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Sprint–Agility Imbalance in Female Youth Volleyball Athletes Sports School: A Cross-Sectional Fitness Profile of Strength, Endurance, Speed, and Change-of-Direction Performance

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ABSTRACT

Purpose of the study: This study profiled the physical fitness of female volleyball athletes enrolled at the Riau Specialized Sports School, Indonesia, with emphasis on upper-body muscular strength, aerobic endurance, linear sprint speed, and change-of-direction agility.

Materials and methods: A cross-sectional descriptive design was used. All eight female volleyball athletes available in the school program were recruited through total-population sampling. The test battery comprised an upper-body strength test, a 15-min track-running test, a 50-m sprint, and a 6 × 10-m shuttle run. Scores were classified using the normative categories adopted by the original school-based assessment protocol. Because individual raw scores were not retained in the source dataset, the analysis was restricted to frequencies, percentages, and the reported composite score.

Results: Upper-body strength was classified as fair in six athletes (75.0%) and poor in two (25.0%). Aerobic endurance was fair in seven athletes (87.5%) and poor in one (12.5%). All athletes were placed in the highest category for the 50-m sprint, whereas shuttle-run agility was poor in six athletes (75.0%) and fair in two (25.0%). The reported composite fitness score was 4.93, corresponding to the fair/moderate category. Two-sided exact binomial tests against a 50% good-or-higher benchmark were significant for all four components (Holm-adjusted $p = .0313$); sprint speed was above the benchmark, whereas strength, endurance, and agility were below it.

Conclusions: The athletes demonstrated a markedly uneven physical profile: linear sprint performance was strong, but agility, upper-body strength, and endurance were insufficiently developed for balanced volleyball preparation. Training should prioritize progressive change-of-direction, aerobic-conditioning, and resistance-training interventions while preserving speed qualities. The findings are exploratory because of the small single-site sample, absent participant anthropometrics, and reliance on categorical rather than raw performance data.

Keywords
adolescent athletes; change of direction; physical conditioning; sports school; volleyball performance; women's sport.

INTRODUCTION

Contextual Framework: The Multidimensional Demands of Volleyball

Volleyball is a high-intensity, intermittent team sport that places extensive physiological demands on athletes, characterized by a complex, dynamic interplay between anaerobic and aerobic energy systems (Akarçeşme et al., 2022; Maughan & Shirreffs, 2017; Ramírez-Campillo et al., 2021). Performance is primarily defined by short-duration, high-intensity efforts—including high-frequency vertical jumps for blocking and attacking, forceful upper-limb spikes, and rapid, multi-directional agility maneuvers—interspersed with brief recovery intervals (Avansar et al., 2015; Rebelo et al., 2024). The phosphagen system is critical for these explosive actions, while aerobic capacity is essential for facilitating efficient physiological recovery between repeated rallies throughout a match (Abdioğlu et al., 2024) .

Achieving competitive success requires a multifaceted physical profile, which demands the harmonious development of muscular strength, explosive power, linear speed, and aerobic capacity (Ayed et al., 2023; Hakim et al., 2025; Lidor & Ziv, 2010). Lower-body explosive power, in particular, serves as a foundational quality, demonstrating strong correlations with both acceleration speed and the ability to execute effective change-of-direction movements in response to unpredictable game stimuli (Nejić et al., 2025; Young et al., 2014). Furthermore, because the sport requires players to maintain technical precision and decision-making efficiency despite the cumulative effects of physical and mental match fatigue, comprehensive physical preparation is critical (Domingos-Gomes et al., 2024; Valayi et al., 2024). Fatigue-induced decrements in motor programming and psychomotor function can impair reaction times, spike velocity, and jumping performance, thereby undermining tactical execution (Rollo & Williams, 2023; Yu et al., 2025). Consequently, robust physical preparation is paramount not only for performance optimization but also for mitigating the risk of injuries, particularly to the shoulder, knee, and ankle joints, which are highly vulnerable to the stresses of repetitive jumping, landing, and overhead striking (Boichuk et al., 2025; Eerkes, 2012; Gerberich et al., 1987; Kiliç et al., 2017; Rebelo et al., 2025; Reeser et al., 2006).

Critical Examination of Existing Literature

In youth and developmental pathways, routine fitness profiling serves as a fundamental tool for monitoring athlete progression, identifying talent, and optimizing training adaptations. Existing research has widely established that muscular strength is the bedrock for sprinting and jump performance Lidor & Ziv (2010), while agility—defined by the ability to rapidly brake, pivot, and re-accelerate in response to unpredictable game stimuli—is crucial for effective court movement (Ayed et al., 2023; Young et al., 2014). Furthermore, aerobic fitness is recognized for its critical role in facilitating physiological recovery between repeated high-intensity bouts, a hallmark of modern, fast-paced volleyball matches (Abdioğlu et al., 2024; Maughan & Shirreffs, 2017).

However, a critical limitation in existing literature is the frequent failure to account for biological maturation and its confounding influence on physical performance indices, particularly in adolescent female athletes. Studies have indicated that maturational growth, rather than training engagement alone, often drives improvements in performance during key developmental stages (Cobley et al., 2025; Salter et al., 2024). Consequently, many standard testing protocols, often developed for senior, elite populations, lack the sensitivity required to distinguish between genuine training-induced adaptations and the natural, chronologically driven physiological changes associated with growth (Ledergerber et al., 2026; Zemková & Hamar, 2018). Furthermore, research has traditionally disproportionately focused on elite senior athletes or large-cohort longitudinal studies, overlooking the substantial intra-individual variability and unique physiological profiles inherent in smaller, niche female youth cohorts(McNarry, 2018; Prasad et al., 2025). This reliance on group-level, generalized normative cut-points often masks individual deficiencies and fails to provide coaches with actionable, context-specific insights necessary for effective, periodized programming (Carvalho et al., 2019; Παπαδοπούλου et al., 2019). Given these gaps, there is a clear paucity of data regarding granular, field-based fitness profiles within smaller, school-based settings, which complicates the formulation of tailored, evidence-based strength and conditioning interventions (Albaladejo-Saura et al., 2022; Pfeifer et al., 2019).

Identification of Research Gaps

The existing literature often fails to address the unique logistical and developmental constraints faced by smaller, specialized training centers. Research findings from elite, high-resource settings may not directly translate to school-based programs, where training opportunities, athlete maturation levels, and support systems differ considerably. Furthermore, the reliance on composite fitness scores in many practical settings can mask specific component-level weaknesses, leading to generalized training programs that fail to address individual athlete deficiencies in key areas like agility or upper-body strength.

Rationale for the Research

A granular, component-level analysis is required to overcome the limitations of composite scoring and to ensure that training load is balanced. The initial assessment conducted at the Riau Specialized Sports School suggested that despite apparently high sprint performance, the athletes' overall physical condition was only moderate. Without a detailed analysis of specific physical capacities, coaches are unable to formulate evidence-based, individualized strength and conditioning prescriptions. This study aims to bridge this gap by conducting a detailed physical-fitness assessment of the student athletes at the Riau Specialized Sports School to facilitate more effective, data-driven training.

Research Objectives

Accordingly, this study aimed to describe the physical-fitness profile of female volleyball athletes at the Riau Specialized Sports School. The specific objectives were: 1) To classify the athletes' performance across four key domains: upper-body muscular strength, 15-min running endurance, 50-m linear sprint speed, and 6 × 10-m shuttle-run agility; 2) To interpret the practical implications of the resulting profile for the design of targeted training interventions.

Research Hypotheses

Because only categorical outcomes were retained, the hypotheses were operationalized using a practical proficiency threshold. For each fitness component, an athlete was considered proficient when the result was categorized as good, very good, or excellent. The null hypothesis (H0) stated that 50% of the athletes met the proficiency standard ($p = .50$), whereas the alternative hypothesis (H1) stated that the observed proportion differed from 50% ($p \neq .50$). The hypotheses were tested separately for upper-body strength, aerobic endurance, linear sprint speed, and shuttle-run agility.

MATERIALS AND METHODS

Study Design and Participants

This investigation used a cross-sectional, quantitative descriptive design. The target population comprised all female volleyball athletes enrolled in the Riau Specialized Sports School volleyball program at the time of assessment. Because the accessible population was small, total-population sampling was used, resulting in eight participants ($n = 8$). The source manuscript did not report age, body mass, stature, playing position, training age, menstrual status, injury history, or weekly training exposure. These variables should be added from the original athlete records before journal submission because they are necessary for interpreting developmental and performance difference.

Study Organization and Testing Procedures

Testing was organized as a single-site field assessment. The battery included: (1) an upper-body muscular-strength test reported in the source document as an arm and shoulder strength/push-up assessment; (2) a 15-min running test conducted on a 400-m track, with performance expressed as completed laps; (3) a 50-m linear sprint; and (4) a 6 × 10-m shuttle run to assess change-of-direction speed. The original document did not specify warm-up procedures, trial number, recovery intervals, timing technology, surface, environmental conditions, or tester reliability. For reproducibility, the authors should insert these operational details from their field log before submission.

Outcome Classification

Each performance was converted into an ordinal normative category using the cut points contained in the original assessment sheet. Category frequencies and percentages were then calculated for each component. A composite score was also reported in the source dataset; a value of 4.93 was interpreted as fair/moderate according to the study's overall classification range of 4.0–5.9.

Statistical Analysis and Hypothesis Testing

Data were summarized using absolute frequency (n) and percentage (%) for each category. Percentages were calculated as n/8 × 100. The component-level analysis was emphasized because an overall average can conceal opposing patterns across fitness qualities. No means, standard deviations, medians, confidence intervals, correlations, or regression models were calculated for the individual test performances because raw athlete-level values were not available in the retained dataset.

The exploratory null hypothesis for each fitness component was H0: $p = .50$, where p represented the proportion of athletes meeting the good-or-higher proficiency standard. The two-sided alternative was H1: $p \neq .50$. A two-sided exact binomial test was used because the cohort was very small and the observed proficient counts were at the distributional boundaries (0/8 or 8/8), conditions under which asymptotic proportion tests are unreliable. For $x = 0$ or $x = 8$ under $p = .50$, the two-sided exact probability was .0078. Four component-wise tests were performed; therefore, Holm's sequential procedure was applied to control the family-wise type-I error rate. As all unadjusted values were equal, each Holm-adjusted p value was .0313. Statistical significance was set at adjusted $p < .05$.

The benchmark of 50% was defined a priori for the revised analysis as a pragmatic cohort-balance criterion, not as a validated national population norm. Accordingly, inferential findings were interpreted as exploratory evidence of whether the observed cohort distribution was markedly above or below an evenly divided proficiency proportion. Effect-size estimation and population generalization were avoided because of the small single-site census, categorical data reduction, and absence of an external reference sample.

Ethical Considerations

The source manuscript did not provide the name of an institutional ethics committee, approval number, consent procedure, or assent procedure. These details cannot be reconstructed and must not be invented. Before submission, the authors must insert the verified ethics statement in the following form: "The study was approved by FKIP Universitas Islam Riau (Approval No.UIR-FKIP/Research/971-0003321. Written informed consent was obtained from participants and, for minors, from parents or legal guardians; participant assent was also obtained." The study should be reported in accordance with the Declaration of Helsinki and applicable Indonesian regulations.

RESULTS

The component-level results revealed substantial heterogeneity. Speed was the strongest assessed quality, whereas agility was the clearest weakness. Strength and endurance were concentrated in the fair category, with a minority of athletes classified as poor.

Table 1. Upper-body muscular-strength classification (n = 8)

Norm range	Category	n	%
9–17	Poor	2	25.0
18–26	Fair	6	75.0
27–35	Good	0	0.0
36–44	Very good	0	0.0
>45	Excellent	0	0.0

Note. Percentages were recalculated from the reported frequencies.

Table 2. Fifteen-minute running-endurance classification (n = 8)

Completed laps	Category	n	%
1–4	Poor	1	12.5
5–9	Fair	7	87.5
10–15	Good	0	0.0
16–20	Very good	0	0.0
>21	Excellent	0	0.0

Table 3. Fifty-meter sprint classification (n = 8)

Time (s)	Category	n	%
9.9–9.2	Poor	0	0.0
9.1–8.4	Fair	0	0.0
8.3–7.6	Good	0	0.0
7.5–6.9	Very good	0	0.0
<6.8	Excellent	8	100.0

Note. The exceptionally favorable classification should be verified against the original timing records and the appropriateness of the normative table for the athletes' age and sex.

Table 4. Six-by-ten-meter shuttle-run agility classification (n = 8)

Time (s)	Category	n	%
19.6–19.0	Poor	6	75.0
18.9–18.3	Fair	2	25.0
18.2–17.5	Good	0	0.0
17.4–16.8	Very good	0	0.0
<16.7	Excellent	0	0.0

Table 5. Overall physical-fitness classification (n = 8)

Composite-score range	Category	n	%
9.6–10.0	Excellent	0	0.0
8.0–9.5	Very good	0	0.0
6.0–7.9	Good	0	0.0
4.0–5.9	Fair/moderate	8	100.0
2.0–3.9	Poor	0	0.0

Note. The reported cohort composite score was 4.93.

Exploratory Hypothesis Tests

Using the good-or-higher threshold, no athlete met the proficiency criterion for upper-body strength, endurance, or agility, whereas all athletes met the criterion for sprint speed. Each component differed significantly from the 50% reference proportion. The results remained significant after Holm adjustment, although the direction was favorable only for sprint speed.

Table 6. Exact binomial tests of component-level proficiency

Component	Meeting standard, n/N	Observed %	Exact p	Holm-adjusted p	Decision	Interpretation
Upper-body strength	0/8	0.0	.0078	.0313	Reject H0	Below benchmark
15-min endurance	0/8	0.0	.0078	.0313	Reject H0	Below benchmark
50-m sprint speed	8/8	100.0	.0078	.0313	Reject H0	Above benchmark
6 × 10-m agility	0/8	0.0	.0078	.0313	Reject H0	Below benchmark

Note. Proficiency was defined as good, very good, or excellent. Exact p values are two-sided binomial probabilities under H0: p = .50. Holm adjustment was applied across four tests.

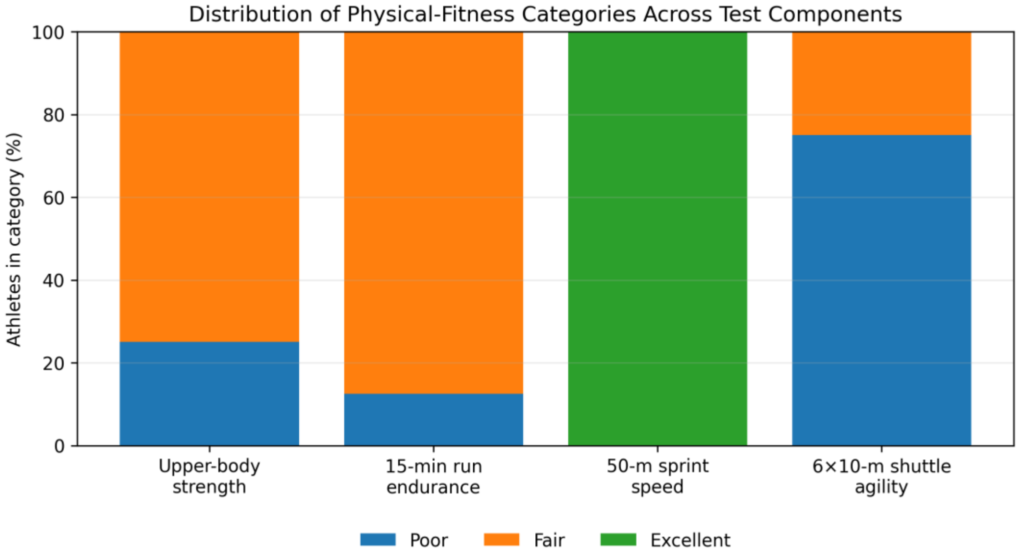

Figure 1. Component-level distribution of athletes across the reported physical-fitness categories.

The principal finding is the contrast between excellent 50-m sprint classification (100.0%) and weak shuttle-run agility (75.0% poor). This pattern suggests that the capacity to run quickly in a straight line did not translate into comparable braking and directional-change performance. In addition, no athlete achieved a good or higher category for upper-body strength, endurance, or agility.

DISCUSSION

This study identified a pronounced imbalance in the physical-fitness profile of female volleyball athletes in a specialized Indonesian sports-school setting. While the cohort's composite score was categorized as fair/moderate, this aggregate metric masked substantial component-level variability: sprint speed was exceptionally high, whereas agility, upper-body strength, and aerobic endurance were underdeveloped.

The observed agility deficit is particularly significant for performance. Volleyball requires frequent, high-intensity movements such as lateral shuffling, rapid acceleration, and deceleration, necessitating sophisticated change-of-direction mechanics (Barnes et al., 2007; Sassi et al., 2009). Unlike straight-line speed, COD ability requires eccentric braking strength, body control, and efficient re-acceleration, which are often distinct from pure sprinting ability (Sassi et al., 2009). Consequently, the present findings caution against using a 50-m sprint time as a proxy for comprehensive court-movement readiness. Developing reactive agility is paramount, as the ability to effectively respond to unpredictable game stimuli is a key determinant of competitive success (Bassa et al., 2024).

Furthermore, the lack of upper-body strength in this cohort may negatively influence volleyball-specific technical demands. Effective spiking, blocking, and serving rely on the coordinated transfer of forces through the kinetic chain, which is facilitated by a robust foundation of general strength (Pawlik et al., 2022; Suchomel et al., 2016). Increased muscular strength is also positively correlated with improvements in jump performance, sprinting, and COD (Marković & Mikulić, 2010; Suchomel et al., 2016). Therefore, training programs should transition from isolating arm musculature to a progressive resistance approach targeting the upper body, trunk, and lower limbs to support power development and reduce injury risk (Abed et al., 2018; Ramírez-Campillo et al., 2021).

While volleyball is not a strictly aerobic sport, the fair endurance classification may limit recovery between high-intensity efforts during matches and training (Paz et al., 2017). Efficient recovery relies on both aerobic capacity and the ability to rapidly clear metabolites. Future conditioning strategies should focus on maintaining the sport's intermittent nature, utilizing small-sided volleyball activities, high-intensity interval training, and repeated-effort drills rather than prolonged, steady-state running (Trajković et al., 2011).

The sprint findings, while favorable, must be interpreted with caution. The uniformity of the excellent sprint classification may stem from genuine speed-oriented development, but potential mismatches between the normative tables and the athletes' specific demographics—as well as potential methodological errors in timing—cannot be excluded. Rigorous verification of original timing records against age- and sex-specific norms is mandatory before this result can be used to inform talent identification or benchmarking (Paz et al., 2017; Τσούκος et al., 2019).

The exploratory inferential analysis confirmed the component imbalance, with all four tests rejecting the 50% proficiency benchmark following multiplicity adjustment. While this statistical significance provides evidence of a non-normative cohort distribution, it does not imply uniformly superior performance. Rather, it highlights the extreme nature of the current findings relative to the pragmatic benchmark used, suggesting a skewed athletic profile that requires targeted intervention.

In terms of practical ramifications, these results advocate for a targeted, periodized approach. COD training should integrate deceleration techniques, reactive agility, and multidirectional sprinting, while strength training must be carefully sequenced with plyometric loading (Bassa et al., 2024; Marković & Mikulić, 2010; Ramírez-Campillo et al., 2021). Conservative volume progression is critical, particularly for athletes currently lacking the requisite strength and landing mechanics, to mitigate the risk of overuse injuries (Gabbett, 2016).

Finally, this study possesses several constraints. The small sample size and single-site design limit generalizability (Hecksteden et al., 2021). Furthermore, the absence of crucial data—including anthropometric profiles, maturation status, training history, and raw scores—prevents a more nuanced assessment of variability or potential associations (Paz et al., 2017). Future research must prioritize larger, multi-site cohorts and preserve raw data, while also incorporating sport-specific assessments like 5–10-m acceleration, reactive agility, and longitudinal tracking of performance and technical metrics (Barnes et al., 2007; Sassi et al., 2009). Finally, the absence of ethics documentation in the original manuscript must be rectified before formal publication.

DISCUSSION

Interpreting the Outcomes

The central finding of this study—that PJOK teachers in Hiliserangkai District, Nias Regency demonstrate overall "Very Good" teaching competence—is both encouraging and nuanced. On the surface, it may appear to contradict national aggregate data Rosadi et al. (2025) and Haris et al. (2025) indicating lower competence scores in remote Indonesian regions. However, several contextual factors warrant careful interpretation.

First, the total sampling design (N=5) means that individual teacher characteristics are disproportionately influential on group scores. All five participants hold formal S1 (Bachelor's) degrees in PJOK and are currently employed in certified teaching positions, which may reflect a minimum threshold of formal preparation not captured by broader provincial surveys. Second, the peer-assessment methodology used in this study—in which senior colleagues evaluated each teacher's practice—may produce somewhat more favorable ratings than student perception surveys or independent external evaluations, a limitation discussed below.

The consistent "Very Good" classification across six of the eight dimensions suggests that pedagogical competence in foundational areas remains relatively robust, even within resource-constrained environments, as these core skills are heavily reinforced during initial teacher education (Aeni et al., 2023, p. 314; Mohamadi & Malekshahi, 2018, p. 1; Rempillo & Quinito, 2025, p. 3). The dimensions of learning theory mastery (100% Very Good) and communication with students (100% Very Good) are particularly notable given that prior student interview data indicated concerns about instructional variability and goal-setting practices. This discrepancy may reflect a gap between competence as assessed by peer evaluators and competence as experienced by students, underscoring the value of multi-perspective assessments.

Evaluation Against Prior Studies

The present findings present a more optimistic profile of pedagogical competence than those reported by Putra and Suwiwa, who observed a mean score of 55/100 in remote East Java schools, and the Kemendikbudristek regional average(Bastian et al., 2016, p. 10; Purbasari et al., 2026). This discrepancy is likely attributable to methodological variance; whereas this study utilized an expert-validated, 85-item structured peer-evaluation instrument, national indices frequently depend on more generalized administrative metrics. Consistent with this, Nugroho et al. observed elevated scores when employing validated, multi-item assessment tools rather than administrative proxies, thereby underscoring how measurement methodology significantly moderates observed competence levels.

The observation that curriculum development demonstrated the greatest variability—with 60% of teachers categorized as "Good" rather than "Very Good"—is consistent with evidence that curriculum adaptation remains a significant challenge for rural physical education teachers, who must reconcile national mandates with localized constraints regarding facilities and student profiles (Yan et al., 2024, p. 10; Yan & Dai, 2025, p. 6). Correspondingly, Faisal & Martin (2019, p. 18) identified curriculum enactment as the dimension most strongly correlated with access to professional development, suggesting that targeted capacity-building programs could substantially enhance instructional performance in this area..

The uniformly high scores on assessment and utilization of assessment results (both 100% Very Good) contrast with the preliminary student interview data, which indicated that evaluation practices were perceived as irregular or opaque. This discrepancy parallels findings by Rink (2013), who noted that formal assessment competence—the ability to design valid instruments—does not always translate into consistent formative feedback practices observable by students. This similarly highlights the disparity between teachers' self-reported assessment proficiency and their observable assessment behaviors in physical education settings (Haerens et al., 2018, p. 997; Hernán et al., 2022, p. 129).

Implications of the Findings

These findings yield substantive implications for both educational policy and pedagogical practice. Regarding local and district-level educational administration, the data suggest that current teacher preparation pathways have effectively cultivated a robust foundation of pedagogical competence among PJOK educators in Hiliserangkai. Nevertheless, the observed variability in curriculum development proficiency highlights an exigency for targeted professional development initiatives; such programs should support educators in effectively adapting national curricula to constrained local environments, an approach aligned with existing scholarly recommendations (Haryani et al., 2021, p. 97; Pleasants et al., 2021, p. 14; Webb et al., 2016, p. 465)..

For school administrators, the finding that communication and student relationship competencies are strong provides a positive foundation upon which more sophisticated instructional strategies—such as tactical games models Dyson et al. (2004) and sport education Metzler (2011)—could be introduced through structured coaching and mentoring. The low standard deviations across most dimensions (particularly Dimensions E, F, G, H) suggest a collegial professional culture that could facilitate peer-learning and collaborative professional development (Casey & Jones, 2011).

For teacher educators at Universitas Negeri Medan, the competence profile suggests that pre-service programs have been effective in foundational areas but should strengthen modules on differentiated curriculum design and evidence-based student assessment practices, particularly for graduates likely to serve in remote and resource-limited educational environments.

Limitations of the Research

Several limitations of the present study should be acknowledged. First, the sample size (N=5) severely constrains statistical power and generalizability; findings cannot be extrapolated to other districts or provinces without caution. The small N also precludes meaningful subgroup analyses (e.g., by gender, experience, or school). Second, the primary instrument relied on peer-assessment by designated colleagues rather than on independent external observation, structured student surveys, or performance-based tasks (video-coded teaching episodes), which are generally considered methodologically superior measures of teaching competence. Third, social desirability bias may have inflated scores if peer assessors were reluctant to rate colleagues unfavorably in a tight-knit professional community. Fourth, no data were collected on contextual moderating variables—such as school facilities, student socioeconomic status, class size, or teacher workload—that are known to influence instructional quality. Fifth, the cross-sectional design precludes any causal inference; this study describes competence at a single point in time without capturing developmental trajectories. Future research should employ longitudinal designs, larger and more representative samples, multi-rater methodologies, and objective behavioral measures (e.g., systematic observation instruments such as SOFIT or QPET) to overcome these limitations.

CONCLUSION

The female volleyball athletes assessed at the Riau Specialized Sports School displayed a fair/moderate overall physical-fitness level, but their profile was not balanced. Linear sprint speed was the strongest component, whereas shuttle-run agility represented the most prominent deficit; upper-body strength and 15-min running endurance were also below desirable developmental targets. The exploratory exact binomial tests supported this imbalance: sprint proficiency exceeded the 50% benchmark, whereas strength, endurance, and agility fell below it after Holm adjustment. These findings reinforce the need for component-specific interpretation rather than reliance on a single composite score. Coaches should prioritize progressive change-of-direction training, whole-body resistance exercise, and volleyball-specific interval conditioning while maintaining existing speed qualities. The study provides a preliminary baseline for program evaluation, but stronger conclusions require a larger sample, complete participant characteristics, verified test procedures, raw performance scores, and prospective follow-up. The authors are encouraged to submit practical recommendations derived from subsequent monitoring and intervention cycles.

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CONFLICT OF INTERESTS

The authors declare no conflict of interest. This statement should be confirmed by all authors before submission.

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DATA AVAILABILITY

The aggregated data used in this article are reported in the tables. Individual-level raw data were not available in the source manuscript. A final journal submission should state whether de-identified raw data can be shared upon reasonable request and under applicable ethical restrictions.

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