

Gross Motor Ability Profiles of Elementary School Students with Autism at a Special School in Sleman, Indonesia

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ABSTRACT: This study described the gross motor ability profile of elementary school students with autism at SLB Autistik Fajar Nugraha, Depok, Sleman, Indonesia. A descriptive cross-sectional design was used with total sampling of seven students aged 8-10 years (six boys and one girl). Gross motor performance was observed through six tasks: a 5-m tiptoe walk, a 5-m balancebeam walk, a jump from a 15-cm block, an overarm ball throw for distance, a standing long jump, and a one-leg hoop-jumping task. Each task was scored from 1 to 3, and the summed score was converted to a percentage and classified using predefined performance categories. The strongest performance was recorded on the balance-beam task, for which five students (71.4%) achieved the highest score. Four students (57.1%) achieved the highest score on both the tiptoe walk and the block-jump task. The standing long jump produced the lowest mean task score (1.71), and no student achieved the highest category. Overall, three students (42.9%) were classified as adequate, two (28.5%) as excellent, one (14.3%) as good, and one (14.3%) as low. The findings indicate marked task-level variability: balance was relatively strong, whereas horizontal jumping power and singleleg stability require greater instructional attention. Individualized, repetitive, visually demonstrated, and engaging adaptive physical education activities are recommended. Because the study involved a small single-school sample and a locally adapted instrument, the results should be interpreted as a site-specific profile rather than a population estimate.

KEYWORDS: autism spectrum disorder; gross motor ability; balance; muscular strength; adaptive physical education; special education

I. INTRODUCTION

Autism spectrum disorder is primarily defined by differences in social communication and restricted or repetitive patterns of behavior, but motor difficulties are also common and functionally important. Recent syntheses show that many children with autism experience clinically meaningful limitations in balance, coordination, object control, and broader motor proficiency [1], [2]. Gross motor ability shapes how children move through school environments, participate in play and physical education, and access opportunities for social interaction. Consequently, a motor profile is not merely a description of physical performance; it can inform educational participation, independence, and the design of individualized support.

Motor performance among children with autism is highly heterogeneous. Some children can complete basic locomotor and balance tasks efficiently, while others have difficulty with bilateral coordination, postural control, motor planning, or producing sufficient muscular force. Meta-analytic evidence indicates that gross motor differences are evident across multiple domains and may be associated with social functioning [2]. Intervention reviews further suggest that structured physical activity and motor-skill programs can improve fundamental motor outcomes when activities are systematic, repeated, and adapted to the learner [3]-[5]. These findings support the need for practical school-based assessment before programs are planned.

In Indonesia, special schools often deliver adaptive physical education with limited locally available profiling data. At SLB Autistik Fajar Nugraha, students participate in physical education once each week and swimming approximately once every two weeks. The school had not previously documented the distribution of gross motor ability across a set of balance and strength tasks. Without such information, teachers may find it difficult to identify which movement components are already functional and which require targeted practice.

This study therefore aimed to describe the gross motor ability profile of elementary school students with autism at SLB Autistik Fajar Nugraha, Depok, Sleman. The analysis focused on performance in six observable tasks representing dynamic balance, lower-limb strength, upper-limb throwing performance, horizontal jumping, and single-leg stability. The study was intended to provide

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a baseline for adaptive physical education planning rather than to test an intervention or estimate prevalence beyond the participating school.

II. METHODS

A. Design and Setting

A descriptive cross-sectional study was conducted at SLB Autistik Fajar Nugraha in Dabag, Condongcatur, Depok District, Sleman Regency, Special Region of Yogyakarta, Indonesia. Data collection took place from 26 May to 3 June 2023 during the second semester of the 2022/2023 academic year. The descriptive design was selected because the study sought to document the students' existing performance without manipulating instruction or providing an experimental treatment [11].

B. Participants

The participants were all seven elementary school students with autism who were available at the school and met the study context, representing a total-sampling approach. The group consisted of six boys and one girl aged 8-10 years. All assessments were conducted within the school setting. The small sample reflects the complete accessible population at the research site rather than a sample selected to represent the wider population of children with autism.

C. Assessment Instrument and Procedure

Gross motor ability was assessed using an observation-based instrument adapted from Vernelyla [10]. The instrument contained six performance tasks: (1) walking on tiptoe along a straight 5-m line; (2) walking across a 5-m balance beam; (3) jumping down from a 15-cm block; (4) throwing a ball as far as possible; (5) performing a standing long jump; and (6) jumping through hoops using one leg as the supporting leg. The first two tasks primarily assessed balance, while the remaining tasks emphasized lower-limb strength, upper-limb throwing performance, horizontal power, and single-leg stability. Gross motor tasks involving large muscle groups are commonly used to observe functional movement capacity [8], [9].

Each task was rated on a three-point performance scale. A score of 1 indicated inability to complete the target movement or performance below the minimum criterion; a score of 2 indicated partial or moderate completion; and a score of 3 indicated successful completion of the full criterion. The teacher and researcher explained and demonstrated each task before observation. The best observed performance was retained for scoring. The source instrument reported task reliability coefficients ranging from 0.6612 to 0.8771 [10]. These coefficients are reported as characteristics of the source instrument; reliability was not re-estimated in the present seven-participant sample.

D. Data Analysis

Frequencies, percentages, and mean item scores were calculated for each task. Scores across the six tasks were summed, producing a possible total between 6 and 18. The total was converted into a percentage of the maximum score using: $\text{performance percentage} = (\text{obtained score} / 18) \times 100$. For descriptive interpretation, the study used the following predefined categories: excellent (91-100), good (75-90), adequate (61-75), moderate (51-60), and low (50 or below). Category frequencies were then expressed as percentages of the seven participants. The analysis was descriptive; no inferential statistical tests were conducted because the study involved the full accessible group at one school and was not designed for hypothesis testing [12].

E. Ethical Considerations

The school granted permission for data collection, and assessments were conducted during school activities under teacher supervision. Only aggregate results are reported, and no personally identifying information is included in this manuscript.

III. RESULTS

A. Task-Level Gross Motor Performance

Performance varied substantially across the six tasks. The balance-beam walk produced the highest mean score (2.71), with five students achieving the maximum score. Tiptoe walking and jumping from the 15-cm block each had a mean score of 2.43, and four students achieved the maximum score on each task. Ball throwing showed a relatively even distribution between scores 2 and 3. The standing long jump had the lowest mean score (1.71); five students achieved score 2, two achieved score 1, and none achieved score 3. The one-leg hoop task showed the greatest polarization, with three students at score 1 and three at score 3.

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Table I. Task-Level Distribution of Gross Motor Performance (N = 7)

Assessment task	Primary domain	Mean score	Score 1, n (%)	Score 2, n (%)	Score 3, n (%)
5-m tiptoe walk	Balance	2.43	1 (14.3)	2 (28.6)	4 (57.1)
5-m balance-beam walk	Balance	2.71	0 (0.0)	2 (28.6)	5 (71.4)
Jump from a 15-cm block	Lower-limb strength	2.43	1 (14.3)	2 (28.6)	4 (57.1)
Ball throw for distance	Upper-limb / object control	2.29	1 (14.3)	3 (42.9)	3 (42.9)
Standing long jump	Horizontal power	1.71	2 (28.6)	5 (71.4)	0 (0.0)
One-leg hoop jumping	Single-leg stability	2.00	3 (42.9)	1 (14.3)	3 (42.9)

Note: Score 1 = below criterion or unable to complete; Score 2 = partial/moderate completion; Score 3 = full criterion achieved.

B. Overall Gross Motor Ability Classification

After the six task scores were summed and converted to percentages, three students (42.9%) were classified in the adequate category. Two students (28.5%) were classified as excellent, one (14.3%) as good, and one (14.3%) as low. No student was classified in the moderate category. Thus, the modal classification for the group was adequate, while the distribution also showed meaningful individual differences.

Table II. Overall Gross Motor Ability Classification

Performance percentage	Category	Frequency	Percentage
91-100	Excellent	2	28.5%
75-90	Good	1	14.3%
61-75	Adequate	3	42.9%
51-60	Moderate	0	0.0%
≤ 50	Low	1	14.3%
Total		7	100.0%

IV. DISCUSSION

The principal finding was that the group's overall gross motor ability was most commonly classified as adequate, but the aggregate category concealed substantial variation across tasks and students. Balance performance was comparatively strong: 71.4% of the students achieved the highest score on the balance-beam walk, and 57.1% achieved the highest score on the tiptoe walk. In contrast, no student reached the highest score on the standing long jump, and the one-leg hoop task produced an equal split between the lowest and highest scores. This pattern indicates that a student may perform well in one motor domain while requiring considerable support in another.

The strong balance-beam results should not be interpreted as evidence that balance is uniformly unaffected in students with autism. Broader research consistently reports motor heterogeneity and frequent difficulty with postural control, coordination, and complex movement [1], [2]. The present results are specific to a small group whose school routine included weekly physical education and periodic swimming. Repeated exposure to locomotor and balance activities may have supported performance, but the current descriptive design cannot establish that the school program caused the observed outcomes.

The standing long jump appears to be the clearest instructional priority. This task requires coordinated arm swing, bilateral take-off, rapid force production, body control in flight, and a stable landing. A child can possess sufficient general strength yet still

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struggle to organize these components into an efficient movement sequence. The absence of maximum scores therefore may reflect a combination of horizontal power, motor planning, comprehension of the demonstration, and confidence. Similarly, the polarized one-leg hoop results suggest that unilateral stability was highly individual: some students completed the task effectively, while others had difficulty maintaining support and following the required sequence.

The ball-throwing task showed a more favorable distribution, with six of seven students scoring in the moderate or highest category. Object-control tasks remain important because large meta-analytic work suggests that object-control differences can be prominent in autism [2]. Teachers should therefore avoid assuming that acceptable performance in a simple distance throw will automatically transfer to catching, aiming, timing, or participation in group games. A broader assessment battery would be needed to characterize object-control proficiency comprehensively.

From an instructional perspective, the findings support individualized adaptive physical education. Structured motor programs have shown potential to improve fundamental motor skills in children with autism [3]-[5]. For this group, instruction should emphasize short and concrete directions, visual demonstration, repeated practice, predictable task sequences, and immediate feedback. Colorful hoops, marked pathways, low obstacles, and progressively adjusted distances can make practice easier to understand and more motivating. The teacher can also separate complex tasks into components—for example, practicing arm swing, two-foot take-off, and landing before combining them into a standing long jump.

The results also have practical value for communication with families. Teachers and parents can use the task profile to agree on a small number of safe, repeatable activities that can be practiced across school and home settings. Progress should be monitored by recording the quality of movement, the amount of assistance required, and consistency across repeated opportunities rather than relying only on a single categorical score. Sensorimotor and psychomotor approaches in Indonesian educational settings have likewise emphasized structured, meaningful, and repeated activity [6], [7].

Several limitations must be considered. First, the sample included only seven students from one special school, so the findings cannot be generalized to other schools or to children with autism as a whole. Second, the instrument was locally adapted and used broad three-point ratings and operational cut-offs; it is not equivalent to a standardized norm-referenced motor assessment. Third, the study did not include a comparison group, repeated measurement, or an intervention. Fourth, students varied in their understanding of instructions, and some performed movements according to their own preferences despite demonstrations. Assessment time was also constrained by preparation for semester examinations. Finally, the study did not document autism support level, intellectual functioning, medication, habitual physical activity, or current inter-rater reliability, all of which could influence performance. Future studies should recruit larger multisite samples, use standardized assessments, document relevant participant characteristics, and examine changes after a clearly specified adaptive physical education program.

V. CONCLUSIONS

The gross motor ability of the seven elementary school students with autism was most frequently classified as adequate. The task profile was uneven: balance-beam walking, tiptoe walking, and jumping from a low block were relative strengths, whereas the standing long jump and one-leg hoop task indicated greater need for support in horizontal power, movement sequencing, and unilateral stability. The findings provide a practical baseline for individualized adaptive physical education at the participating school. They should be interpreted as a site-specific descriptive profile, not as a population estimate. Future programming should use repeated visual instruction, engaging equipment, progressive task difficulty, and periodic reassessment to document individual improvement.

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