

# Gender-Specific Analysis of Anthropometric Measures and Motor Performance in School-Aged Children

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## **ABSTRACT**

This research investigates the relationship between anthropometric characteristics and motor performance in school-aged children, addressing a significant gap in existing literature. A sample of 250 students (130 boys and 120 girls) aged 12 to 16 years from four schools in the Dhaka Region was analyzed using stratified random sampling. Different anthropometric measures included body height, mass, BMI, and various limb dimensions, whereas motor performance was evaluated through different tests i.e. hand tapping, sit and reach, standing long jump, and agility tasks. Data analysis was performed using IBM SPSS V26, employing normality test, independent samples t-tests and Pearson correlation coefficients with a significance level set at  $p < 0.05$ . The results showed significant gender differences, with girls showing greater measurements in several anthropometric parameters, while boys outperformed girls in strength-based tasks like the standing long jump. Conversely, girls excelled in flexibility tests. The correlation analysis emphasised that specific anthropometric measures, such as leg and arm length, positively influenced motor performance, whereas a higher BMI negatively impacted agility and endurance. The study accentuates the importance of couture physical education programs to individual anthropometric profiles, considering gender disparities and specific physical attributes, to enhance motor performance among school-aged children. This research contributes valuable insights for the development of effective physical education strategies.

**Keywords:** Anthropometric characteristics; motor performance; gender differences; school-aged children

## INTRODUCTION

Many disciplines including anthropology, sports science, physical education, and medicine (Herron, 2023; O'Brien-Smith et al., 2020) depend on the scientific study of human body measurements, sometimes known as anthropometry. It offers essential data on human development, body composition, and the consequences these elements produce on performance and health (Casadei & Kiel, 2024; Fryar et al., 2016; Viviani et al., 2018). Key measures of human anthropometry comprise height, weight, upper-arm girth, wrist diameter, sitting height, arm length, shoulder width, hip width, skinfold thicknesses, and girths (Bogin & Marcos, 2023; Herron, 2023; Mrugalska & Karwowski, 2023; Norgan, 1994). These tests assist in comprehending personal physique and possible physical capacity (Casadei & Kiel, 2024; Guntoro et al., 2023). Assessing physical fitness and athletic potential depends on motor performance—that is, abilities needed for effective movement and physical activity—which combines with physical activity (Boby, 2023; Haga, 2008; McNeil, 2014). While fine motor skills require minor muscle movements such hand tapping (ADI et al., 2022; Sutapa et al., 2021), gross motor abilities entail significant muscular motions including sprinting and jumping. Designing appropriately customized individual training regimens, optimizing sports results, and so offering chances to support healthy physical development in children and adolescents depend on an awareness of the relationship between body build and motor performance (Dapp et al., 2021; Kohl et al., 2013). In disciplines including physical education, sports science, and human biology, the interaction between anthropometric traits and motor performance became a well-reversed topic of research (Bartlett, 1998; Milič et al., 2017). Understanding the link between physical characteristics (such as body height, mass and composition) to motor skills will help practitioners create effective training programs, enhance athletic performance as well as preserve general health (Kohl et al., 2013).

Previous studies repeatedly show how physical features affect different motor skills (Brown et al., 2005; Crane et al., 2023; Dapp et al., 2021; Gaul & Issartel, 2016; Holfelder & Schott, 2014; McDonough et al., 2020). Height and limb length, for example, can greatly affect jumping or reaching; body mass and composition are tightly linked to strength, endurance, and agility (Acar & Eler, 2019; Alemdaroğlu, 2012; Kohl et al., 2013; Ishida et al., 2021; Mendez-Rebolledo et al., 2022). Moreover, gender variations in anthropometric traits and motor performance are clear, especially in the developmental years when boys and girls show different growth patterns impacted by environmental, hormonal, and genetic elements (Atikovič et al., 2023; Dusan, 2012; Knafo & Spinath, 2011). Notwithstanding a lot of study, thorough investigations examining the complex interactions between many anthropometric measurements and motor ability across sexes are still needed. Many times, existing research concentrate on narrow age groups or limited variables, thereby lacking knowledge of how these interactions change and influence important developmental phases. Although many research have looked at the association between anthropometric traits and motor performance, many have been constrained in scope, concentrating on particular age groups, limiting variables, or small sample numbers. Moreover, little studies fully address the gender variations in these interactions across the developmental years. This discrepancy calls for thorough investigation of several anthropometric measurements and their relationships with different motor skills in a heterogeneous sample of school-age children.

The major objective of this study is to investigate the differences between the anthropometric features and motor skills of boys and girls. The study also aims to look at the correlations among certain anthropometric parameters and indices of motor performance in children in school age. It searches for significant anthropometric traits that significantly affect motor performance and provides evidence-based recommendations for curriculum in physical education and training fit for boys and girls. This study aims to bridge the research gap by providing a comprehensive analysis of the links between many anthropometric parameters and motor performance in both sexes. The results will support public health, sports science, and physical education by guiding the creation of focused training and education initiatives, improving physical fitness and lowering health risks among young populations.

## **METHOD**

### ***Participants***

250 children in all, from four separate Dhaka Region schools, made up the study's participants; 130 boys and 120 girls made up a balanced representation. To guarantee that the sample fairly mirrored the student population, stratified random sampling was used. To reach proportional participation from every category, the strata were categorized according to gender and school type—e.g., public and private. To reduce selection bias, individuals were chosen at random within every stratum. This approach guaranteed that, considering any variations among demographic categories, the sample reflected the larger student population. For the whole sample, participants' mean age, body weight, and body height were  $14.02 \pm 1.12$  years;  $36.87 \pm 4.95$  kg and  $143.21 \pm 5.73$  cm respectively. Two-stage screening was carried out to guarantee participants' health and fit for the study. Students first sent a medical history form signed by their guardians outlining any physical issues, recent injuries, or chronic diseases that would limit their involvement. The research team looked over this paper in order to do preliminary screening. Trained medical experts then performed a thorough physical examination looking for musculoskeletal integrity, cardiovascular fitness, and general physical condition. This phase included tracking vital signs, checking joint mobility, and evaluating any obvious indicators of pain or restrictions. The trial was stopped any participant displaying symptoms of an illness that would endanger them during testing. To further ensure their capacity to safely and successfully complete the motor skill tests, every participant also received a fitness evaluation. This thorough procedure guaranteed that only kids in ideal condition were included, therefore reducing the possibility of injury or health issues during tests.

Strong devotion to ethical issues guaranteed that the study followed accepted policies for the treatment of human subjects. We also got informed permission from all of the participants and their parents. We regularly maintained participants' confidentiality throughout the research procedure and told them they were free to withdraw from the study at any time without running a foul of any rules.

### ***Procedures***

This study utilized a cross-sectional research design to investigate the relationships between anthropometric measures and motor skills among students. The design was chosen for its ability to provide a snapshot of the associations between physical characteristics and motor performance at a

single point in time. Anthropometric measurements were conducted utilizing meticulous techniques to ensure the accuracy and reliability of the data collected. Body height was quantified utilizing a stadiometer with precision to the nearest 0.1 cm, whereas body mass was evaluated through a calibrated weighing scale, documented to the nearest 0.1 kg. The calculation of Body Mass Index (BMI) is performed using the formula  $BMI = \text{Body Mass (kg)} / \text{Height}^2 (\text{m}^2)$ . The measurement of sitting height was conducted from the sitting surface to the apex of the head utilizing a sitting height gauge, while leg length was assessed from the greater trochanter to the lateral malleolus employing a tape measure. The measurement of arm length was conducted from the acromion to the distal tip of the middle finger, while shoulder width was assessed by measuring the distance between the two acromion processes. The measurement of hip width was conducted at the broadest section of the hips, while wrist diameter was assessed at the narrowest region of the wrist utilizing a caliper. Additionally, upper-arm girth was evaluated at the midpoint located between the shoulder and elbow. The measurement of upper-leg girth was conducted at the midpoint located between the hip and the knee joint. The measurement of skinfold thicknesses at the biceps, triceps, subscapular, and abdominal sites was conducted utilizing a skinfold caliper. Motor skill performance was evaluated through a series of standardized tests. Hand tapping was assessed by counting the frequency of hand taps performed in thirty seconds, while flexibility was measured using the sit and reach test. Explosive leg power was evaluated through the standing long jump, and hand-eye coordination along with reaction time was assessed through the ball rejection test. Abdominal endurance was measured with sit-ups performed in one minute, and upper body strength and endurance were evaluated through pull-up endurance. Agility was assessed using the 10 × 5 agility test, which required participants to complete ten 5-meter sprints, and speed and agility were further evaluated through the shuttle run, which involved running back and forth over a set distance. Data collection was conducted over four weeks, with anthropometric measures taken first followed by the motor skill tests. All measurements were performed by trained professionals to ensure consistency and accuracy. Participants received instructions and practice trials for each motor skill test to minimize performance errors.

### ***Contextualizing Gender Differences***

Gender differences were studied within the framework of developmental and physiological changes during adolescence. Boys and girls in this age group experience distinct growth patterns influenced by hormonal changes, including differences in muscle mass, fat distribution, and physical strength. These variations were considered during data interpretation to understand their impact on motor skill performance and anthropometric measurements. For example, boys typically exhibit greater gains in muscle mass and explosive power due to increased testosterone levels during puberty (Bezuglov et al., 2023; Handelsman, 2017). In contrast, girls often demonstrate superior flexibility and balance, partly attributable to differences in skeletal and muscular development (Haizlip et al., 2015). These physiological changes, along with social and environmental factors, were carefully considered to contextualize the observed differences in performance outcomes. By incorporating these developmental factors, the study provided a comprehensive understanding of how gender differences influence physical and motor skill development during adolescence.

### Data Analysis

Data analysis was conducted using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp., Armonk, NY, USA). Prior to conducting inferential analyses, the normality of the data distribution **for all continuous variables was assessed using the Shapiro-Wilk test**, which is appropriate for small to moderate sample sizes. All variables showed p-values greater than 0.05, indicating that the assumption of normality was met for parametric testing.

To examine gender differences in anthropometric characteristics and motor skill performance, independent samples t-tests were applied. The significance level was set at  $p < 0.05$ . The relationships between anthropometric measures and motor skill variables were analyzed using Pearson's correlation coefficient ( $r$ ). The strength of Pearson's correlation coefficient ( $r$ ) was interpreted as follows: negligible ( $< 0.1$ ), weak ( $0.1-0.3$ ), moderate ( $0.3-0.5$ ), and strong ( $> 0.5$ ), in accordance with common statistical guidelines. All statistical procedures were performed at a 95% confidence level.

**Table 1. Shapiro-Wilk Test of Normality for Key Variables**

Variable	Statistic (W)	df	p-value
Age	0.981	250	0.082
Body Height (cm)	0.976	250	0.065
Body Mass (kg)	0.968	250	0.071
BMI (kg/m <sup>2</sup> )	0.983	250	0.112
Standing Long Jump	0.985	250	0.119
Sit and Reach	0.981	250	0.093
Pull-Up Endurance	0.978	250	0.073

Note: All p-values are greater than 0.05, indicating that the assumption of normality was not violated.

## RESULTS

**Figure-1** presents a comprehensive analysis of the differences in physical and performance variables between boys and girls, integrating both descriptive statistics and inferential statistics. The mean values for each variable are represented by bars, where boys are represented by the first set of bars, and girls by the second for each variable. The chart also includes t-values, represented by a separate set of bars (in red and blue), corresponding to the right y-axis. These t-values measure the difference between boys and girls for each variable, relative to the variability within the groups. The green dashed lines at  $t = \pm 1.96$  mark the threshold for statistical significance at a 95% confidence level. When a t-value bar extends beyond these lines, it indicates that the difference between boys and girls is statistically significant.

According to the **Figure 1** reveals that certain physical variables, such as body height, leg length, and hip width, show significant differences between boys and girls, with girls generally having higher values in these measurements. Similarly, skinfold measurements, which indicate body fat distribution, are significantly higher in girls, reflecting known gender differences in fat distribution.

Performance variables also show distinct patterns. Girls demonstrated significantly better flexibility, as measured by the sit-and-reach test, while boys outperform in measures of explosive power

and endurance, such as the standing long jump, ball rejection frequency, and pull-up endurance. Boys also tend to perform better in agility and speed tests, such as the shuttle run and 10 × 5 agility test.

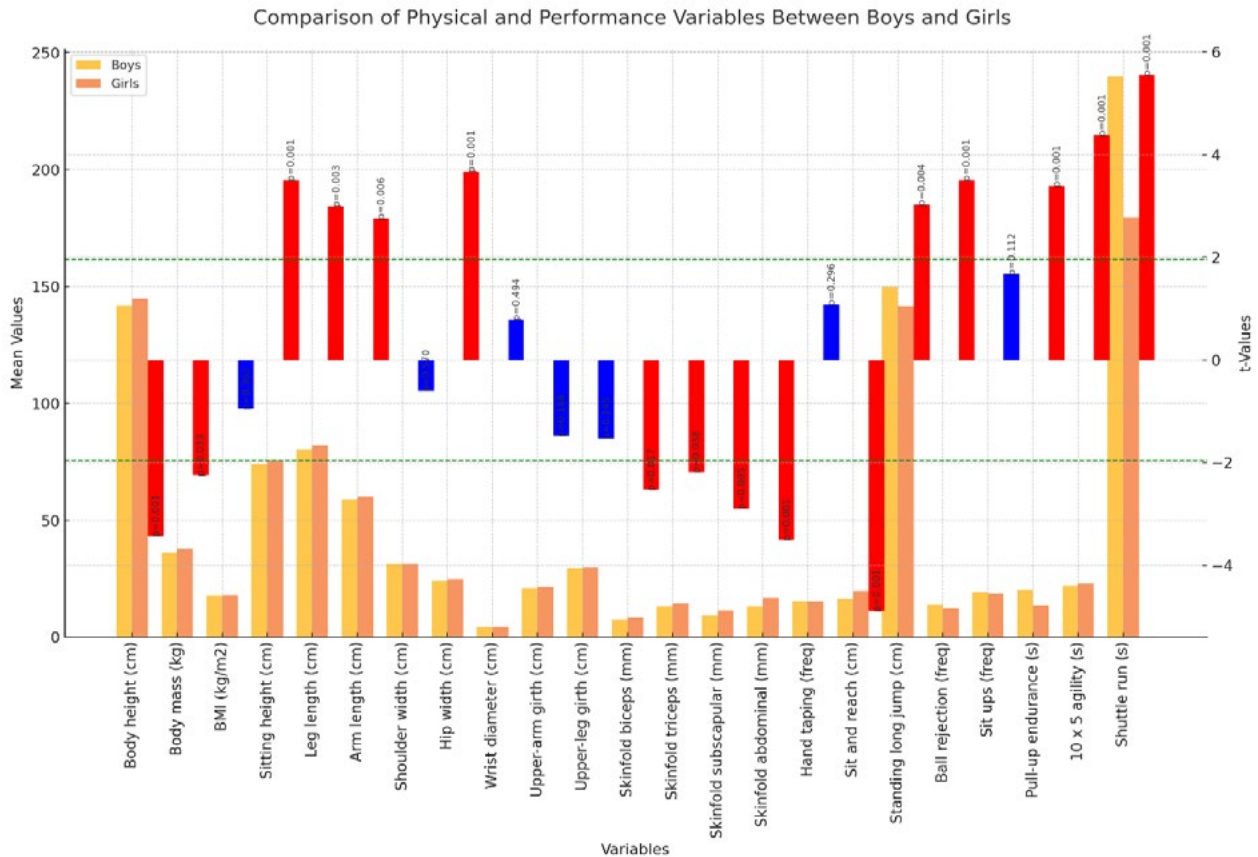


Figure 1. Comparison of various physical and fitness characteristics between boys and girls.

The correlation analysis presented in Table-1 indicates a significant negative relationship between body mass and performance in the Standing Long Jump ( $r=-0.296$ ,  $p<0.001$ ), Sit Ups ( $r=-0.243$ ,  $p<0.001$ ), and Pull-Up Endurance ( $r=-0.435$ ,  $p<0.001$ ). This suggests that an increase in body mass is linked to a decline in performance across these assessments. In a similar vein, the analysis reveals a significant negative correlation between BMI and performance in the Standing Long Jump ( $r=-0.450$ ,  $p<0.001$ ), Sit Ups ( $r=-0.307$ ,  $p<0.001$ ), and Pull-Up Endurance ( $r=-0.450$ ,  $p<0.001$ ). This indicates that an increase in BMI is associated with a decline in performance across these motor assessments. The analysis reveals a positive correlation between Sitting Height and Ball Rejection ( $r=0.126$ ,  $p=0.042$ ), suggesting that an increase in sitting height may enhance performance in this particular assessment. However, it also has a negative correlation with Pull-Up Endurance ( $r=-0.222$ ,  $p<0.001$ ) and Shuttle Run ( $r=-0.140$ ,  $p=0.023$ ), indicating that greater sitting height might negatively impact these performance measures. Leg Length is positively correlated with Standing Long Jump ( $r=0.130$ ,  $p=0.034$ ) and Ball Rejection ( $r=0.181$ ,  $p=0.003$ ), suggesting that a longer leg length can enhance performance in these tests. Skinfold measurements show significant negative correlations with Standing Long Jump (Skinfold Abdominal:  $r=-0.405$ ,  $p<0.001$ ), Sit Ups (Skinfold Biceps:  $r=-0.352$ ,  $p<0.001$ ), and Pull-Up Endurance (Skinfold Triceps:  $r=-0.487$ ,  $p<0.001$ ), indicating that higher skinfold values, which reflect greater body fat, are associated with inferior performance in these motor tests.

In summary, the correlations observed in the table suggest that greater body mass and higher BMI are generally linked to reduced performance in strength and endurance tasks, while attributes like leg length and sitting height have more varied impacts on different motor skills.

**Table 2. Correlations between Motor Skill Performance and Anthropometric Measurements**

<b>Variables</b>	<b>Hand Taping</b>	<b>Sit and Reach</b>	<b>Standing Long Jump</b>	<b>Ball Rejection</b>	<b>Sit Ups</b>	<b>Pull-Up Endurance</b>	<b>10 × 5 Agility</b>	<b>Shuttle Run</b>
	r/p	r/p	r/p	r/p	r/p	r/p	r/p	r/p
<b>Body Height</b>	-0.034 / 0.578	-0.048 / 0.439	0.076 / 0.216	0.141 / 0.022	-0.054 / 0.380	-0.220 / 0.000	-0.019 / 0.759	-0.092 / 0.138
<b>Body Mass</b>	0.018 / 0.777	-0.066 / 0.285	-0.296 / 0.000	0.017 / 0.784	-0.243 / 0.000	-0.435 / 0.000	0.242 / 0.000	-0.388 / 0.000
<b>BMI</b>	0.047 / 0.447	-0.056 / 0.368	-0.450 / 0.000	-0.068 / 0.270	-0.307 / 0.000	-0.450 / 0.000	0.343 / 0.000	-0.471 / 0.000
<b>Sitting Height</b>	-0.043 / 0.484	0.017 / 0.781	0.048 / 0.436	0.126 / 0.042	-0.089 / 0.147	-0.222 / 0.000	0.017 / 0.787	-0.140 / 0.023
<b>Leg Length</b>	-0.078 / 0.205	-0.064 / 0.299	0.130 / 0.034	0.181 / 0.003	-0.014 / 0.820	-0.153 / 0.013	-0.077 / 0.215	-0.009 / 0.888
<b>Arm Length</b>	0.006 / 0.920	-0.026 / 0.672	0.120 / 0.051	0.138 / 0.025	0.048 / 0.433	-0.192 / 0.002	-0.072 / 0.245	-0.074 / 0.230
<b>Shoulder Width</b>	-0.035 / 0.572	0.001 / 0.998	0.075 / 0.222	0.129 / 0.037	-0.052 / 0.397	-0.193 / 0.002	-0.023 / 0.707	0.113 / 0.066
<b>Hip Width</b>	-0.023 / 0.711	0.011 / 0.861	-0.201 / 0.001	-0.001 / 0.983	-0.210 / 0.001	-0.383 / 0.000	0.167 / 0.006	-0.344 / 0.000
<b>Wrist Diameter</b>	-0.088 / 0.152	0.035 / 0.571	0.197 / 0.001	0.203 / 0.001	0.055 / 0.371	-0.010 / 0.876	-0.158 / 0.010	0.077 / 0.215
<b>Upper-Arm Girth</b>	0.026 / 0.674	-0.053 / 0.389	-0.352 / 0.000	-0.007 / 0.905	-0.200 / 0.001	-0.409 / 0.000	0.253 / 0.000	0.433 / 0.000
<b>Upper-Leg Girth</b>	-0.029 / 0.643	-0.082 / 0.186	-0.254 / 0.000	-0.004 / 0.950	-0.171 / 0.005	-0.382 / 0.000	0.198 / 0.000	-0.350 / 0.000
<b>Skinfold Biceps</b>	0.036 / 0.558	-0.115 / 0.061	-0.525 / 0.000	-0.173 / 0.005	-0.352 / 0.000	-0.476 / 0.000	0.418 / 0.000	-0.523 / 0.000
<b>Skinfold Triceps</b>	0.030 / 0.623	-0.122 / 0.054	-0.547 / 0.000	-0.196 / 0.001	-0.345 / 0.000	-0.487 / 0.000	0.468 / 0.000	-0.556 / 0.000
<b>Skinfold Subscapular</b>	0.015 / 0.815	-0.059 / 0.343	-0.475 / 0.000	-0.078 / 0.206	-0.341 / 0.000	-0.375 / 0.000	0.361 / 0.000	-0.418 / 0.000
<b>Skinfold Abdominal</b>	0.105 / 0.088	-0.081 / 0.191	-0.522 / 0.000	-0.155 / 0.012	-0.405 / 0.000	-0.457 / 0.000	0.415 / 0.000	-0.485 / 0.000

## DISCUSSION

The research focused on examining the correlations between different anthropometric measurements and motor skill performance within a cohort of 250 students, comprising 130 boys and 120 girls. The t-test results revealed several significant gender differences in anthropometric measures and motor skills. These differences are crucial for understanding how physical characteristics impact motor performance and highlight areas for targeted interventions. The analysis showed that boys were significantly shorter and had lower body mass compared to girls. Specifically, boys had a mean body height of 141.84 cm, while girls had a mean height of 144.75 cm, and boys had a mean body mass of 35.94 kg compared to 37.93 kg for girls. The significant t-values for body height ( $t=-3.42$ ,  $p=0.001$ ) and body mass ( $t=-2.24$ ,  $p=0.033$ ) indicate that these physical attributes differ between genders, which aligns with existing research showing that girls tend to be taller and heavier at certain developmental stages (Lang et al., 2022; Piek et al., 2008). The t-test results revealed significant differences in several motor skills between boys and girls. Boys performed significantly better in the Standing Long Jump ( $t=3.022$ ,  $p=0.004$ ) and Ball Rejection ( $t=3.501$ ,  $p=0.001$ ), while girls exhibited superior performance in the Sit and Reach ( $t=-4.877$ ,  $p<0.001$ ) test. These differences reflect broader trends in motor skill development, where boys often excel in explosive power and upper body strength, while girls may demonstrate greater flexibility (Budiarti et al., 2022; Comfort et al., 2024; Vasileva et al., 2021).

The correlation analyses explored the relationships between various anthropometric measures and motor skill performance. Several noteworthy correlations emerged, providing insights into how physical characteristics influence motor abilities. Body height exhibited weak to moderate correlations with motor skills. Although body height did not show strong relationships with Hand Taping ( $r=-0.034$ ), Sit and Reach ( $r=-0.048$ ), and Standing Long Jump ( $r=0.076$ ), there was a significant positive correlation with Ball Rejection ( $r=0.141$ ,  $p=0.022$ ). This suggests that taller individuals may have a slight advantage in tasks involving arm extension, which aligns with findings that body height can influence performance in certain physical tasks (Aouichaoui et al., 2024; Stulp et al., 2015) impacting an athlete's performance and overall development. This study aimed to examine the anthropometric and physical performance variables concerning age and maturity status, establishing reference values for physical performance among Tunisian players. A total of 560 handball players (309 males and 251 females aged 13–19 years. BMI demonstrated a strong negative correlation with Standing Long Jump ( $r=-0.450$ ,  $p=0.000$ ) and a significant negative correlation with other motor skills, including Sit and Reach ( $r=-0.056$ ,  $p=0.368$ ). These results support the idea that a higher BMI, which reflects both fat and muscle mass, can limit performance in explosive and flexibility-based tasks (Ding & Jiang, 2020; Kung et al., 2020) a gradual increase in sedentary lifestyles along with the increased consumption of a modern, hypercaloric diet has resulted in a substantial increase in the number of those classified as overweight or obese in China. The prevalence of overweight and obesity has become a key public health issue. However, it is important to be cautious when interpreting the literature as the majority of studies apply cross-sectional data to assess and subjectively compare the relationship between physical fitness and being overweight and obese. In the present study, longitudinal data were collected from 3066 students (enrolled in 2014).

Sitting Height showed a significant positive correlation with Ball Rejection ( $r=0.126$ ,  $p=0.042$ ). This suggests that a greater sitting height, which reflects upper body length, might be beneficial for tasks requiring upper body coordination and reach, aligning with literature suggesting that upper body dimensions can influence motor performance (Cerfoglio et al., 2023; Pichardo et al., 2019) the use of inertial-based systems has been applied to remote rehabilitation, opening new perspectives for outpatient assessment. In this study, we assessed the accuracy and the concurrent validity of the angular measurements provided by an inertial-based device for rehabilitation with respect to the state-of-the-art system for motion tracking. Data were simultaneously collected with the two systems across a set of exercises for trunk and lower limbs, performed by 21 healthy participants. Additionally, the sensitivity of the inertial measurement unit (IMU). Leg Length was positively correlated with Standing Long Jump ( $r=0.134$ ,  $p=0.034$ ) and negatively correlated with Ball Rejection ( $r=-0.181$ ,  $p=0.003$ ). These results indicate that longer legs may contribute to better performance in jumping tasks but might not significantly affect ball rejection abilities. Arm Length was positively correlated with Standing Long Jump ( $r=0.120$ ,  $p=0.051$ ) and Ball Rejection ( $r=0.138$ ,  $p=0.025$ ). Longer arms would thus be helpful for jobs involving arm extension and coordination, so supporting results from other studies on the effect of arm length on motor abilities (Carron & Bracegirdle, 1974; Iorga et al., 2023). With regard to any of the motor skills assessed, shoulder width displayed no appreciable association. This lack of correlation implies that the performance of the particular motor abilities evaluated in this study could not be much influenced by shoulder width. With Sit and Reach ( $r=-0.201$ ,  $p=0.001$ ) Hip Width showed a negative association; with Standing Long Jump ( $r=0.167$ ,  $p=0.006$ ) it showed a positive correlation. Whereas the positive correlation with jumping ability corresponds with results showing hip dimensions can influence lower body power, the negative correlation with flexibility tests indicates that a greater hip width may limit flexibility (Harold W. Kohl et al., 2013).

With Ball Rejection ( $r=0.203$ ,  $p=0.001$ ) Wrist Diameter had notable positive connections and with Pull-Up Endurance ( $r=-0.158$ ,  $p=0.010$ ) notable negative correlations. These findings imply that while bigger wrist diameter could help with jobs requiring hand-eye coordination, it may compromise endurance. Standing Long Jump ( $r=-0.171$ ,  $p=0.005$ ) and Shuttle Run ( $r=-0.350$ ,  $p=0.000$ ) were adversely linked with Upper-Leg Girth. These findings imply that bigger upper-leg girth may compromise performance in explosive and endurance activities, consistent with research showing that occasionally excessive muscle mass might impede performance in physical activities (Crawley, 2001; Furrer et al., 2023). Particularly Biceps and Triceps, skinfold measurements revealed negative correlations between different motor skills, meaning that generally worse motor performance corresponds with greater skinfold thickness. Increased abdominal fat can restrict physical performance, hence Skinfold Abdominal likewise showed notable negative relationships with Sit and Reach ( $r=-0.405$ ,  $p=0.000$ ) and other tests (Lee et al., 2020; Shim et al., 2024). The results fit accepted knowledge on how physical traits affect motor abilities. The negative effect of BMI on leaping ability and flexibility, as noted in this study, for example, supports earlier studies demonstrating that greater BMI is linked with poorer performance in physical tasks (Chen et al., 2020; Sergi et al., 2023; Shen et al., 2015). Comparably, the favorable relationship between body height and several motor skills corresponds with studies stressing the role of physical dimensions in performance (Chen et al., 2023; Kohl et al., 2013; Stodden et al., 2009).

## CONCLUSION

The results revealed notable variations in body height, body mass, and some motor skills across sexes. Girls particularly were observed to be taller and heavier than boys. While girls perform quite well in flexibility, the boys demonstrated better performance in explosive power and ball rejection tasks. Higher BMI and body mass may thus compromise physical performance in these domains, according to results also showing significant negative associations between explosive power and endurance tests and body mass index (BMI). Conversely, body height revealed a modest positive connection with ball rejection skill, meaning taller people might have benefits in jobs needing reach and coordination.

Emphasising the complicated interaction between physical dimensions and motor ability, several anthropometric measurements—including leg length, arm length, and wrist diameter—were also substantially connected with particular motor skills. For agility and endurance activities, for example, improved performance was linked to greater upper-arm girth; conversely, higher skinfold measurements were coincided with poorer motor performance.

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