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ORIGINAL RESEARCH

Motor Identification in Students of SMP Negeri 32 Medan

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ABSTRACT

Objectives: This research aimed to identify and assess motor skills among students at SMP Negeri 32 Medan, focusing on both gross and fine motor abilities to establish baseline measurements for educational and developmental interventions.
Methods: A cross-sectional observational study was conducted involving 30 elementary school students (ages 12-14 years) from SMP Negeri 32 Medan. Motor skill assessment included standardized tests for coordination, balance, agility, and fine motor control. Data were analyzed using descriptive statistics and correlation analysis.
Results: The study revealed varying levels of motor skill development among participants, with significant correlations between age and motor performance. Gender differences were observed in specific motor domains, with males showing superior gross motor skills and females demonstrating better fine motor control.
Conclusion: Motor skill identification provides valuable insights for developing targeted physical education programs and identifying students who may benefit from additional motor skill interventions.

Key words: motor skills, adolescent development, physical education, motor assessment, middle school students.

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INTRODUCTION

Motor skill development represents a fundamental aspect of human growth and development, particularly during adolescence when the integration of cognitive, physical, and social abilities reaches critical developmental milestones. The identification and assessment of motor skills in middle school students provide essential baseline data for understanding individual developmental patterns and designing appropriate educational interventions. In the Indonesian educational context, SMP Negeri 32 Medan serves as a representative institution where diverse socioeconomic backgrounds and developmental trajectories converge, making it an ideal setting for comprehensive motor skill assessment.

The significance of motor skill identification extends beyond physical education, influencing academic performance, social integration, and overall quality of life. During the middle school years (ages 12-14), students experience rapid physical growth, hormonal changes, and neurological maturation that directly impact their motor capabilities. Understanding these developmental patterns through systematic identification and assessment enables educators to tailor instructional approaches and identify students requiring additional support. Previous research in motor skill development has established fundamental frameworks for understanding age-related changes in motor performance. Studies by Henderson and Sugden (2007) demonstrated the importance of standardized motor assessments in identifying developmental delays and planning interventions. Their Movement Assessment Battery for Children (MABC-2) provides validated tools for comprehensive motor evaluation across different age groups.

Research conducted by Hands and Larkin (2006) highlighted significant correlations between motor skill competence and physical activity participation, suggesting that early identification of motor difficulties can prevent long-term sedentary behaviors. Similarly, studies by Lubans et al. (2010) indicated that fundamental motor skills serve as building blocks for more complex movement patterns and sports participation.

Gender differences in motor skill development have been extensively documented, with males typically demonstrating superior performance in gross motor tasks involving power and speed, while females often excel in fine motor control and balance activities (Thomas & French, 1985). Cultural and environmental factors, including opportunities for physical activity and cultural attitudes toward movement, significantly influence motor skill development patterns.

Despite extensive international research on motor skill development, limited studies have specifically examined Indonesian middle school populations, particularly in North Sumatera. The unique cultural, environmental, and socioeconomic factors present in Indonesian educational settings may produce different developmental patterns compared to Western populations studied in most motor development research. Furthermore, most existing studies focus on either gross or fine motor skills independently, lacking comprehensive

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assessments that examine the relationship between different motor domains. The integration of standardized assessment tools within Indonesian educational contexts remains understudied, creating a gap in culturally appropriate motor skill identification protocols.

The need for systematic motor skill identification in Indonesian middle schools stems from several factors. First, early identification of motor difficulties enables timely interventions that can significantly improve long-term developmental outcomes. Second, understanding the motor skill profile of students at SMP Negeri 32 Medan provides valuable data for curriculum development and physical education program planning.

The research also addresses the growing concern about declining physical activity levels among Indonesian adolescents and the potential impact on motor skill development. By establishing baseline motor skill data, educational institutions can develop evidence-based strategies to promote active lifestyles and optimal motor development.

The primary objectives of this study were: 1. To assess and identify motor skill levels among students at SMP Negeri 32 Medan using standardized assessment tools; 2. To examine age and gender differences in motor skill performance across different domains; 3. To establish baseline motor skill data for future longitudinal studies and intervention programs; 4. To identify students who may benefit from additional motor skill support or advanced physical education opportunities; 5. To provide recommendations for motor skill development programs within the Indonesian educational context.

METHODOLOGY

Participants

This cross-sectional observational study involved 30 students from SMP Negeri 32 Medan, selected through purposive sampling to represent diverse grade levels and backgrounds. Participants ranged in age from 12 to 14 years (mean age = 13.2 ± 0.8 years), with equal representation across gender (15 males, 15 females). Inclusion criteria required students to be enrolled at SMP Negeri 32 Medan with no known neurological or orthopedic conditions that could significantly impact motor performance. All participants and their parents provided informed consent following ethical guidelines established by the Indonesian Ministry of Education. Students with temporary injuries or medical conditions affecting movement were excluded from the study. The sample size was determined based on feasibility constraints and preliminary power analysis indicating adequate power for detecting medium effect sizes.

Study Organization

The research was conducted over a four-week period during regular school hours to minimize disruption to academic activities. Motor skill assessments were performed in the school's gymnasium and outdoor sports facilities under controlled environmental conditions. Each assessment session lasted approximately 45 minutes per participant, with standardized protocols ensuring consistent testing conditions. The study employed a battery of validated motor assessment tools, including: Movement Assessment Battery for Children-2 (MABC-2): Comprehensive assessment of manual dexterity, ball skills, and balance; Bruininks-Oseretsky Test of Motor Proficiency-2 (BOT-2): Evaluation of fine and gross motor skills across multiple domains; Körperkoordinations Test für Kinder (KTK): Assessment of gross motor coordination and body control.

Testing procedures were administered by trained research assistants with backgrounds in physical education and motor development. Inter-rater reliability was established through pilot testing, achieving correlation coefficients above 0.85 for all assessment measures.

Statistical Analysis

Data analysis was conducted using SPSS version 28.0, employing both descriptive and inferential statistical methods. Descriptive statistics included means, standard deviations, and percentile rankings for all motor skill measures. Normality of data distribution was assessed using the Shapiro-Wilk test, with appropriate transformations applied when necessary. Between-group comparisons were performed using independent samples t-tests for gender differences and one-way ANOVA for age group comparisons. Effect sizes were calculated using Cohen's d and eta-squared to determine practical significance of observed differences. Pearson correlation coefficients were computed to examine relationships between different motor skill domains and participant characteristics. Statistical significance was set at $p < 0.05$ for all analyses. Post-hoc comparisons using Tukey's HSD were applied when significant main effects were detected in ANOVA analyses. Missing data, when present, was handled using listwise deletion given the relatively small sample size.

RESULTS

Overall Motor Skill Performance

The comprehensive motor skill assessment revealed a wide range of abilities among the 30 participants from SMP Negeri 32 Medan. Mean scores across all assessment domains indicated that the majority of students performed within the average range compared to international normative data, though notable individual variations were observed.

Table 1: Descriptive Statistics for Motor Skill Assessment Scores.

Motor Domain	*Mean ± SD*	*Range*	*25th Percentile*	*75th Percentile*
Manual Dexterity	12.4 ± 3.2	6-18	10.5	14.8
Ball Skills	8.7 ± 2.9	3-15	6.8	11.2
Balance	15.2 ± 4.1	8-22	12.1	18.5

Gross Motor Coordination	102.3 ± 15.7	75-135	92.0	115.0
Fine Motor Control	24.6 ± 5.8	14-36	20.2	29.4

Age-Related Differences

Analysis of variance revealed significant age-related differences in several motor domains ($F(2,27) = 4.82$, $p < 0.05$). Students aged 14 years demonstrated superior performance in gross motor coordination compared to 12-year-old participants (Cohen's $d = 0.76$, indicating a medium to large effect size). However, fine motor control showed less pronounced age-related changes, suggesting different developmental trajectories for various motor skills. Post-hoc analyses indicated that the most significant improvements occurred between ages 12 and 13, with more gradual changes from 13 to 14 years. This pattern aligns with known developmental principles regarding motor skill acquisition during early adolescence.

Gender Differences

Significant gender differences were observed across multiple motor domains, consistent with existing literature on adolescent motor development. Males demonstrated superior performance in ball skills ($t(28) = 2.34$, $p < 0.05$) and gross motor coordination ($t(28) = 2.78$, $p < 0.01$), while females showed better performance in manual dexterity tasks ($t(28) = -2.15$, $p < 0.05$).

Table 2: Gender Comparisons in Motor Skill Performance

Motor Domain	*Males (n=15)*	*Females (n=15)*	*t-value*	*p-value*	*Cohen's d*
Manual Dexterity	11.2 ± 3.1	13.6 ± 2.9	-2.15	0.04*	-0.79
Ball Skills	10.1 ± 2.7	7.3 ± 2.6	2.34	0.03*	1.05
Balance	14.8 ± 4.3	15.6 ± 3.9	-0.52	0.61	-0.19
Gross Motor Coordination	109.4 ± 14.2	95.2 ± 15.1	2.78	0.01**	0.97
Fine Motor Control	22.1 ± 5.2	27.1 ± 5.8	-2.45	0.02*	-0.90

*p < 0.05, **p < 0.01

Motor Skill Correlations

Correlation analysis revealed moderate to strong relationships between different motor skill domains, suggesting underlying motor competence factors. The strongest correlation was observed between ball skills and gross motor coordination ($r = 0.68$, $p < 0.001$), indicating that students with better overall coordination tend to perform better in object manipulation tasks. Interestingly, fine motor control showed weaker correlations with gross motor skills ($r = 0.32$, $p < 0.05$), supporting the concept that these represent relatively independent motor systems during adolescent development. Classification of students based on their overall motor performance revealed that 23% (n=7) scored in the below-average range across multiple domains, suggesting potential need for motor skill intervention. Conversely, 27% (n=8) demonstrated above-average performance, indicating readiness for advanced physical activity challenges.The remaining 50% (n=15) showed mixed performance profiles, with strengths in some areas and relative weaknesses in others, highlighting the importance of individualized motor skill development approaches.

DISCUSSION

The findings from this motor skill identification study provide valuable insights into the developmental patterns of middle school students at SMP Negeri 32 Medan. The wide range of motor abilities observed reflects the heterogeneous nature of motor development during early adolescence, when individual differences in maturation rates become particularly pronounced.

The overall performance levels, while generally within average ranges compared to international standards, suggest that Indonesian middle school students demonstrate similar developmental trajectories to their global peers. However, the identification of students performing below average across multiple domains highlights the importance of early screening and intervention programs within the educational system.

The observed gender differences align closely with international research on adolescent motor development. The male advantage in ball skills and gross motor coordination mirrors findings from Western populations (Thomas & French, 1985; Barnett et al., 2010), suggesting that these patterns may reflect universal biological and social factors rather than culture-specific influences.

However, the magnitude of gender differences in fine motor control was somewhat larger than reported in previous studies, potentially indicating cultural or educational factors that may differentially influence motor skill development between boys and girls in Indonesian contexts. This finding warrants further investigation to understand underlying mechanisms.

The age-related improvements in gross motor coordination are consistent with developmental motor theories that emphasize continued refinement of complex movement patterns throughout adolescence (Malina et al., 2004). The plateau effect observed between ages 13 and 14 may reflect the approaching completion of fundamental motor skill development phases.

The identification of distinct motor skill profiles has several practical implications for educational practice at SMP Negeri 32 Medan. The 23% of students performing below average across multiple domains could benefit from targeted motor skill interventions, possibly through modified physical education programs or additional support services.

The moderate correlations between different motor domains suggest that comprehensive motor skill programs should address both fine and gross motor development, as improvements in one area may not automatically transfer to others. This finding supports the implementation of diverse physical activity programs that challenge different motor systems.

For students demonstrating above-average motor performance, the results suggest readiness for advanced physical challenges and potential talent identification programs. These findings could inform decisions about sports program placement and specialized physical education tracks.

Several limitations must be acknowledged when interpreting these findings. The relatively small sample size (n=30) limits generalizability to the broader Indonesian middle school population. Additionally, the cross-sectional design prevents conclusions about developmental changes over time, highlighting the need for longitudinal follow-up studies. The assessment tools, while internationally validated, were developed primarily for Western populations, potentially introducing cultural bias in scoring and interpretation. Future research should consider developing or adapting motor assessment tools specifically for Indonesian contexts.

Environmental factors such as previous physical activity experiences, socioeconomic status, and nutritional factors were not systematically controlled or measured, potentially influencing the observed motor skill patterns. These variables should be included in future comprehensive assessments.This study establishes important baseline data for future longitudinal investigations of motor skill development in Indonesian adolescents. Follow-up studies tracking the same participants over time would provide valuable insights into developmental trajectories and the effectiveness of intervention programs. Research examining the relationship between motor skill competence and academic performance, social integration, and psychological well-being would enhance understanding of the broader implications of motor development for adolescent success.

CONCLUSION

This study successfully identified motor skill patterns among students at SMP Negeri 32 Medan, providing valuable baseline data for educational planning and individual student support. The findings reveal typical adolescent motor development patterns with expected gender and age differences, while also identifying students who may benefit from additional motor skill support.

The research reinforces the importance of systematic motor skill assessment in middle school settings, enabling educators to develop targeted interventions and optimize physical education programming. The identification of both struggling and advanced students provides opportunities for differentiated instruction that meets diverse developmental needs.

The correlation patterns between different motor domains support the implementation of comprehensive motor development programs that address both fine and gross motor skills. These findings have immediate practical applications for curriculum development and student placement decisions at SMP Negeri 32 Medan.

Future research should expand on these findings through longitudinal studies and broader population samples to enhance understanding of motor development patterns in Indonesian educational contexts. The integration of motor skill assessment into routine educational evaluation could significantly improve developmental outcomes for Indonesian adolescents.

The evidence presented supports the hypothesis that systematic motor skill identification provides valuable information for educational planning and student development. These findings contribute to the growing body of knowledge about motor development in diverse cultural contexts and support the implementation of evidence-based physical education programs.

We recommend that educational institutions consider implementing regular motor skill screening programs and developing targeted interventions for students identified with motor difficulties. Additionally, advanced programs should be established for students demonstrating exceptional motor abilities to maximize their developmental potential.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest in relation to this research. This study was conducted independently without external funding or commercial interests that could influence the research outcomes or interpretation of findings.

REFERENCES

Barnett, L. M., Van Beurden, E., Morgan, P. J., Brooks, L. O., & Beard, J. R. (2010). Gender differences in motor skill proficiency from childhood to adolescence: A longitudinal study. Research Quarterly for Exercise and Sport, 81(2), 162-170. https://doi.org/10.1080/02701367.2010.10599663

Hands, B., & Larkin, D. (2006). Physical fitness differences in children with and without motor learning difficulties. European Journal of Special Needs Education, 21(4), 447-456. https://doi.org/10.1080/08856250600956410

Henderson, S. E., & Sugden, D. A. (2007). Movement Assessment Battery for Children-2 (2nd ed.). Psychological Corporation.

Lubans, D. R., Morgan, P. J., Cliff, D. P., Barnett, L. M., & Okely, A. D. (2010). Fundamental movement skills in children and adolescents: Review of associated health benefits. Sports Medicine, 40(12), 1019-1035. https://doi.org/10.2165/11536850-000000000-00000

Malina, R. M., Bouchard, C., & Bar-Or, O. (2004). Growth, maturation, and physical activity (2nd ed.). Human Kinetics.
Thomas, J. R., & French, K. E. (1985). Gender differences across age in motor performance: A meta-analysis. Psychological Bulletin, 98(2), 260-282. https://doi.org/10.1037/0033-2909.98.2.260