International Journal of
Disabilities Sports and Health Sciences
e-ISSN: 2645-9094

RESEARCH ARTICLE

The Locomotor Movement Abilities of Children Aged 5-6 Years in Terms of Geographical Aspects (Coastal and Mountain Areas)

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Abstract
This study examines the differences in locomotor abilities of children aged 5-6 years in two locations, namely coastal and mountainous areas in Kebumen City, Indonesia. This is important because children's locomotor outcomes are still poor and there has been no identification of locomotor abilities judging from previous studies that only examined manipulative movement abilities. Overall, this study contributes greatly to future research by providing important insights into how environmental and geographical factors interact with children's physical development, which in turn can aid in the creation of more effective policies and interventions to support holistic child development. Using descriptive research methods, the population was 40 schools specifically for coastal and mountainous areas, then sampling was carried out in 2 stages, namely using cluster random sampling techniques and then purposive sampling. The sample size was 130 with details of 65 children in coastal areas and 65 in mountainous regions. This instrument has been validated and reliable on 135 children in Indonesia with a validity result of 2.27 > t table 1.65 and reliability of 0.765. The statistical test results showed a p value = 0.013 which means that there is a relationship between children's locomotor abilities with geography in the two different locations, namely mountains and coasts. The average child's locomotor ability in coastal areas was found to be superior compared to mountainous areas.

Keywords
Locomotor Skills, Coastal Areas, Mountainous Areas, 5-6 Years Old Children, Geographical Aspects

INTRODUCTION

Early childhood is a generation that requires special attention for its growth and development (Fitri & Ummah, 2022). Early childhood is ready and has a good level of maturity, namely the age of 5-6 years, besides that it has brought up a significant variety of potential in the developmental dimension (O'Brien et al., 2016a). Regular, well-designed activity in childhood is essential for maintaining health into adulthood. Poor activity in childhood is a predictor of non-participation in sports and a predictor of health-related problems later in life (McGann et al., 2020). Lack of physical activity from preschool age causes 80% of adolescents to become inactive, resulting in a 20-30% higher risk of death (WHO, 2022). Gross motor skill development is an important aspect of early childhood (Webster et al., 2019). Mastery of gross motor skills is fundamental to physical health, cognitive and social development, achievement, and psychosocial development. However, today's children spend more time sitting, playing computer games, and watching TV, while less than 5% of the day is spent on physical skills (González et al., 2017). In addition, most modern children no longer have proficient gross motor skills such as not being able to kick, jump, throw, and even walk properly (O'Brien et al., 2016b). For this reason, physical activities are needed so that children's gross motor skills increase (Morrison et al., 2018).

Many motor skill studies are not very specific. Each stage of child development has different phases. Not only in each stage but also in nutritional status, gender, facilities at school or home, and geographical conditions where the child

Received: 30 June 2024 ; **Revised** ; 28 July 2024 ; **Accepted:** 06 September 2024; **Published:** 25 September 2024

How to cite this article: Fitri, A.W., Dimyati, D., and Ayriza, Y. (2024). The Locomotor Movement Abilities of Children Aged 5-6 Years in Terms of Geographical Aspects (Coastal and Mountain Areas). *Int J Disabil Sports Health Sci*;7(5):1163-1171.https://doi.org/10.33438/ijdshs.1507608

lives. Therefore, problems related to the assessment of gross motor skills are still evident in preschool age (Pelemiš, 2018).

Gross motor development in childhood is strongly influenced by the characteristics of children's growth and maturity (morphological, physiological, and neuromuscular) (Mustafa & Sugiharto, 2020; Ügüten & Ersöz, 2024). This is because motor development occurs within a specific social context, and the environment in which a child is raised is very important. In general, play and learning activities in the surrounding environment and the nutritional status of children can influence children's behavior and activities. Thus early childhood is strongly influenced by its environment, such as children who live in mountainous areas will often walk on uneven road contours and are hilly. Conversely, children who live in coastal areas, and daily activities are accustomed to hot weather conditions and flat areas, this certainly affects their physical development and movement.

In addition to consideration of the location of school institutions, an important thing to note is that the environment will greatly affect physical potential, especially the potential for movement and physicality. PAUD institutions in the Kebumen district are scattered in mountainous areas and also on the south coast.

One example is the potential of children's movement in terms of jumping will be different from the medium and lowlands. The differences in children's movement abilities and physical potential from a geographical point of view should be of concern to teachers and sports talent scouts so that they can pay different attention to handling growth and development and their movement potential (Saparia et al., 2023).

Locomotor movements are significant for children to master because they will continue to be part of children's daily lives in the future, such as for games, physical activities, and sports (Aye et al., 2017). However, some areas in Indonesia still have locomotor abilities such as jumping, jumping, and walking (Djuanda & Suryani, 2021; Muslihin, 2020), teachers and parents are more likely to emphasize their children's numeric than their physical skills. If the child's locomotor ability is not developed, the problem will increase and expand as the child ages (Phytanza et al., 2023). For example, children are not trained to run fast, dodge, jump, and jump which can result in awkward and stiff movements due to a lack of coordination or frequent falls. One of the main focuses in early childhood education is to develop children's gross motor skills, especially locomotor abilities.

From other previous studies, the results of gross motor skills seen from the geographical aspect of the results show that there is indeed a difference between coastal and mountainous areas. From this fact, it is very important to identify the potential of the two geographically different locations so that they can be used as a reference in developing the potential of children's movements in both areas, both coastal and mountainous for locomotor abilities.

This study aims to see the results of the locomotor ability test of children from two different areas, namely mountainous and coastal areas, referring to previous research that has been carried out in a similar way to see the ability of control objects. Asnaldi et al., (2020) and gross motor skills Saparia et al., (2023) from children in two different locations. Another consideration that becomes the basis of why this research is important is the locomotor results of children who are still not good, there has been no identification of locomotor abilities to see from 2 geographically different locations and the results of this study can be used as a reference in developing the potential of early childhood movement in mountainous and coastal areas. Based on this, this study was conducted to examine differences in the locomotor abilities of children aged 5-6 years in terms of geographical aspects of mountains and coasts.

MATERIALS AND METHODS

Methods

The research to be conducted using descriptive quantitative aims to measure and describe the characteristics of a phenomenon objectively and numerically (Babbie, 2010). In the context of research related to locomotor features of 5-6-year-old children in coastal and mountainous areas, this method allows researchers to directly measure children's physical abilities, such as the ability to run, jump, or balance, and describe the distribution of these characteristics among the population under study.

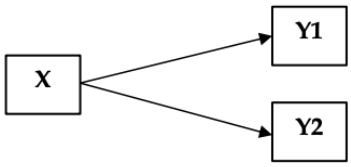

Figure 1. Research design

Instruments Study

The research instrument used the TGMD-2 (Ulrich & Sanford, 2000) with locomotor skill subtests including run, gallop, hop, horizontal jump, skip, and slide. This instrument has been tested for validity and reliability on 135 children in Indonesia and the results for validity were 2.27 > t table 1.65 and reliability was 0.765 (Apriyani et al., 2018).

Participants

In the initial research plan, 40 kindergarten school institutions specialized in coastal and mountainous areas. Sample determination was carried out using several techniques including cluster random sampling and purposive sampling of the number of schools that were reduced based on the location of the sub-district closest to the coast or mountains based on the location of the sub-district. Furthermore, the determination of the number of samples used as testes using purposive sampling techniques with the criteria of children aged 5-6 years, not in conditions of special needs so that the total sample was 130 samples with details of 65 children from coastal areas and 65 children from mountainous regions.

This research has been approved by the Ethics Committee of the University of State Yogyakarta (Reg.No.:T/53/UN34.9/KP.06.07/2024).Participant provided informed consent, with the volunteer form covering research details, risks, benefits, confidentiality, and participant rights. The research strictly adhered to the ethical principles of the Declaration of Helsinki, prioritizing participant's rights and well-being in design, procedures, and confidentiality measures.

Procedure

The research will be conducted for approximately 2 months starting from initial observations to data collection and drawing conclusions, data collection techniques are carried out in several ways. They start with observation and then measure children's locomotor abilities using the TGMD-2 instrument. After the measurement, data analysis techniques were carried out on the research data using several stages.

First, calculations will be performed based on the norm table that has been determined on the TGMD-2 instrument (Ulrich & Sanford, 2000). Second, descriptive analysis will be conducted to describe the data obtained, provide basic summary statistics such as mean, median, standard deviation, and frequency distribution, and conduct a Chi-Square Test (Gravetter, 2013) with the TGMD-2 results. In the context of this study, the Chi-Square Test can be used to test the relationship of locomotor ability between geographical aspects and the results of the TGMD-2 assessment, and then also statistically describe the locomotor ability of each mountainous and coastal area based on gender, age, height and BMI. Third, concluding the last step that summarizes the research findings and answers the research questions posed (Creswell, 2014).

RESULTS

This research instrument uses the TGMD-2 and has been validated, for which a frequency distribution analysis is carried out to find out the locomotor abilities of children in coastal and mountainous areas. Details are presented in Table 1.

Table 1. Frequency distribution of locomotor movements of children in mountainous areas

Standar Score	Frekuensi		Assesment
	Absolute (Fa)	Relative (%)	
17-20	0	0.00%	Very high
15-16	0	0.00%	High
13-14	20	30.77%	Above average
8-12	20	30.77%	Average
6-7	15	23.07%	Below average
4-5	10	15.38%	Low
1-3	0	0.00%	Very Low
Total	65	100%	

*locomotor categorization TGMD-2

Table 1 shows that the results of children scoring above the average are 20 children equal to the average of 20. Meanwhile, the results of the assessment below the average are 15 children and low are 10 children. Table 2 shows that the results of children scoring above the average are 25 children equal to the average of 20. Meanwhile, the results of the assessment below the average are 12 children and low are 8 children. The results of the two tables' analysis explain that in general, the locomotor abilities of children in coastal areas are better than those in mountainous areas when viewed from the categorization of the TGMD-2 instrument.

Table 2. Frequency distribution of locomotor movements of children in coastal areas

Standar Score	Frekuensi		Assesment
	Absolute (Fa)	Relative (%)	
17-20	0	0.00%	Very high
15-16	0	0.00%	High
13-14	25	38.46%	Above average
8-12	20	30.76%	Average
6-7	12	18.46%	Below average
4-5	8	12.30%	Low
1-3	0	0.00%	Very Low
Total	65	100%	

*locomotor categorization TGMD-2

Table 3 shows some general differences including the maximum score of children's locomotor ability in mountainous and coastal areas. The results show that there is a higher mean difference in the locomotor scores of coastal children compared to the mean scores of children in mountainous areas, namely 34.2612 for coastal areas and 32.8208 for mountainous areas.

Next, explain the results of descriptive analysis of coastal and mountain children from the range of scores, maximum, minimum, average, and standard deviation ranging from age, gender, BMI, and height.

Table 3. Descriptive analysis of total locomotor score of coastal and mountain areas

	N	Range	Min.	Max.	M	SD
Coastal	65	13.00	29.00	42.00	34.2615	2.74589
Mountain Areas	65	19.00	24.00	43.00	32.8308	3.50254

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

The results from Table 4 to Table 9 show that in terms of gender, age, and height, boys in coastal areas are superior to boys in mountainous areas. Vice versa, girls in coastal areas are superior to boys in mountainous areas. The results of the analysis of these tables explain that the movement skills of children in coastal areas are better than children in mountainous areas when viewed from the categorization of gender, age, and height. However, it looks different in Tables 10 and 11 in the BMI category, the results of mountain children are superior to coastal children.

Table 4. Descriptive analysis of locomotor scores of boys from coastal and mountain areas

	N	Range	Min.	Max.	M	SD
Coastal	33	10.00	29.00	39.00	33.7273	2.42735
Mountain Areas	29	15.00	28.00	43.00	32.3103	3.53658

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 5. Descriptive analysis of locomotor scores of coastal and mountainous girls

	N	Range	Min.	Max.	M	SD
Coastal	32	13.00	29.00	42.00	34.8125	2.97774
Mountain Areas	36	15.00	28.00	43.00	32.2500	3.46719

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 6. Descriptive analysis of locomotor scores of 5-year-old children from coastal and mountainous areas

	N	Range	Min.	Max.	M	SD
Coastal	40	13.00	29.00	42.00	34.3000	2.97166
Mountain Areas	44	15.00	28.00	443.00	32.6591	3.47712

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 7. Descriptive analysis of locomotor scores of 6-year-old children from coastal and mountainous areas

	N	Range	Min.	Max.	M	SD
Coastal	25	9.00	30.00	39.00	34.2000	2.39792
Mountain Areas	21	15.00	24.00	39.00	33.1905	3.61413

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 8. Descriptive analysis of locomotor scores of children under 100cm height from coastal and mountainous areas

	N	Range	Min.	Max.	M	SD
Coastal	35	13.00	29.00	42.00	34.7143	2.88578
Mountain Areas	36	15.00	28.00	43.00	33.5667	3.61685

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 9. Descriptive analysis of locomotor scores of children over 100cm tall from coastal and mountainous areas

	N	Range	Min.	Max.	M	SD
Coastal	30	10.00	29.00	39.00	33.7333	2.39792
Mountain Areas	35	15.00	24.00	39.00	32.2000	3.32371

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 10. Descriptive analysis of locomotor scores of children with a bmi below 13kg from coastal and mountainous areas

	N	Range	Min.	Max.	M	SD
Coastal	37	11.00	28.00	39.00	33.4865	2.65227
Mountain Areas	31	15.00	28.00	43.00	33.6129	3.40272

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 11. Descriptive analysis of locomotor scores of children with a bmi above 13kg from coastal and mountainous areas

	N	Range	Min.	Max.	M	SD
Coastal	28	10.00	28.00	38.00	33.6786	2.52475
Mountain Areas	34	16.00	23.00	39.00	32.2941	3.40272

Mean (M), Std.Deviation (SD), Minimum (Min.), Maximum (Max.)

Table 12 shows the statistical description of the results of locomotor ability seen from several categories such as gender, age, BMI, and height. The overall P-value results are above >0.05 which indicates that there is no relationship between categories (age, gender, BMI, height) and geographical aspects. This indicates that children's locomotor ability is influenced by the geographical area where the children live.

Table 12. Descriptive analysis of total locomotor score of coastal and mountain areas

	Locomotor Categorization TGMD-2				Total	P-value
	Coastal		Mountains			
	n	%	n	%		
Boys	33	59,7	29	44,6	65	0.598
Girls	32	49,3	36	55,4	68	
5 year Old	40	61,5	44	67,6	84	0.463
6 year old	25	38,5	21	32,4	46	
Under 100cm Height	35	53,8	30	46,2	65	0.380
Over 100cm tall	30	46,2	35	53,8	65	
BMI below 13kg	37	56,9	31	47,6	68	0.292
BMI above 13kg	28	43,1	34	52,4	62	

In contrast, Table 13 shows the results of locomotor ability as seen from the results of the TGMD-2 assessment and mountain coastal geographical conditions. The P-value results also show less than <0.05, which indicates that there is a relationship between the TGMD-2 assessment and the geographical conditions of the mountainous coastline on children's locomotor abilities.

Overall, the data presented in Figure 2 provide valuable insights into children's gross motor development and can help parents and educators adjust the motor learning process so that children's growth and development will be maximized.

Table 13. Descriptive analysis of total locomotor score of coastal and mountain areas and TGMD-2

	Locomotor Categorization TGMD-2				Total	P-value
	Coastal		Mountains			
	n	%	n	%		
Run	13	22,8	8	11,1	21	0.013
Gallop	1	1,7	20	27,7	21	
Hop	8	14,3	13	18,5	21	
Horizontal Jump	11	19,2	10	13.8	21	
Skip	11	19,2	9	12,5	20	
Slide	13	22,8	12	16,6	26	

DISCUSSION

The results showed that the geographical environment has a significant influence on the development of children's motor skills. Children living in coastal areas tend to have better motor skills compared to children living in mountainous areas. This may be explained by differences in the types of physical activities available in these environments. In coastal areas, children may be more involved in activities such as swimming, playing in the sand, and other water activities that can improve their gross motor skills and object control. In contrast, children in mountainous areas may have less access to such physical activities, which may limit the development of their motor skills.

Compared to previous research conducted Asnaldi et al., (2020) and Saparia et al., (2023) provides important insights into the development of children's motor skills in different geographical locations. Asnaldi et al. focused on the ability to control objects, which includes skills such as catching, throwing, and kicking. The study found that children in coastal areas showed better object control ability compared to children in mountainous areas.

The geographical location of where children live varies, thus affecting children's physical abilities (Goodway et al., 2010). The geographical location where children live has a significant influence on their physical and motor abilities. Children growing up in different environments face diverse physical conditions, which affect the type and frequency of physical activity they engage in. Research shows that children who live in coastal areas tend to have better locomotor skills compared to those who live in mountainous areas.

The beach environment offers unique terrain, such as unstable sand and uneven terrain, which naturally challenges and enhances children's motor skills. Children in beach areas are accustomed to playing in the sand, walking along the beach, and engaging in physical activities that demand more

complex motor adaptations. These daily activities improve locomotor skills such as balance, coordination, and muscle strength, which become more developed compared to children living in areas with flatter or uphill terrain such as in the mountains. The more physical activity that is done the level of physical fitness will be higher (Safaringga & Herpandika, 2018).

In addition to these differences, nutritional status also has an effect, children with poor nutrition or obesity will interfere with children's health and movement skills (Yunita, 2021; Hafidah & Nurjanah, 2022). This research has shown that children with good nutritional status tend to have better motor skill development compared to children who are malnourished or obese. Good nutritional status provides the energy and nutrients necessary for the development of muscles, bones, and the nervous system that support motor skills. In addition, children with good nutrition tend to be more physically active, which further strengthens their motor skills.

Children with poor nutritional status will experience direct physical growth barriers which affect the level of children's movement skills. The ability to move in children with good nutritional status will be maximized compared to children with poor nutritional status or obesity. children with poor nutritional status, or obesity. This is because children's movement skills are strongly influenced by individual nutritional status (Sepriadi, 2017).

This study corroborates previous findings that gender has a significant influence on locomotor ability in children (Colombo-Dougovito, 2017). The results show that boys tend to have better locomotor skills than girls, both in coastal and mountainous areas. This phenomenon can be explained by differences in physical activity patterns and play characteristics between boys and girls. However, these sex differences in locomotor skills were consistent across a range of geographical environments, whether in coastal areas with sandy terrain and challenging winds or in mountainous areas with steep and rocky terrain. This suggests that sex factors are more dominant than environmental influences in determining the development of children's locomotor skills (Arifiyanti, 2020).

Moreover, this study provides contrasting results from previous research that the difference is the facilities available at home or school that enable children to develop their potential (Rohyana & Adawiyah, 2018). Children's locomotor skills require a large play area so that children can freely move and move appropriately. It is not limited if the area is indoors or outdoors. If the school provides sufficient facilities for their locomotor abilities, their movement skills will be better. Environmental facilities including schools and homes are a factor in the condition of children's motor skills not developing as they should, an environment that does not have sufficient play facilities will result in stunted child development (Wang et al., 2022).

The results of the study in general both children from mountainous and coastal areas have average locomotor abilities. When viewed from the results of locomotor abilities, children from mountainous areas do not fall into this category, while coastal areas do. This can also occur from the teacher's ability to teach is very influential on children's locomotor abilities. The difference in the quality of teachers in the two regions is also influential. The teacher's ability to teach has a significant effect on children's motor skills. (Nobre et al., 2020), although further research is needed on the quality of teachers in both coastal and mountainous areas.

The implications of this research are expected to be able to provide an overview of children's locomotor abilities in detail from previously conducted research. It was found that the average index of locomotor ability in coastal areas was better. This research is very helpful for further researchers to be able to develop the potential of movement and can also be one of the indicators used to map the direction of motor development in early childhood based on regional potential.

Conclusion

In conclusion, the results of data analysis show that there is a relationship between children's locomotor abilities and geography in the two different locations, namely mountains and coasts. The average child's locomotor ability in coastal areas was found to be superior compared to mountainous areas.

ACKNOWLEDGMENT

The author would like to express his deepest gratitude to Yogyakarta State University as the place where the author studied. Deep gratitude is also expressed to all parties involved in this research.

Conflict of Interest

We declare that the article we have written is not involved in any conflict of interest.

Ethics Statement

This research has been approved by the Ethics Committee of the University of State Yogyakarta (Reg.No.:T/53/UN34.9/KP.06.07/2024).

Author Contributions

Study design, AF, D and YA; Data collection, AF; Statistical analysis, AF; Data interpretation, AF, D and YA; Literature search, AF, D and YA. All authors have read and approved the published version of the manuscript.

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