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# Analysis of motor coordination abilities of students: Comparative study of students in urban and rural areas

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## Abstract

The main predictor that supports motor skills is the mastery of motor coordination that is effectively developed through learning programs at elementary school ages. This study aims to analyze the differences in coordination skills of children who live in urban and rural areas. This study used a cross-sectional design, and the research subjects were elementary school students aged between 7 - 9 years (N=640; male=320 and female=320) spread across urban and rural areas in West Sumatra Province, Indonesia. Samples were collected through a purposive sampling technique. Coordination data were measured using the Körperkoordinations Test für Kinder (KTK): balance beam, moving sideways, jumping sideways and eye-hand coordination. The data were analyzed using the IBM SPSS statistical program version 25. The results of the analysis revealed that Urban students had a superior motor coordination average score compared to rural students. Based on the t-test, there was a significant difference in general coordination abilities between urban and rural students (p value< 0.05). The motor coordination skills of students in urban settings are superior to those of students in rural settings, both male and female. It is believed that by having adequate facilities and equipment, schools in Urban have more opportunities to practice coordination both structured and independently. It is recommended to optimize movement coordination training for students in a structured manner in physical education and extracurricular learning at school.

**Keywords:** motor coordination, urban, rural, elementary school students.

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**Authors contribution:** a – Preparing concepts; b – Formulating methods; c – Conducting research; d – Processing results; e – Interpretation and conclusions; f - Editing the final version

## INTRODUCTION

One of the important elements of learning and mastering skills in physical activities and special motor skills, including sports, is the ability to coordinate skills (CMS). Matos et al. (2022) said from their point of view that it is necessary to develop research regarding coordination because it is

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believed to contribute directly to improving the ability to manipulate an object (ball) using the upper and lower limbs. Other studies show this coordination skill is a strong predictor of gaining skill proficiency, therefore, coordination development receives much attention and needs to be optimized for children (Freitas et al., 2015; Henrique et al., 2018).

In fundamental motor skills, coordination of motion is believed to be very urgent because this skill is part of the ability to regulate the harmony of motion of body parts related to body control capabilities (Supriatna & Suhairi, 2021). Several studies reveal that motor coordination is a complex skill to be able to control and harmonize motors as a foundation for achieving early basic skills in mastering the basic techniques of certain sports (Braumann & Stiller, 2010; Syafruddin, 2017). Individuals who have good motion coordination will find it easy to learn and realize optimal motion.

At elementary school age, students' basic motor skills, both locomotor and object control, should be approaching a perfect or perfect level for learning more complex movements (Goodway et al., 2019). For students who are at the elementary school level of education, it is a crucial age in learning the basics of fundamental motors to motors that lead to specialized motors that are useful for physical education, daily activities and learning techniques in sports. For students who are at the elementary school level of education, it is a crucial age in learning the basics of fundamental motors to motors that lead to specialized motors that are useful for physical education, daily activities and learning techniques in sports. Motor and coordination skills developed during childhood are considered building blocks for sport-specific motor patterns and are usually the focus of physical development programs for children to develop motor skills from an early age (Jukic et al., 2019).

Coordination of motor skills will develop if they are always done and practised in a structured and unstructured manner. Children will have the opportunity to improve their skills in physical education and sports activities as well as extracurricular activities at school. Understandably, schools are the dominant environment in developing motor skills, including coordination

skills, through physical education, sports and extracurricular learning. Furthermore, in seeing and predicting children's abilities and talents, it has been agreed that good motor skills are "better movers", which substance coordination of motor according to Pion (2015), is a variable that is considered to be able to predict children's motor skills and achievements in sports in the future.

According to Syafruddin (2017), coordination abilities are characterized by mastery of various forms and variations of movements, both for learning and sports. General coordination skills can be obtained from the results of training and learning programs as well as physical activity in extracurricular activities at school. Faber (2020) explains that students' motor coordination or, more precisely, motor perception can be developed through intensive intervention for at least 5 weeks in physical education learning.

Coordination ability greatly supports the mastery of motor skills. Coordination includes eye-foot, eye-hand, hand-eye-foot and so on, if the integration of these several elements is good, it will be easy to realize the motor well (Oktarifaldi et al., 2020). It can be understood that coordination of motion is needed in life, which helps realize the abilities and skills needed in student life. It is known throughout the world that the majority of children in the preschool to elementary school stages are not encouraged to carry out adequate movement and physical activity or are not even facilitated at all (Chaput et al., 2016; Berglind & Tynelius, 2017). Studies reveal that up to 19% of children in the world suffer from impaired motor coordination development and the ratio of males to females is 2:1, so intervention and planned action are needed, including control and monitoring during motor execution for children (Gomez & Sirigu, 2015; Zwicker et al., 2012).

Developmental coordination disorder is a condition that includes delayed acquisition of motor skills, clumsiness, and inaccurate execution of daily life tasks such as catching objects, riding a bicycle and so on. This is not due to intellectual disability or medical conditions but conditions and vacancies that are not provided (Emanuele et al., 2022). The COVID-19


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period has led to much more excessive sedentary habits among children due to COVID restrictions or the risk of infection. This condition is believed to influence the development of children's movement coordination because they tend not to do as much physical activity as they should (Esen et al., 2023).

Pesce Ibarra (2018) explains that the ability to learn coordination skills is best learned during childhood or elementary school because the basic functions of the central nervous system develop very strongly at that age. It can be understood that it is important to do motion learning, especially coordination skills at the age of children to get optimal coordination results. The activities carried out by students, both male and female, are largely influenced by their social and environmental factors, such as the influence of family, peers, teachers, and the physical environment of residence (Bolger et al., 2021).

The difference in geographical location is thought to result in differences in physical conditions, skills, and personal health between students living in urban and rural areas (Syaifuddin & Juanita, 2016). Elementary school students in rural and urban, of course, have different characteristics, social and mindsets, and there have been few studies that mention the comparison of learning achievement of elementary school students who live in rural and urban (Aisah et al., 2022).

Based on several studies on learning outcomes between students in urban and rural (Aisah et al., 2022; Bakhtiar, 2014; Duarte et al., 2021) highlight differences in movement competence between school locations and places of residence. Thus, it is necessary to carry out research by comparing the learning outcomes and abilities of students in Urban and rural, because the West Sumatra area generally consists of Urban and rural. Comparing the coordination skills of urban and rural students aims to obtain factual initial data, which will later be used as a basic reference in preparing teaching programs in physical education. Based on research by Bakhtiar (2014), the proficiency of elementary school children has different tendencies based on gender and region of residence. Furthermore, Rural

children are superior in locomotor physical activity, but Urban children are better in their motor coordination.

Researchers assume that it is necessary to see and analyze the ability of students between urban and rural, especially the ability to coordinate motion, which is a supporting variable in every successful motor of children. This is also based on the demographic diversity in Indonesia, including West Sumatra, which is the subject of this research, West Sumatra is an area that has quite diverse areas, including rural areas, uban lowlands and highlands, where the research samples were deliberately taken from these areas.

Coordination is believed to be the foundation of motor that is useful in daily life educational activities and the basis for them to learn techniques in various sports. Through this research, it is hoped that factual conditions in the field can be revealed, which would be useful for many parties, especially physical education teachers, extracurricular coaches, trainers, and policymakers, in finding the right solutions related to the results of this study.

## METHOD

The subjects in this research were elementary school students aged 7 to 9 years. The population in this study were elementary school students aged 7 to 9 years in West Sumatra. A total of ten (10) public schools in four (4) urban and five (5) rural in West Sumatra Province participated in this research. The sample consisted of 640 students, 320 male students and 320 female students, each group of students attending schools in the urban and the rural, 160 male students and 160 female students. This research is a type of quantitative research with a Cross-Sectional study approach design, namely an observational study design that involves and looks at data from a population at a certain point in time (Wang & Cheng, 2020). Thus, this research uses an observational study approach regarding the motor skills of elementary school students.

Motor coordination was evaluated using the Körperkoordinations Test für Kinder (KTK), which was developed and validated in Germany and consisted of (1) a balance beam and walking backwards on a beam. Motor coordination was evaluated using the Körperkoordinations Test für Kinder


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(KTK) developed and validated in Germany (Matos et al., 2022), which consists of (1) balance beam, walking backwards on a beam. There are three beams with a length of 3 meters and a width of 3 cm, 4.5 cm and 6 cm respectively. The score is calculated as many steps as the student can take in walking backwards. (2) moving sideways, shifting with the body on two 25 cm x 25 cm platforms alternately to the side. The score is calculated based on the student's ability to move the body within 20 seconds for 2 repetitions. (3) jumping sideways, jumping to the left and right sides using 2 legs between the left and right sides limited by small blocks measuring 3 cm x 1 cm x 60 cm as a barrier. The score is taken on how much the student jumps for 15 seconds and is done 2 repetitions. (4) Eye-hand coordination, throwing a tennis ball to the target with one hand and catching the reflection of a tennis ball with a different hand on a wall that the size and target distance has determined, the score is taken on how many students are able to throw and catch for 30 seconds which is done 2 repetitions (Matos et al., 2022). Data analysis in this study used descriptive methods, using the average standard deviation assisted using the IBM SPSS Statistics program version 25. After testing the normality of the data, a t-test was conducted to see the significance between the coordination of motion of Urban students and students, male and female

Before the research was carried out, the researcher sent a permission letter to the school principal to conduct observations and research with letter numbers for Urban schools (018/YSO/III/2023; 019/YSO/III/2023; 014/YSO/I/2023; 019/YSO /V/2023) and for Rural schools (007/YSO/I/2023; 011/YSO/I/2023; 012/YSO/I/2023; 017/YSO/I/2023; 016/YSO/I/2023; 020/YSO/V/2023). After the researcher obtained written permission from the school principal, physical education teacher, class teacher and parents, the data was collected collectively. The schools that were the subject came from urban areas, including the Cities of Payakumbuh, Padang Panjang, Padang, and Bukittinggi. Furthermore, schools also come from rural areas, including Lima Puluh Kota, Tanah Datar, Pasaman, Solok, and Agam Regency.

The results of the data analysis will later be described in the form of a table, and the acquisition of each student's motor coordination skills will be grouped based on norms that have been determined into seven (7) categories. The categories are: (1) very superior, (2) superior, (3) above average, (4) average, (5) below average, (6) low, (7) very low. To assign students to each category, grouping is carried out by dividing them into 7 scales. The book Quantitative Data Analysis with the IBM SPPS program explains that the first step is to find the maximum value, minimum value, average value and standard deviation. The next step is to determine the measurement range or distance by subtracting the maximum value from the minimum value. Once obtained, we divide the range by 7 previously determined criteria (Qomusuddin & Romlah, 2021).

Classification and data analysis are first carried out to determine the results according to the criteria group. The initial step taken was to code the data based on both the location of residence (urban and rural) and gender (male and female). The next step is to convert the scores obtained by each student into grades or weights given based on the 7 predetermined criteria.

Four instruments will be converted, namely: balance beam, jumping sideways, moving sideways and eye-hand coordination. For the balance beam, the maximum score is 72, where students who get a score in the measurement range or distance of 50 will be divided into 7 criteria with the lowest weighting from 1 to 7. For jumping sideways, the maximum score is 84 with a measurement distance of 69 and divided by 7 criteria, the lowest weight is 1, and the highest is 7. Furthermore, moving sideways the maximum score is 79 with a range of 61 divided by 7 criteria, the lowest weight is 1, and the highest is 7. For eye-hand coordination, the score maximum is 42 with a range of 42 divided by 7 criteria, with the lowest weight being 1 and the highest being 7.

The next step is to add up each score or weight obtained from the four test instruments, which becomes the final value of data analysis processing in this research. On each instrument, the highest score is 7, and the lowest is 1, while on the eye-hand coordination variable, there are students who


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get a score of 0 because they do not have a score or are not able to do it correctly. The maximum value for the overall motor coordination score is 28 points. To convert it to each category according to the student's characteristics, it is the sum of all the weights obtained and added up from the four items. To see the differences in rural, urban and rural male students, urban and rural female students carried out an independent samples test (t-test).

## RESULT

Based on 640 students who were observed, analysis of student data in Urban areas showed that the highest student movement coordination score was 23, and the lowest score was 5. The average overall student coordination score in Urban was (M=14.47 SD=3.1), and the coordination score was for male students (M=15.09 SD=3.1) and females (M=13.86 SD=2.9). The average score for student coordination in the rural as a whole (M=13.75 SD 3.3), coordination for male students (M=14.62 SD=3.3) and female students (M=12.96 SD=2.9). Overall, student coordination is in the average category for both male and female students between the two urban and rural areas; only male students in the urban area are in the above-average category. For more details, see Table 1, which explains urban and rural groups.

**Table 1.** Description of coordination group data acquisition

| GROUP | | N | Average | Std | Min | Max | RATINGS |
|---|---|---|---|---|---|---|---|
| Urban | **General** | 320 | 14.47 | 3.1 | 5 | 23 | Average |
| | Male | 160 | 15.09 | 3.1 | 7 | 23 | Above Average |
| | Female | 160 | 13.86 | 2.9 | 5 | 19 | Average |
| Rural | **General** | 320 | 13.75 | 3.3 | 6 | 22 | Average |
| | Male | 160 | 14.62 | 3.3 | 6 | 22 | Average |
| | Female | 160 | 12.96 | 2.9 | 6 | 22 | Average |

(Qomusuddin & Romlah, 2021).

From Table 1, the Urban student group has a superior coordination average compared to the Rural student group. Male students in the urban area are superior to male students in the rural area, and the achievement scores for female students in the urban area are also superior to female students in the rural area. The group of female students in the Rural had the

lowest coordination score, while the group of students who had the highest score were males from the Urban with a category above the average.

Based on the measurement results of the four converted motor coordination instrument items, namely: balance beam, jumping sideways, moving sideways and eye-hand coordination, the maximum score is 72, minimum of 13 for balance beam, maximum of 84, minimum of 15 for jumping sideways, maximum 79, minimum 17 for moving sideways and a maximum of 42, a minimum of 0 for the eye-hand coordination score. The score range is obtained through the maximum score minus the minimum score for the four items and is divided into 7 criteria, the lowest weight is 1, and the highest is 7 in scoring. The following is Table 2, which details the acquisition of motor coordination skills for each student in general and for Males and Females in Urban.

**Table 2.** Results of coordination urban student

| SCORES COORDINATION | Urban Student | | | DESCRIPTIVE RATINGS |
|---|---|---|---|---|
| | General | Male | Female | |
| > 20 | 6 | 6 | 0 | Very Superior |
| 18 - 20 | 43 | 26 | 17 | Superior |
| 15 - 17 | 123 | 67 | 56 | Above Average |
| 12 - 14 | 100 | 41 | 59 | Average |
| 9 - 11 | 34 | 14 | 20 | Below Average |
| 6 - 8 | 12 | 6 | 6 | Low |
| < 6 | 2 | 0 | 2 | Very Low |

(Qomusuddin & Romlah, 2021).

Based on the results of data analysis, the coordination abilities of Urban students were divided into seven categories, for the very superior category there were only 6 male students, for the superior category there were 43 students, 26 male and 17 female, in the above average category there were 123 students. Students, 67 male and 56 female. For the average category, there were 100 students consisting of 41 males and 59 females, for the below average category, there were 34 students, 14 male and 20 female, for the low category, there were 12 students, 6 male and 6 female. Meanwhile, in the very low coordination category, only 2 female students were found.

Based on the measurement results of the four instrument items, balance beam, jumping sideways, moving sideways and eye-hand coordination, the score range was obtained through the maximum score


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minus the minimum score for the four items and divided into 7 criteria, the lowest weight being 1 and the highest being 7 in giving the score. The following is Table 3, which details the acquisition of motor coordination skills for each student in general and for males and females in rural.

**Table 3.** Results of obtaining coordination with rural students

| Scores | Student | | | Descriptive |
|---|---|---|---|---|
| Coordination | General | Male | Female | Ratings |
| > 20 | 9 | 7 | 2 | Very Superior |
| 18 - 20 | 26 | 20 | 6 | Superior |
| 15 - 17 | 97 | 60 | 37 | Above Average |
| 12 - 14 | 112 | 47 | 65 | Average |
| 9 - 11 | 58 | 18 | 40 | Below Average |
| 6 - 8 | 18 | 8 | 10 | Low |
| < 6 | 0 | 0 | 0 | Very Low |

(Qomusuddin & Romlah, 2021).

Based on the results of data analysis, the coordination abilities of Rural students were divided into seven categories, for the very superior category, there were 9 students, 7 males and 2 females, for the superior category, there were 26 students, 20 male and 6 female, in the above average category. On average, 97 students were found, 60 male and 37 female. For the average category, there were 112 students consisting of 47 males and 65 females, for the below average category, there were 58 students, 18 male and 40 female, for the low category, there were 18 students, 8 male and 10 female. Not only were a few students in the very low coordination category.

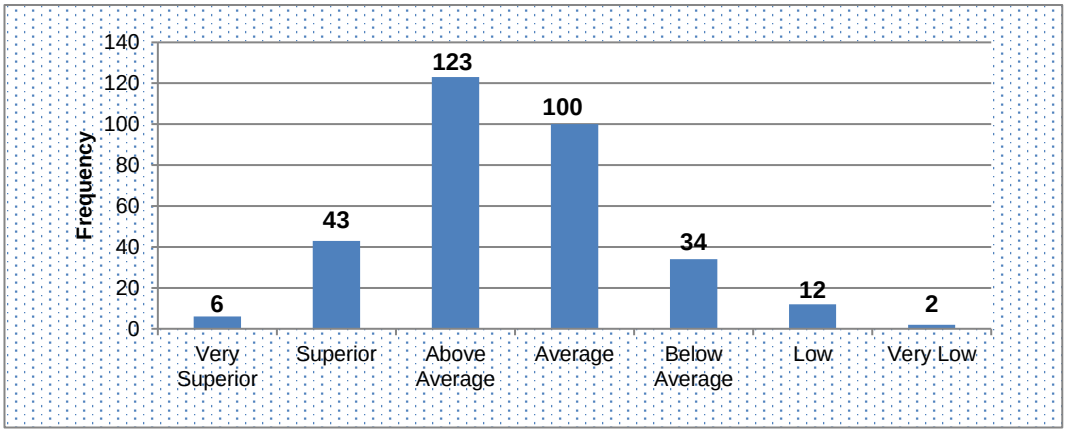


**Figure1.** Coordination Abilities Urban Students

Based on the results of data analysis, urban students have quite good motor coordination abilities. Only 2 students are still in the very low category,

and 12 people are in the low category. In the below-average category, 34 people were found, and 100 people were in the average category. The highest gainers were in the above-average category, namely 123 people, and 43 people were in the superior category. Finally, there were 6 people in the very superior category. It was found that 6 male Urban students were in the very superior category, 26 students were in the superior category, 67 students were above average, 41 students were in the average category, 14 others were in the below average category, and 6 students were in the low category. Of female students, none of them is in the very superior category, 17 students are in the superior category, 56 students are above average, 59 are in the average category, 20 students are below average, 6 are in a low category and 2 students are in the very low category.

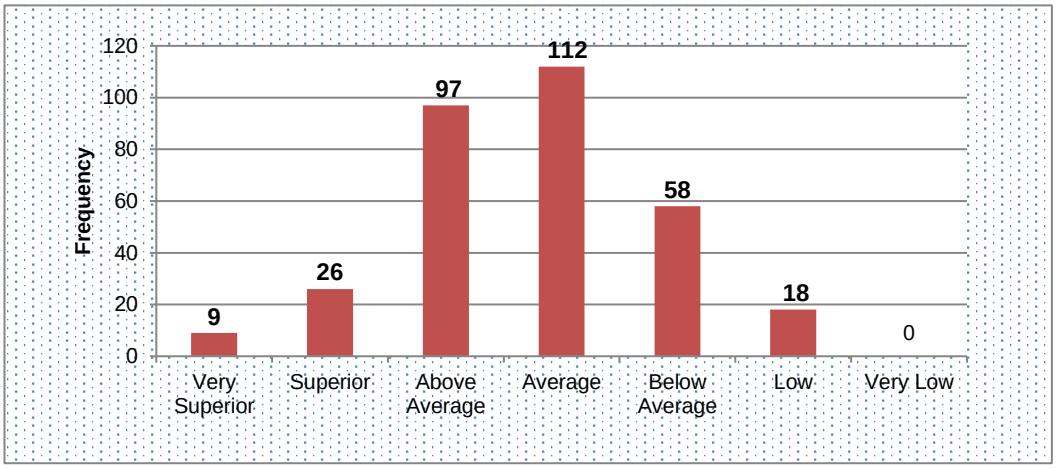


**Figure 2.** Coordination Abilities Rural Students

Analysis of data on Urban students revealed that the students' motor coordination abilities were good, no one was seen in the very low category, and 18 people were in the low category. In the below-average category, 58 students were found, and 112 students were in the average category. For the above category, there was an average of 97 students, and 26 people were in the superior category, and for the very superior category, there were 9 students. There are 7 male Rural students in the very superior category, 20 students in the superior category, 60 students in the above average category, 47 students in the average category, 18 others in the below average category and 8 students in the low category. For female students,


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there were 2 students in the very superior category, 6 students in the superior category, 37 students above average, 65 students in the average category, 40 students below average, 10 students in the low category and no students in the very low.

The t-test of different means was conducted to see the difference between the coordination ability of Urban students and Rural students, in general, there is a significant difference between the coordination ability of Urban students compared to Rural students, it can be concluded that Urban students are superior to Rural students obtained (sig. value<0.05). However, for the coordination ability of male students between Urban and rural, there is no significant difference obtained (sig. value>0.05), this means that there is no difference in the average coordination ability of Urban and rural male students. Furthermore, for the coordination ability of female students between Urban and rural, there is a significant difference obtained (sig. value<0.05), meaning that Urban students are superior in the coordination of motor compared to rural students. It can be seen in the description of the Independent Samples Test analysis in Tables 4, 5 and 6 below.

**Table 4.** Coordination abilities between urban and rural students

| Result | | F | Sig. | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Motor Coordination | Equal variances assumed | 1.037 | 0.309 | 2.744 | 638 | 0.006 |
| | Equal variances are not assumed. | | | 2.744 | 636.15 | 0.006 |

Based on data analysis through independent samples tests in Table 4 between students attending schools in the Urban and the Rural, it was found that the $F_{count}$ was (1.037), and the $t_{count}$ was (2,744). Furthermore, the significance value (2-tailed) is (0.006). This means that there is a significant difference between the motor coordination skills of Urban students and Rural students. It is understood that Urban students have superior motor coordination skills compared to Rural students.

**Table 5.** Coordination abilities between male urban and rural students

| Result | | F | Sig. | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Motor Coordination | Equal variances assumed | 0,874 | 0.351 | 1.307 | 318 | 0.192 |
| | Equal variances are not assumed. | | | 1.307 | 315.988 | 0.192 |

Data analysis reveals that in Table 5, through independent samples between male students in the Urban and male students in the Rural, the $F_{count}$ was 0.874, and the $t_{count}$ was 1.307. Furthermore, the significance value (2-tailed) is 0.192. This means that the motor coordination skills of Urban male students and Rural male students are the same. It is understood that although Urban males are superior, their coordination skills are similar to those of Rural areas students.

**Table 6.** Coordination abilities between female urban and rural students

| Result | | F | Sig. | t | df | Sig. (2-tailed) |
|---|---|---|---|---|---|---|
| Motor Coordination | Equal variances assumed | 005 | 0.945 | 2.784 | 318 | 0.006 |
| | Equal variances are not assumed. | | | 2.784 | 319.999 | 0.006 |

Data analysis reveals that in Table 6, through independent samples between male students in the Urban and male students in the Rural, the $F_{count}$ was 0.05, and the $t_{count}$ was 2.784. Furthermore, the significance value (2-tailed) is 0.006. There is a significant difference between the motor coordination skills of Urban female students and Rural female students. It is understood that Urban students have significantly superior motor coordination skills compared to Rural students.

## DISCUSSION

This research evaluates students with the same characteristics such as age, school and several other similarities. However, in principle, this research tests the learning outcomes (movement coordination abilities) of students who live and attend school in urban and rural areas. Based on the results of data analysis, it was generally found that urban students had superior motor coordination skills compared to rural students, both male and female. For male students, urban motor coordination abilities are slightly superior to those of rural male students, but the difference is not significant. Meanwhile, the difference between the motor coordination abilities of urban female students are significantly superior to that of female students in the rural. It is understood that male students have almost the same motor coordination abilities, but urban students outperform female students.


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Students' motor coordination has a dominant role in obtaining the quality of motor or motor skills that students display. One of the most important aspects of the relationship between motor coordination and FMS that needs to be emphasized is that people who have competent motor coordination will have good basic motor skills (Matos et al., 2022). This convinces the researcher of the importance of optimal motion coordination in every motor task for every student.

This finding is in line with previous research, showing that male students have better coordination compared to female students, and this will have implications, especially for students' object control skills. At the age of 6 to 10 years, males are superior in coordination as measured by eye-hand coordination, very high results were displayed by male students (Platvoet et al., 2018). The findings also revealed that male students were far superior to female students, a trend believed to be influenced by different activities between male and female students in practising or learning motor coordination. Santos et al. (2020) also revealed that males were seen to be superior compared to female students at each data collection location in Peru, the Amazon and other countries, it is believed that the intensity of male students for physical activity is greater than that of females.

The data revealed that female rural students were the lowest sample group in terms of motor coordination skills in this study. Researchers assume this condition is influenced by many things, especially regarding facilities and infrastructure for learning and realization in their daily lives, both at school, in the family, and the environment. Research findings (Aisah, 2022) revealed that based on these results, elementary schools domiciled in the urban obtained a percentage of achievement of 64.08%, while elementary schools domiciled in the rural obtained a percentage of learning achievement of 35.92%. Bakhtiar (2014) explains that this condition may be caused by the situation in areas where technology facilities are somewhat limited compared to urban areas. Meanwhile, the availability of support facilities for children in urban areas to do physical activity is more numerous and easily accessible than in other areas.

Other findings in the age groups showed differences in their average coordination ability, where the coordination ability of students' motor skills increased with age. The age group of 9 years had better coordination compared to the ages of 7 and 8 years. The physiological basis of the coordination of the motor is the coordination of the innervation process of the nervous system (Bompa & Gregory, 2019), regardless of training intensity, it is believed that students with higher age groups have a more optimal nervous system process. It can be understood that age supports the achievement of good coordination but still needs to be done learning and exercises programmatically through structured learning. However, studies on maturation status (Freitas et al., 2015; Freitas et al., 2016) found no substantial relationship between maturation and coordination. This suggests that maturation is only sometimes influential in improving students' motor coordination skills naturally. The ability to coordinate motor skills is also influenced by socio-culture because the culture of motor and physical activity has a significant influence on the maturity of motor skills, including coordination, for a child (Ré et al., 2018).

Optimal motor coordination will be useful for students in learning special motor skills in sports. Improving specific coordination skills (CMS) is one of the most important factors in achieving the desired ability results (Bojkowski et al., 2022). Coordination of motion is key to the success of the desired technique, where skills involving special motors require coordination skills both in sports.

Teachers/trainers, and parents need to exert effort to improve students' coordination skills. Coordination training can be done by providing variations and forms of motor that lead to certain sports techniques (Marta & Oktarifaldi, 2020). Coordination training can be done in many ways, one of which is by optimizing zig-zag run training. The effect of this exercise can improve the coordination performance of basketball players (Pratama et al., 2022). Trecroci suggests that "our findings show that combining the Jumping Rope training method at the beginning of the training session is


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effective for improving coordination and balance in preteen soccer players for 8 weeks" (Trecroci et al., 2015).

The direct learning method (demonstration) can improve students' motor skills and is very effective for students who have high or low coordination in PE and sports (Soegiyanto & Rahayu, 2013). Some of these findings can be used as a reference and assumed to have many functions of coordination both in sports and in optimizing motion for other special motion purposes. In athletics, for example, coordination is needed in integrating motors to get optimal performance (Marta, 2020).

Many interventions are carried out effectively to improve coordination skills, be it through physical education learning, extracurricular activities at school, or programs that are deliberately run towards sports. This can be used as a reference and basis that, if done programmatically and structured, will improve coordination. Coordination training from an early age is a determining factor for the skills and abilities of students and athletes in any sport in the future (Vandorpe et al., 2012). Carrying out 10 minutes of bilateral coordination exercises regularly will do more to improve children's concentration and attention at school than a normal physical education lesson of the same duration (Fernandes et al., 2016). manipulative-oriented exercises that serve to build and improve hand coordination and foot coordination for junior tennis athletes (Nadia et al., 2023).

Santos et al. (2020) revealed that the main predictors that affect children's coordination of motor skills are playground areas with obstacles, multi-sport roofs, frequency and duration of Physical Education classes, school infrastructure, and optimization of physical education and extracurricular programs in elementary schools (Oktavianus et al., 2021) explained that every sports teacher and coach must be able to become a motivator and inspirer in providing an understanding of the importance of motor for every child, and be able to develop coordination skills to help the process of optimal motor and physical development of children. De Souza et al. (2014) proved that children who have good motor coordination at the

age of 6 will tend to be active and skilled in physical activities at the age of 10.

Based on observations and qualitative data collected by researchers, the better coordination of motor of students in the Urban is due to the fact that urban students have more complete facilities for exercise than rural students, in addition to schools in the Urban participating in this study have physical education teachers with good programs in extracurricular activities. In contrast, the Rural students who were sampled in this study did not all schools have physical education teachers, and other findings revealed that the infrastructure in Rural schools was very minimal and added that extracurricular activities were not optimal, this is in accordance with several studies previously described. In addition, support from parents for urban students is higher than that for rural students; in other words, the urban environment supports students in participating in physical activity and sports, both from schools, families, and parents, to better physical education programs.

Based on the findings of this research, in general, the average motor coordination skills of students are in the average category. Based on the findings of this research, in general, the average motor coordination skills of students are in the average category. Empirically, it is revealed that Urban students outperform Rural students because motor coordination is the dominant predictor in realizing optimal movement, it is recommended to optimize structured movement coordination exercises, especially in physical education and extracurricular learning at school, guided by physical education teachers so that students' movement coordination can be improved significantly. So that this research can develop and produce more comprehensive findings, it is necessary to emphasize to students, teachers, and future researchers the need to discuss other variables and expand the research population and sample. It is hoped that later, we will be able to reveal the causes of differences in motor coordination abilities in terms of gender, age group and location of residence and find programs to solve problems for each of these variables.


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## CONCLUSION

In general, the motor coordination skills of students who study in urban areas are superior to those of students in rural areas. Male students in both urban and rural areas have superior motor coordination skills than female students, and male and female students in urban areas are superior to male and female students in rural areas. Because motor coordination is the dominant predictor in realizing optimal movement, it is recommended to optimize structured movement coordination exercises, especially in physical education and extracurricular learning at school, so that students' movement coordination can be significantly improved. This research has limitations, including the small sample size for the West Sumatra area, furthermore, this research has only observed and measured students' motor coordination skills and has yet to provide interventions or look for variables that support student coordination. For further research, apart from increasing the sample size, it is necessary to examine the causal variables to reveal differences in the coordination abilities of Urban and rural students.

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