

Do Physical Performance Metrics Truly Differentiate Talent? Evidence from Selected and Non-Selected Youth Rugby Players

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ABSTRACT

This study examined differences in physical performance between selected and non-selected youth rugby players within the Malaysian National Rugby Development Program (NRDP), with particular emphasis on the role of physical attributes in talent identification processes. A total of 88 male players aged 13–14 years participated in the study and were categorised into selected ($n = 39$) and non-selected ($n = 49$) groups based on programme selection outcomes. Physical performance was evaluated using a comprehensive standardised test battery assessing muscular strength, muscular endurance, speed, power, agility, flexibility, and aerobic capacity. Multivariate analysis of variance (MANOVA) was conducted to determine differences between groups. The results revealed a statistically significant overall effect of selection status on physical performance ($p < .05$), indicating that selected players demonstrated superior performance across several key physical attributes. In particular, significant advantages were observed in muscular strength, speed, and lower-body power among selected players. These findings suggest that physical performance plays a critical role in youth rugby selection processes and decision-making criteria. However, the results also raise important concerns regarding the potential influence of biological maturation, as early-maturing athletes may possess temporary physical advantages that affect selection outcomes. Consequently, reliance solely on physical performance metrics may limit the effectiveness and fairness of talent identification systems. This study contributes to the growing body of literature by highlighting the need for more comprehensive and multidimensional evaluation approaches that integrate physical, technical, tactical, and developmental factors to improve the accuracy of athlete selection processes.

Keywords: Talent Identification, Youth Athletes, Rugby Performance, Physical Fitness, Athlete Development

INTRODUCTION

Talent identification (TID) is a fundamental component of long-term athlete development systems, particularly in physically demanding and collision-based sports such as rugby (Baker et al., 2020; Till et al., 2020). Effective identification of youth athletes with high performance potential enables structured progression toward elite competition and contributes to sustained national sporting success. Within this context, physical performance testing has become a central component of selection processes due to its objectivity and direct relevance to sport-specific demands.

Rugby performance is characterised by intermittent high-intensity efforts requiring a combination of muscular strength, sprint speed, lower-body power, agility, and aerobic capacity (Gabbett, 2021a; Jones et al., 2021). These physical attributes are essential for executing key match actions such as tackling, sprinting, and repeated high-intensity efforts. Consequently, previous studies have consistently reported that selected youth athletes outperform non-selected peers in these physical performance variables (Till et al., 2020; Weakley et al., 2021).

Despite the widespread use of physical testing in talent identification, growing evidence suggests that performance outcomes during adolescence are strongly influenced by biological maturation (Malina et al., 2015; Arede et al., 2021). Early-maturing athletes often demonstrate superior strength, speed, and power due to advanced physiological development rather than inherent talent. This introduces a potential bias within selection systems, whereby athletes are selected based on temporary developmental advantages rather than long-term performance potential (Dugdale et al., 2021).

Furthermore, recent literature has highlighted that talent identification should be conceptualised as a multidimensional and dynamic process, incorporating not only physical attributes but also technical, tactical, and psychological factors (Baker et al., 2020; McCarthy et al., 2022). However, empirical evidence evaluating the extent to which physical performance alone differentiates selected and non-selected athletes in applied settings remains limited, particularly within developing rugby nations such as Malaysia.

Within the Malaysian National Rugby Development Program (NRDP), selection decisions are based on a combination of physical testing, competition performance, and coach evaluation. However, the relative contribution of physical performance to selection outcomes, and the extent to which these decisions may be influenced by maturation-related factors, has not been systematically examined.

Therefore, the present study addresses this gap by examining differences in physical performance between selected and non-selected youth rugby players within the NRDP. It was hypothesised that selected players would demonstrate superior performance in key physical attributes, particularly muscular strength, speed, and lower-body power. In addition, this study aims to provide evidence-based insights into the effectiveness and potential limitations of current talent identification practices.

MATERIALS AND METHODS

Research Design

A quantitative cross-sectional comparative design was employed to examine differences in physical performance between groups.

Participants

A total of 88 male youth rugby players aged 13–14 years participated in this study. Participants were categorised into selected ($n = 39$) and non-selected ($n = 49$) groups based on NRDP selection outcomes. Purposive sampling was used because the study focused specifically on players that undergone screening process based on NRDP selection process.

Instruments

Participants completed a comprehensive standardized test battery designed to assess key components of physical fitness relevant to youth rugby performance. Prior to testing, all participants performed a standardized warm-up consisting of light aerobic activity, dynamic stretching, and sport-specific movements to minimize injury risk and ensure optimal performance. All tests were administered by trained personnel using consistent instructions and standardized procedures to enhance measurement reliability. Participants were provided with familiarization trials where appropriate, and the best performance from multiple attempts was recorded for analysis.

Muscular strength was assessed using handgrip dynamometry and push-up performance. Handgrip dynamometry is widely recognized as a valid and reliable measure of upper-body strength when standardized testing protocols are followed (Darrall-Jones et al., 2016). Push-ups were included to assess functional upper-body strength and muscular endurance, consistent with established youth fitness testing batteries (Morina et al., 2022). Muscular endurance was further evaluated using the sit-up test, which provides an indication of core muscular endurance and fatigue resistance (Morina et al., 2022).

Speed performance was assessed using 10 m and 30 m sprint tests, representing acceleration and short-distance sprint capacity. Linear sprint tests have demonstrated high reliability in adolescent rugby populations when standardized procedures are applied (Darrall-Jones et al., 2016). Lower-body power was assessed using the standing broad jump, a widely accepted and reliable field-based test of explosive strength in youth populations (Thomas et al., 2020). Agility was measured using the shuttle run test, which reflects the ability to rapidly change direction and is commonly used in youth fitness assessments (Morina et al., 2022).

Flexibility was assessed using the sit-and-reach test, a standard measure of hamstring and lower-back flexibility included in many fitness test batteries (Morina et al., 2022). Aerobic capacity was evaluated using the multistage fitness test (bleep test), which provides a valid estimate of cardiorespiratory fitness and maximal oxygen uptake (VO_{2max}) in youth populations (Tomkinson et al., 2017).

Data Collection Procedure

All participants completed informed consent procedure before the physical test. Data collection was conducted at Universiti Putra Malaysia (UPM) and all of the test were conducted during morning session. Each test was performed two times excluding bleep test, and the best score was recorded for analysis. All testing procedures were conducted under researcher supervision to endure consistency and reliability.

Statistical Analysis

Descriptive statistics (mean \pm SD) were calculated, and multivariate analysis of variance (MANOVA) was used to assess differences between groups, with significance set at $p < .05$.

RESULTS

Descriptive Statistics

Descriptive statistics for all physical performance variables are presented in Table 1. Selected players demonstrated higher mean values across most variables, particularly in muscular strength, speed, and lower-body power compared to non-selected players.

Table 1: Descriptive Statistics for Physical Performance

Variable	Selected (n = 39)	Non-selected (n = 49)
Right Handgrip (kg)	30.84 \pm 6.60	26.02 \pm 6.82
Left Handgrip (kg)	29.61 \pm 6.57	25.99 \pm 7.05
Push-ups (reps)	22.18 \pm 9.20	17.35 \pm 7.28
Sit-ups (reps)	19.82 \pm 3.78	19.31 \pm 3.43
10 m Sprint (s)	1.93 \pm 0.13	1.95 \pm 0.15
30 m Sprint (s)	4.66 \pm 0.62	4.87 \pm 0.45
Standing Broad Jump (cm)	193.95 \pm 22.69	187.41 \pm 18.33
Shuttle Run (s)	11.34 \pm 0.68	11.65 \pm 0.85
Sit and Reach (cm)	33.97 \pm 5.58	32.09 \pm 6.74
Bleep Test (VO_{2max})	48.09 \pm 4.74	46.25 \pm 4.51

Note: Lower values indicate better performance for sprint and shuttle run tests.

Multivariate Analysis

A multivariate analysis of variance (MANOVA) was conducted to examine differences in physical performance between selected and non-selected players. The results revealed a statistically significant multivariate effect of selection status on physical performance, Wilks' Lambda = 0.971, $F(15, 67) = 1.96$, $p < .05$, partial $\eta^2 = .029$, indicating that the combined physical performance variables differed between groups. The results are presented in Table 2.

Table 2: MANOVA Results

Test	F	p	Partial η^2
Wilks' Lambda	1.96	< .05	.029

Selected players demonstrated higher mean values across most performance variables, particularly in muscular strength, speed, and lower-body power. MANOVA revealed a significant overall effect of selection status on physical performance ($p < .05$), indicating that selected players exhibited superior physical characteristics compared to non-selected players.

Univariate Analysis

As presented in Table 3, selection status was associated with significant differences in key physical performance variables. Selected players consistently outperformed non-selected players in muscular strength, upper-body endurance, sprint performance, and lower-body power, suggesting that these attributes play a critical role in selection decisions within the NRDP.

Table 3: Significant Differences and Interpretation of Physical Performance Variables

Variable	p-value	Significance
Right Handgrip (kg)	< .05	Significant
Left Handgrip (kg)	< .05	Significant
Push-ups (reps)	< .05	Significant
Sit-ups (reps)	> .05	Not significant
10 m Sprint (s)	> .05	Not significant
30 m Sprint (s)	> .05	Not significant
Standing Broad Jump (cm)	> .05	Not significant
Shuttle Run (s)	> .05	Not significant
Sit and Reach (cm)	> .05	Not significant
Bleep Test (VO ₂ max)	> .05	Not significant

Note: Significance based on univariate ANOVA results following MANOVA. Variables marked as significant indicate $p < .05$.

Follow-up univariate analyses indicated that significant differences between selected and non-selected players were observed in right-handgrip strength, left-handgrip strength, push-up performance, and balance beam ($p < .05$), while all other variables were not statistically significant.

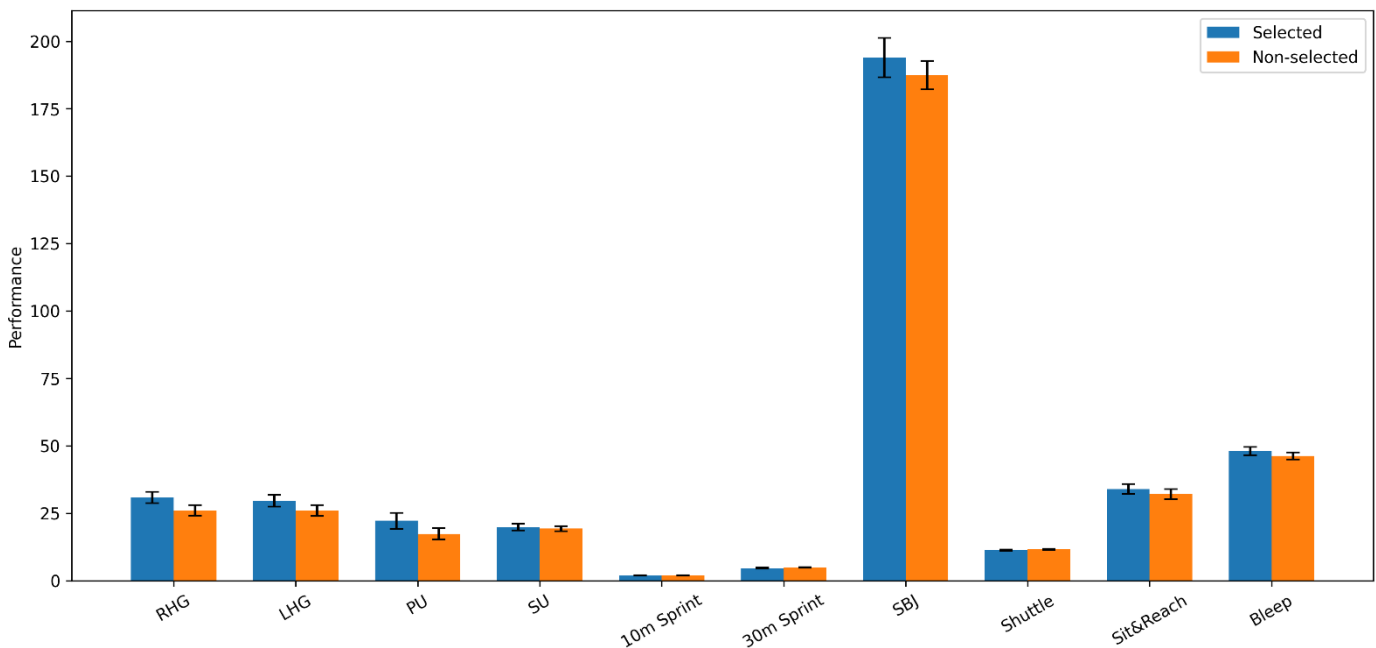


Figure 1: Comparison of Selected and Non-Selected Players Across Physical Performance Variables (Mean ± 95% CI).

Error bars represent 95% confidence intervals. Lower values indicate better performance for sprint and shuttle run tests.

As illustrated in Figure 1, selected players consistently outperformed non-selected players across key physical performance variables, particularly in muscular strength, sprint performance, and lower-body power.

DISCUSSION

The present study examined differences in physical performance between selected and non-selected youth rugby players within a national talent identification programme. The findings indicate that selected players exhibit superior performance in key physical attributes, particularly muscular strength, sprint speed, and lower-body power. These results are consistent with previous research identifying these attributes as critical determinants of rugby performance and selection outcomes (Gabbett, 2021b; Till et al., 2020; Weakley et al., 2021).

Muscular strength emerged as a key differentiating factor between groups, reinforcing its importance in contact-based actions such as tackling, rucking, and scrummaging. Similarly, speed and lower-body power were identified as important contributors to selection, reflecting their relevance to high-intensity match demands and repeated sprint efforts characteristic of rugby performance (Jones et al., 2021; Dos’Santos et al., 2021). Collectively, these findings support the continued use of physical performance assessments within youth rugby talent identification systems.

However, these findings must be interpreted within the developmental context of adolescence, where physical performance is strongly influenced by biological maturation. During this stage, substantial inter-individual variability exists due to differences in growth and maturation timing (Malina et al., 2015; Arede et al., 2021). Early-maturing athletes often demonstrate enhanced strength, speed, and power due to advanced physiological development rather than superior long-term potential. As a result, the observed performance differences between selected and non-selected players may reflect temporary maturation-related advantages rather than stable indicators of talent (Johnston et al., 2018; Dugdale et al., 2021).

While the present study highlights the potential influence of biological maturation on physical performance differences, it is important to note that no direct measures of maturation (e.g., peak height velocity, Tanner staging, or maturity offset) were included in the empirical analysis. Therefore, the interpretation of maturation-related bias remains inferential and should be interpreted with caution. Future research should incorporate objective maturation indicators to enable a more precise evaluation of its impact on talent identification processes.

This limitation has important implications for the validity and fairness of performance-based selection systems. An over-reliance on physical performance metrics may introduce systematic bias, favouring early-maturing individuals while potentially overlooking late-maturing athletes who may possess comparable or greater long-term potential (McCarthy et al., 2022). Such bias may negatively affect talent development pathways by reducing diversity and limiting the identification of future elite performers.

In addition, the generalisability of the present findings may be limited by the specific sample characteristics, as participants were drawn from a single national development programme. Differences in training environments, selection criteria, and development pathways across regions may influence physical performance outcomes. Therefore, future research should consider including more diverse samples across multiple regions and development systems to enhance the external validity of findings.

From a theoretical perspective, these findings align with contemporary models of talent identification, which emphasise the multidimensional and dynamic nature of athlete development (Baker et al., 2020). Talent should not be viewed as a static construct based solely on physical performance, but rather as an evolving interaction between physical, technical, tactical, and psychological factors over time.

From an applied perspective, the findings provide important implications for coaches and practitioners involved in youth rugby development. While physical testing remains a valuable component of the selection process, it should not be used in isolation. Integrating multiple performance domains, including technical skills, tactical understanding, and psychological characteristics, may enhance the accuracy and fairness of selection decisions and better support long-term athlete development.

Despite the valuable insights provided by this study, several limitations should be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships or determine whether the observed physical performance differences translate into long-term athletic success. While selected players demonstrated superior performance at the time of assessment, it remains unclear whether these advantages persist over time or accurately predict future elite performance outcomes.

Therefore, future research should adopt longitudinal designs to track the developmental trajectories of selected and non-selected athletes. Such approaches would enable a more comprehensive evaluation of talent identification effectiveness by examining how early selection decisions relate to long-term performance, retention, and progression within the sport. Longitudinal tracking may also help to disentangle the influence of biological maturation from true performance potential, providing a more valid basis for talent identification decisions.

CONCLUSION

The present study demonstrated that selected youth rugby players exhibit significantly superior performance in key physical attributes, particularly muscular strength, sprint speed, and lower-body power, compared to their non-selected counterparts. These findings reinforce the importance of physical performance as a critical component in talent identification within youth rugby development programmes. However, the results also highlight important limitations associated with the reliance on physical performance metrics, particularly during early adolescence, where differences in biological maturation may substantially influence performance outcomes. Consequently, selection processes based solely on physical attributes may favour early-maturing athletes, potentially overlooking individuals with long-term developmental potential.

From a practical perspective, these findings underscore the need for a more comprehensive and multidimensional approach to talent identification. Integrating physical, technical, tactical, and developmental assessments may enhance the accuracy and fairness of selection decisions while supporting sustainable athlete development pathways. However, it is important to acknowledge that maturation-related factors were not directly included in the present analysis, and thus the potential influence of biological maturation on selection outcomes remains inferential. Future research incorporating objective measures of maturation is warranted to provide a more comprehensive understanding of talent identification processes.

Future research should explore longitudinal approaches to better understand how early selection decisions influence athlete development over time, as well as investigate the interaction between maturation, training exposure, and performance outcomes across more diverse populations and development pathways.

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