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Performance Profile and Conditioning Needs Analysis of Youth Silat Athletes in a Kuala Lumpur Sports School

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ABSTRACT

Introduction: This study investigated the performance profiles and conditioning needs of youth Silat athletes in a Kuala Lumpur sports school. A survey with tests designed employed.' Physical characteristics and significant differences existed among youth according to variables: gender,experience, and weight categories. **Methodology**: A total of 36 youth Silat athletes recruited; aged 13 to 17 years categories and comprising 18 males and 18 females. Physical performance was assessed using standardized fitness tests; broad jump forward; handgrip; push-up maximal; 20-second kicking test for both legs; Edgren Sidestep Test and Yo-Yo Intermittent Recovery Test Level 1**. Results**: Descriptive and inferential statistic showed overall mean broad jump distance of 203.58 ± 30.53 cm, right-hand grip strength of 32.73 ± 8.86 kg, left hand grip strength of 31.90 ± 10.92 kg, dominant-leg kicking of 42.53, non-dominant-leg kicking of 39.67, Edgren Sidestep Test score 1.86 ± 0.49, and Yo-Yo test distance of 534.44 ± 328.76m. Male demonstrated significantly better performance than female in practically all profiling However, no significant gender differences in the Edgren Sidestep Test ($p = .056$). Hence, experiences showed significant differences in right and left hand grip strength ($F = 4.576$, $p = .018$),($F = 4.106$, $p = .026$) respectively and 20-second kicking for the non-dominant leg ($F = 3.637$, $p = .037$), while no significant differences observed other variables. Weight category, only Yo-Yo Intermittent Recovery Test Level 1 - VO_2max significant difference ($F = 2.970$, $p = .046$), whereas all other variables were not. **Conclusion,** Youth Silat athletes demonstrated conditioned physical profiles and fulfilled their conditioning needs.

Keywords: Youth Silat Athletes, Performance Profile, Conditioning Needs, Physical Fitness, Experience.

INTRODUCTION AND LITERATURE REVIEW

Pencak Silat is a traditional martial art originating from Southeast Asia that has evolved into a competitive sport of international stature. In Malaysia, Silat is not only embodies cultural heritage but also serves as a central discipline in youth sports development, particularly within specialized training schools in urban centers such as Kuala Lumpur. The increasing involvement of adolescent athletes in Silat competitions underscores the need for a comprehensive understanding of their athletic profiles and conditioning requirements.

Performance profiling of youth Silat practitioners involves the systematic assessment of physical, physiological, and technical attributes that contribute to success in sport. Research on combat sports highlights the importance of factors such as aerobic fitness, muscular strength and power, agility, speed, and balance in determining performance (Andrianto & Hariono, 2024). Establishing normative data and benchmarks for these attributes in young Silat athletes enables coaches and sport scientists to tailor training programs, address weaknesses, and optimize long-term athlete development. Thus, evaluating attributes such as explosive power, agility, endurance, balance is crucial to guide evidence-based conditioning strategies. This approach ensures that training for youth Silat athletes not only enhances performance but also supports safe and sustainable athletic development.

Within specialized performance environments such as the Kuala Lumpur Sports School (KLSS), structured talent development programs emphasize both technical skill and physical conditioning. This study profiled the KLSS's youth Silat cohorts divided by age group (13–14- 16 vs. 15–17 years) and competitive experience (novice vs. advanced) to identify how explosive power, agility, endurance, and balance vary across subgroups.

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The KLSS facility offers dedicated martial-arts training halls, sport-science support (e.g., regular physiological monitoring, strength-and-conditioning coaching), and periodized practice schedules. By situating the analysis in this elite setting, the research would characterize the performance needs unique to KLSS athletes and also provided a model for optimizing conditioning protocols in comparable youth Silat developmental programs.

Given Silat's physical demands, which include explosive strikes, rapid changes of direction, and precise balance, it is essential to identify each athlete's strengths and weaknesses to design effective training strategies (Ojeda-Aravena et al., 2023). While general fitness testing protocols exist, few studies have specifically examined the performance profiles and conditioning needs of Malaysian youth Silat athletes. Furthermore, differences in age, sex, and training experience among young athletes highlight the importance of group comparisons for more tailored training support. This gap highlights the need to determine the baseline performance characteristics of youth Silat athletes through standardized testing, compare their performance profiles across groups such as age, sex, and training as well as competition experience, and identify conditioning needs that could be guided evidence-based and targeted training strategies. By addressing these issues, the study aims to provide systematic, data-driven insights that enhancing conditioning programs and support the long-term development of youth Silat athletes in Kuala Lumpur sports schools.

The existing literature on the physical performance characteristics and conditioning needs of youth athletes in combat sports, with a particular focus on Silat. While substantial research has been conducted on other combat sports such as Taekwondo, Karate, and Judo, there remains a significant gap in Silat-specific studies, especially concerning the performance profiling and conditioning needs of youth Silat athletes.

The past studies review have highlighted the critical physical attributes necessary for success in combat sports, including explosive power, agility, endurance, and strength. Studies from allied sports have shown that these attributes are essential for executing powerful strikes, quick movements, and maintaining high performance during competition. However, there is limited research on how these characteristics specifically translate to Silat and how they should be developed through targeted training interventions.

Moreover, the literature has revealed a lack of research on age-appropriate conditioning for youth Silat athletes, particularly those in the 13–17 age group. This gap underscores the need for evidence-based training programs evidences that account for the rapid physical changes occurring in this age group, which is crucial for ensuring the safe and effective development of young athletes.

Furthermore, the review identified the absence of Silat-specific performance benchmarks and the need for groups analysis to assess how factors like age, sex, and competition experience influence performance in Silat. This study addressed these gaps by profiling the physical performance of youth Silat athletes at the Kuala Lumpur Sports School and identifying their conditioning needs, which is crucial for designing more targeted and effective training programs. Hence, these are the several main intention investigating objectives of this study as

1. To compare the baseline physical fitness attributes of youth Silat athletes, including

explosive power, agility, speed, endurance, and balance, using standardized fitness

assessments.

2. To identify differences in physical performance profiles across groups categorized

by gender, and competition experience and weight category within the Kuala Lumpur

sports school.

3. To determine specific conditioning needs from the performance profiles and provide

evidence-based recommendations to optimize training strategies for youth Silat athletes.

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METHODOLOGY

This study employed a survey with tests research design aimed at profiling the physical performance characteristics and conditioning needs of youth Silat athletes in a Kuala Lumpur sports school. The design is suitable as it facilitates systematic and objective assessment of athletes' physical and physiological attributes at a specific point in time, without intervention or manipulation.

The choice of a descriptive cross-sectional study allows for the collection of baseline data across a representative cohort, enabling comparison between groups classified by variables such as age, sex, and competition experience. The design supports identifying existing conditioning strengths and gaps, providing a snapshot of athlete profiles relevant for informed training program recommendations.

Using validated and standardized physical fitness tests within this design ensures reliable data. The approach balances feasibility, scientific rigor, and ethical considerations, offering comprehensive insights into the conditioning status of youth Silat athletes in a controlled sports school training environment.

The sample size for this study be drawn from the total population of youth Silat athletes (n = 45) enrolled in the Kuala Lumpur Sports School. Given the relatively small number of athletes in this specialized group, the study aim to include all eligible participants who meet the inclusion criteria. This provided a complete and representative sample of youth Silat athletes for data collection, enhancing the validity and applicability of the findings. The sample be further categorized based on age (13-14 vs. 15-17 years) and competition experience (novice vs. advanced) to allow for between group analysis.

Purposive sampling employed to select youth Silat athletes aged between 13 and 17 years, enrolled in the Silat training program at the Kuala Lumpur Sports School. The following inclusion criteria applied

Test Purpose Tools Used Supporting Literature

Anthropometric Measurements: To assess height, body mass, and body composition.

Seca 206 Body Meter, Seca 813 Digital Weighing Scale (Lesinski et al., 2020; RiveraAmézquita et al., 2025) "Anthropometric measurements and their relevance in sport science."

Standing Broad Jump: To assess explosive lower-body power required for rapid, multidirectional movements. Measuring tape, broad jump mat (Rahman, 2021; Westermann et al., 2020). "Reliable and validated of the Broad Jump Test for youth athletes."

Handgrip Strength Test: To measure grip strength, essential for weapon handling and clinch.

Camry EH101 Handgrip Dynamometer (Gerodimos, 2012) "Reliable and validated of handgrip strength measurements in youth athletes."

Push-Up Test: To assess upper-body muscular endurance for sustained striking.

Floor mat, Casio Stopwatch (Gillen et al., 2018; Hadiana et al., 2022) "Reliable and validated of the push-up test for assessing upper-body endurance in youth athletes."

Yo-Yo Intermittent Recovery Test: To assess aerobic capacity and recovery during intermittent exercise. Shuttle cones, YoYo Audio Track (Deprez et al., 2015)

20-Second Kicking Test: To assess explosive leg strength, speed, and endurance for kicking.

Stopwatch, kick pads (Apollaro et al., 2024; Damrah et al., 2023) "Development and reliability of a kick test system for Taekwondo athletes."

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Agility Test (Silat-Specific): To assess lateral agility and footwork, crucial for Silat movement. Custom agility frame, stopwatch (Ben Hassen et al., 2022; GálPottyondy et al., 2021) "Reliable and validitated of the Edgren Sidestep Test for assessing agility in youth athletes in combat sports.

Tests Pprotocol

Component Description

Participant Briefing & Screening

Explain study objectives and procedures; obtain informed consent; complete health screening; conduct pilot testing one week prior.

Standardized Pre-Test Controls

Instruct athletes to avoid vigorous exercise and caffeine 24 h prior, maintain hydration, and have a light meal 2 h before each session.

Warm-Up & Familiarization

Perform a 10-minute dynamic warm-up; demonstrate each test; allow one practice attempt for each test to ensure proper technique and reduce learning effects.

Testing Order

Day 1: Standing Broad Jump, Handgrip Strength, Push-Up Test

Day 2: Yo-Yo Intermittent Recovery L1, 20- Second Kick Test, Sidestep Test

Rest Intervals & Standardization

2 min between trials within a test; 5 min between different tests; maintain environmental conditions at 22–24 °C and 50–60% humidity.

Safety Procedures

Supervision by certified strength coaches; spotters for jumps; immediate access to firstaid kit; monitor athletesfor distress or technique breakdown.

Data Recording & Management

Record results on preformatted sheets; dualentry verification; daily digitization and secure storage onpassword-protected server with backups.

Pilot Testing

Trial all procedures with a small group of volunteer athletes to confirm timing, logistics, and clarity of instructions, and make minor adjustments before formal data collection begins.

RESULTS AND DISCUSSION

Participant Characteristics

This study involved a total of 36 youth Silat athletes, aged between 13-17 years old. The participants were selected from a Kuala Lumpur sports school and were categorized based on gender, weight class, and competition experience. The initial sample included athletes who had at least one year of competitive experience in Silat. After considering the exclusion criteria, the remaining 36 athletes were divided into two gender groups,

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each with 18 athletes. The weight categories used to divide the participants were as follows: Group 1 (Class A & B Putra/Putri, weighing between 39–47 kg), Group 2 (Class C & D Putra/Putri, weighing between 47–55 kg), Group 3 (Class E & F Putra/Putri, weighing between 55–63 kg), and Group 4 (Class G Putra/Putri, weighing above 63 kg). The sample size and classification allowed for detailed analysis of various physical performance metrics in relation to gender and weight class.

Table 1: Distribution of Participants (n = 36)

Gender	n	Percentage (%)
Male	18	50.0
Female	18	50.0
Total	**36**	**100.0**

The participants in this study were equally distributed between male and female athletes, with 18 participants in each gender group, resulting in a 50% representation for both males and females. This gender balance allows for a fair comparison across all physical fitness tests and ensures that the findings are not biased by gender.

Table 2 Participants Distribution According to their Anthropometry (n = 36)

Variable	Gender	n	Mean	Std. Dev.	Min	Max
Height (cm)	Female	18	157.56	4.91	147.50	166.00
Height (cm)	Male	18	162.69	6.79	153.00	177.00
Arm Span (cm)	Female	18	160.67	3.82	152.00	167.00
Arm Span (cm)	Male	18	166.61	7.95	155.00	180.00

The anthropometric measurements, including height and arm span, were recorded for both male and female athletes. The mean height for female participants was 157.56 cm, while male athletes had a mean height of 162.69 cm. Similarly, the arm span of male athletes (166.61 cm) was greater than that of female athletes (160.67 cm). These differences in anthropometric data aligned with typical biological variations between genders, which influence physical performance in certain fitness tests or even the actual competition.

Inferential Statistics Results

Table 3. Summary of Inferential Statistical Results (n = 36)

Variable	Test Used	Grouping	Sig.	Interpretation
Broad Jump Forward	Independent t-test	Gender	.001	Significant
Handgrip Right	Independent t-test	Gender	.013	Significant
Handgrip Left	Independent t-test	Gender	.047	Significant
Push-Up Maximal	Independent t-test	Gender	.001	Significant
20-sec Kicking Dominant Leg	Independent t-test	Gender	.008	Significant
20-sec Kicking Non-Dominant Leg	Independent t-test	Gender	.023	Significant
Edgren Sidestep Test	Independent t-test	Gender	.056	Not Significant
Yo-Yo Test IRT1 VO_2max	Independent t-test	Gender	.001	Significant
Broad Jump Forward	ANOVA	Weight	.129	Not Significant
Handgrip Right	ANOVA	Weight	.591	Not Significant
Handgrip Left	ANOVA	Weight	.196	Not Significant
Push-Up Maximal	ANOVA	Weight	.458	Not Significant
20-sec Kicking Dominant Leg	ANOVA	Weight	.574	Not Significant

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20-sec Kicking Non-Dominant Leg	ANOVA	Weight	.288	Not Significant
Edgren Sidestep Test	ANOVA	Weight	.759	Not Significant
Yo-Yo Test IRT1 VO_2max	ANOVA	Weight	.046	Significant

Based on Table 3, the independent samples t-test showed that gender significantly influenced most of the physical performance variables measured in this study. Significant gender differences were found in broad jump forward, right- and left-hand handgrip strength, push-up maximal performance, 20-second kicking performance for both dominant and nondominant legs, and all Yo-Yo Intermittent Recovery Test Level 1 variables. However, no significant gender difference was found in the Edgren Sidestep Test, indicating that agility performance was relatively similar between male and female athletes and this might cause of range of motion as females are performing better comparatively.

For experience level, the one-way ANOVA indicated significant differences in right-hand handgrip strength, left-hand handgrip strength, and 20-second kicking performance for the non dominant leg. No significant differences were found in broad jump forward, push-up maximal performance, dominant leg kicking performance, Edgren Sidestep Test, or the Yo-Yo Intermittent Recovery Test Level 1. This suggested that experience level influenced selected strength and kicking, but not all aspects of physical performance.

In terms of weight category, the one-way ANOVA revealed that only the Yo-Yo Intermittent Recovery Test Level 1, namely VO_2max, level, and distance, differed significantly across the weight groups. The remaining variables, including broad jump forward, handgrip strength, push-up maximal performance, kicking performance, and Edgren Sidestep Test, did not show significant differences. Overall, these findings indicated that gender was the most consistent factor associated with differences in physical performance, while experience level and weight category showed more limited effects depending on the specific variable measured.

CONCLUSION

The descriptive statistics provided a clear picture of the physical fitness characteristics of youth Silat athletes. The participants' performance varied across the tests, with differences based on their gender, weight class, and competition experience. These results suggest that conditioning programs should consider these factors to effectively improve or enhance performance.

The inferential statistical analysis confirmed the importance of experience and gender in shaping athletic capabilities, these findings were essential for the development of targeted training regimens to optimize performance in youth Silat athletes. Hence, this study successfully profiled the physical performance characteristics and conditioning needs of youth Silat athletes in a Kuala Lumpur sports school. The findings showed that the athletes displayed variation across all tested physical components, namely explosive power, strength, muscular endurance, agility, kicking performance, and aerobic endurance. These results confirm that youth Silat athletes require a broad physical foundation to meet the demands of training and competition specifically Silat concerned..

The inferential showed that gender significantly influenced most of the measured performance variables, including broad jump, handgrip strength, push-up performance, kicking ability, and aerobic endurance. Experience level significantly affected right-hand handgrip strength, left-hand handgrip strength, and non-dominant leg kicking performance, while weight category significantly influenced only Yo-Yo Intermittent Recovery Test Level 1 performance. Agility, as measured by the Edgren Sidestep Test, did not differ significantly across the compared subgroups.

Overall, these findings suggested that conditioning needs among youth Silat athletes are not uniform and should be planned according to the athlete's specific physical profile. Thus, this study provides useful sport-specific evidence for understanding the physical demands of youth Silat and offers a foundation for more effective conditioning practices.

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By identifying which performance variables differ across groups and which remain relatively similar, the study contributed meaningful information for coaches, trainers, and sports schools in designing more targeted and evidence-based development programs for youth Silat athletes.

In addition, coaches should strengthen the aerobic conditioning component of training, particularly for athletes in weight categories that may be disadvantaged in endurance performance. Intermittent running drills, sport-specific interval training, and progressive endurance programs should be included to improve recovery ability and sustain performance during repeated bouts of activity in Silat, the body of knowledge.

However, although agility did not differ significantly across groups, it should continue to be maintained through Silat-specific footwork and reaction drills, as it remains an important performance quality in combat situations. Maintaining this component is important to ensure that athletes continue to execute evasive and attacking movements effectively during matches.

It is recommended that coaches implement individualized conditioning programs for youth Silat athletes rather than using a general training approach for all athletes. Since significant differences were found across gender for most performance variables, training loads and exercise emphasis should be adjusted according to the athlete's current physical capacity, particularly in lower-body power, upper-body strength, muscular endurance, and aerobic fitness.

It is also recommended that specific attention be given to developing handgrip strength and non-dominant leg kicking performance, especially among less experienced athletes. Since experience level significantly influenced these variables, training should include grip-strength exercises, technical repetition using both limbs, and drills that encourage balanced bilateral development. This may help improve both technical execution and overall competitive effectiveness.

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For future research, it is recommended that a larger sample be used and that athletes from multiple sports schools or Silat training centres be compared to improve the generalizability of the findings. Future studies may also include additional variables such as flexibility, reaction time, balance, or match-performance indicators to provide a more comprehensive Silat-specific performance profile. A longitudinal design would also be valuable to examine how physical performance changes over time in response to structured training and athlete maturation.

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