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Multidimensional Talent Identification in Taekwondo Kyorugi: Analytical Hierarchy Process (AHP) Method Approach

Fauzi Syahria Zein[1*], Dede Rohmat Nurjaya[2], Mulyana[3]

[123] *Sports Education, Graduate School, Universitas Pendidikan Indonesia, Jl. Dr. Setiabudi No.229, Isola, Kec. Sukasari, Kota Bandung, Jawa Barat 40154, Indonesia*

Corresponding author. Email **:** fauziszein.fs@gmail.com

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Abstract. Taekwondo performance in the modern era has undergone a tactical paradigm shift following the global implementation of the Protector and Scoring System (PSS). In Indonesia, grassroots talent identification remains largely subjective and vulnerable to precociousness bias, indicating the need for objective, multidimensional, and evidence-based selection instruments. This study aimed to develop a comprehensive talent identification model for Taekwondo Kyorugi athletes by determining criteria, sub-criteria, and priority weights using the Analytical Hierarchy Process (AHP). An exploratory sequential mixed-methods design was employed. The qualitative phase involved a systematic literature review to identify relevant talent indicators, while the quantitative phase used an AHP pairwise comparison questionnaire to obtain expert judgments, which were analyzed using Expert Choice software. The participants were 30 experienced Taekwondo coaches from various provinces in Indonesia, all of whom held at least a national coaching license and were actively involved in coaching athletes competing at national and international levels. The AHP results showed that anthropometry was the highest-priority criterion for early talent identification, with a weight of 54.7%, followed by psychology (15.9%), physiology (15.2%), and technical skills (14.2%). At the sub-criteria level, leg length (20.3%) was the most important anthropometric indicator. Speed (5.6%) was the dominant physiological indicator, mental toughness (5.9%) was the leading psychological indicator, and head kick (5.3%) was the highest-priority technical skill. All pairwise comparisons met the consistency requirement, with a Consistency Ratio below 0.10. These findings provide an expert-based priority framework to support more systematic and evidence-based talent identification in Taekwondo Kyorugi.

Keywords: Taekwondo; Kyorugi; Talent Identification; Analytical Hierarchy Process (AHP)

INTRODUCTION

Achievement on the international sporting stage, particularly at the Olympics, has transformed from a mere arena for individual competition to a representation of the excellence of a country's sports development system. In Indonesia, through the National Sports Grand Design (DBON) policy umbrella, sports investment strategies are now focused on leading sports deemed to have a high probability of winning Olympic medals, including Taekwondo in the Kyorugi (fighting) category. To be able to penetrate the dominance of world-class elite athletes, the national development ecosystem can no longer rely solely on sporadic and non-standardized recruitment processes. Building a foundation for elite achievement requires an early talent identification framework that is precise, scientifically standardized, and adaptable to developments in modern sports science (Johnston et al., 2018).

Talent identification in the context of competitive sports is a systematic process for identifying individuals with the innate potential to become future elite athletes. In the modern sports era, talent identification is no longer viewed as a single event, but rather as a continuum integrated within the Talent Identification, Selection, and Development (TISD) framework. This process aims to minimize uncertainty in long-term development investments by screening individuals with genetic, physical, and psychological profiles suited to the specific demands of a particular sport (Till & Baker, 2020). Since the late 1960s and early 1970s, several Eastern European countries have recognized the weaknesses of traditional talent identification programs and sought to develop methods supported by strong theory and scientific evidence.

The urgency of updating talent identification systems has become even more pressing given the tactical revolution that has occurred in Taekwondo over the past decade. Since the global adoption of the Protector and Scoring System (PSS), the paradigm of Kyorugi fighting has undergone a drastic shift. Point scoring, which previously relied on the visual subjectivity of human referees, is now determined solely by the thresholds of electronic sensors on the hogu and headgear. This technological transition demands a much higher level of precision, speed, and accuracy than in previous eras and directly gave rise to the trend of front-leg fencing styles, where efficient distance management and head kick execution are key weapons (Moenig et al., 2020).

The impact of implementing the PSS system is a fundamental shift in the ideal profile of a Taekwondo athlete. Recent biomechanical studies have shown that anthropometric structure, particularly the ectomorphic-mesomorphic posture with a dominant long-limb ratio, provides an absolute mechanical advantage on the mat. Superior reach serves as a lever, allowing athletes to score points from a safe distance without risking entering a tight fighting space, while simultaneously making it difficult for shorter opponents to launch counterattacks (Scamardella et al., 2025). Given that limb length is a genetically inherited attribute that cannot be significantly modified through training, identifying anthropometric parameters must be a primary filter from the early detection phase.

Ironically, despite the rapid evolution of global regulations and tactics, talent identification practices at the grassroots level and in regional development centers such as PPLP and SKO in Indonesia are still often stuck in conventional methods. The selection of young athletes is often based solely on the coach's instincts or a track record of instant achievements in age-group championships. This approach triggers an early maturation bias, where coaches tend to recruit children who appear to be "today's champions" without evaluating their long-term genetic potential (Roberts et al., 2021). This systematic error in the talent detection phase has fatal consequences, resulting in high rates of performance stagnation as athletes advance to senior age groups.

In the Long-Term Athlete Development (LTAD) concept, the development process to reach the elite level takes 8 to 12 years (Bompa & Buzzichelli, 2019). Therefore, talent identification must be holistic and multidimensional, integrating four main pillars: Anthropometry, Physiology, Psychology, and Technique. While Anthropometry acts as the structural foundation (baseline hardware), the Physiology component serves as the driving force. In a PSS ecosystem characterized by high-intensity, intermittent action, physiological attributes such as speed and agility are essential prerequisites for responding to gaps in the opponent's defense a fraction of a second earlier (Tornello et al., 2023).

Furthermore, the success of a young talent in the LTAD program depends heavily on their psychological profile. Martial arts are not just physical contests, but also mental battles. Psychological attributes such as mental toughness and intrinsic motivation are key catalysts that ensure an athlete can endure pain, acute fatigue, and competition

pressure without losing focus (Belem et al., 2022). Numerous studies in martial arts sport psychology have identified that mental resilience and achievement motivation are strong predictors of athlete success at higher levels of competition, making them essential for assessment during the initial identification phase.

Previous studies on talent identification in Taekwondo still leave significant empirical gaps. Research by Wazir et al. (2019) only analyzed the correlation between anthropometric attributes and physical performance in a small sample of elite athletes, without formulating weighting parameters for the beginner screening phase. On the other hand, research by Andriani and Rusdiana (2023) attempted to apply the Analytical Hierarchy Process (AHP) method to children's Taekwondo. However, the variables studied were still very limited to basic physical components such as VO2Max and explosive power, and did not integrate the urgency of mastering adaptive PSS techniques or psychological resilience attributes. This confirms that there is no talent assessment instrument in Indonesia that analyzes the hierarchy of Taekwondo criteria in a comprehensive, up-to-date, and standardized manner.

To address this pressing need for coaching governance, the Analytical Hierarchy Process (AHP) method is considered the most comprehensive resolution instrument. As a branch of multi-criteria decision-making, the AHP is capable of not only parsing the complexity of talent selection variables into a systematic hierarchical structure but also converting the subjective justifications of elite coaching experts into an objective and quantitative mathematical ratio scale. Through the Consistency Ratio (CR) calculation, the AHP method can mathematically prove and validate field phenomena, including why Leg Length and Speed parameters should be assigned a higher priority weighting than pure Aerobic Capacity during the talent scouting stage (Nurjaya et al., 2020).

Based on the overall argument, the tactical realities of modern competition, and pressing needs in the field, this research was conducted to develop an innovative scouting model for the future of Indonesian Taekwondo. By extracting empirical experience and expert judgment through the AHP methodology, this research is designed to produce a talent identification weighting matrix that is precise, adaptive to the latest World Taekwondo regulations, and based on evidence-based practice. The final results of this study are projected to serve as a blueprint for objective selection guidelines for the Indonesian Taekwondo Executive Board (PBTI), the Ministry of Youth and Sports, and

coaches at all national development centers, with the hope of minimizing recruitment bias so that the young talents recruited are those with the best potential to develop into champions at the Olympics (Lloyd et al., 2015).

METHOD

This study employed a mixed methods research (MMR) approach, combining quantitative and qualitative methods in an integrated and sequential manner. This approach is believed to provide a deeper and more comprehensive understanding than using either approach alone (Creswell, 2014). The chosen design was an exploratory sequential mixed methods approach, in which qualitative data were first collected through a systematic literature review (SLR), analyzed in depth, and then followed by collection as the instrument development stage and quantitative data analysis using the AHP instrument distributed to experts. This combination of approaches was chosen because it overcomes the limitations of a single approach while allowing for synthesis that results in a stronger scientific contribution.

The first stage of the research was conducted through a Systematic Literature Review (SLR) in the scientific databases Scopus and Web of Science. The search strategy used the keywords "Taekwondo Identification," "Taekwondo Anthropometry," "Taekwondo Physiological," "Taekwondo Psychological," and "Taekwondo Technical Skill." The literature search was limited to the period 2015 to 2026 to ensure the relevance of the references. The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines were applied to guide article selection to ensure a transparent, reproducible, and unstructured selection bias-free literature selection process (Johnston et al., 2018). A total of 201 scientific articles were identified, and a multi-step screening process was conducted to obtain 18 sub-criteria divided into four main aspects.

The primary instrument used in this study was the Analytical Hierarchy Process (AHP), a multi-criteria decision-making (MCDM) technique developed by Thomas L. Saaty in the 1970s. The AHP method was chosen for its ability to manage complex problems by breaking them down into an operationalized hierarchy, conducting pairwise comparisons at each level to ensure a comprehensive investigation, and producing a single, quantitatively measurable decision output (Nurjaya et al., 2020). The AHP has also been proven effective in various athlete selection contexts across various sports internationally, including soccer, rugby, and rowing.

The AHP hierarchical model in this study is formulated through three levels. The first level (topmost) represents the research objective, which is to identify the talents of Taekwondo Kyorugi athletes. The second level consists of four main criteria: Anthropometric, Physiological, Technical, and Psychological, and the third level explains the sub-criteria within each main criterion. The Anthropometric sub-criteria include Height, Leg Length, Body Composition, and Somatotype; while the Physiological sub-criteria include Aerobic Capacity, Strength, Power, Speed, Agility, and Flexibility (Wazir et al., 2019).

The population in this study was all experienced taekwondo coaches throughout Indonesia. The sampling technique used judgment sampling, which is based on specific considerations, because the AHP method requires reliance on a group of relevant experts according to their specialization in decision-making. Sample inclusion criteria included: taekwondo coaches who are national team coaches or regional coaches who hold national/international licenses, and have more than three years of coaching experience. The total sample used was 30 coaches spread across various provinces in Indonesia, including coaches from the National Team, West Java, Central Java, East Java, DKI Jakarta, Bali, Aceh, and others (Roberts et al., 2021).

The AHP questionnaire instrument was designed based on the pairwise comparison scale developed by Saaty, with a range of values from 1 to 9 and its inverse. A value of 1 indicates that both elements are equally important, a value of 3 indicates that one element is slightly more important, a value of 5 indicates that one element is more important, a value of 7 indicates that one element is clearly more important, and a value of 9 indicates that one element is absolutely more important than the other. The questionnaire was structured to compare each pair of criteria and sub-criteria, including 6 comparison pairs for the main criterion, 6 pairs for the Anthropometric sub-criterion, 15 pairs for the Physiology sub-criterion, 6 pairs for the Technique sub-criterion, and 10 pairs for the Psychology sub-criterion (Andriani & Rusdiana, 2023).

The Technique sub-criterion was operationalized specifically in the context of early talent identification, not in the context of mature athletes at the elite level. The four technique sub-criteria evaluated were: (1) Head Kick / High Dollyo Chagi — the candidate's innate potential to execute head kicks quickly and with balance; (2) Roundhouse Kick / Dollyo Chagi — the ability to master the basic mechanics of a whip

kick; (3) Spinning Kick / Dwi Chagi — the level of motor coordination and spatial orientation; and (4) Cut Kick / Yop Chagi — the ability to use the front leg for distance control. This operationalization is important to ensure all respondents have a consistent understanding when conducting pairwise comparisons (Menescardi et al., 2019).

The Psychology sub-criteria were established based on a review of the latest martial arts sports psychology literature and encompass five attributes: Self-Confidence, Focus, Emotional Control, Mental Toughness, and Motivation. The selection of these five attributes is supported by research identifying the six important psychological skills for taekwondo athletes: goal setting, self-confidence, imagination, self-talk, fighting spirit, and concentration, which were then summarized into measurable core constructs (Nam et al., 2022). The received data was then processed using SPSS version 25 and manual AHP matrix calculations to obtain priority weights and Consistency Ratio (CR) values.

The validity and consistency of expert assessments were verified by calculating the Consistency Ratio (CR) at each hierarchical level. In accordance with the AHP standard rules established by Saaty, assessments are considered consistent and valid if the CR value is ≤ 0.10. If the CR value exceeds this threshold, the questionnaire is returned to the respondent for review to ensure data quality. This mathematical validation standard is the main difference between AHP and conventional subjective weighting methods, as each weighting result can be quantitatively proven for its appropriateness (Goodarzi et al., 2021). In addition to AHP, this study also conducted correlation analysis between criteria to understand the interdependence of variables.

The data collection technique was implemented through several complementary stages. First, a documentation study of relevant previous scientific literature served as a basis for developing a conceptual framework and research instruments. Second, a Focus Group Discussion (FGD) was conducted with taekwondo coaches and experts to validate the content of the criteria and sub-criteria formulated through the SLR. Third, an AHP-based questionnaire was distributed to 30 experienced coach respondents. The conceptual framework of this study refers to the LTAD (Long-Term Athlete Development) principle, which emphasizes that the development process towards elite level takes 8 to 12 years, making early selection based on scientific criteria crucial for the efficiency of development investment (Bompa & Buzzichelli, 2019).

Although this study involved a relatively limited sample size (n=30), the selection of respondents was carried out strictly through judgment sampling techniques to ensure data quality. In the Analytical Hierarchy Process (AHP) methodology, the validity of the results is not determined by the large-scale sample size (inferential statistics), but rather by the level of expertise and logical consistency of the decision-makers. The use of 30 coaches with national/international licenses and experience coaching elite teams is considered representative for extracting in-depth expert consensus. Furthermore, all instruments have undergone Consistency Ratio (CR) testing with results below the 0.10 threshold, which mathematically proves that expert judgment is stable, consistent, and scientifically accountable for the development of this weighting model.

The Analytical Hierarchy Process (AHP)-based data processing in this study was conducted using Expert Choice software. This software is a multi-criteria decision-making instrument specifically designed to systematically integrate qualitative and quantitative assessment elements. In the context of this research, Expert Choice serves as a tool to simplify hierarchical modeling, accelerate the calculation of pairwise comparison matrix weights, and minimize the risk of manual calculation errors in complex decision structures.

Expert Choice's method of analyzing the research data follows several structured stages. First, a decision hierarchy is compiled into the system, encompassing the main objective (goal), criteria, sub-criteria, and alternative choices. Second, the application processes the assessment data input in the form of pairwise comparison scores obtained from expert respondent questionnaires. Third, Expert Choice automatically performs a synthesis calculation to calculate the local and global priority weights for each element. Concurrently, the application performs a consistency test (Consistency Ratio / CR). If the resulting CR value is <0.1, the assessment is considered consistent and valid for use. Finally, the application performs a sensitivity analysis to see to what extent changes in the criteria weights can affect the final ranking of the alternatives being tested.

RESULT AND DISCUSSION

The Systematic Literature Review analysis successfully identified 18 valid and relevant sub-criteria divided into four main criteria: Anthropometry, Physiology, Engineering, and Psychology. The selection of these criteria and sub-criteria was supported by reliable scientific sources from the Scopus and Web of Science databases.

Through a rigorous selection process based on the PRISMA guidelines from a total of 201 articles, representative and up-to-date references were obtained to support the construction of this study's AHP hierarchy. These four criteria together represent a holistic approach to talent identification that goes far beyond conventional physical measurements (Johnston et al., 2018).

1. Main Criteria Priority Value

Priority of Main Criteria The results of data processing from 30 respondents using the AHP method at the main criteria level show a very clear distribution of priority weights. The Anthropometric criteria occupy the first priority position with a very significant highest weight, namely 0.547 (54.7%). The second position is occupied by the Psychological criteria with a weight of 0.159 (15.9%), followed by a small difference by the Physiological criteria of 0.152 (15.2%), and the Technical criteria in the last position with a weight of 0.142 (14.2%). The Consistency Ratio (CR) value obtained is 0.021, which is far below the maximum threshold set by Saaty, namely CR <0.10, so that all expert assessments on this main criterion are declared very consistent, legitimate, and valid (Andriani & Rusdiana, 2023).

Table 1. Comparison of the Main Criteria Pair Matrix with Priority Values

	Anthropometri	Physiologi	Psychology	Technique	Priority Values
Anthropometri	1	5,115	2,894	3,098	0,547
Physiologi	0,196	1	0,969	1,277	0,152
Psychology	0,346	1,032	1	1,151	0,159
Technique	0,323	0,783	0,869	1	0,142
	CR= 0,02		CR < 0.1 (Accepted)		

Figure 1. Expert Choice Result for Main Criteria

The dominance of anthropometry, with a weighting of 54.7%, reflects the expert consensus that posture and physical dimensions are the most crucial foundations for early talent identification. This finding aligns with the basic principles of modern sports, which stipulate that body structural characteristics are the primary prerequisite for optimal development of physical and technical components. Empirically, anthropometric profiles

are strongly influenced by innate genetic factors, where skeletal dimensions such as peak height and limb length have biological limitations that cannot be significantly modified through any training program (Baker et al., 2020). Therefore, in the initial talent search stage, selecting candidates based on innate postural advantages is the most rational screening step.

The dominant priority of anthropometry over other aspects is closely related to the law of trainability. Physiological components such as speed and agility, as well as mastery of basic kicking techniques, are dynamic attributes that are highly trainable—meaning that candidate athletes with standard initial abilities can still improve dramatically through a long-term periodized training program (LTAD). In contrast, modifications in leg bone length or limb proportions depend purely on a child's natural growth phase and genetic constraints (Lloyd et al., 2015). This is the logical basis for why experts prefer to seek out the "raw material" for an ideal physique from an early age.

In the specific context of Taekwondo Kyorugi, anthropometric advantages provide an absolute biomechanical advantage on the mat. A linear posture with long limbs allows athletes to have a more lethal striking range. Biomechanically, longer limbs function as leverage, generating greater swing momentum, allowing for more efficient force delivery toward the target. Furthermore, athletes with longer reach have the tactical advantage of executing attacks from a safe zone while dictating distance management, making it extremely difficult for shorter opponents to penetrate the defense (Menescardi et al., 2019).

The empirical reality on the field of recent Taekwondo competitions also validates these experts' collective views, especially since the global implementation of the latest-generation PSS system by World Taekwondo. The use of electronic sensors drastically shifts the tactical paradigm of Kyorugi, leading to a more front-leg fencing style. Within the PSS ecosystem, the use of cut kicks or push kicks to steal sensor points from a distance greatly benefits athletes with ectomorphic-mesomorphic (tall and slender) physiques, who can contact their opponent's sensor a fraction of a second earlier without risking entering the tight-range zone (Da Silva Santos et al., 2021).

2. Anthropometric Sub-Criteria Values

In the Anthropometric sub-criteria group, the AHP synthesis results placed Leg Length as the most prioritized indicator with a very dominant weight, namely 0.465

(46.5%). The next order was occupied by Somatotype (0.207 or 20.7%), Height (0.183 or 18.3%), and Body Composition (0.145 or 14.5%). The CR value obtained was 0.026, which is below the CR threshold < 0.10, thus proving that the expert assessments are very consistent and valid (Wazir et al., 2019). The high urgency of leg length is very relevant to the characteristics of the Kyorugi fighting number, where more than 90% of the attack techniques and point scores are executed using the lower extremities.

Table 2. Comparison of Anthropometric Sub-Criteria Pair Matrix with Priority Values

	Height	Leg Length	Body Composition	Somatotipe	Priority Values
Height	1	0,254	1,574	0,929	0,183
Lege Length	3,935	1	2,753	1,190	0,465
Body Composition	0,635	0,363	1	0,752	0,145
Somatotipe	1,076	0,524	1,330	1	0,207
CR = 0,02				< 0,10 (Accepted)	

Figure 2. Expert Choice Result for Anthropometric Sub-Criteria

Biomechanically, the advantage of leg length provides exceptional mechanical efficiency in generating kicking power. Referring to the principle of the lever in physics, a longer force arm will generate significantly greater angular velocity and momentum at the end of the lever (the leg) upon execution, even though the initial force exerted from the groin is relatively the same. This greater momentum is crucial for generating power that meets the pressure threshold on the PSS sensor for scoring valid points (Scamardella et al., 2025). Therefore, leg length not only provides a distance advantage but also optimizes the destructive quality of the technique being executed.

An interesting finding is that experts place leg length significantly above overall height. This reflects their in-depth understanding of body proportions. Towering height does not necessarily correlate with fighting effectiveness if an athlete has a long torso but relatively short legs. In the current Taekwondo ecosystem, dominated by front-leg fencing tactics, an excessively long upper body actually becomes a more accessible target

area for opponents. Conversely, athletes with average height in their class but a proportionally longer limb ratio are considered significantly more advantageous because they minimize the target area of the chest while maximizing leg reach (Kwok et al., 2021).

The second-place ranking of Somatotype (20.7%) over Height suggests that innate skeletal shape and type are more essential to identify early on than mere height. The ideal somatotype profile for elite Taekwondo athletes consistently skews toward the ectomorphic-mesomorphic type, with a linear, lean physique supported by a dense muscular structure. This body type facilitates high levels of agility and minimizes the load carried during explosive movements. Body composition is prioritized last because this parameter is highly volatile and most easily manipulated through nutritional interventions and strength and conditioning programs as the development process progresses (Cular et al., 2021).

3. Physiological Sub-Criteria Values

In the Physiology sub-criteria group, the AHP results show that Speed ranks first with a weight of 0.261 (26.1%), followed by Agility (0.184 or 18.4%), Flexibility (0.169 or 16.9%), Power (0.144 or 14.4%), Aerobic Capacity (0.133 or 13.3%), and Strength (0.110 or 11.0%). The CR value obtained is 0.016, which is far below CR < 0.10, proving that the pairwise comparison instrument in this Physiology sub-criteria is very valid and consistent. The high urgency of speed very much represents the empirical reality of modern Taekwondo Kyorugi matches as a martial sport characterized by high-intensity intermittent activity (Bridge et al., 2018).

Table 3. Comparison of Physiological Sub-Criteria Pair Matrix with Priority Values

	Aerobic Capacity	Strength	Power	Speed	Agility	Flexibility	Priority Values
Aerobic Capacity	1	1,713	1,008	0,567	0,549	0,557	0,133
Strength	0,584	1	0,834	0,456	0,666	0,706	0,110
Power	0,992	1,199	1	0,662	0,926	0,756	0,144
Speed	1,764	2,193	1,511	1	1,855	1,758	0,261
Agility	1,821	1,502	1,080	0,539	1	1,383	0,184
Flexibility	1,795	1,416	1,323	0,569	0,723	1	0,169
	CR = 0,02				< 0,10 (Accepted)		

Figure 3. Expert Choice Result for Physiological Sub-Criteria

In the PSS-based refereeing ecosystem, kick execution speed and reaction time are key determinants of point scoring. Athletes are required to respond to gaps in their opponent's defense and touch their feet to the sensor faster than the blink of an eye. A split-second delay in executing an attack not only costs them points but also opens up a fatal opportunity for an interception. Agility, ranked second, is highly relevant because the highly tactical nature of modern Kyorugi combat requires athletes to constantly move to control distance. Superior agility allows athletes to enter the attack zone, execute techniques, and quickly exit with full balance before their opponent can counter-kick (Valdes-Badilla et al., 2021).

Flexibility, ranked third (16.9%), directly correlates with World Taekwondo point regulations. Head kicks carry the highest point reward of 3 to 5 points; without adequate dynamic flexibility in the hip and leg joints, athletes will not be able to achieve the Range of Motion (ROM) required to execute upper kicks safely, quickly, and precisely without compromising balance. Flexibility also plays a crucial role in preventing muscle injuries when athletes perform extreme ranges of movement, a fundamental requirement in Kyorugi (Nikolaidis et al., 2016).

Aerobic capacity ranks fifth with a weight of 0.133 (13.3%). Although not the top-ranked attribute, the aerobic energy system still serves as a crucial foundation for recovery. In a three-round competition format, and with the necessity of competing multiple times within a single day, aerobic endurance serves to accelerate the elimination of lactic acid and restore phosphocreatine reserves between rounds. However, in the talent identification stage, experts consider aerobic capacity a highly trainable attribute that is much easier to improve through endurance programs over time than pure speed or innate agility (Julio & Franchini, 2021).

Strength (absolute strength) is ranked last in priority, with a weight of 0.110 (11.0%). This placement makes good biomechanical and physiological sense, as

Taekwondo is a weight-class-based sport. Excessive focus on muscle hypertrophy and absolute strength can lead to disproportionate increases in body mass, which can make it difficult for athletes to maintain their weight class. Furthermore, excessive muscle mass and stiffness often negatively impact leg speed and flexibility. A functional explosive strength profile (power) is much more preferred than static absolute strength in the context of early talent identification (Khayyat et al., 2020).

4. Psychological Sub-Criteria Values

The AHP synthesis results for the Psychology sub-criteria placed Mental Toughness at the top of the hierarchy with a very dominant weight of 0.314 (31.4%), followed by Motivation (0.215 or 21.5%), Focus (0.176 or 17.6%), Self-Confidence (0.159 or 15.9%), and Emotional Control (0.136 or 13.6%). The CR value obtained was 0.034, which is below CR < 0.10, confirming that the expert assessment instrument for this Psychology sub-criterion is highly consistent and valid. The high priority of Mental Toughness confirms that Taekwondo Kyorugi is not just a contest of physical capacity and technique, but also an intense psychological battle (Nam et al., 2022).

Table 4.4. Comparison of Psychology Sub-Criteria Pair Matrix with Priority Values

	Confidence	Focus	Emotional Control	Mental Toughness	Motivation	Priority Values
Confidence	1	1,522	0,939	0,456	0,554	0,159
Focus	0,657	1	1,752	0,658	0,841	0,176
Emotional Control	1,065	0,571	1	0,330	0,893	0,136
Mental Toughness	2,193	1,520	3,030	1	1,278	0,314
Motivation	1,805	1,189	1,120	0,782	1	0,215
CR= 0,03			< 0,10 (Accepted)			

Figure 4. Expert Choice Result for Psychology Sub-Criteria

In the literature on martial arts sports psychology, mental toughness is defined as resilience, or an athlete's ability to maintain focus, determination, and fighting spirit

under extreme pressure. Taekwondo competitions require athletes to be prepared for physical pain from impacts, acute fatigue, and even situations where they are trailing in the final seconds. Athletes with high levels of innate mental toughness possess superior coping mechanisms; they are less likely to burn out during a spartan training program and are able to demonstrate peak performance even under pressure (Lim & O'Sullivan, 2016). Identifying potential athletes who persevere is a crucial long-term investment for coaches.

Placing motivation squarely in second place is empirically sound. Exceptional anthropometric excellence and physical talent will be wasted without a strong, intrinsic drive from within the athlete to continue training and improving. Persistent achievement motivation serves as the psychological fuel that ensures a young talent is willing to overcome the difficult phases of LTAD without coercion. Experts believe that athletes who are highly motivated from the initial identification phase tend to have significantly better levels of discipline and independence, ultimately differentiating between athletes who reach the elite level and those who stagnate at the intermediate level (Gorner et al., 2019).

Emotional control is prioritized last not because it is unimportant, but because emotional regulation is a highly trainable psychological skill that matures with increasing biological age and competitive experience. In early development, during the talent identification phase, emotional fluctuations such as nervousness or excessive aggression are psychologically normal. Modern sports coaches have a variety of psychological intervention tools to channel this aggression into productive energy on the mat. Therefore, experts prioritize finding athletes who already possess a solid foundation of mental toughness and motivation, rather than demanding premature emotional maturity from young talent (Patenteu et al., 2024).

5. Technical Sub-Criteria Values

Analysis of the Technique sub-criteria places the Head Kick / High Dollyo Chagi at the highest priority with a weight of 0.332 (33.2%), followed by the Roundhouse Kick / Dollyo Chagi (0.249 or 24.9%), the Spinning Kick / Dwi Chagi (0.220 or 22.0%), and the Cut Kick / Yop Chagi (0.199 or 19.9%). The CR value obtained is 0.031, which is below the CR limit < 0.10, proving that expert considerations in determining the priority of this technique are very consistent and valid. The high urgency of the Head Kick is

directly rooted in the latest World Taekwondo point regulation system, where a valid kick to the headgear provides a very massive point accumulation (3 points for a direct kick and 5 points if accompanied by a spin) (Moenig et al., 2020).

Table 4.5 Comparison Matrix of Technical Sub-Criteria Pairs with Priority Values

	Roundhouse Kick/ Dollyo Chagi	Cut Kick/ Yop Chagi	Spinning Kick/ Dwi Chagi	Head Kick/ High Dollyo Chagi	Priority Values
Roundhouse Kick/ Dollyo Chagi	1	1,438	1,411	0,509	0,249
Cut Kick/ Yop Chagi	0,695	1	0,971	0,685	0,199
Spinning Kick/ Dwi Chagi	0,709	1,030	1	0,893	0,220
Head Kick/ High Dollyo Chagi	1,965	1,460	1,120	1	0,332
CR= 0,03			< 0,1 (Accepted)		

Figure 5. Expert Choice Result for Technical Sub-Criteria

The Head Kick is classified as a game-changing technique capable of instantly overturning a point deficit. Biomechanically, executing this technique requires extreme hip flexibility, perfect dynamic balance, and explosive power to defy gravity. A young athlete's innate ability to quickly lift their leg toward their head without losing their balance is an indicator of high-level kinesthetic talent that cannot be developed from scratch in a short time (Ge et al., 2021). Identifying this innate motor skill early on will provide coaches with a clear picture of a candidate's long-term potential.

The Roundhouse Kick/Dollyo Chagi, which finished second, represents its significance as a key weapon in Kyorugi combat. Various match video analysis studies consistently show that the Dollyo Chagi to the body is the technique with the highest percentage of use in all world-level championships. The technique's efficiency lies in its trajectory, which allows athletes to execute attacks quickly from various angles, both as opening attacks and counterattacks. Mastering the efficient biomechanics of Dollyo

Chagi is a necessary foundation before athletes can develop more complex variations (Tornello et al., 2023).

The Spinning Kick / Dwi Chagi, ranked third, presents a very high level of biomechanical difficulty because it demands the integration of axial body rotation, spatial coordination, and complex dynamic balance. In the context of electronic protection systems, a spinning kick toward the body is valued at 4 points and often generates significantly more power than other kicks, making it highly effective in penetrating sensory thresholds. Given its complexity, young athletes who can execute this spinning technique with precision demonstrate above-average kinesthetic talent and spatial awareness (O'Sullivan et al., 2021). Identifying this potential early on allows coaches to develop a valuable tactical asset.

The Cut Kick / Yop Chagi's low priority does not mean it is unimportant in modern combat. On the contrary, it is crucial for controlling distance and interrupting opponent attacks in front-leg fencing styles. However, from a talent identification perspective, the effectiveness of the cut kick relies more on innate postural advantages (leg length) than on pure motor complexity. If a candidate already has long legs, training an effective cut kick technique is considered much easier than developing extreme flexibility for a head kick or complex coordination for a spinning kick. This makes the AHP-derived technique priority constellation very logical and consistent with the findings of previous criteria (Mathys et al., 2021).

The findings of this study confirm the interdependence or close relationship between criteria in shaping a potential athlete's profile. Anthropometric dominance (54.1%) does not stand alone but rather serves as a mechanical foundation (baseline hardware) for the effectiveness of other components. For example, excellence in the Leg Length sub-criterion directly facilitates efficient Head Kick execution in the Technique dimension. Biomechanically, superior limb reach allows athletes to score from a safe distance, which in turn reduces physiological workload, allowing Aerobic Capacity to be allocated more effectively for recovery between rounds. Furthermore, the link between psychological and technical aspects is evident in how mental toughness serves as a catalyst for athletes to maintain precision in executing complex attacks like the Spinning Kick under pressure and physical exhaustion. This integration demonstrates that talent

identification should be viewed as an interlocking continuum, where structural advantages strengthen athletes' functional capabilities.

CONCLUSION

This study successfully produced a comprehensive, standardized, and evidence-based model for identifying Taekwondo Kyorugi athlete talent through the integration of a Systematic Literature Review and the Analytical Hierarchy Process (AHP) method, involving 30 experienced expert coaches from across Indonesia. The study's key findings consistently positioned Anthropometry as the most essential foundation for early talent identification, with a dominant weighting of 54.**7**%, followed by Psychology (1**5**.**9**%), Physiology (1**5**.**2**%), and Technique (14.**2**%). At the sub-criteria level, Leg Length (4**6**.**5**%) was the most crucial structural indicator in the Anthropometric dimension; Speed (26.**1**%) was the most important physical attribute in the Physiology dimension; Mental Toughness (31.**4**%) dominated the Psychology dimension; and Head Kick / High Dollyo Chagi (33.**2**%) was the most valuable motor skill in the Technique dimension. All Consistency Ratio (CR) values at each hierarchical level were well below 0.10, proving that the overall expert assessment instrument was highly consistent and valid. The implications of this research are significant for the Indonesian Taekwondo coaching ecosystem. The resulting AHP weighting matrix model can be directly implemented as an objective and standardized athlete selection guideline by PBTI, PPLP, SKO, and PengKot/PengDa throughout Indonesia, to prevent instinct-based recruitment bias and replace it with an evidence-based practice system. For further research, it is recommended to develop a web-based or Android application that integrates this AHP algorithm so that it can be accessed by coaches throughout Indonesia, and to conduct a longitudinal study over 5 to 10 years to validate the effectiveness of this talent identification model in producing high-achieving Taekwondo athletes at the national and international levels.

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