# The relationship of motor skills with performance: Meta-analysis study

*by* Ahmad Muchlisin Natas Pasaribu

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# The relationship of motor skills with performance: Meta-analysis study

**Ahmad Muchlisin Natas Pasaribu[1]*, Juli Candra[2], Rizal Kamsurya[3], Zainur[4], Nurkadri[5], Anak Agung Ngurah Putra Laksana[6]**

**Universitas Bhayangkara Jakarta Raya, Indonesia[1]**
**STKIP Media Nusantara Citra, Indonesia[2]**
**Universitas Islam Riau, Indonesia[4]**
**Universitas Negeri Medan, Indonesia[5]**
**Universitas PGRI Mahadewa, Indonesia[6]**

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## ABSTRACT

This study aims to test the effect size of motor skills on the performance of a person in the field of sports. The type of research used is meta-analysis Studyes. The data sources in this study are google scholar, Jurnal SINTA, Scopus, and Eric. The livelihood of literature from various sources uses the keywords motor skills and performance. Data analysis is conducted through the stages of variable identification, identification of r values, transforming the r value into the z distribution which is the size effect of each study, calculating variance, calculating the Error Standard of z, and calculating the summary effect. Summary effect calculation using Jeffreys's Amazing Statistics Program (JASP) software. The results showed that there was a significant positive correlation between motor skills and performace. The relationship of motor skills to performance falls into the moderate category with a random effect correlation value of 0.498.

**Keywords:** Motor Skills; performance; meta-analysis

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**Corresponding author:** Ahmad Muchlisin Natas Pasaribu, Department of Sport Coaching, Faculty of Education, Universitas Bhayangkara Jakarta Raya, DKI Jakarta, Indonesia
Email: ahmad.muchlisin@dsn.ubharajaya.ac.id

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## INTRODUCTION

Motor skill is one of the important factors in the development of individuals related to one's physical movements and activities in exercise (Sari & Indahwati, 2016). Differences in the level of motor skills can impair a person's technical mastery speed and performance in sports activities (Doli et al., 2018). Hence, one's motor skills need to be trained and enhanced to help with basic technical mastery that positively impact performance in any sporting activity. Research on motor skills has been done extensively in the field of exercise. Such Studyes indicate that motor skills have a positive effect on the accomplishments of both athletes and students in the various sports. But such results tend to vary, so a comprehensive analysis of overall motor skills in relation to the performance of a person requires.

Research performed by (Mustafa & Sugiharto, 2020) suggests that motor skills can produce dynamic results in motion activity for a student to perform a sports game. Further research done by (Leonardo &

Komaini, 2021) concludes that there is a balance between physical activity and motor skills. It means that when the motor skills are good, then physical activity is also performed properly. Research done by (Bahridah & Neviyarni, 2021) states that to improve the quality of motion activity and improved performance, good motor skills are required.

One's motor development is an important aspect to consider. A person who has good motor skills is more conversational or otherwise active. It affects a person's confidence when he socializes or performs an activity. (Ot et al., 2017) reveals that a person with good motor skills will make activity more agile and prompt. Movements made are more coordinated and can increase confidence in activities. Further, good coordination of movement can help performance or performance become more maximum and premeditated. This will make him more adept at solving daily problems he faces (Mahmud, 2019). That statement is strengthened by (Puspita et al., 2018) to achieve the maximum results in performing a movement or activity in sports requires good motor skills. Thus summarizing motor skill is a stage in development in the elements of maturity and control of one's movements. A person who has good motor skills can then control his exercise in carrying out a motion/activity to obtain a maximum result.

Basically, different motor skills in each child. One's motor skills could be seen from a basic motor. According to (Zulrafli & Kamarudin, 2021) motor skills were affected by the experience and activity of motor training. When a student had a disability in motion activities would hinder basic motion ability (carisman et al., 2018). The same is said by (Mahfud & Fahrizqi, 2020) the impact of low motor skills could have on academic achievement.

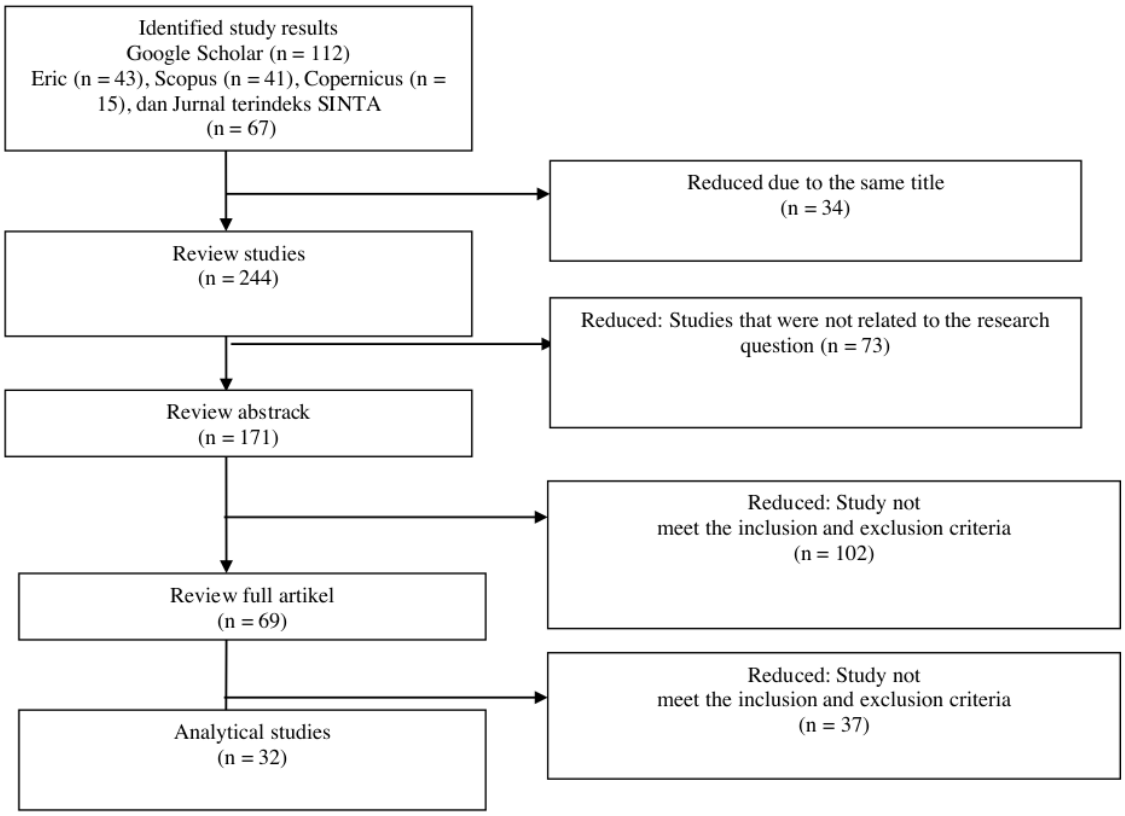
Effort that could be made to improve student motor skills can be done by playing a sports game (Mahfud & Fahrizqi, 2020). Similar presentations were also given (dawn, 2017) by engaging in sports activities will enhance and enhance student motor skills. (Rismayanthi, 2013) it also explained that through sporting activities, stimulus to student motor skills would increase. From the foregoing findings, it might be concluded that efforts in developing a student's motor skills could be made by providing physical activity that could help the performance of the student. Based on the background of this problem the purpose of this study is to test an effect size from the motor skills to performance in sports which was done through the meta-analysis study.

## METHODS

The type of research used was meta-analysis study. Meta-analysis was one type of analysis in statistics done by combining results from 2 or more similar Studyes for quantitative data combined (Anwar et al., 2005). The meta-analysis study was conducted in this study to test an effect size from the motor skills of a person's performance in sports. Steps to conducting meta-analysis Studyes (1) selecting and studying research topics, (2) collecting a number of results with appropriate headings, (3) counting effect size, (4) identifying heterogeneity effect size, (4) interpreting the research and drawing conclusions DE coster in (Waluyohadi, 2019).

The data sources in this study were derived from scientific literature sources of research articles published in national journals and international journals. Data acquisition was made online through Google scholar, a cystic national journal, scopus, and Eric library. The livelihood of articles involved visiting the website of each source - https://.google.com, httpsscholar://a.brin.go. Id, https://www.scopus.com, and https://eric.ed.gov, using key words "motor skills" and "motor ability," "sports performance," and "sport performance."

The study population was 278 articles obtained from various sources. Sampling samples were conducted using a certain constituent random sampling, which was a sample retrieval technique using specific criteria. The selection criteria for a sample selection using the inclusion and excretion criteria set in the study are (1) a sinta, scopus, and Eric article (2) discussing motoric and performance abilities in sports, (3) articles published in 2011-202, (4) articles using quantitative research design, particularly corelational, and (4) the article is not restricted to the author's origin. Selection of samples obtained 32 Studyes qualified for inclusion and exclusion to be analyzed, as shown in the following picture 1.




**Picture 1. Diagram the Flow of Search Strategies to Identify the Study Who Qualified for Meta-Analysis**

Data livelihood from multiple sources, and data analysis stages were done through (1) research variable identification. After being found, enter in the corresponding variable column, (2) value identification was on each of the articles analysed. If Studyes that were reported to contain only a fort, then are transformed into an area value, using equations:

$$F = t^2 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (1)$$

$$t = \sqrt{F} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

$$r = \frac{t}{\sqrt{t^2+N-2}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (3)$$

(3) transforming the value of were to the distribution of the z which was a size effect from each study, then accounting for variance, (4) accounting for errors' standards from z, and (5) accounting for the summary effect of the entire study (Retnawati et al., 2018). Calculating summary derived involves using meta-analysis for jeffreys' amazing statistics program (jasp).

## RESULTS AND DISCUSSIONS

Meta-analysis study was conducted on 39 research Studyes obtained from Google scholar, Eric, scopus, and pubmed. A total of 239 articles did not meet both the inclusion and the exclusion criteria for analysis of a total of 278 Studyes obtained regarding the relationships of motor skills with the performance. The study analysed was presented at the following table 1.

**Table 1. Eligible Studyes and Conducted Meta-Analysis**

| | Authors/Year | Name of Journal | Indeks of Jurnal | Sample characteristics | N | Measurement Variable | R |
|---|---|---|---|---|---|---|---|
| 1 | Sulaeman, (2019) | Exercise : Journal of Physical Education and Sport | Sinta 4 | College student | 20 | Long Distance Jump | 0.8940 |
| 2 | Ramadan & Ningrum, (2019) Study 1 | JUARA : Jurnal Olahraga | Sinta 3 | Junior High School | 21 | Lay-up shoot (Basket) | 0.5359 |
| 3 | Ramadan & Ningrum, (2019), Study 2 | JUARA : Jurnal Olahraga | Sinta 3 | Junior High School | 21 | BasketBall | 0.5023 |
| 4 | Nikšić et al., (2019) | Pedagogics, Psychology, Medical-Biological Problems of Physical Training and Sports | Eric & PubMed | Elementary School | 53 | Long Distance Jump | -0.0434 |
| 5 | Pešić et al., (2015) | Facta Universitatis: Series Physical Education & Sport | Scopus (Q3) | Junior High School | 15 | Swimming | 0.7228 |
| 6 | Saputra, (2018) | Journal of Physical Education and Sports | Sinta 4 | Elementary School | 44 | Pencak Silat | 0.7947 |
| 7 | Naldi & Irawan, (2020) | Jurnal Performa Olahraga | Sinta 5 | Elementary School | 25 | Foot Ball | 0.4670 |
| 8 | Muharram, (2015) | Jurnal Sportif | Sinta 2 | Elementary School | 40 | Run 100 meter | 0.3855 |
| 9 | Pahliwandari et al., (2018) | Jurnal Pendidikan Olahraga | Sinta 4 | College student | 35 | Volly Ball | 0.7660 |
| 10 | Sepriadi, (2017) | Jurnal Keolahragaan | Sinta 2 | Elementary School | 34 | Physical Fitness | 0.8020 |
| 11 | Nuryadi, (2018) | Jurnal Fakultas Keguruan Dan Ilmu Pendidikan | Copernicus | Elementary School | 40 | BasketBall | 0.3819 |
| 12 | Solissa, (2014) | Journal of Physical Education Health and Sport | Sinta 3 | College student | 90 | Taekwondo | 0.5165 |
| 13 | Dewi & Sitompul, (2016) | Jurnal Teknologi Pendidikan (JTP) | Sinta 4 | Junior High School | 77 | Foot Ball | 0.2270 |
| 14 | Doli et al., (2018) | Jurnal Pedagogik Olahraga | Copernicus | Senior High School | 40 | Foot Ball | 0.7433 |
| 15 | Setiawan et al., (2020) | Journal of Teaching Physical Education in Elementary School | Sinta 4 | Elementary School | 24 | Gymnastics | 0.7807 |
| 16 | Semarayasa, (2016) | Jurnal Pendidikan Jasmani Indonesia | Sinta 3 | College student | 40 | Sepak Takraw | 0.6076 |
| 17 | Fong et al., (2011), Study 2 | Research in Developmental Disabilities | Scopus (Q2) | Elementary School | 83 | Diversity | 0.2640 |
| 18 | Fong et al., (2011), Study 3 | | Scopus (Q2) | Elementary School | 83 | Recreation | 0.2490 |
| 19 | Fong et al., (2011), Study 4 | | Scopus (Q2) | Elementary School | 83 | Skill | 0.2350 |
| 20 | Boichuk et al., (2017) | Journal of Physical Education and Sport | Scopus (Q3) | Senior High School | 20 | BasketBall | 0.4530 |
| 21 | Vukasevic et al., (2020), Study 1 | | Scopus (Q2) | College student | 48 | BasketBall | 0.0839 |
| 22 | Vukasevic et al., (2020), Study 2 | | Scopus (Q2) | College student | 48 | BasketBall | 0.2991 |
| 23 | Vukasevic et al., | | Scopus | College | 48 | BasketBall | -0.207 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | (2020), Study 3 | | (Q2) | student | | | |
| 24 | Vukasevic et al., (2020), Study 4 | Sport Mont | Scopus (Q2) | College student | 48 | BasketBall | -0.112 |
| 25 | Vukasevic et al., (2020), Study 5 | | Scopus (Q2) | College student | 48 | BasketBall | -0.047 |
| 26 | Vukasevic et al., (2020), Study 6 | | Scopus (Q2) | College student | 48 | BasketBall | -0.108 |
| 27 | Vukasevic et al., (2020), Study 7 | | Scopus (Q2) | College student | 48 | BasketBall | 0.079 |
| 28 | Vukasevic et al., (2020), Study 8 | | Scopus (Q2) | College student | 48 | BasketBall | 0.022 |
| 29 | Vukasevic et al., (2020), Study 9 | | Scopus (Q2) | College student | 48 | BasketBall | -0.108 |
| 30 | Khodaverdi & Bahram, (2015), Study 1 | Annals of Applied Sport Science | Scopus (Q3) | Junior High School | 24 | Physical Activity | 0.4470 |
| 31 | Khodaverdi & Bahram, (2015), Study 2 | | Scopus (Q3) | Junior High School | 24 | Physical Activity | 0.1350 |
| 32 | Khodaverdi & Bahram, (2015), Study 3 | | Scopus (Q3) | Junior High School | 24 | Physical Activity | 0.3900 |

## Heterogeneity Test Results

The heterogeneity test was conducted to determine the heterogeneity level of the analyzed Studyes. The test results are in table 2 below.

**Tabel 2. Fixed and Random Effects**

| | Q | df | p |
|---|---|---|---|
| Omnibus test of Model Coefficients | 41.286 | 1 | < .001 |
| Test of Residual Heterogeneity | 366.978 | 38 | < .001 |

*Note*. *p* -values are approximate.

Table 2 showed that the 32-effect size from the analyzed study was heterogeneous (q = 187,030, p- 001), where the p-value 0.05. Thus, the random effect model was more appropriate to estimate the mean effect size from the 32 analyzed Studyes. The above indicates that there was a potential for investigating moderator variables that affect the relationship between motor skills and performance.

## Result Summary Effect/Mean Effect Size

The summary effect test aimed to calculate the level of correlation between motor skills and performance variables based on the random effect correlation value. The test results were in Table 3 below.

**Tabel 3. Coefficients**

| | | | | | 95% Confidence Interval | |
|---|---|---|---|---|---|---|
| | Estimate | Standard Error | z | p | Lower | Upper |
| Intercept | 0.409 | 0.074 | 5.501 | < 0.001 | 0.263 | 0.555 |

*Note*. Wald test.

Table 3 showed that the results of the analysis using the random effects model showed that there was a significant positi correlation between motor skills and performance (z=5.501, p<0.001.95% CI,[0263;0.555]). The relationship between motor skills and performance were in the moderate category

with the correlation value of Random Effect (r _RE) = 0.409 (Cohen, 1988). Furthermore, the distribution of effect sizes from each study was found in the following forest plot.

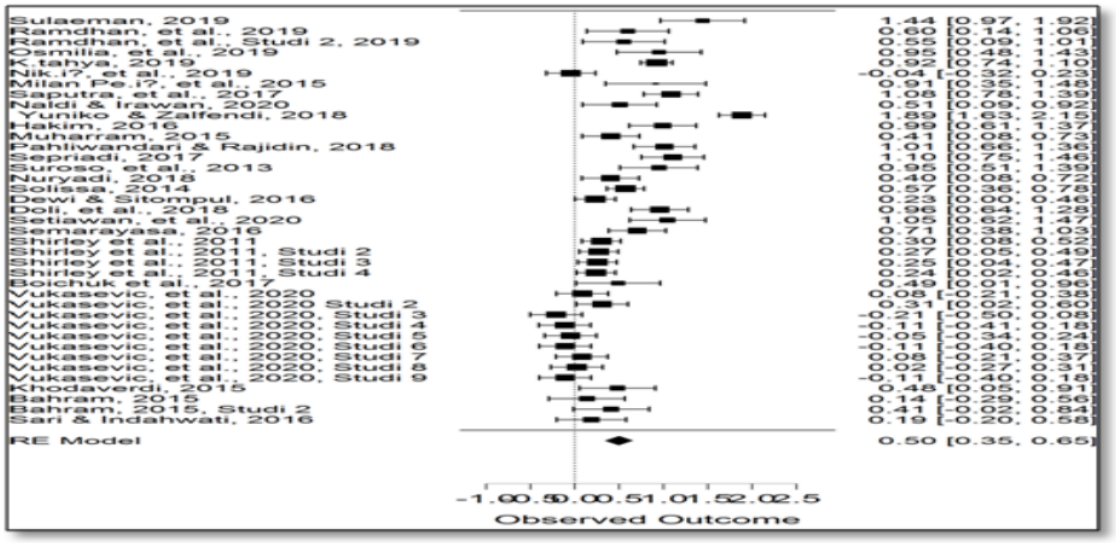



**Figure 2. Forest Plots Deployment Effect Size**

Based on Figure 1. the forest plot, The data could be seen that the effect size of the analyzed Studyes varies between -0.21 to 1.44. The figure above also showed that the reported Studyes had different results, thus impacting the spread of effect size across each study.

**Publication Bias Analysis**

Publication bias analysis was conducted to determine the existence of bias from each study analyzed. The results of the publication bias analysis in the meta-analysis Studyes carried out are shown in Figure 2 below.

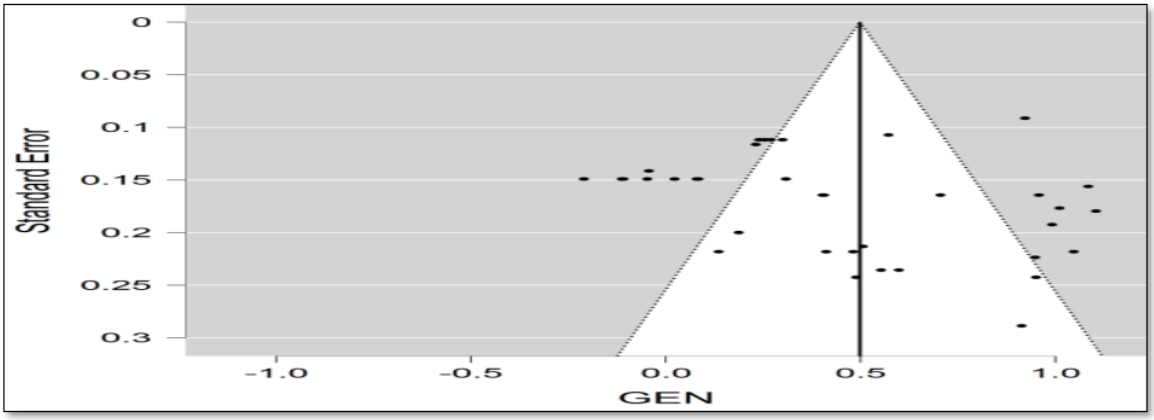



**Figure 3. Fubbel Plots Analysis Results**

Figure 2. The funnel plot above was difficult to show whether the plot was symmetrical or not, so an Egger test was needed to test the symmetry of the plot, so that accurate conclusions could be obtained regarding whether there is publication bias based on the results of the analysis carried out. The results of the Egger's test analysis are shown in Table 4 below.

**Table 4. Regression Test for Funnel Plot Asymmetry ("Egger's test")**

| | Z | P |
|---|---|---|
| Sei | 1.889 | 0.059 |

Based on Table 4 above, the results of the Egger test appear that the p-value <0.05 "or "0.0003 <0.05. In this way, the data could be concluded that there's no publication bias issue within the meta-analysis considers conducted. To get a high level of precision, distribution inclination was also carried out utilizing Record Drawer Examination or Fail-safe N, which appears in Table 5 underneath.

**Table 5. File Drawer Analysis**

| | Fail-safe N | Target Significance | Observed Significance |
|---|---|---|---|
| Rosenthal | 4954.000 | 0.050 | < .001 |

The results of the file drawer analysis showed that K = 32, so 5K+10=5(32)+10=170. The Fail-safe N value obtained is 2045 with a target significance of 0.05 "and P"-value<0.001" ." Since the Fail-safe N value is >5K+10 or 2045 >170, the data could be concluded that there was no publication bias problem in the meta-analysis Studyes conducted.

## DISCUSSION

Motor skills were basically the ability underlying a common and fundamental motion that contributes to effective movements in sports (Zulkifli et al., 2018). Motor skills played an integral part in a person's performance in sports activities, as one's physical movements or activities were influenced by his or her motor affinity (Ramadan & Ningrum, 2019). In addition, the one's own motor skill factor could be one's mastery contributing factor in the basic engineering mastery of the sport (Zulkifli et al., 2018). Analysis showed that there were a significant and positive relationship between the performance of the motor skills, in which the relationship between the two variables falls under the moderate category with the value of the are _re = 0.409 that indicates that the better the motor skills, the more physical activity done will be maximum (Sulaeman, 2019). This study reinforced previously made Studyes that motor skills correlate positively with one's performance in sports (Naldi & Irawan, 2020; Ramadan & Ningrum, 2019; Semarayasa, 2016; Solissa, 2014). Thus one's motor skills needed attention and thought for improvement because they could affect one's sporting activities (Piek et al., 2006).

The find described a statistical similarity of motor skills to the performance of 14.55% with a heterogeneous study (I: 2= 85.45%). The findings indicate that the performance of a person in the field of exercise did not depend entirely on his or her own motor skills. A person's performance on a sport's maximum or lack thereof was determined more than the natural engineering mastery of the sport (Wu et al., 2007). Good basic technical mastery made it easier for a person to make the move in a sport, since the action he does is more relaxed, effective, and efficient (Malik & Rubiana, 2019). In addition to this kind of regular exercise and exercise schedule needed to be considered to increase one's performance. Although this aspect was not specifically analyzed, the results of the (Aprianova & Hariadi, 2016) show that an appropriate, regular type of exercise on a sport could make a person's movement better, and enhanced a person's basic technical ability.

While the image of analysis on fubbel plots did not show specifically whether or not publication bias based on degenerated Studyes, egger's test and fail-safe analysis indicated lack of publication bias. This suggests that a meta-analysis study of motor skills in relation to the performance of a person could be accepted as an accurate and consistent analysis.

## CONCLUSION

Research suggests that there was a significant positive correlation between motor skills and performance. The performance's motor skills included a moderate category with random effect (r characteristics _re) value = 0.409. The results of this study were merely a summary effect of the impact motor skills can have on performance in sports. Advanced research that could be done that test the influence of moderate variables on the performance of sports.

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