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Survey-based mapping of gross motor skills and body mass index in female students of lower grade state elementary schools

Pemetaan berbasis survei keterampilan motorik kasar dan indeks massa tubuh pada siswa perempuan sekolah dasar negeri kelas rendah

Nida Qowiyatul Amaliya[1], Febrita Paulina Heynoek[2], Rama Kurniawan[3], Norlena Salamuddin[4]
[1,2,3] Malang State University, Indonesia
[4] INTI International University, Malaysia
Email: nida.qowiyatul.1906116@students.um.ac.id[1], febrita.paulina.fik@um.ac.id[2], rama.kurniawan.fik@um.ac.id[3], norlena.salamuddin@newinti.edu.my[4]

ABSTRACT

Motor skills and body mass index play an important role in carrying out daily activities, because every activity carried out requires movement. Motor skills are very important in the development stages of students for future provisions. The purpose of this study was to determine the description of gross motor skills and body mass index in female students of lower grade Elementary Schools in Blimbing District, Malang City. This study used a quantitative descriptive method with a survey design, data were collected using the Test of Gross Motor Development second edition (TGMD-2) instrument and body mass index measurements based on age (BMI/U) which were analyzed using percentage techniques. The results of data analysis from the gross motor skills test showed that lower grade female students got the average category. While the results of the body mass index measurement based on age, lower grade female students obtained normal criteria. It was concluded that female students who have gross motor skills are more physically active andhave better energy balance, which can help maintain their body mass index normal.

Key words: Gross motor skills; body mass index.

Keterampilan motorik dan indeks massa tubuh memiliki peranan penting dalam melakukan kegiatan sehari-hari, karena setiap aktivitas yang dilakukan membutuhkan gerak. Keterampilan motorik sangat penting dalam tahapan perkembangan peserta didik untuk bekal di masa mendatang. Tujuan dari penelitian ini untuk mengetahui gambaran keterampilan motorik kasar dan indeks massa tubuh pada peserta didik perempuan Sekolah Dasar Negeri kelas rendah di Kecamatan Blimbing Kota Malang. Penelitian ini menggunakan metode deskriptif kuantitatif dengan rancangan survei, data dikumpulkan menggunakan instrumen *Test of Gross Motor Development second edition* (TGMD-2) dan pengukuran indeks massa tubuh berdasarkan umur (IMT/U) yang dianalisis dengan teknik persentase. Hasil analisis data dari tes keterampilan motorik kasar menunjukkan bahwa peserta didik perempuan kelas rendah mendapatkan kategori rata-rata. Sedangkan hasil pada pengukuran indeks massa tubuh berdasarkan umur, peserta didik perempuan kelas rendah memperoleh kriteria normal. Dapat disimpulkan bahwa peserta didik perempuan yang memiliki kemampuan motorik kasar lebih aktif secara fisik dan keseimbangan energi yang lebih baik, maka dapat membantu menjaga indeks massa tubuh tetap normal.

Kata kunci: Keterampilan motorik kasar; indeks massa tubuh.

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Correspondence Address:

Nida Qowiyatul Amaliya
Physical Education, Health and Recreation, Faculty of Sport Science, Malang State University, Indonesia
Email: nida.qowiyatul.1906116@students.um.ac.id

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INTRODUCTION

Quality students are determined by the determining factors for success, namely by taking advantage of opportunities during the golden age in the periodization of human growth and development. The golden age will be a determinant for the future of the nation, so it needs to start from an early age, such as in the lower grades of elementary school. Because at that time students have a strong memory (Mahfud & Yuliandra, 2020). Students tend to pay attention, see, observe, and practice what they have recorded in their brains.

Each student has different characteristics; the characteristics of lower grader elementary school-age children are six to nine years. This age has tendencies, such as liking to play, liking to move, and liking to feel or do something directly. So educators need to know and understand these characteristics to facilitate the learning process (Hanifah et al., 2020).

When children reach school age, they should have good motor skills appropriate to their age and be able to adapt to environmental conditions. Students' motor skills can be stimulated through physical education, sports and health learning at school. This is to the physical education, sports and health learning outcomes (CP) in the independent curriculum that students have skill abilities in the form of basic movement patterns and good motor skills, stated in (Kemendikbudristek, 2022). Physical education, sports and health learning outcomes are divided into several phases, in the lower classes they are included in phases A and B. The aim ofs learning physical education, sports and health is to develop awareness of the importance of physical activity to achieve body growth and development as well as a lifelong active lifestyle and develop basic movement patterns and movement skills which is based on the application of sconcepts, principles, strategies, and tactics in general according to ability.

According to Purwanto and Baan (2022), it was concluded that physical education, sports and health activities can improve studentss' motor skills. Motor skills are very important in the development stages of students for future preparation. The better a person's motor skills, it is possible that his working power will be better, and vice versa (Yudanto & Alfian, 2020). There are two motor skills that we need to know, one of which is gross motor skills. These gross motor skills involve large muscles that coordinate body movements and play an important role in carrying out daily activities, such as running, pulling, pushing, and catching (Mahfud & Fahrizqi, 2020). A student's gross motor skills can be identified through non-locomotor, locomotor, and manipulative movements which are classified as basic motor skills (Nur et al., 2017). Good gross motor skills can help children do physical activities more effectively and having a balanced Body Mass Index can support these abilities. Good gross motor skills can help children do physical activities more effectively and having a balanced Body Mass Index can support these abilities (Sulton & Jajat, 2018).

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This is because the Body Mass Index has the benefit of knowing a person's body condition, whether they are overweight or thin, by calculating body weight divided by height squared, so the Body Mass Index is one way to measure the ideal condition of the human body (Diyono, 2019).

Body Mass Index is a very important part of physical activity for physical education purposes. Several factors that influence a person's weight or height are heredity, fat, and exercise (Hanum, 2023). Energy requirements for a person's physical activity or Basal Metabolic Rate (BMR) are influenced by factors such as age, gender, and body composition. Energy and physical activity requirements are obtained from the estimated BMR value multiplied by age plus the BMR value according to gender (Welis & Rifki, 2013). Therefore, to prevent overweight and obesity in students, it is necessary to carry out appropriate, safe, and effective physical activity to lose weight (Primasoni, 2021). Such as regular and controlled exercise, because it will help maintain optimal body weight. The movements made when exercising are very different from the movements when carrying out daily activities such as standing, sitting or just using your hands. Body Mass Index measurement has the advantages of being easier to use, cheap, and safe, and the method is also simpler compared to other nutritional status measurements (Widardo et al., 2018).

Based on the results of related research conducted by Siddiq and Wiguno (2022), this research is very important for physical education teachers to determine further action. Because this study only discusses the growth and development of gross motor skills of students in one cluster only. so that researchers expand the scope by taking samples of female students. in this case, the development of basic motor skills in children is certainly closely related to gender, this opinion was put forward by Kurniawan (2018).

The opinion expressed by Mustafa and Sugiharto (2020), is that educators must be motivators and intermediaries in forming good motor skills in students. Therefore, the implementation and level of understanding of educators in providing facilities to students is very important. Educators' initial understanding of gross motor skills as a learning diagnostic to develop learning designs that are appropriate to students' competencies and conditions. This research can be used as pre-test material to determine students' gross motor skills and growth and development before proceeding to more complex material. Apart from that, it can also be carried out for summative assessment as an evaluation process of students' abilities in understanding the material that has been given. This research is important to carry out because elements of motor skills are more often used to improve aspects of life. It is very important to pay attention to students' motor skills so that there are no developmental delays in the future related to health, changes in body size can be easily detected using the five senses which can cause students to feel less confident (Fitriani & Adawiyah,

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2018). Students need encouragement to actively participate in basic movement activities. According to Kurniawan (2018), to realize students who actively participate in basic movement activities, special attention is needed from educators, parents and schools.

The results of a preliminary study conducted by researchers with the head of the Blimbing District KKGO on May 12, 2023, showed that at Elementary Schools Blimbing District, Malang City, they had never carried out a Gross Motor Skills test using the TGMD-2 instrument, and Body Mass Index measurements based on age for low class students. The same thing was also expressed when researchers conducted direct observations and interviews on 14-18 May 2023 at several elementary schools in Blimbing District, Malang City, with physical education educators who taught in lower grades, that the Gross Motor Skills test and Body Mass Index measurement had never been carried out. However, when students were in first grade, screening for external diseases was carried out by the community health center. Researchers conducted a preliminary study via Google Forms with closed interviews. Out of a total of 26 respondents, 19 respondents (73.1%) said they had never tested gross motor skills and body mass index. And 23 respondents (88.5%) out of a total of 26 respondents said it was necessary to test gross motor skills and measure body mass index. These tests and measurements need to be carried out on elementary school students, especially by PJOK teachers to find out a picture of gross motor skills and Body Mass Index measurements, because this is very important to do, especially for lower-grade students. When the COVID-19 outbreak occurred in 2020, learning was carried out online (88.5%), so students had limitations in being able to maintain and improve their motor skills.

Based on the background above, the researcher is interested in conducting a research entitled "Survey-Based Mapping Gross Motor Skills and Body Mass Index in female students of lower grade state elementary schools." This research aims to find out and examine the description of Gross Motor Skills and Body Mass Index among lower grade female elementary school students in Blimbing District, Malang City. So, students can be exposed to good and correct motor skills or movement skills from an early age and the students' growth and development is appropriate to their age. With this research, it is hoped that researchers can contribute to the implementation of the Physical education learning process in schools.

METHOD

This research uses a quantitative descriptive method by applying a survey approach. Quantitative descriptive research is research that aims to provide a systematic, factual description or picture using numbers objectively, starting from data collection, and data interpretation to form and results (Budiwanto,

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2017). In descriptive research, there is no need to test hypotheses or look for relationships between variables.

This research was conducted at the State Elementary School, Blimbing District, Malang City on lower-class students with a sample of 72 female students. The selection of samples taken in this research used a purposive sampling technique. This technique is carried out due to certain considerations, such as limited funds, time, energy, and distance to distant locations, and is adjusted to the desired characteristics to obtain a representative sample (Winarno, 2013). The characteristics of the sampling in this study consisted of core elementary schools and impact elementary schools, female students, and students in grades 1, 2, and 3. The sample in this study is expected to provide a confidence level of 90% with a tolerance limit error or what is called a significance level of 10% which is calculated using the Slovin formula (Yakin, 2023). Because the smaller the error tolerance limit used, the more accurately the sample will represent the population (Budiwanto, 2017).

The instrument used in this research is a test and measurement instrument, namely an instrument that contains Gross Motor Skills and Body Mass Index indicators. Thus, researchers used the Gross Motor Development Test Second Edition or TGMD-2nd Edition (Ulrich, 2000), to measure the gross motor skills of lower-grade female students aged 7-10 years. This test includes 12 movement components which are categorized into two subvariables, namely locomotor and object control. Included in the locomotor test are run, gallop, hop, leap, horizontal jump, and slide. Meanwhile, the Object Control category, namely striking a stationary ball (hitting a stationary ball), stationary dribble (bouncing the ball), catch (catching), kick (kicking), overhand throw (throwing from above), and underhand roll (throwing from below).

The TGMD-2 was first developed in the United States and has been confirmed as a reliable, valid, and well-standardized assessment tool for measuring the development of gross motor skills in children except children with special needs. The TGMD-2 is a valid measure of gross motor skills and can be used with confidence (Ulrich, 2000). In Indonesia, this instrument has been tested for validity and reliability with very high results with a correlation coefficient of 0.765 (Apriyani et al., 2018). The Gross Motor Skills test was carried out twice in data collection. The instrument used in measuring Body Mass Index is standard child anthropometry with indicators measuring body weight and height calculated based on the BMI/U formula (Body Mass Index according to age) which is converted into z-score values for children aged 5-18 years referring to in the Peraturan Menteri Kesehatan Republik Indonesia (2020) concerning Child Anthropometric Standards. The Body Mass Index measurement is carried out once using a scale to measure body weight and a microtome or stadiometer to measure body height.

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This research uses a quantitative approach with data analysis using percentage techniques to determine categorization as the meaning of the data. The percentage technique can provide an easy picture in analyzing or finding out the most data in a percentage (%) (Purnomo & Matin, 2021). The stages in data collection are the preparation stage, implementation stage, and research results reporting stage. In collecting data, researchers went directly to the research location to obtain accurate data. During data collection, students are given sufficient rest time before taking tests and measurements to minimize fatigue. All gross motor skills tests are carried out outdoors and bodys mass index measurements are carried out indoors. After obtaining all the necessary data, researchers processed the raw data according to TGMD-2 and BMI/U norms and then carried out a percentage analysis to interpret the data and draw objective conclusions. This study has obtained permission from the education office and the school. In addition, researchers also ensure the confidentiality of data and are only used for research purposes. students are also given the opportunity to refuse to participate in the study if they do not want to do so without any element of coercion.

FINDINGS AND DISCUSSIONS

Findings

The results of the research were carried out through the process of collecting data on mapping gross motor skills and body mass index on low class elementary school female students in Blimbing District, Malang City using the Test of Gross Motor Development (TGMD-2) instrument and measuring Body Mass Index (BMI) based on age converted into z-score values for children aged 5-18 years. The total sample of low class female students was 72 at SDN Blimbing District, Malang City who had various gross motor Skills and Body Mass Index. The following are the results of the female students' Gross Motor Skills test and Body Mass Index measurements after entering in the form of values, percentages, diagrams and descriptives.

Gross motor skills female

Table 1. Description of gross motor skills results data for low class female students

Gross Motor Quoetients	Frequency	Percentage	Category
>130	0	0%	Very Superior
121 - 130	0	0%	Superior
111 - 120	1	1%	Above Average
90 - 110	29	40%	Average
80 - 89	17	24%	Below Average
70 - 79	20	28%	Poor

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<70	5	7%	Very Poor
TOTAL	72	100%	

Based on the data presented in table 1, the results of the Gross Motor Skills test for lower-class female students at SDN in Blimbing District, Malang City, show that the highest percentage is in the average category, with 29 students getting a score of 90-110 with a percentage 40%. For the Poor category, 20 students scored 70-79 with a percentage of 28%. In the below-average category, 17 students scored 80-89 with a percentage of 24%. Meanwhile, in the very poor category, 5 students scored < 70 with a percentage of 7%. In the above-average category, there was 1 student who got a score of 111-120 with a percentage of 1%. There were no students who got scores in the very superior (very good), or superior (good) categories. The following is a diagram of the results of the Gross Motor Skills test for lower-class female students.

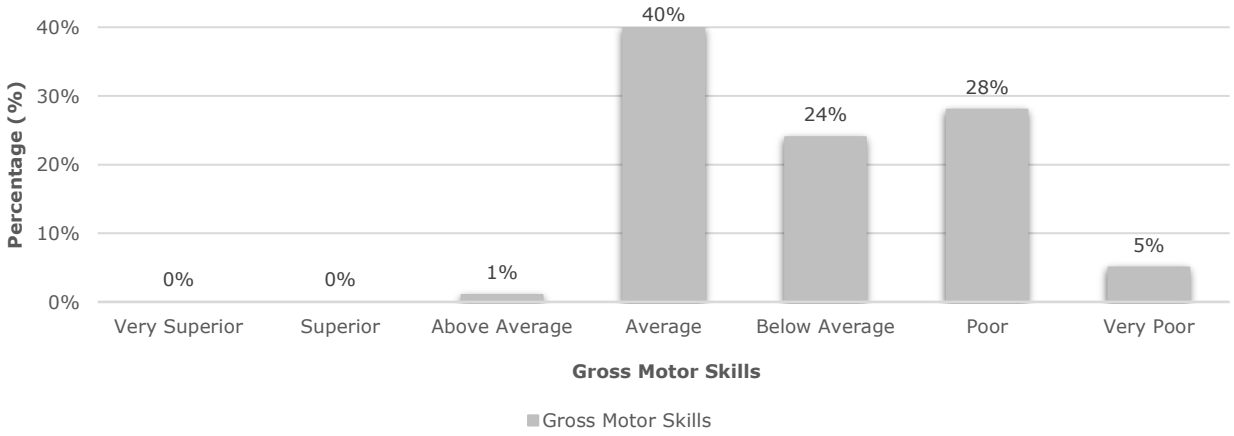

Figure 1. Diagram of gross motor skills results for low class female students

Body mass index female

Table 2. Description of body mass index results data for low class female students

Body Mass Index	Frequency	Percentage	Category
<-3 SD	0	0%	Severely Thinness
-3 SD sd <-2 SD	0	0%	Thinnes
-2 SD sd +1 SD	62	86%	Normal
+1 SD sd +2 SD	7	10%	Overweight
>+2 SD	3	4%	Obesity
TOTAL	72	100%	

Based on the data presented in table 2, the results of measuring the Body Mass Index of lower-class female elementary school students in Blimbing District, Malang City, explain that 62 students (86%) are in the normal category.

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7 students (10%) are classified as obese. And 3 students (4%) are classified as obese. There are no students in the very thin and thin categories in the Body Mass Index results for low-class female students. The following is a diagram of the results of Body Mass Index measurements for lower-class female students.

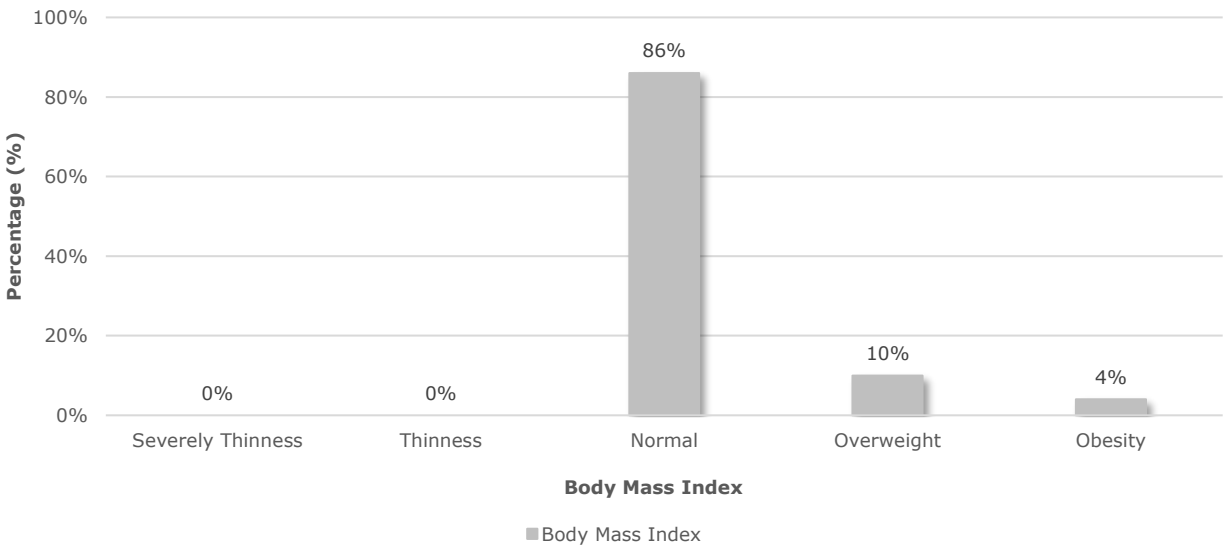

Figure 2. Diagram of body mass index results for low class female students

Discussion

Motor skills are the ability to carry out movements efficiently related to physical abilities in the form of the quality of coordination and control of body parts that involve movement and are created by environmental factors or learning outcomes (Logan et al., 2014). Motor skills are divided into fine motor skills and gross motor skills. Fine motor skills are movement abilities that are influenced by small muscles as the main role in the body. Meanwhile, gross motor skills involve the large muscles of the body. In gross motor skills there are components in the form of locomotor, non-locomotor and manipulative movements (Mustafa & Sugiharto, 2020). According to Sutapa (2022), locomotor movement is the ability to move from one place to another, for example walking, running, rolling, jumping, jumping, stepping or shifting. Non-locomotor movements are abilities that are not accompanied by changing position (no movement), for example bending, pulling, pushing, rotating, lifting, lowering. Manipulative movements are abilities that attempt to channel force to certain objects or things and vice versa (using tools), for example hitting, kicking a ball, catching a ball, throwing, rolling.

Body Mass Index is a simple way to classify a person's weight through the ratio of body weight (kg) to height (m) squared (Yugan et al., 2023). Body Mass Index (BMI) is a measuring tool that can monitor the growth and development of students (Saputra et al., 2023). This can be known by the student's weight

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category. However, the results of the Body Mass Index are not fixed, because changes in students related to body weight and height can influence the results of the Body Mass Index as students age. This Body Mass Index measurement is considered cheap and easy to carry out in categorizing body weight and as an effort to solve nutritional problems in students. According to DuBose et al., (2018) students who have a Body Mass Index in the excessive category will have a high risk and health problems, students who are overweight show low levels of physical activity, lack of physical activity will affect students' motor skills. Therefore, BMI or IMT is related to students' gross motor skills.

This research aims to determine the description of Gross Motor Skills and Body Mass Index among female students at low class public elementary schools in Blimbing District, Malang City. Based on the data analysis that has been carried out, an overview of the Gross Motor Skills of low class female students at SDN Blimbing District, Malang City is obtained in the average category with a percentage of 40%. Meanwhile, based on the Body Mass Index description of female State Primary School students Low class in Blimbing District, Malang City is at a percentage of 86% in the normal category.

Factors that influence the results of Gross Motor Skills and Body Mass Index in lower grade female students are the lack of activities that can improve gross motor skills, such as running, punching, kicking. The researcher's experience when collecting data at school found that many students were in the classroom silently, some were sleeping too. Students do not listen or pay attention when given instructions by researchers, such as chatting with friends, playing alone, and often complaining about doing basic movements. Agrees with research conducted by Khatami and Pujijuniarto (2022) that many students tend to choose to sit in class and the canteen rather than doing physical activity. Apart from that, the influence of the surrounding environment can affect students' motor skills. Research conducted by Ishud and Romadona (2020), argues that if children lose the opportunity to develop normally due to the influence of environmental factors, they are at risk of experiencing backwardness in the future. And students have not been doing outdoor activities or sports for a long time due to the Covid-19 outbreak (pandemic period) in 2020 and are currently just entering the endemic era based on Keputusan Presiden Republik Indonesia Nomor 17 Tahun 2023 Tentang Penetapan Berakhirnya Status Pandemi Corona Virus Disease 2019 (COVID-19) Di Indonesia. So students still need to improve their gross motor skills, especially grades 2 and 3, because when they enter the new school year, online learning is carried out. In this case, learning is carried out less effectively because basic movements need to be corrected correctly from an early age directly by educators, especially Physical Education, Sports and Health teachers. According to Muslihin (2020), parents and educators play

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a role in providing good direction, so that students do not make basic movement errors in the activities they carry out.

Body Mass Index measurements also need to be carried out from an early age, because it is to determine the growth and development of the student's body, so that undesirable things such as delays in the student's growth and development do not happen. So that if there are students who have delays or have problems with their growth and development, they can be resolved properly. This may be due to inadequate nutrition or lack of exercise in daily activities. In this case, the role of parents is also very important to help educators in maintaining student growth and development and health. However, this also does not serve as a reference or benchmark that students do not have poor growth and development. If body weight and height increase, it will affect the results of the Body Mass Index (BMI) measurement, because BMI is calculated using body weight (kg) divided by height squared (m2) and in this study it was only done once when data was collected. As time goes by, students can understand the importance of doing sports activities that can increase Gross Motor Skills (gross motor skills) and Body Mass Index (body mass index) through daily activities. Female students with gross motor skills are more physically active and have better energy balance, which can help keep their body mass index normal.

CONCLUSION

Based on the results of data analysis and discussion of research on the survey-based mapping of Gross Motor Skills and Body Mass Index in lower grade female students of State Elementary Schools in Blimbing District, Malang City, which has been carried out, it can be concluded that the Gross Motor Skills in female students of lower grade elementary school in Blimbing District, Malang City have an average category and the results Body Mass Index is in the normal category. Female students with good gross motor skills tend to have a normal body mass index. Therefore, it is important for physical education teachers to prioritize the development of gross motor skills in lower grade female students through structured and directed sports learning materials and programs. The role of teachers and parents is still very much needed daily activities, because Gross Motor Skills and Body Mass Index have a very important role in students lives in the future. Physical education teachers can work together with parents regarding sports activities outside of school, such as playing with balls, cycling, running, jumping which can improve students motor skills. With this research, researchers hope that physical education teachers can implement and apply the Gross Motor Skills test using Test of Gross Motor Development-2 instrument. Schools can monitor the body mass index of lower grade female students regularly to identify students at risk of having a very thin or obese body mass

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index. Researchers can then carry out research using other instruments such as the elements of balance, strength, agility, speed to describe gross motor skills and Body Mass Index measurements to find out growth and development of students.

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