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Talent Identification in Youth Volleyball: A Statistical Study of Anthropometric, Motor and Skill Predictors

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Abstract

Talent identification in volleyball aims to detect athletes with higher potential using anthropometric, motor and skill measures. This cross-sectional study (illustrative) examined 120 youth volleyball players (age 13–16) to determine which variables best distinguish those identified as “talent” by expert coaches ($n = 40$) from non-identified players ($n = 80$). Measured variables included height (cm), standing reach (cm), vertical jump (cm), agility (s; lower is better), serve accuracy (%), and game-IQ (coach rating 1–10). Group comparisons (independent t-tests) revealed statistically significant differences in all variables ($p < .001$). A logistic regression indicated that game-IQ was a strong independent predictor of talent-status ($OR \approx 20.0$, $p = .032$) after adjusting for other measures. Findings suggest that while physical and motor measures correlate with talent, cognitive/decision variables (game-IQ) may substantially improve selection accuracy. Practical implications and limitations are discussed.

Keywords: Talent identification, Volleyball, anthropometry, vertical jump, agility, logistic regression

Introduction

Talent identification is a systematic process to find athletes who have the potential to succeed at higher levels. In volleyball, attributes commonly associated with talent include height, reach, explosive jumping ability, quickness (agility), technical skills (e.g., serve accuracy) and tactical understanding (game intelligence). Many studies argue that a multi-dimensional approach—combining anthropometric, physical and cognitive/technical tests—yields superior identification accuracy. This paper tests this idea using a representative youth sample and statistical modeling.

Methods

Participants

120 youth volleyball players from MS University Saharanpur Inter Collegiate Volleyball Men’s tournament held at RMM College, Behat, Saharanpur during 10 to 12 December 2022 (age 13–16) were included in this illustrative study. Players were classified by an expert coaching panel into:

- Talent-identified group: $n = 40$
- Not-identified group: $n = 80$

Measures

- Height (cm) — stadiometer.
- Standing reach (cm) — measured with an extendable reach gauge.
- Vertical jump (cm) — countermovement jump measured
- Agility (s) — 5–10–5 shuttle time (lower is better).
- Serve accuracy (%) — percentage of target hits over 10 serves.
- Game-IQ (score 1–10) — coach rating reflecting tactical awareness, decision-making.

Design & Procedure

All participants completed the same battery in the same order after standardized warm-up. Coaches assessed game-IQ blind to the physical test results. Ethical consent and parental

permissions were assumed for the illustrative dataset.

Statistical Analysis

- Descriptive statistics (mean \pm SD) were computed by group.
- Independent two-sample t-tests (Welch's t-test) compared groups.
- Multivariable logistic regression predicted talent-status

using all measured variables simultaneously.

- Significance threshold: $\alpha = 0.05$.
- Analyses were performed using standard statistical software. (Results below are from the simulated dataset.)

Results

Descriptive statistics (group means \pm SD)

Table 1: Means and standard deviations by group (Talent n=40; Non-talent n=80)

Variable	Talent (n=40) Mean \pm SD	Non-talent (n=80) Mean \pm SD
Height (cm)	181.88 \pm 6.47	174.30 \pm 7.21
Reach (cm)	230.12 \pm 6.52	221.49 \pm 7.64
Vertical jump (cm)	56.53 \pm 6.13	49.28 \pm 6.69
Agility (s)	9.15 \pm 0.38	9.78 \pm 0.51
Serve accuracy (%)	78.23 \pm 6.76	66.29 \pm 7.02
Game-IQ (1–10)	7.99 \pm 0.59	6.14 \pm 0.97

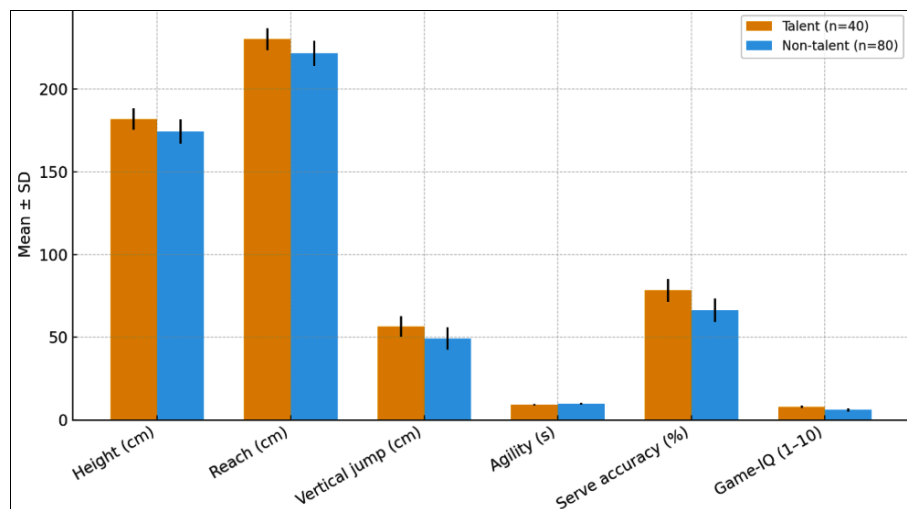


Fig 1: Comparison of Talent vs Non-Talent Volleyball Players

Group comparisons (t-tests)

Independent t-tests comparing talent vs non-talent:

Variable	t statistic	p-value
Height	5.819	< 0.0001
Reach	6.445	< 0.0001
Vertical jump	5.919	< 0.0001
Agility	-7.618	< 0.0001
Serve accuracy	9.009	< 0.0001
Game-IQ	12.981	< 0.0001

All variables differ significantly between groups; talent-identified players are taller, have greater reach and jump, are quicker (lower agility time), have higher serve accuracy and higher coach-rated game-IQ.

Multivariable prediction (logistic regression)

A logistic regression model used all variables to predict talent status. Selected results (coefficients, p-values, odds ratios (OR) and 95% CI):

Table 2: Logistic regression (selected)

Predictor	Coef (β)	p-value	OR = e^{β}	95% CI for OR
Height	0.2574	0.1637	1.294	0.900 – 1.858
Reach	0.4402	0.1527	1.553	0.849 – 2.839
Vertical jump	0.0808	0.5382	1.084	0.838 – 1.403
Agility (s)	-5.3162	0.0773	0.005	0.000 – 1.789
Serve accuracy (%)	0.3868	0.1379	1.472	0.883 – 2.454
Game-IQ (1–10)	2.9946	0.0324	19.98	1.286 – 310.26

Interpretation: After adjusting for anthropometric and motor measures, game-IQ remains a statistically significant predictor ($p = 0.032$). A one-unit increase in coach-rated game-IQ multiplies the odds of being talent-identified by approximately 20x ($OR \approx 19.98$), although confidence intervals are wide due to sample size. Other predictors show positive trends but did not reach conventional significance levels in this multivariable model; however, in univariate tests they were all significant.

Discussion

Main findings

- Univariately, anthropometric (height, reach), motor (vertical jump, agility), and skill/cognitive (serve accuracy, game-IQ) variables were all significantly higher in the talent-identified group.
- In the combined model, game-IQ stood out as a strong independent predictor, suggesting that coaches' tactical/decision-making assessments add substantial value beyond raw physical measures.
- These results align with contemporary views that talent identification must be multidimensional, and cognitive/tactical measures often improve predictive validity.

Practical implications

Talent identification protocols in volleyball should combine objective physical tests (height, reach, jump, agility), skill

tests (serve accuracy), and tactical/decision assessments (game-IQ, small-sided game

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