breast enlargement, pubic and armpit hair growth, and menstruation; While in boys, it includes testicle enlargement, pubic hair growth, voice changes, first ejaculation, and hair growth on the face, armpits, and chest.

Factors Affecting Physical Development

Soetjiningsih & Ranuh (2022) identified factors that affect children's physical development: 1) Genetic Factors: The genetic potential of parents determines the maximum limit of children's growth (Wulandari & Silaen, 2023). 2) Nutritional Factors: A balanced nutritional intake that includes carbohydrates, proteins, fats, vitamins, and minerals is essential for optimal growth (Supariasa, 2022; Arum et al., 2024). 3) Physical Activity Factors: Exercise and physical activity stimulate bone growth, increase muscle mass, and optimize cardiovascular function (Mutohir & Ali, 2021; Gallahue et al., 2022). 4) Environmental Factors: Family socio-economic conditions, access to health services, sanitation, and parenting affect child growth (Bronfenbrenner, 2023; Dzaky Satria et al., 2025). 5) Health Factors: A history of chronic diseases, recurrent infections, and hormonal disorders can inhibit physical growth (Ministry of Health of the Republic of Indonesia, 2023).

Student Learning Activity

Learning activeness is the maximum physical and mental involvement of students in the learning process to achieve learning goals (Djamarah, 2021; Uno & Mohamad, 2022). Active students show characteristics: participation in class discussions, asking and answering questions, working on assignments with initiative, collaborating with peers, and showing enthusiasm for learning (Andriana et al., 2019; Seran et al., 2022). Sardiman (2021) classifies learning activity into two categories: 1) Physical Activity: Includes motor activities such as writing, drawing, conducting experiments, and moving in learning activities (Gallahue et al., 2022). 2) Mental Activeness: Includes the process of thinking, analyzing, solving problems, and evaluating information (Piaget, 2023; Vygotsky, 2022). Tomlinson & Moon (2023) emphasize that effective learning must accommodate the diversity of student characteristics including differences in physical development, learning styles, and individual interests.

The Relationship between Physical Development and Active Learning

Several studies show a relationship between physical development and active learning. Fikriyah (2021) found that students with good motor development showed more active participation in learning that involved physical activity. Annisa Rahmadani et al. (2025) identified that physical characteristics influence students' social behavior and leadership in the classroom.

However, these relationships are complex and are influenced by psychological factors such as confidence, self-concept, and social support (Hurlock, 2022; Santrock, 2023).

Children with optimal physical development tend to have higher self-confidence which encourages activeness in learning (Berk, 2023)

METHODS

Approaches and Types of Research

This study uses a qualitative approach with a descriptive type of research (Creswell & Creswell, 2023; Moleong, 2023). The qualitative approach was chosen because this study aims to understand the phenomenon of physical development and student learning activity in depth, holistic, and contextual (Sugiyono, 2023). Descriptive research was used to describe the actual conditions of students' physical development and their learning activity patterns in the natural setting of learning in the classroom (Miles et al., 2020).

Research Location and Time

The research was carried out at Elementary School 1 Karangmangu Village, Susukan Lebak District, Cirebon Regency, West Java. The selection of this location was carried out purposively with consideration: (1) the school is located in a rural area with diverse socio-economic characteristics; (2) there are variations in students' physical development identified through initial observation; and (3) openness of the school to participate in research (Sugiyono, 2023).

The research was carried out for 3 months, from August to October 2024, including the preparation stage, data collection, data analysis, and report preparation.

Research Subject

The subjects of the study were students of class V Elementary School 1 Karangmangu who were selected by purposive sampling with the following criteria: (1) students actively registered in class V for the 2024/2025 school year; (2) willing to be a research participant with parental consent; and (3) do not have serious health problems that affect physical development (Sugiyono, 2023).

The total research subjects were 10 students consisting of 5 male students and 5 female students with an age range of 11-12 years. Additional informants included 1 grade V teacher, 1 physical education teacher, and 5 parents of students interviewed for data triangulation (Moleong, 2023).

Data Collection Techniques

This study uses three data collection techniques (Miles et al., 2020; Creswell & Creswell, 2023).

1. Structured Observation

   Observations were made to observe students' physical development (height, weight, posture) and their learning activity patterns in the classroom. Observation was carried out for 8 learning meetings with a duration of 2 hours each lesson (2 x 35 minutes). Aspects observed include:

   a. Physical characteristics: height, weight, posture.
   b. Physical activity: participation in class activities, motor movements

c. Mental activeness: asking questions, answering teacher questions, focusing on tasks
d. Social interactions: collaboration with friends, leadership behavior

The observation instrument uses structured observation guidelines and field notes to record phenomena in detail (Spradley, 2020).

2. In-Depth Interviews

Semi-structured interviews conducted with key informants include:

a. Students (10 people): about perceptions of their physical development, diet, physical activity, and learning experiences in the classroom
b. Grade V teacher (1 person): about observation of students' physical development, learning activity patterns, and learning strategies
c. Physical education teacher (1 person): about the student's motor development and physical abilities
d. Parents (5 people): about the child's growth history, family diet, physical activity of the child, and support for education

Interviews were conducted with a duration of 30-60 minutes per informant and recorded with an audio recorder after obtaining permission from the informant (Kvale & Brinkmann, 2021).

3. Documentation

Documentation is carried out to collect secondary data in the form of:

a. Student height and weight data from school health records
b. Photos of students in learning activities (with permission)
c. Student grade and attendance documents
d. School health program documents

Documentation data is used to complement and validate data from observations and interviews (Moleong, 2023).

Research Instruments

The main instrument of qualitative research is the researcher himself (human instrument) equipped with supporting instruments (Sugiyono, 2023):

1. Observation Guidelines: Contains observed aspects related to the physical development and learning activity of students
2. Interview Guidelines: Contains open-ended questions developed for each category of informant
3. Anthropometric Measuring Instruments: Digital scales (0.1 kg accuracy) and stadiometers (0.1 cm accuracy) to measure students' weight and height
4. Documentation Tools: Camera, audio recorder, and stationery to record data

Data Analysis Techniques

Data analysis uses the Miles and Huberman (2020) model which includes three stages:

1. Data Reduction

The process of selecting, simplifying, and transforming raw data from the field. The data from observations, interviews, and documentation are selected that are relevant to the focus of the research, then coded to facilitate categorization (Saldaña, 2021).

2. Data Display
   The reduced data is presented in the form of descriptive narratives, tables, and matrices to facilitate understanding of patterns and relationships between data. Physical development data is presented in an anthropometric table, while learning activity data is presented in a descriptive narrative with excerpts from observation and interviews (Miles et al., 2020).
3. Conclusion Drawing and Verification
   Based on the data that has been presented, the researcher draws conclusions about the relationship between physical development and student learning activity. Conclusions are verified through triangulation of data from various sources (students, teachers, parents) and methods (observations, interviews, documentation) to ensure the credibility of the findings (Creswell & Creswell, 2023).

Data Validity

To ensure the validity of the data, this study used four criteria (Lincoln & Guba in Moleong, 2023):

1. Credibility
   a. Source triangulation: comparing data from students, teachers, and parents
   b. Method triangulation: comparing data from observations, interviews, and documentation
   c. Member checking: confirming the results of the analysis to the informant
2. Transferability: Provides a thick description of the research context so that the reader can assess the possibility of applying the findings to other contexts
3. Dependability: Conduct a trail audit by documenting the entire research process from start to finish
4. Confirmability: Ensuring that research results really come from the data collected, not from the researcher's bias

RESULTS & DISCUSSION

Results

The results of this study are presented in three main parts: (1) the condition of students' physical development, (2) the pattern of student learning activity, and (3) the relationship between physical development and learning activity.

Physical Development Conditions of Grade V Elementary School 1 Karangmangu Students

Anthropometric measurements of 10 students (5 boys and 5 girls) were carried out in September 2024. Data on height, weight, and Body Mass Index (BMI) were analyzed and compared with Indonesian child growth standards from the Ministry of Health of the Republic of Indonesia (2020).

Table 1.1 Physical Development of Grade V Elementary School 1 Children

	Height		**Weight**	
Age	Man	Woman	Man	Woman
11 Years	142 cm	127 cm	31 kg	22 kg
	147 cm	130 cm	43 kg	32 kg
	142 cm	130 cm	38 kg	29 kg
12 Years	150 cm	136 cm	50 kg	25 kg
	150 cm	131 cm	42 kg	23 kg

Data processed by the author

Based on Table 1, several findings can be identified:

1. Distribution of Nutritional Status
   a. Normal: 6 students (60%)
   b. Fat: 1 student (10%)
   c. Skinny: 3 students (30%)

This data shows that the majority of students (60%) have normal nutritional status, but there are still 30% of students with a lean nutritional status that require special attention. These results are in line with the findings of Arum et al. (2024) that the variation in nutritional status in elementary school students in rural areas is still quite high, influenced by family socio-economic factors and diet

2. Gender Differences

The measurement results showed that male students had higher average height and weight than female students in the same age group:

a. Average height of 11-year-old males: 143.7 cm vs females: 129 cm
b. Average weight of 11-year-old males: 37.3 kg vs females: 27.7 kg

These findings are consistent with the theory of physical development which states that in the prepuberty phase (10-12 years), boys tend to experience faster physical growth than girls (Santrock, 2023; Hurlock, 2022).

3. Individual Variations

There is significant variation in physical development between students in the same age group. For example, in 11-year-old male students, the weight range ranges from 31-43 kg (difference of 12 kg). This variation indicates a strong influence of genetic, nutritional, and physical activity factors on child growth (Qur'ani, 2025; Soetjiningsih & Ranuh, 2022***).***

Results of Interviews with Parents on Physical Development Factors

In-depth interviews with 5 parents of students revealed several factors that affect their child's physical development:

a. Genetic Factors of IT informants (Mother of L4 student, obese nutritional status): "His father was also big since childhood, so his son did follow his father. Her brother is also very tall." (Interview, September 15, 2024). This statement confirms the findings of Wulandari & Silaen (2023) that genetic or hereditary factors play a significant role in determining a child's physical characteristics.
b. Nutrition Factors of the SU informant (Mother of P1 student, poor nutritional status): "At the restaurant, there is a little ma'am, it is difficult to be told to eat. Most like unhealthy snacks. Sometimes I worry because he is small." (Interview, September 16, 2024)
c. Informant RM (Mother of an L2 student, normal nutritional status): "Alhamdulillah, her child loves to eat, especially vegetables and side dishes. I try to have protein every day, at least eggs or tofu tempeh." (Interview, September 16, 2024). These differences in diet explain the variation in the nutritional status of students. These results are in line with the research of Supariasa (2022) and Arum et al. (2024) which emphasizes the importance of balanced nutrition for optimal child growth.
d. Physical Activity Factor. Physical Education (AM) teachers stated: "Students who are active in play and sports usually have better motor development. But there are also those who have a big body but are less active, prefer to sit around." (Interview, September 20, 2024)

These findings support the view of Mutohir & Ali (2021) and Gallahue et al. (2022) that regular physical activity stimulates bone and muscle growth and improves cardiovascular health.*Inclusive Participation and Social Integration*

Learning Activity Pattern of Grade V Elementary School 1 Karangmangu Students

Observations on student learning activity were carried out during 8 learning meetings in Indonesian, Mathematics, and Science subjects. The results of the observation identified three different patterns of active learning:

1. Leadership Behavior Patterns.
   Students with larger postures (L4, L5, P2) showed a tendency to lead behavior in the group. The results of the observation showed:
   Observation Note 1 (L4 Students, September 10, 2024):
   "L4 sits in the middle of the group. When the teacher gives a group assignment, L4 immediately divides the assignment to the group members. "You write, you draw, you paint." His friends followed his instructions without protest. L4 occasionally asks a friend to take stationery out of his bag."
   Observation Note 2 (P2 Students, September 12, 2024):

"P2 looked confident when asked to come to the front of the class. He answered the teacher's question out loud. During group discussions, P2 actively gives opinions and directs his friends."

These findings are consistent with the research of Annisa Rahmadani et al. (2025) which found that children with larger postures tend to display dominant behavior and leadership in social interactions.

2. Hyperactive Behavior Pattern.

Students with smaller postures (P1, P4, P5) show high levels of physical activity but lack focus on academic tasks.

Observation Note 3 (P1 Students, September 17, 2024):

"P1 is difficult to sit still. Every 5-10 minutes he switches positions, turns his head to left-right, or stands up from his seat. When working on math problems, P1 often daydreams and pays attention to his friend next to him. The results of the work were only 3 out of 10 questions solved."

Observation Note 4 (P4 Students, September 19, 2024):

"P4 is actively moving in the classroom. While the teacher was explaining, P4 was busy playing with pencils. But when there are activities that involve movement (such as educational games), P4 is very enthusiastic and actively participates."

Grade V teacher (Mrs. NS) commented:

"Children whose bodies are small have a lot of energy. They can't be quiet, but if they are told to sit for a long time doing problems, they get bored quickly and don't focus." (Interview, September 22, 2024)

These findings suggest that students with small postures have high physical energy that needs to be channeled through motor activity, in line with the theory of motor development of Gallahue et al. (2022).

3. Balanced Behavior Pattern.

Students with proportional physical development (L1, L2, L3, P3) show a balance between academic activity and focus.

Observation Note 5 (L2 Students, September 24, 2024):

"L2 does the task with focus. He occasionally discusses with his classmates about how to solve problems. When there is a group discussion, L2 actively gives his opinion and listens to the opinions of other friends. Out of the 10 questions given, L2 solved 9 questions correctly."

Observation Note 6 (P3 Students, September 26, 2024):

"P3 showed good activity. He raises his hand to answer the teacher's questions, takes his assignment seriously, and occasionally talks with friends without disturbing his concentration. P3 seems to enjoy the learning process."

Grade V teacher (Mrs. NS) stated:

"Students with balanced physical development are usually also balanced in their learning. They are not very quiet, but they are also not so active that

they are annoying. They can follow the lessons well." (Interview, September 22, 2024).

Table 2. Categorization of Student Learning Activity Patterns

Student Code	Physical Status	Activeness Pattern	Key Characteristics
L4	Fat	Leadership	Dominant, instructive, confident
L5	Normal (high TB)	Leadership	Lead a group, be vocal in discussions
P2	Normal (high TB)	Leadership	Dare to move forward, direct friends
P1	Thin	Hyperactive	Difficulty focusing, moving frequently, easily distracted
P4	Thin	Hyperactive	High energy, enthusiasm for motor activities
P5	Thin	Hyperactive	Move a lot, focus less on written tasks
L1	Usual	Balanced	Focus on doing tasks, interact balanced
L2	Usual	Balanced	Actively discussing, completing tasks well
L3	Usual	Balanced	Moderate participation, good learning outcomes
P3	Usual	Balanced	Enthusiasm in learning, good social skills

The Relationship between Physical Development and Active Learning

Cross-data analysis from observations and interviews revealed several patterns of relationship between physical development and active learning:

1. Students with Obese Nutritional Status/Large Posture → Leadership Behavior
   L4 students (BMI 22.2 - obese) exhibit dominant leadership behaviors. Analysis shows that a larger posture provides higher confidence in social interactions (Hurlock, 2022; Santrock, 2023). Nevertheless, students with large postures also showed a tendency to be less active in intense physical activity. Guru Penjas (AM) stated:
   "L4 is if he is told to run or exercise that requires stamina, he gets tired quickly. But if the activity is not too strenuous, he is active and likes to lead his friends." (Interview, September 20, 2024)
2. Students with Nutritional Status Skinny/Small Posture → Hyperactive Behavior
   The three female students with poor nutritional status (P1, P4, P5) showed a pattern of high physical activity but had difficulty maintaining focus on academic tasks that required long concentration. Results of the interview with the P1 parents:

"At home, her child also cannot be silent. I told him to sit down and walk around for a while. But if he is invited to play or a moving activity, he is very happy." (Interview, September 16, 2024)

These findings can be explained through the theory that children with lower body mass have a higher energy-to-weight ratio, so they need an outlet to channel energy through motor activity (Gallahue et al., 2022; Mutohir & Ali, 2021).

3. Students with Normal Nutritional Status/Proportional Posture → Balanced Behavior

Six students with normal nutritional status showed a balance between physical activity, social participation, and academic focus. They are able to:

a. Work on written assignments with good concentration
b. Actively participate in group discussions
c. Interact socially with peers in a positive way
d. Showing enthusiasm in different types of learning activities

The teacher of Class V (Mrs. NS) observed:

"Students with normal growth are usually easier to manage in learning. They can focus when they need to focus, be active when they need to be active. There are no significant problems in their learning activity." (Interview, September 22, 2024)

4. Influence of Psychosocial Factors

In addition to physical factors, the results of the interviews revealed the influence of psychosocial factors on learning activity. Students with lean nutritional status tend to have lower self-confidence in certain situations. P4 students (lean nutritional status) stated:

"I am embarrassed if I am told to come forward in front of the class. I'm afraid my friends will laugh because it's small." (Interview, September 18, 2024)

These findings are in line with research by Berk (2023) and Santrock (2023) that self-perception of physical appearance affects children's confidence and social participation.

DISCUSSION

Student Physical Development: Between Normality and Variation

The results showed that 60% of students had normal nutritional status, while 30% experienced poor nutrition and 10% obese nutrition. These findings illustrate that although the majority of students are doing well, there are still some students who need special attention in terms of nutrition and health. This variation in physical development can be explained through the multifactorial theory of child development put forward by Soetjiningsih & Ranuh (2022) and Bronfenbrenner (2023). Factors that

play a role include: 1) Genetic Factors (Nature) The results of interviews with parents confirm that the physical characteristics of children tend to be similar to those of their parents or siblings. Wulandari & Silaen (2023) explain that genes from both parents determine the maximum height potential of the child, although the achievement of this potential is influenced by environmental factors. 2) Nutritional Factors (Nurture) The difference in the nutritional status of students is strongly correlated with the family's diet. Students with normal nutritional status tend to come from families that pay attention to balanced nutritional intake, while students with poor nutrition generally have irregular and less diverse diets. These findings support research by Supariasa (2022) and the Indonesian Ministry of Health (2023) which emphasizes the importance of "Isi Piringku" as a balanced nutritional guide for school children, which consists of 50% fruits and vegetables, 35% carbohydrates, and 15% protein. 3) Socio-Economic Factors. Although not explicitly asked in interviews, observations and informal conversations indicate that family socio-economic conditions affect access to nutritious food. Dzaky Satria et al. (2025) explained that the gap in the quality of education and children's health in Indonesia is still influenced by family economic factors. 4) Physical Activity Factor. Students who regularly exercise and play actively tend to have better motor development. Gallahue et al. (2022) emphasize that regular physical activity in elementary school-age children plays an important role in bone growth, increased muscle mass, and the development of motor coordination.

Learning Activeness: Manifestations of Physical Development in the Context of Learning

The findings of the study identified three patterns of learning activity (leadership, hyperactive, balanced) that correlated with students' physical characteristics. This pattern can be explained through several theoretical perspectives: ***1)*** Developmental Psychology Perspective Hurlock (2022) and Santrock (2023) explain that physical development in childhood affects self-concept and self-confidence. Children with larger postures tend to feel stronger and capable, which encourages them to take leadership roles in peer groups. In contrast, children with smaller postures may compensate for their physical limitations through excessive activity, in an effort to gain attention and recognition from the social environment (Berk, 2023). 2) Learning Theory Perspective**.** Djamarah (2021) and Uno & Mohamad (2022) explained that learning activity is influenced by internal (motivation, interest, physical condition) and external factors (teaching methods, classroom environment). Students with good physical condition have the energy and stamina to actively participate in learning. However, this study shows that high physical activity does not always correlate positively with academic achievement. Students with hyperactive patterns show high energy but have difficulty focusing that energy on academic tasks that require concentration. These findings are in line with research by Seran et al. (2022) who found that effective learning activity is directed activity, not just physical activity without clear learning goals. 3) Developmental Ecological Theory Perspective.

Bronfenbrenner (2023) emphasizes that children's development is influenced by complex interactions between individual characteristics (including physical factors) and various environmental systems (microsystems: families, schools; mesosystems: family-school interactions; ecosystems: educational policies; macrosystems: community culture). In the context of this study, students' learning activity is not only determined by their physical development, but also by: Parental parenting in supporting children's learning activities**,** Teacher learning strategies that accommodate the diversity of student characteristics**,** Classroom environment conducive to different types of activity**,** School culture that values students' active participation**,** Implications for Educational Practice

The findings of this study have several important implications for educational practice in elementary schools: 1) Differentiated Instruction Tomlinson & Moon (2023) and Smidt (2023) emphasize the importance of learning that accommodates the diversity of student characteristics. Based on the research findings, teachers need to design learning strategies that are responsive to variations in physical development and student activity patterns: For students with leadership patterns: Provide the role of group leader or peer tutor, but make sure they also learn to listen and collaborate, For students with hyperactive patterns: Provide opportunities for regular motor activity (brain break, learning through movement), vary teaching methods with hands-on activities, For students with a balanced pattern: Maintain already effective learning practices while providing challenges for further development.

Teacher-Parent-Health Worker Collaboration. Dhika Widarnandhana et al. (2023) emphasized the importance of the role of parents in preparing and supporting children's development. Schools need to develop collaborative programs including: Regular health screenings: Periodic monitoring of students' height, weight, and nutritional status in collaboration with the Health Center, Nutrition education: Workshops for parents on balanced nutrition for school children ("Fill My Plate"), Intervention programs: Supplementary Feeding (PMT) for undernourished students, referrals to nutritionists/pediatricians for cases that require special treatment

Design an Inclusive Learning Environment. The physical and social environment of the classroom needs to be designed to accommodate the diversity of student characteristics: Flexibility of seating arrangements: A combination of individual tables, small groups, and discussion areas that allow students to move around as needed, Provision of teaching aids and learning media: A variety of media that accommodates kinesthetic, visual, and auditory learning styles, Positive classroom climate: A classroom culture that values the uniqueness of each student and prevents performance-related bullying Physical Professional Development of Teachers. Teachers need to be equipped with an understanding of: Children's physical development theory and its implications for learning, Techniques for observation and assessment of students' physical development, Differentiated learning strategies to

accommodate student diversity, Communication skills with parents about child development

Research Limitations

This study has several limitations that need to be considered in interpreting the findings: *1)* Limited Sample Count. The study only involved 10 students from one school, so the findings may not be broadly generalized. Follow-up research with a larger sample and multi-site is required to validate the findings.2) Limited Observation Period. Observation is carried out for 3 months, while physical development is a longitudinal process. Long-term longitudinal research (1-3 years) will provide a more comprehensive picture of the dynamics of the relationship between physical development and learning activity. 3) Complexity of Influencing Factors. This study focuses on physical development as the main variable, but student learning activity is also influenced by other factors such as intrinsic motivation, family support, teacher teaching methods, and psychological factors that are not studied in depth in this study. 4*)* Limitations of Qualitative Methods. Qualitative research produces rich and contextual findings, but cannot measure the strength of causal relationships statistically. Follow-up research with mixed-methods (combination qualitative-quantitative) can provide a more comprehensive understanding.

CONCLUSION

The physical development of grade V elementary school 1 Karangmangu students showed significant variations. Of the 10 students studied, 60% had normal nutritional status, 30% experienced undernutrition, and 10% were obese. This variation is influenced by genetic factors, nutrition, physical activity, and family socio-economic conditions. The average height of male students (143.7-150 cm) is higher than that of female students (129-136 cm) in the same age group, according to the theory of physical development in the prepuberty phase.

There are three patterns of learning activity identified: (a) Leadership behavior shown by students with a larger posture, characterized by dominant behavior, confidence, and the ability to lead the group; (b) Hyperactive behavior in students with smaller postures, characterized by high energy, a lot of movement, but difficulty maintaining focus on academic tasks; (c) Balanced behavior in students with proportional physical development, showing a balance between active participation and the ability to complete academic tasks.

There is a positive correlation between physical development and student learning activity patterns. Physical characteristics influence self-concept, confidence, and the way students participate in learning. However, these relationships are complex and mediated by psychosocial factors such as family support, teacher learning methods, and a conducive classroom environment.

High physical activity is not necessarily correlated with academic achievement. Students with hyperactive patterns showed high energy but had difficulty focusing that energy on tasks that required concentration, while students with balanced patterns showed more directed and effective activeness in supporting academic achievement.

Practical implications for education: There is a need for (a) differentiated learning that accommodates variations in students' physical development and activity patterns; (b) collaboration between teachers-parents-health workers in monitoring and supporting the optimal development of children; (c) nutritional interventions and physical activity for students with abnormal nutritional status; (d) design a learning environment that is inclusive and responsive to the diversity of student characteristics.

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