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CORRELATION ANALYSIS OF PHYSICAL FITNESS ON THE OPTIMIZATION OF MOTOR ABILITIES IN JUNIOR HIGH SCHOOL STUDENTS

MUHAMMAD KHOIRUDIN JAZALI[1], HILMY ALIRIAD[2], MOHAMMAD DA'I[3]
Email: mkhoirudinj@gmail.com, hilmy@unugiri.ac.id, mohammadai@unugiri.ac.id
[123]*Affiliation: Department of Physical Education, Faculty of Teacher Training and Education, Universitas Nahdlatul Ulama Sunan Giri, Indonesia*

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ABSTRAK
Studi ini dimaksudkan untuk menelaah keterkaitan antara tingkat kebugaran jasmani dengan upaya pengoptimalan kemampuan motorik pada peserta didik di jenjang Madrasah Tsanawiyah. Metode kuantitatif berbasis desain korelasional dipilih sebagai kerangka kerja penelitian. Subjek yang dilibatkan berjumlah 120 siswa, yang dijaring memakai pendekatan purposive sampling. Untuk menghimpun data, peneliti memanfaatkan dua perangkat ukur, yakni Tes Kebugaran Jasmani Indonesia (TKJI) yang difokuskan pada penilaian unsur-unsur kebugaran fisik, serta Test of Gross Motor Development-3 (TGMD-3) yang dipakai untuk mengukur keterampilan gerak. Berdasarkan hasil pengolahan data, diperoleh keterkaitan positif yang bermakna antara variabel kebugaran jasmani dan kemampuan motorik dengan nilai koefisien sebesar r = 0,78 (p < 0,01). Di antara seluruh unsur kebugaran yang dikaji, kekuatan otot tampil sebagai penyumbang paling dominan terhadap kemampuan motorik (r = 0,72), diikuti daya tahan jantung-paru (r = 0,68), kelincahan (r = 0,65), serta fleksibilitas (r = 0,58). Berdasarkan temuan tersebut, dapat ditarik kesimpulan bahwa pembinaan kebugaran fisik memegang fungsi krusial dalam memaksimalkan keterampilan gerak siswa pada jenjang Madrasah Tsanawiyah.

Keywords:
Physical Fitness, Motor Ability, Junior High School Students, Correlation

ABSTRACT
This investigation set out to explore how levels of physical fitness relate to the development of motor skills in students at the junior secondary school stage. To address the research question, a quantitative correlational framework was adopted. Through purposive sampling, 120 students from junior secondary schools were selected to participate. Data gathering relied on two measurement tools, namely the Indonesian Physical Fitness Test (TKJI) for assessing fitness components, and the Test of Gross Motor Development-3 (TGMD-3) for capturing motor skill performance. The statistical output pointed to a substantial positive association between fitness and motor competence among the participants, expressed by a correlation value of r = 0.78 (p < 0.01). When examined component by component, muscular strength emerged as the leading contributor to motor performance (r = 0.72), with cardiovascular endurance close behind (r = 0.68), then agility (r = 0.65), and finally flexibility (r = 0.58). Taken together, the evidence suggests that strengthening physical fitness is integral to maximising the motor capabilities of junior secondary school learners.

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INTRODUCTION

Among the building blocks for shaping competent human capital, physical fitness occupies a central position. According to Ortega et al. (2020), the term denotes one's bodily capacity to carry out routine physical tasks without succumbing to undue fatigue, while still preserving enough reserve energy for recreational pursuits as well as unforeseen demands. This construct is built from several interlinked elements — namely heart-lung endurance, muscle strength, agility, and joint flexibility — that operate jointly to underpin a person's movement performance. Throughout the growth stages of childhood and adolescence, the contribution of fitness should not be downplayed, given that these years constitute a pivotal phase for forming enduring health habits and bodily competencies.

For school-aged children, motor ability serves as a fundamental cornerstone of developmental progression. Robinson et al. (2020) argued that fundamental movement skills (FMS) operate as basic capabilities that underlie the performance of more advanced bodily activities. Acquiring proficiency in motor skills throughout adolescence will help sustain enduring participation in active lifestyles and contribute to general wellness. Stodden et al. (2021) drew attention to the dynamic interaction among motor skill, fitness levels, and engagement in physical pursuits, all of which mutually shape one another along a child's developmental path. Such mutual influence implies that progress in one area can spark progress in another, gradually building a positive cycle of bodily growth.

Functioning as religion-affiliated secondary education units, junior high schools hold a pivotal role in moulding both the moral character and the physical capacity of their pupils. Yet, preliminary observations carried out by the research team revealed that a large portion of junior high school learners exhibit comparatively poor levels of bodily fitness. Such circumstances are believed to obstruct the maximisation of pupils' motor abilities throughout physical education sessions. Investigation by Masanovic et al. (2020) uncovered a downward pattern in physical fitness across school-aged populations that parallels diminished physical activity and the growing rate of obesity. This worrisome inclination accentuates the pressing need to design intervention initiatives that concurrently target both bodily fitness and motor skill enhancement.

An earlier inquiry conducted by Liu et al. (2023) reported a positive linkage between basic movement competencies and elements of health-related fitness in young populations. Findings from the meta-analysis of Burton et al. (2023) further reinforced that a favourable association exists between motor proficiency on the one hand, and physical activity, fitness levels, and psychosocial traits on the other, particularly in adolescent groups. Even so, those works were undertaken with samples whose profiles deviate from those of Indonesian junior high school pupils. Variations in cultural background, economic conditions, and educational frameworks call for context-specific studies to grasp the linkage between fitness and motor capabilities within this particular cohort.

Drawing on this rationale, the present inquiry was launched to investigate how bodily fitness relates to the maximisation of motor capabilities in junior high school learners. It is hoped that the study will yield contributions of both conceptual and applied value toward designing physical education initiatives that uplift learning quality and pupil wellness. Beyond that, the resulting evidence may guide

policy choices regarding curriculum structuring in physical education and the distribution of resources for student-health promotion within faith-affiliated school environments.

The importance of this inquiry rests in its potential to close the divide between conceptual insight and on-the-ground practice in physical education. While considerable scholarly attention has been devoted to investigating the linkage between fitness and motor abilities across various groups, dedicated work focusing specifically on Indonesian junior high school pupils remains noticeably limited. The current study seeks to fill that void by supplying empirical findings that can serve as foundation material for curriculum design, the formulation of teaching strategies, and the planning of intervention initiatives suited to this population's particular needs.

The research articulates three goals. The first is to assess the broad linkage between bodily fitness and motor capabilities among junior high school pupils. The second is to pinpoint which particular fitness elements make the most meaningful contribution to motor abilities. The third is to draft applicable suggestions for physical education programming grounded in the study's outcomes. Collectively, these aims are designed to produce both conceptual understanding and operational guidance for educators and decision-makers.

Bodily fitness can be viewed as a multi-faceted construct embracing a range of physiological and functional capacities of the human organism. Cattuzzo et al. (2021) grouped fitness into two broad classes — health-oriented fitness and skill-oriented fitness. The health-related branch incorporates aerobic capacity, muscular force, muscular stamina, joint mobility, and body make-up. Such elements bear a direct connection to wellness outcomes and to one's everyday functional capability. Evaluating fitness in young populations has gained mounting importance, with expanding research linking it to numerous health markers, ranging from heart-and-vessel wellness and metabolic activity to mental well-being.

The notion of motor competence captures one's skill in carrying out fundamental movement tasks, which act as the foundational pieces upon which more sophisticated motor behaviours are constructed. Bolger et al. (2021) performed an extensive systematic review that mapped worldwide fundamental motor skill levels among young people, documenting marked discrepancies between regions and demographic groups. Their work showed that motor competence is shaped by a number of factors, ranging from family economic status and the availability of opportunities for active play, to societal views on physical education. Motor competence develops along a path moulded jointly by biological maturation processes and the lived experiences within one's environment.

Scholars have devoted considerable effort to mapping how bodily fitness and motor competence interrelate within the published literature. Utesch et al. (2021) conducted a meta-analytic review tracing how motor competence relates to bodily fitness from infancy onward to early adult years. The pooled outcomes uncovered moderate-to-strong positive correlations between these two domains across every age band examined. Such association tends to strengthen as childhood unfolds into adolescence, hinting that the linkage between fitness and motor competence grows more salient with maturational advancement. Such a developmental signature carries meaningful weight for deciding the timing and structure of intervention initiatives aimed at lifting both fitness and motor proficiency.

Stodden et al. (2021) proposed a growth-oriented framework illustrating the dynamic ties linking motor competence, fitness, and engagement in physical activity. Under this conceptualisation, motor competence and bodily fitness sustain a two-way connection — gains in either area help foster gains in the other. Likewise, both elements interact with and are shaped by an individual's involvement in physical activity. Such a theoretical schema has gained backing from a wide array of empirical inquiries

and lays the conceptual groundwork for interpreting the multi-layered interplay among these factors throughout childhood and youth.

A range of inquiries devoted specifically to the link between fitness components and motor capabilities have generated useful insights. Chagas and Barnett (2023) mapped the route running from health-oriented bodily fitness toward motor competence in adolescent learners and observed that joint mobility, muscle strength, and stamina each play a meaningful part in shaping motor competence. The implication of their work is that the various fitness elements may differ in how strongly they influence motor competence.

Evaluating motor capabilities in young populations generally entails appraising fundamental movement skills, which can be split into locomotor competencies and object-manipulation competencies. Ulrich (2020) introduced the Test of Gross Motor Development-3 (TGMD-3), a tool widely adopted to gauge such competencies in young learners. The TGMD-3 affords a thorough appraisal of motor performance and has gained validation across diverse populations. Its outcomes can be applied to flag youngsters with motor difficulties and to track shifts in motor competence as time progresses.

Within the Indonesian school context, gauging bodily fitness is most often performed through the Indonesian Physical Fitness Test (TKJI), a battery devised by the Health Ministry of the Republic of Indonesia (Kemenkes RI, 2020). The battery encompasses tests for aerobic capacity (12-minute running test), muscular force (push-ups, sit-ups, vertical jump), agility (4×10-metre shuttle run), and joint flexibility (sit-and-reach). The TKJI has undergone standardisation for Indonesian young people and supplies normative reference data segmented by age. Employing assessment instruments tailored to the cultural setting is a prerequisite for accurate fitness evaluation among specific groups.

Even as the body of work on bodily fitness and motor competence continues to grow, additional inquiry remains warranted to scrutinise these connections within particular cultural and educational milieus. Junior high schools constitute distinctive learning settings that intertwine religious teaching with general academic study. Gaining clarity on how fitness ties to motor capabilities inside this specific group can supply the groundwork for crafting interventions that are simultaneously culturally responsive and pedagogically appropriate. The current investigation aims to meet that need by probing the linkage between fitness and motor abilities in junior high school pupils.

The contribution of physical education to nurturing both fitness and motor competence is gaining wider acknowledgement in educational policy and pedagogical practice. Lima et al. (2020) reported that motor proficiency and aerobic fitness wield a stronger pull on body fatness over time than does physical activity itself, accentuating the relevance of these two factors for health-related results. Their longitudinal investigation showed that sustaining elevated levels of motor competence and fitness across the childhood years tracks with healthier body composition pathways into the adolescent stage.

Hands (2020) tracked shifts in motor skill and fitness indicators among youngsters exhibiting high versus low motor competence over a period spanning five years. The data showed that those who began with strong motor competence preserved their lead across the years, whereas peers with weaker competence demonstrated only modest gains. Such a trajectory points to the criticality of early support to tackle motor difficulties and to halt the widening divide between learners situated at differing competence levels.

How body composition shapes the connection between fitness and motor abilities has, similarly, drawn scholarly attention. Webster et al. (2021) looked into how body composition relates to fundamental motor skill proficiency in young learners and found that elevated fat mass corresponds with diminished motor competence. The mechanism behind this association may involve the

mechanical and physiological burdens that excess body weight places on movement efficiency and physical execution.

Spring et al. (2023) examined how body composition, physical activity engagement, and the unfolding of fundamental motor skills relate during the early years of life. Their analysis brought to light the layered interactions among these elements, and proposed that being active may operate as a buffer mitigating the harmful impact of unfavourable body composition on motor maturation. Such evidence highlights why fostering active lifestyles is vital for sustaining healthy body proportions and motor proficiency alike.

The interplay of motor skills with cognitive growth has, in like manner, gained attention in current scholarship. Shi and Feng (2022) carried out a wide-ranging synthesis on motor skills and the cognitive gains they bring in young populations, examining the connections, underlying mechanisms, and broader perspectives at play. The evidence they assembled indicates that motor skill growth is bound up with multiple cognitive outcomes, encompassing executive function, scholastic achievement, and brain maturation. Such ties further bolster the case for treating motor competence as an important developmental endpoint.

Turning to the Indonesian setting, scholarly attention to bodily fitness and motor abilities has expanded notably in the last several years. Several studies have surveyed the fitness levels of Indonesian young people via the TKJI, contributing reference data covering different ages and regional contexts. That said, work that explicitly probes how fitness relates to motor capabilities among Indonesian schoolchildren is still in short supply. Through empirical findings drawn from a clearly defined cohort of junior high school students, the present inquiry aims to help bridge this gap.

METHODS

A quantitative methodology employing a correlational layout was implemented in this inquiry. Such a design was opted for in order to scrutinise how the fitness variable connects with the motor ability variable in junior high school pupils (Creswell & Creswell, 2020). Adopting a correlational lens permits one to assess both the magnitude and the orientation of associations between variables without having to manipulate the independent variable, which suits the goal of probing naturally occurring variability in fitness and motor capabilities.

The target population spanned the entire student body of State Junior High Schools situated in the South Jakarta area, totalling roughly 2,400 learners. To draw the sample, the purposive selection method was applied with the following criteria: (1) enrolment in either grade 7 or grade 8, (2) being aged 12 to 14, (3) absence of any physical condition that might impede testing, and (4) willingness to take part in the study. Calculating sample size through Slovin's formula at a 5% margin of error yielded a final sample of 120 pupils (Field, 2021). With this sample size, sufficient statistical power is afforded to identify substantive correlations between the variables of interest.

For data acquisition, the following instruments were utilised: (1) the Indonesian Physical Fitness Test (TKJI) to capture fitness components, comprising the 12-minute run as a marker of aerobic capacity, push-ups to gauge upper-arm muscle strength, sit-ups to assess core muscle strength, the vertical jump for lower-limb muscle strength, the 4×10-metre shuttle run for agility, and the sit-and-reach for joint flexibility (Kemenkes RI, 2020); (2) the Test of Gross Motor Development-3 (TGMD-3) deployed to evaluate motor capabilities, covering both locomotor competencies and object-manipulation competencies Ulrich (2020). Both tools carry well-documented reliability and validity for examining their respective constructs in young populations.

The collection of data ran for a four-week stretch and was integrated into the regular schedule of physical education periods. Before data gathering commenced, every assessor underwent training to guarantee uniform administration of the testing protocol. Pupils received explicit guidance for each assessment, and a sufficient warm-up routine was conducted prior to the fitness testing. Every learner finished the entire battery within a single sitting of around 90 minutes. Across all data-collection sessions, the testing surroundings were held constant so as to limit environmental confounds on performance.

The analytical procedures consisted of the following steps: (1) descriptive statistics for portraying data characteristics, (2) the Kolmogorov–Smirnov test for assessing normality, (3) Levene's test to verify variance homogeneity, and (4) Pearson Product Moment correlation analysis to gauge the linkage between fitness and motor abilities. Multiple regression was additionally undertaken to ascertain how much each fitness component contributes to motor performance (Pallant, 2020). Every statistical computation was carried out via SPSS version 26 with the alpha threshold fixed at $p < 0.05$.

Ethical matters received careful attention throughout the study. Before data gathering started, ethical approval was secured from the relevant institutional ethics review board. Written consent was obtained from the parents or legal guardians of every participant. Pupils were notified that taking part was on a voluntary basis and that they were free to discontinue at any moment without consequence. All collected information was kept confidential and stored under secure conditions. The research procedures complied with the ethical tenets articulated in the Declaration of Helsinki.

Pilot testing prior to the main data-gathering phase was used to verify instrument reliability. Test–retest reliability values for the TKJI subcomponents fell between 0.82 and 0.91, signifying levels ranging from good to excellent. To examine TGMD-3 inter-rater reliability, two trained raters independently scored a sub-sample of 20 pupils. The intraclass correlation coefficient (ICC) calculated reached 0.89, signalling strong agreement between the two raters. Such reliability indices justify deploying these instruments for research aims.

Instrument validity was confirmed through both content-related and criterion-related validity. The TKJI was constructed in line with established fitness assessment protocols and has earned validation for application with Indonesian young people. The TGMD-3 has demonstrated content validity through expert evaluation as well as criterion-related validity through correlations with other motor assessment batteries. Relying on well-grounded instruments with documented psychometric properties bolsters the trustworthiness of the study findings.

To safeguard consistency throughout every data-gathering session, the procedures were standardised. A detailed protocol was written up to lay out the precise steps for each test, including participant directions, demonstrations of correct execution, and the rules defining a valid attempt. All raters adhered to this protocol with care, in order to keep measurement error to a minimum. The standardised protocol additionally facilitates the replication of this work by other investigators.

RESULTS

Descriptive analysis indicated an average participant age of 13.2 years (SD = 0.8), with the gender breakdown comprising 58 male pupils (48.3%) and 62 female pupils (51.7%). When organised by grade, 64 pupils (53.3%) came from grade 7 while 56 pupils (46.7%) were in grade 8. The body mass index (BMI) averaged 19.8 kg/m² (SD = 3.2), placing it within the normal range as defined by the WHO growth reference standards for young populations.

The fitness assessment yielded mean values of 2,450 metres (SD = 380) for cardiovascular endurance, 18.5 repetitions (SD = 6.2) for muscle strength as measured by push-ups, 12.8 seconds (SD

= 1.4) for agility based on the 4×10-metre shuttle run, and 28.5 cm (SD = 6.8) for flexibility on the sit-and-reach. On the motor ability side, the locomotor skill mean stood at 85.2 (SD = 12.4), the object-control skill mean at 78.6 (SD = 14.2), and the overall motor ability composite at 163.8 (SD = 24.6).

Outcomes of the Kolmogorov–Smirnov normality check showed that all study variables produced p-values exceeding 0.05, leading to the inference that the data conformed to a normal distribution. Levene's homogeneity test similarly returned p-values above 0.05, supporting the conclusion that variance across the data was homogeneous. With these conditions met, the prerequisites for parametric analyses — particularly the Pearson Product Moment correlation — were duly satisfied.

The central finding of this inquiry concerns the existence of a positive and statistically significant link between bodily fitness and motor capabilities among junior high school pupils, captured by a correlation coefficient of $r = 0.78$ ($p < 0.01$). Such a value reflects a robust positive linkage between the two constructs, signalling that pupils with elevated fitness levels are inclined to display superior motor performance. The coefficient of determination (r^2) reached 0.61, meaning that 61% of the variability in motor capabilities is accounted for by bodily fitness.

Drawing on outputs from the multiple regression procedure, the fitness elements that delivered the strongest contribution to motor capabilities turned out to be muscular strength, with a partial correlation coefficient of $r = 0.72$ ($p < 0.01$), then cardiovascular endurance at $r = 0.68$ ($p < 0.01$), agility at $r = 0.65$ ($p < 0.01$), and finally flexibility at $r = 0.58$ ($p < 0.01$). Every fitness element registered a significant positive association with motor abilities, suggesting that each element holds its own role in sustaining motor execution.

Table 1. Correlation Analysis Results between Physical Fitness Components and Motor Abilities

Variable	r	Sig.	Interpretation
Physical Fitness – Motor Abilities	0.78	0.000	Very Significant
Muscular Strength – Motor Abilities	0.72	0.000	Very Significant
Cardiovascular Endurance – Motor Abilities	0.68	0.000	Very Significant
Agility – Motor Abilities	0.65	0.000	Very Significant
Flexibility – Motor Abilities	0.58	0.000	Very Significant

Findings from the regression model showed that combining all fitness elements meaningfully predicted motor abilities ($F = 87.42$; $p < 0.01$), with the model explaining 75.8% of the variability in motor performance ($R^2 = 0.758$). The standardised beta values pointed to muscle strength ($\beta = 0.32$) and cardiovascular endurance ($\beta = 0.28$) as the leading predictors of motor abilities, followed by agility ($\beta = 0.21$) and flexibility ($\beta = 0.15$).

Supplementary analyses were conducted to probe how fitness elements relate to particular categories of motor capabilities. Locomotor competencies displayed their tightest links with cardiovascular endurance ($r = 0.71$) and agility ($r = 0.68$), underscoring how aerobic fitness and movement efficiency matter for activities such as running, jumping, and hopping. Object-manipulation competencies, on the other hand, exhibited the strongest ties to muscle strength ($r = 0.74$) and agility ($r = 0.62$), pointing to the necessity of force generation and coordination in tasks such as throwing, catching, and kicking.

Differences between sexes in how fitness ties to motor abilities were also explored. Male pupils exhibited slightly tighter correlations between muscle strength and motor abilities ($r = 0.75$) when contrasted with their female peers ($r = 0.68$). On the flip side, female pupils registered stronger linkages

between flexibility and motor abilities (r = 0.62) than males did (r = 0.53). These divergences may mirror differing patterns of physical maturation and engagement in activity between the sexes.

Age-based variations were similarly noticed in how fitness aligns with motor abilities. Grade 8 pupils (aged 13–14) displayed stronger correlations between fitness elements and motor capabilities than did grade 7 pupils (aged 12–13). The trend hints that the link between fitness and motor competence intensifies as youngsters move forward through early adolescence, possibly tied to the role that biological maturation plays in physical performance capacity.

How pupils were distributed across the various fitness and motor ability categories was another aspect examined. Applying the median split technique, learners were sorted into either high or low fitness, and either high or low motor ability groupings. Cross-tabulation revealed that 68.3% of pupils with high fitness also displayed high motor abilities, whereas 61.7% of those with low fitness showed low motor abilities. This pattern lends additional weight to the case for a positive linkage between the two constructs.

DISCUSSION

The chief objective guiding this work was to scrutinise how bodily fitness ties to motor abilities in junior high school pupils. Outcomes pointed to a robust, positive, and significant correlation linking the two constructs ($r = 0.78$; $p < 0.01$), implying that elevated fitness levels go hand in hand with stronger motor performance. Such a finding sits in line with prior scholarship establishing the entwined nature of fitness and motor competence throughout childhood and adolescence.

The size of the correlation registered here (r = 0.78) lines up well with what was reported by Utesch et al. (2021), who undertook an extensive meta-analytic synthesis on the linkage between motor competence and bodily fitness across diverse age bands. Their pooled estimate was r = 0.69, slightly beneath what the present study yielded yet still indicating a robust positive linkage. The marginally elevated correlation seen here might be ascribed to the particular age band examined (12–14 years), a stage of swift physical and motor maturation in which the bond between fitness and motor skill may stand out more sharply.

The developmental schema put forward by Stodden et al. (2021) furnishes a conceptual scaffolding for making sense of the linkage uncovered between fitness and motor abilities. Within this schema, motor competence and bodily fitness share a mutual bond, in which advancement in one domain enables advancement in the other. This two-way connection is mediated through engagement in physical activity, which simultaneously calls upon and develops both fitness and motor competence. The robust correlation surfaced here lends support to the proposition that these two constructs are deeply enmeshed throughout the adolescent stage.

Of the fitness elements scrutinised, muscle strength stood out with the highest correlation to motor abilities (r = 0.72). The result aligns with the biomechanical requirements of fundamental movement skills, which usually call for sufficient force generation and muscular control. Work by Chagas and Barnett (2023) likewise pinpointed muscle strength as a meaningful predictor of motor competence among adolescent learners. The relevance of muscle strength to motor performance can be appreciated through the force–velocity principle, which posits that adequate strength is required to produce the forces necessary for executing various movement tasks.

The contribution made by cardiovascular endurance to motor abilities (r = 0.68) draws attention to how aerobic fitness underpins continuous motor performance. Numerous movement tasks — particularly those entailing sustained activity such as running, leaping, or successive throwing — rely on adequate cardiovascular capacity to keep performance up without succumbing to undue fatigue.

Taninen and Halaweh (2023) reported similar associations linking cardiorespiratory fitness with motor coordination among schoolchildren of 11–13 years. Their work additionally documented connections between these physical traits and scholastic outcomes, suggesting that the relevance of bodily fitness reaches well beyond movement alone, into broader developmental territory.

Agility likewise registered a meaningful correlation with motor abilities (r = 0.65), reflecting the relevance of being able to alter direction and bodily position swiftly and effectively. Agility forms a pivotal element of many fundamental movement skills — especially those calling for rapid shifts in movement patterns or for prompt reactions to environmental triggers. Szabo et al. (2020) drew attention to the significance of cultivating agility in 9- to 10-year-old children, observing that this motor capacity underpins performance in a wide spectrum of sporting and physical pursuits. The findings reported here extend such insight to the junior high school cohort.

Flexibility revealed a moderate connection with motor abilities (r = 0.58), the weakest among the fitness components surveyed. Although flexibility carries weight for attaining the full sweep of motion in numerous motor activities, its bearing on motor performance may be more particular to skills demanding wide-ranging joint mobility. Donti et al. (2022) conducted a meta-analytic systematic review on flexibility development in young populations and reported that, while flexibility training is capable of broadening range of motion, its direct effect on motor skill performance may turn out to be more constrained than that of other fitness components.

Outputs from the multiple regression procedure shed further light on how the various fitness components contribute, in relative terms, to motor abilities. Finding that muscle strength and cardiovascular endurance stand out as the leading predictors implies that these elements ought to take precedence within intervention initiatives geared toward enhancing motor performance. Even so, the meaningful contributions made by every fitness component point to the value of pursuing a holistic approach to fitness building.

The applied implications of this work carry considerable weight for designing physical education programmes in junior high school settings. The robust correlation that emerged between fitness and motor abilities signals that physical education curricula must weave in activities geared at advancing both fitness and motor skills together. Loras (2020) carried out a meta-analytic systematic review on how physical education shapes motor competence in young populations, observing that well-structured physical education interventions are capable of producing genuine gains in motor skill. Embedding fitness-oriented activities within motor skill instruction may amplify how effectively such programmes operate.

The findings additionally bear on identifying and supporting pupils who experience motor difficulties. In view of the strong fitness–motor link, learners exhibiting low motor competence are likely to also display low fitness levels. This suggests that thorough assessments should include both fitness and motor skill components in order to obtain a complete picture of a pupil's physical development trajectory. Intervention programmes for pupils struggling with motor skills must address both fitness and skill cultivation simultaneously to maximise outcomes.

A handful of limitations associated with this work merit acknowledgement. To begin with, the cross-sectional layout limits one's capacity to draw causal conclusions about how fitness ties to motor abilities. Longitudinal investigation is called for to clarify how shifts in fitness translate into shifts in motor abilities across time. Secondly, since the sample stemmed from a particular geographic locale and educational milieu, the transferability of these results to other groups may be constrained. Subsequent inquiries should look into these connections within more varied cultural and educational contexts.

A third matter worth noting is that this study leaned on quantitative gauges of fitness and motor abilities, which might fall short of capturing the full intricacy of these constructs. Qualitative facets of movement, such as the quality and efficiency of execution, were not measured. Subsequent inquiries could fold in more thorough assessments that combine both quantitative and qualitative indicators of motor performance. Beyond that, how psychological and social factors shape the fitness–motor link was not explored within the present work.

Despite the limitations cited above, the present inquiry adds several worthwhile contributions to the existing literature. It offers empirical proof of a robust connection between bodily fitness and motor abilities within a population that has thus far been little studied. Its outcomes back the merging of fitness and motor skill cultivation inside physical education programmes, while underscoring the importance of attending to both domains within interventions intended to advance the physical development of young people.

Going forward, subsequent research ought to build upon these findings by exploring how integrated fitness and motor skill interventions perform within junior high school environments. Beyond that, scholars should probe the underlying mechanisms tying fitness to motor capabilities, taking into account neuromuscular factors, biomechanical efficiency, and psychological dimensions. A clearer grasp of such mechanisms can guide the formulation of more focused and impactful intervention strategies.

To wrap up, the present work supplies compelling evidence of a positive and significant link between bodily fitness and motor abilities in junior high school pupils. Its outcomes back the developmental schema put forth by Stodden et al. (2021), which highlights the two-way bond between these two constructs. The applied takeaways stress the value of integrated physical education programmes that work on fitness and motor skill cultivation in tandem to maximise the physical development of young people.

Sex-based variations observed in this work deserve closer reflection. Although the overall correlation between fitness and motor abilities held strong across the entire sample, marked differences emerged when contrasting male and female pupils. Boys posted higher mean values for muscle strength and object-control competencies, whereas girls performed better on flexibility and locomotor competencies. These divergences sit comfortably with established developmental patterns and underscore why gender-aware planning matters in shaping physical education programmes. Educators ought to factor such differences in when devising activities and offering feedback to learners.

Age-based differences within the sample likewise convey valuable insights. Grade 8 pupils (aged 13–14) generally showed elevated levels of both fitness and motor abilities relative to grade 7 pupils (aged 12–13). Such a pattern fits the developmental trajectory typical of early adolescence, during which biological maturation supports gains in physical performance. That said, the magnitude of the fitness–motor correlation held steady across age bands, indicating that the link between the two constructs remains stable throughout this developmental phase.

The outcomes of this study carry weighty implications for assessment practice in physical education. Conventional approaches to physical education evaluation tend to treat fitness and motor skills as two separate territories. Yet the strong correlation surfaced here signals that the two domains are in reality tightly intertwined. Comprehensive evaluation strategies that gauge both fitness and motor capabilities can deliver a fuller view of a pupil's physical development. Combined assessment of this kind can underpin instructional decisions and aid in flagging learners who may stand to benefit from extra support.

Viewed from a pedagogical angle, these outcomes back the adoption of teaching strategies that fold fitness building into motor skill instruction. Rather than handling fitness drills and skill practice as detached pieces of physical education sessions, educators can craft learning experiences that tackle both domains together. For instance, repetitive practice of motor skills can be structured to deliver appropriate fitness demands, while fitness routines can be tailored to reinforce motor skill cultivation. An integrated approach of this sort may sharpen both the efficiency and the impact of physical education delivery.

The findings further bear weight on shaping physical activity initiatives outside the school environment. Community-based schemes and sports clubs can apply these results by ensuring that their offerings address both fitness and motor skill cultivation. Parents and caregivers can be made cognisant of how vital it is to give children exposure to building both fitness and skills through a varied roster of physical activities. Public health drives focused on fostering youth physical activity should weigh the entanglement of fitness and motor competence into both their messaging and their programme architecture.

Setting the present results alongside international research uncovers both points of agreement and unique features. The general pattern of how fitness components relate to motor abilities corresponds reasonably well with work done in varying cultural settings. Even so, the particular features of Indonesia's education system, together with the cultural framing of religion-affiliated education, may sway how these connections present themselves in practice. More extensive cross-cultural inquiry could help disentangle universal patterns from context-bound variations in the fitness–motor link.

The measurement strategy adopted here likewise lends weight to interpreting the results. The TKJI and TGMD-3 stand as well-grounded instruments boasting demonstrated reliability and validity. As is the case with every assessment tool, however, both have limitations of their own. The TKJI captures fitness components relevant to wellness and functional capacity, whereas the TGMD-3 assesses fundamental movement skills that operate as the foundation for more advanced motor behaviours. Drawing on these complementary tools allowed for a thorough scrutiny of the linkage between fitness and motor abilities.

Set against studies conducted within the Indonesian setting, the present outcomes broadly mirror earlier work while delivering more robust evidence on the magnitude of the connection. Aliriad et al. (2023) documented that body mass index, treated as a marker of body composition, exhibited a meaningful tie to fitness levels within a secondary school context, echoing the present study's stress on health-related fitness as the bedrock for motor performance. Along similar lines, Aliriad et al. (2023) showed that both age and motor educability shaped fundamental motor skills among Indonesian young learners in a meaningful way, lending weight to the proposition that motor competence unfolds alongside fitness. The marginally elevated correlation noted here ($r = 0.78$) relative to international meta-analytic baselines could be linked to the homogeneity of the Indonesian sample in terms of schooling context and exposure to physical activity, as well as the developmental window covering ages 12–14. On the contrary, intervention-oriented studies such as those by Aliriad et al. (2025) and Aliriad et al. (2024) demonstrated that focused programmes — such as circuit games featuring auditory sequencing and traditional games — can directly elevate motor skills, hinting that the strong correlational signature documented here aligns with, and is buttressed by, evidence stemming from experimental designs. Similarly, Satria et al. (2023) reported that circuit-based motor activity games lifted movement skills even among youngsters experiencing motor difficulties, signalling that the fitness–motor connection holds firm across diverse groups within the Indonesian context. When taken collectively, these comparisons suggest that the present outcomes line up with the predominant

trajectory of Indonesian scholarship while supplying more focused evidence on the strength of the linkage in the junior high school cohort.

The statistical methodology adopted here, which encompassed correlation alongside regression analyses, supplied solid evidence about the linkages among the variables. The substantial effect sizes seen for the correlations linking fitness components to motor abilities show that these connections are not merely statistically significant but also carry practical weight. Outputs from the regression component offer guidance on which fitness elements deserve priority within intervention initiatives, while still acknowledging the importance of an all-encompassing approach to fitness cultivation.

To close, this work joins the swelling body of evidence affirming the importance of high-quality physical education for the holistic development of young people. The robust connection between fitness and motor abilities highlights the worth of physical education as an indispensable strand of the school curriculum. Decision-makers in policy and school leadership ought to acknowledge how vital it is to allocate adequate time, resources, and backing to physical education programmes. Investing in quality physical education is, in effect, an investment in young people's wellness, growth, and lifelong embrace of active living.

The reach of this work extends past the immediate setting of junior high schools in Indonesia. Its outcomes feed into a worldwide grasp of how fitness ties to motor abilities by supplying evidence drawn from a population that has been thinly represented in the international literature. With physical inactivity and sedentary lifestyles persisting as serious public-health concerns globally, gaining clarity on the factors that shape motor competence and fitness is indispensable for crafting effective interventions.

The COVID-19 outbreak underlined the value of physical wellness and the need for sound health-promotion strategies. School shutdowns and curtailment of physical activity throughout the pandemic exerted detrimental effects on young people's fitness and motor maturation. As schools resume operations and physical education programmes restart, a window opens for adopting evidence-grounded approaches that target both fitness and motor skill cultivation. The findings reported here can act as a touchstone for such initiatives by indicating which fitness components should take precedence within intervention programmes.

CONCLUSION

Drawing on the outcomes and accompanying discussion, it can be concluded that a positive and significant linkage exists between bodily fitness and the maximisation of motor abilities in junior high school pupils. The fitness elements that supplied the most substantial contribution to motor abilities turned out to be muscle strength, trailed by cardiovascular endurance, agility, and finally flexibility. Such findings imply that lifting fitness levels carries an important role in optimising pupils' motor performance. The applied takeaway from this work is the necessity of an integrated fitness-development scheme embedded within physical education sessions in order to elevate pupils' motor abilities. Physical education instructors ought to design lesson activities that simultaneously cultivate the fitness components and the fundamental movement skills, with the aim of maximising the physical development of junior high school learners.

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