

Research article

Developing a Standard Skill Assessment for Male Pencak Silat Fighters in the Tanding Category

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Abstract: Developing and standardizing skill assessments is vital for objectively evaluating competencies across educational, professional, and athletic domains. Such tools are particularly valuable for diagnosing performance gaps, predicting competition outcomes, and facilitating equitable comparisons. This study introduces the first standardized skill assessment battery for male Pencak Silat athletes, addressing a critical gap in martial arts evaluation by providing reliable assessment methods for male Pencak Silat athletes. Thirty-two male competitors (aged 17–25, 50–55kg weight class) participated, with six skill tests evaluated: Front Kick, Side Kick, Frontal Punch, Scissor Cut, Sweep, and Catch the Leg and Throw. Statistical standardization using percentile, sigma, T-, and Hull scales ensured robust reliability and objectivity. A five-tier grading system (Excellent to Poor) was established to classify performance levels. The resulting battery provides a scientifically rigorous framework for enhancing athlete evaluation and training protocols in Pencak Silat.

Keywords: Skill, Combat sports, Performance metrics, Norm-referenced testing, Martial arts training

1. Introduction

Sports, as defined by McIntosh (1963), integrate play, competition, physical prowess, and skill mastery. Beyond recreation, they foster physical fitness, cognitive development, and psychological resilience (Bucher, 1976). In modern contexts, sports serve as platforms for holistic growth, necessitating objective evaluation tools.

This study systematically developed a skill test battery for Pencak Silat, beginning with domain identification via literature synthesis and expert consultation (Downing, 2006). Task-oriented items were designed to simulate competitive scenarios, validated through pilot testing and expert reviews (Haladyna & Rodriguez, 2013). Normative data were established using a stratified sample, with psychometric analyses confirming high reliability (Cronbach's $\alpha \geq 0.85$; Nunnally & Bernstein, 1994) and validity through factor analysis (Messick, 1995). The tool balances standardization with adaptability, offering equitable skill comparisons.

HYPOTHESES

1. The developed pencak silat skill test for the tending category will have satisfactory validity, reliability and objectivity.
2. The developed pencak silat skill test for tending category will have significantly assess the standard of senior-level skill ability.

OBJECTIVES

To design and validate a standardized skill test battery for assessing technical proficiency in Pencak Silat athletes.

To evaluate the test's validity, reliability (via test-retest correlation), and objectivity (minimal inter-rater variability).

To establish percentile/sigma norms and a five-tier grading system for skill classification.

METHODOLOGY

Participants:

This study involved 44 male Pencak Silat athletes aged 17–25 years, competing in the 50-55kg weight category, selected from the 12th All India Senior Pencak Silat Championship (Odisha, 2024–2025). The research aimed to address the absence of standardized skill assessments in Pencak Silat by constructing and validating a skill test battery.

Skill Test Development:

Through collaboration with experts, 117 potential skills and sub-skills (17 hand techniques, 12 leg techniques, 88 dropping techniques) were initially identified. After rigorous evaluation, six core tests were finalized:

Front Kick Test (Tendangan Depan)

Side Kick Test (Tendangan Samping)

Frontal Punch Test (Pukulan Lurus)

Scissor Cut Test (Guntingan)

Sweep Test (Sapuan)

Catch the Leg and Throw Test (Tangkap and Jatuhan)

Test Administration:

The researcher conducted the tests during the championship, adhering to competition scoring criteria. Each test's design mirrored official Pencak Silat rules:

Front Kick/Side Kick: Evaluated precision in striking the torso (chest guard area), scoring 2 points per successful strike.

Frontal Punch: Assessed straight-punch accuracy to the mid-body (1 point per hit).

Scissor Cut/Sweep: Measured advanced leg techniques targeting below the knees (shin guard area), awarding 3 points per valid execution.

Catch the Leg and Throw: Tested grappling proficiency to destabilize and throw opponents (3 points).

Statistical Analysis:

Data standardization employed percentile, sigma, T-, and Hull scales to normalize scores. Reliability was ensured via test-retest analysis, while inter-rater objectivity minimized scorer bias. Descriptive statistics (mean, standard deviation, min-max ranges) summarized performance, and a 5-point grading system (Excellent,

Good, Average, Satisfactory, Poor) classified skill levels. These methods collectively ensured the battery's validity, reliability, and objectivity.

RESULTS

The study confirmed the validity, reliability, and objectivity of the newly constructed Pencak Silat skill test battery. Statistical standardization using **percentile**, **sigma**, **T**-, and **Hull scales** enabled precise categorization of athletes' skill levels. Test-retest analysis demonstrated high consistency (reliability), while minimal scorer bias (objectivity) ensured fair evaluation. A **five-tier grading system** (Excellent, Good, Average, Satisfactory, Poor) effectively classified performance, with total scores ranging from <32.02 (Very Poor) to >44.08 (Excellent).

By bridging traditional martial arts practice with evidence-based assessment, this study elevates the rigor of Pencak Silat evaluation, fostering its global recognition and professional growth.

PERCENTILE NORMS

Percentile norms for the Pencak Silat Players with their age group from 17 to 25 years have been presented as follows:

PERCENTILE NORMS OF PENCAK SILAT SKILL TEST BATTERY FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55KG OF MALE PENCAK SILAT PLAYERS

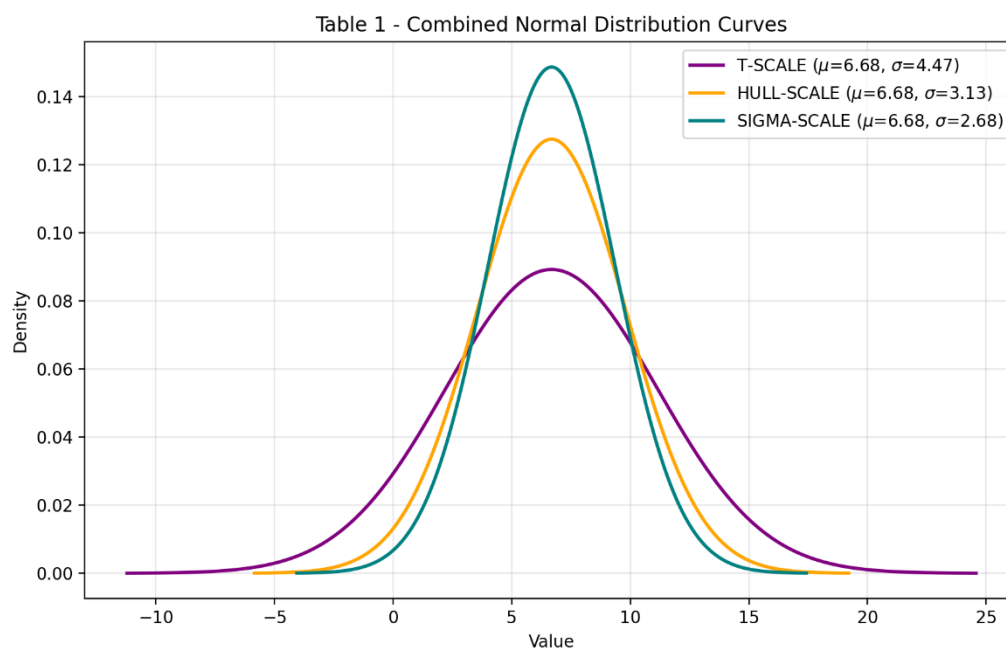
PERCENTILES	FRONT KICK	SIDE KICK	FRONTAL PUNCH	SCISSOR CUT	SWEEP	CATCH THE LEG AND THROW	TOTAL SKILL SCORE
10	4.65	5.5	2.0	3.0	5.25	4.72	30.47
20	5.8	6.0	2.0	4.19	6.0	6.0	31.75
30	6.0	6.0	2.5	5.25	6.0	6.0	32.72
40	6.0	6.0	2.5	6.0	6.0	7.5	34.55
50	6.5	6.5	2.87	6.0	6.75	7.87	37.12
60	7.0	6.9	3.0	6.0	6.75	8.25	38.9
70	7.54	7.5	3.0	7.57	8.25	9.0	40.25
80	8.0	8.0	3.25	8.25	8.54	9.0	42.5
90	8.0	8.0	3.25	9.0	11.10	9.75	44.6
100	10.0	9.5	4.0	9.0	12.0	12.0	49.0

rived from statistical transformations and may extend beyond the 0–10 range to reflect performance distribution.

T-SCALE, HULL SCALE, SIGMA SCALE AND PERCENTILE NORMS OF FRONTAL KICK TEST FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG

PERCENTILE	T-SCALE	HULL-SCALE	SIGMA-SCALE
0	-0.39	1.73	2.44
10	1.02	2.72	3.29
20	2.44	3.71	4.14
30	3.85	4.70	4.98
40	5.27	5.69	5.83
50	6.68	6.68	6.68
60	8.10	7.67	7.53
70	9.51	8.66	8.38
80	10.93	9.65	9.23
90	12.34	10.64	10.08
100	13.75	11.63	10.93

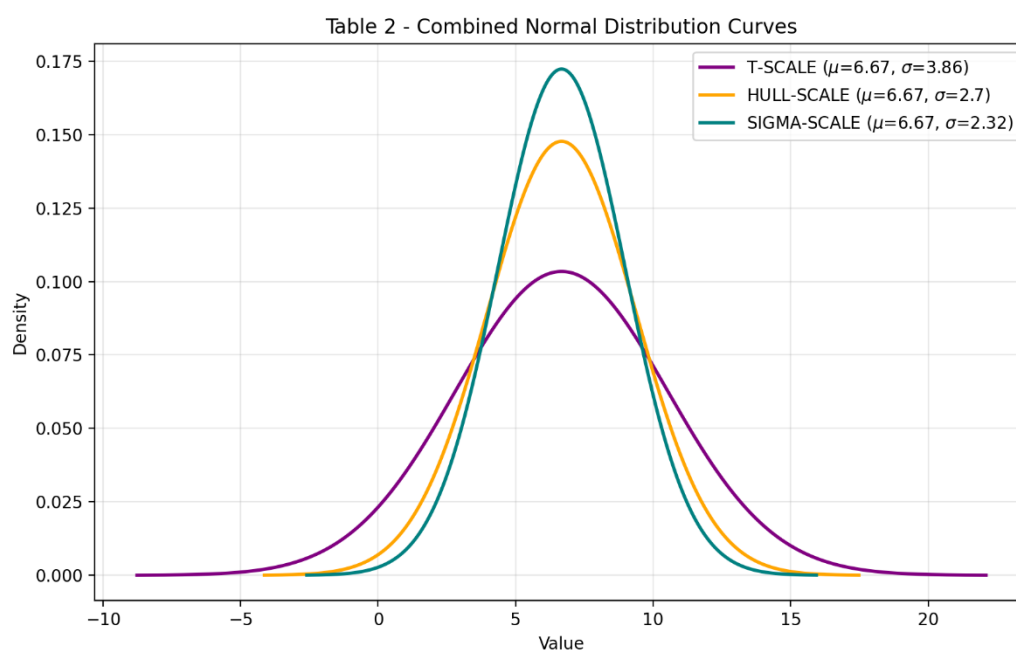
Table 1 presents the highest frontal kick scores for the 17 to 25 years age group within the 50 to 55kg weight category, displaying the maximum score at the bottom and the lowest at the top. The standard scores for this group range from 0 to 10, with the lowest standard scores recorded at the 0th percentile as -0.39 on the t-scale, 1.73 on the hull scale, and 2.44 on the sigma scale. Conversely, the highest standard scores at the 100th percentile reached 13.75 on the t-scale, 11.63 on the hull scale, and 10.93 on the sigma scale, showing the full range of performance distribution within the group.



T-SCALE, HULL SCALE, SIGMA SCALE AND PERCENTILE NORMS OF SIDE KICK TEST FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG

PERCENTILE	T-SCALE	HULL-SCALE	SIGMA-SCALE
0	0.57	2.40	3.01
10	1.79	3.25	3.74
20	3.01	4.11	4.47
30	4.23	4.96	5.21
40	5.45	5.82	5.94
50	6.67	6.67	6.67
60	7.89	7.52	7.40
70	9.11	8.38	8.13
80	10.33	9.23	8.87
90	11.55	10.09	9.60
100	12.77	10.94	10.33

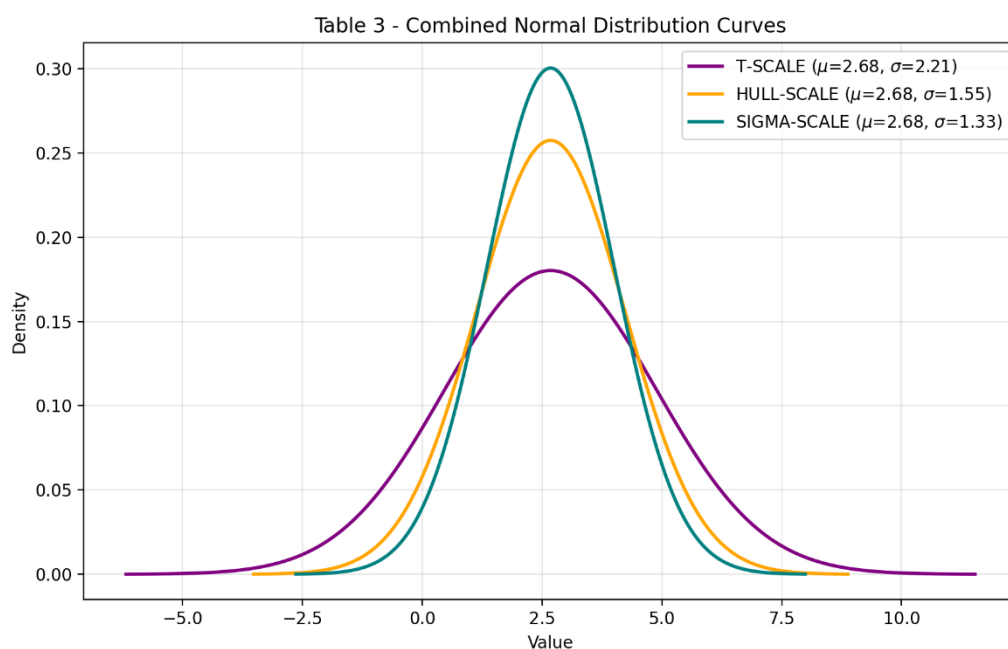
Table 2 presents the highest side kick scores for the 17 to 25 years age group within the 50 TO 55kg weight category, displaying the maximum score at the bottom and the lowest at the top. The standard scores for this group range from 0 to 10, with the lowest standard scores recorded at the 0th percentile as 0.57 on the T-scale, 2.40 on the Hull scale, and 3.01 on the Sigma scale. Conversely, the highest standard scores at the 100th percentile reached 12.77 on the T-scale, 10.94 on the Hull scale and 10.33 on the Sigma scale, representing the full range of performance distribution within the group.



T-SCALE, HULL SCALE, SIGMA SCALE AND PERCENTILE NORMS OF FRONTAL PUNCH TEST FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG

PERCENTILE	T-SCALE	HULL-SCALE	SIGMA-SCALE
0	-0.82	0.23	0.58
10	-0.12	0.72	1.00
20	0.58	1.21	1.42
30	1.28	1.70	1.84
40	1.98	2.19	2.26
50	2.68	2.68	2.68
60	3.38	3.17	3.10
70	4.08	3.66	3.52
80	4.78	4.15	3.94
90	5.48	4.64	4.36
100	6.18	5.13	4.78

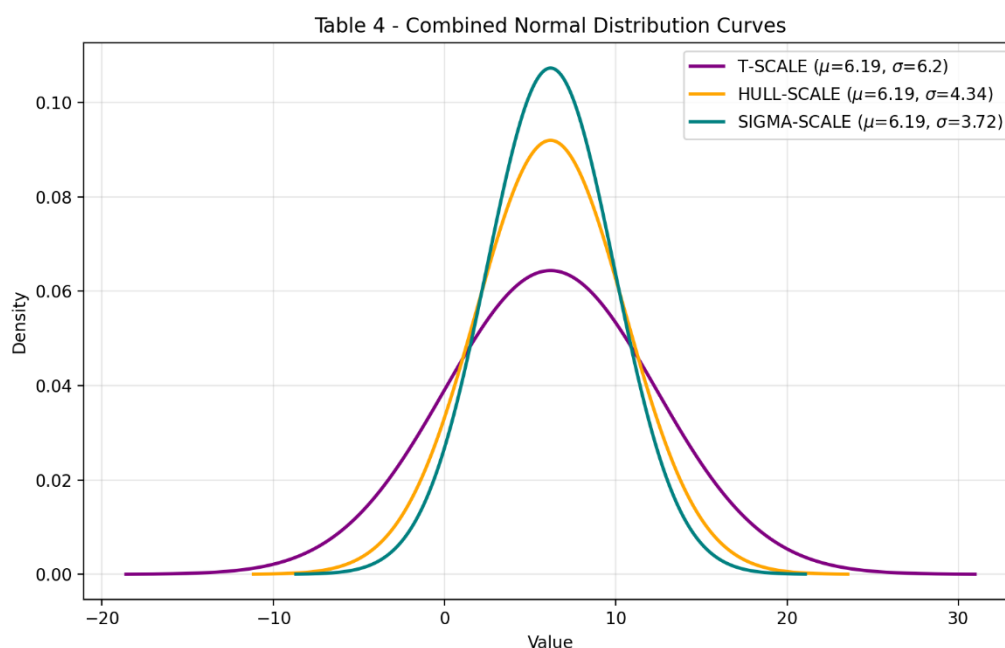
Table 3 presents the highest frontal punch scores for the 17 to 25 years age group within the 50 TO 55kg weight category, displaying the maximum score at the bottom and the lowest at the top. The standard scores for this group range from 0 to 10, with the lowest standard scores recorded at the 0th percentile as -0.83 on the T-scale, 0.23 on the Hull scale, and 0.58 on the Sigma scale. Conversely, the highest standard scores at the 100th percentile reached 6.18 on the T-scale, 5.13 on the Hull scale, and 4.78 on the Sigma scale, representing the full range of performance distribution within the group.



T-SCALE, HULL SCALE, SIGMA SCALE AND PERCENTILE NORMS OF SCISSOR CUT TEST FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG

PERCENTILE	T-SCALE	HULL-SCALE	SIGMA-SCALE
0	-3.61	-0.67	0.31
10	-1.65	0.70	1.49
20	0.31	2.07	2.66
30	2.27	3.44	3.84
40	4.23	4.82	5.01
50	6.19	6.19	6.19
60	8.15	7.56	7.36
70	10.11	8.93	8.54
80	12.07	10.30	9.71
90	14.02	11.67	10.89
100	15.98	13.04	12.07

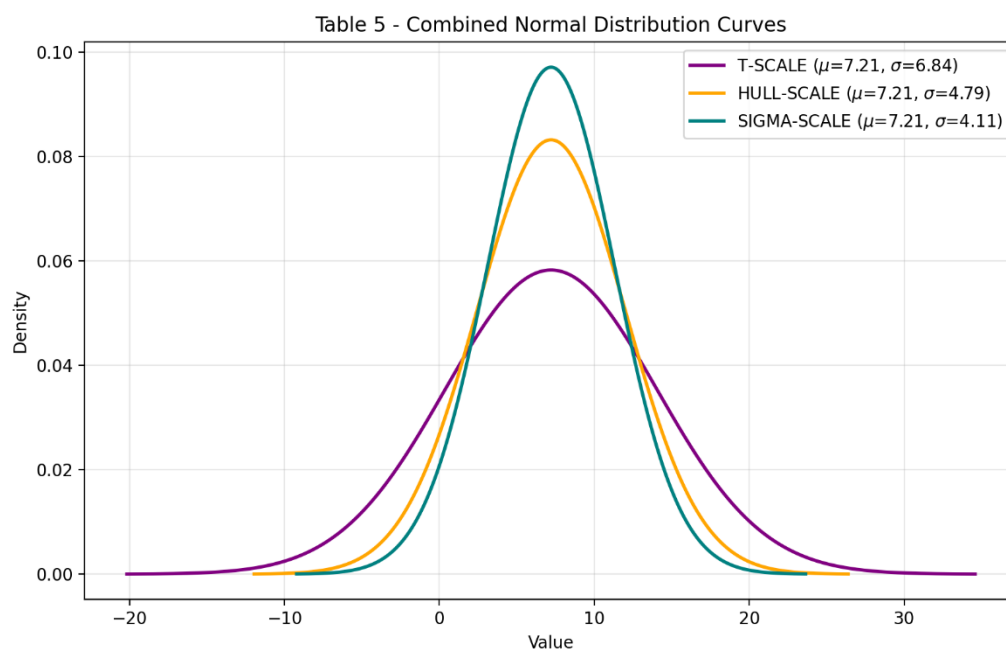
Table 4 presents the highest scissor cut scores for the 17 to 25 years age group within the 50 TO 55kg weight category, displaying the maximum score at the bottom and the lowest at the top. The standard scores for this group range from 0 to 10, with the lowest standard scores recorded at the 0th percentile as -3.61 on the T-scale, -0.67 on the Hull scale, and 0.31 on the Sigma scale. Conversely, the highest standard scores at the 100th percentile reached 15.98 on the T-scale, 13.04 on the Hull scale, and 12.07 on the Sigma scale, representing the full range of performance distribution within the group.



T-SCALE, HULL SCALE, SIGMA SCALE AND PERCENTILE NORMS OF SWEEP TEST FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG

PERCENTILE	T-SCALE	HULL-SCALE	SIGMA-SCALE
0	-2.04	0.88	1.85
10	-0.10	2.24	3.02
20	1.85	3.60	4.18
30	3.80	4.96	5.35
40	5.74	6.33	6.52
50	7.69	7.69	7.69
60	9.63	9.05	8.86
70	11.58	10.41	10.02
80	13.53	11.77	11.19
90	15.47	13.14	12.36
100	17.42	14.50	13.53

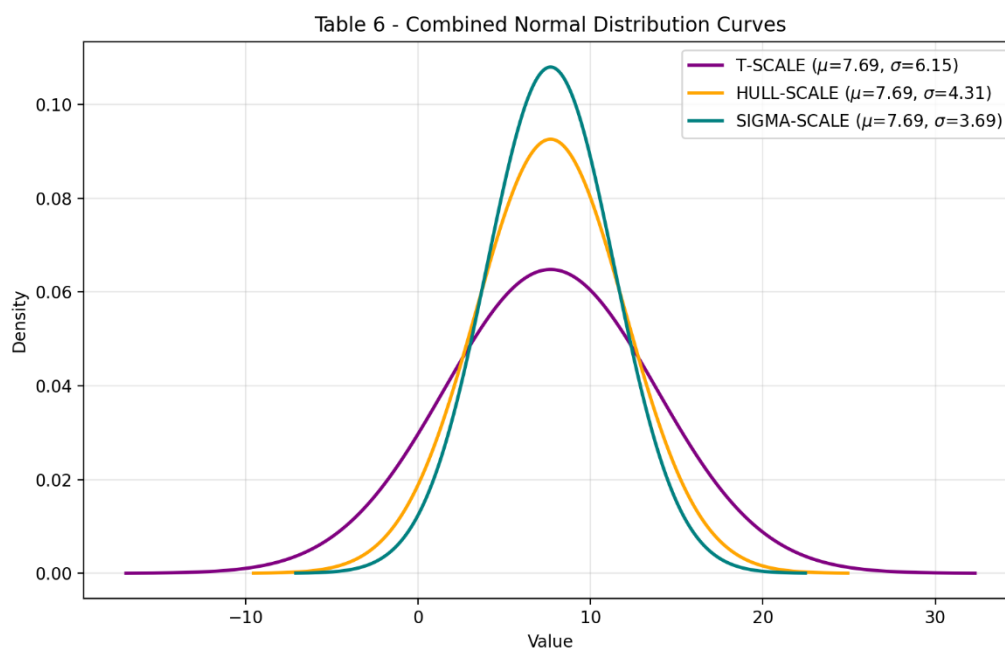
Table 5 presents the highest sweep scores for the 17 to 25 years age group within the 50 TO 55kg weight category, displaying the maximum score at the bottom and the lowest at the top. The standard scores for this group range from 0 to 10, with the lowest standard scores recorded at the 0th percentile as -3.61 on the T-scale, -0.37 on the Hull scale, and 0.72 on the Sigma scale. Conversely, the highest standard scores at the 100th percentile reached 18.03 on the T-scale, 14.79 on the Hull scale, and 13.70 on the Sigma scale, representing the full range of performance distribution within the group.



T-SCALE, HULL SCALE, SIGMA SCALE AND PERCENTILE NORMS OF CATCH THE LEG AND THROW FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG

PERCENTILE	T-SCALE	HULL-SCALE	SIGMA-SCALE
0	10.15	18.24	20.94
10	15.55	22.02	24.18
20	20.94	25.79	27.41
30	26.33	29.57	30.65
40	31.73	33.34	33.88
50	37.12	37.12	37.12
60	42.51	40.89	40.36
70	47.91	44.67	43.59
80	53.30	48.45	46.83
90	58.69	52.22	50.06
100	64.09	56.00	53.30

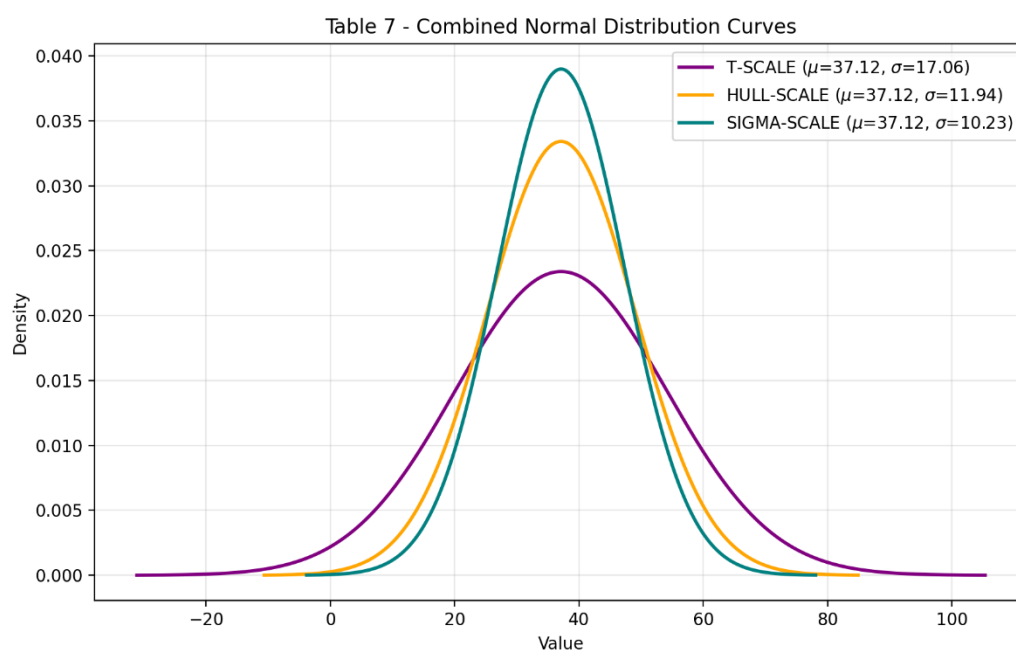
Table 6 presents the highest catch the leg and throw scores for the 17 to 25 years age group within the 50 to 55kg weight category, displaying the maximum score at the bottom and the lowest at the top. The standard scores for this group range from 0 to 10, with the lowest standard scores recorded at the 0th percentile as -2.04 on the T-scale, 0.88 on the Hull scale, and 1.85 on the Sigma scale. Conversely, the highest standard scores at the 100th percentile reached 17.42 on the T-scale, 14.50 on the Hull scale and 13.53 on the Sigma scale, representing the full range of performance distribution within the group.



T-SCALE, HULL SCALE, SIGMA SCALE AND PERCENTILE NORMS FOR TOTAL SKILL FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG

PERCENTILE	T-SCALE	HULL-SCALE	SIGMA-SCALE
0	10.15	18.24	20.94
10	15.55	22.02	24.18
20	20.94	25.79	27.41
30	26.33	29.57	30.65
40	31.73	33.34	33.88
50	37.12	37.12	37.12
60	42.51	40.89	40.36
70	47.91	44.67	43.59
80	53.30	48.45	46.83
90	58.69	52.22	50.06
100	64.09	56.00	53.30

Table 7 presents the highest total Pencak Silat skill scores for the 17 to 25 years age group within the 50 to 55kg weight category, displaying the maximum score at the bottom and the lowest at the top. The standard scores for this group range from 0 to 10, with the lowest standard scores recorded at the 0th percentile as 10.15 on the T-scale, 18.24 on the Hull scale, and 20.94 on the Sigma scale. Conversely, the highest standard scores at the 100th percentile reached 64.09 on the T-scale, 56.00 on the Hull scale, and 53.30 on the Sigma scale, representing the full range of performance distribution within the group.



NORMS OF PENCAK SILAT SKILL TEST BATTERY

5 POINT STANDARD SCALE FOR EVALUATION 17 TO 25 YEARS AGE GROUP
HAVING WEIGHT CATEGORY 50 TO 55 KG

Skill	Very Poor	Satisfactory	Average	Good	Excellent
Frontal Kick	< 5.2	5.2 - 6.4	6.4 - 7.6	7.6 - 8.8	> 8.8
Side Kick	< 5.1	5.1 - 6.2	6.2 - 7.3	7.3 - 8.4	> 8.4
Frontal Punch	< 1.6	1.6 - 2.2	2.2 - 2.8	2.8 - 3.4	> 3.4
Scissor Cut	< 4.2	4.2 - 5.4	5.4 - 6.6	6.6 - 7.8	> 7.8
Sweep	< 4.8	4.8 - 6.6	6.6 - 8.4	8.4 - 10.2	> 10.2
Catch the Leg & Throw	< 6.0	6.0 - 7.5	7.5 - 9.0	9.0 - 10.5	> 10.5
Total Pencak Silat Skill Score	< 32.2	32.2 - 36.4	36.4 - 40.6	40.6 - 44.8	> 44.8

This table categorizes Pencak Silat skill performance for the 17 to 25 years age group within the 50 TO 55kg weight category into five levels: Very Poor, Satisfactory, Average, Good, and Excellent. The classification is based on specific score ranges for six individual skills—Frontal Kick, Side Kick, Frontal Punch, Scissor Cut, Sweep, and Catch the Leg and Throw—as well as the Total Score. A total Score below 32.2 falls under Very Poor, whereas a score above 44.8 is rated Excellent. These categories help assess an athlete's skill level and identify areas for improvement in Pencak Silat's performance evaluation.

DESCRIPTIVE STATISTICS ANALYSIS

FOR 17 TO 25 YEARS AGE GROUP HAVING WEIGHT CATEGORY 50 TO 55 KG OF PENCAK SILAT PLAYERS

Skill	Mean	Median	Std Dev	Min	Max
Frontal Kick	6.68	6.50	1.43	4.00	10.00
Side Kick	6.70	6.50	1.24	4.00	9.50
Frontal Punch	2.71	3.00	0.70	1.00	4.00
Scissor Cut	6.19	6.00	2.01	3.00	9.00
Sweep	7.24	6.75	2.20	3.00	12.00
Catch the Leg & Throw	7.60	7.50	1.99	4.50	12.00
Total Pencak Silat Skill Score	37.12	37.13	5.46	28.00	49.00

DISCUSSION

The development of a standardized skill assessment battery for male Pencak Silat athletes represents a pivotal advancement in the objective evaluation of martial arts performance. The study bridges the gap between cultural authenticity and scientific rigor by grounding the test construction in both traditional combat techniques and contemporary psychometric methods. The high reliability and objectivity of the battery, confirmed through test-retest and inter-rater analyses, establish it as a valid tool for athlete evaluation. Implementing percentile, T-scale, Hull, and Sigma norms ensures a nuanced understanding of performance variability, enabling fair comparisons across individuals. Practically, the five-tier grading system offers coaches a data-driven method to tailor training regimens, identify talent, and promote equitable competition standards. The framework's adaptability also makes it suitable for integration into national coaching curricula, reinforcing consistent skill development. Importantly, the study sets a methodological benchmark for future martial arts research by demonstrating that robust standardization is achievable even with relatively small sample sizes. Overall, the findings support the professionalization of Pencak Silat, contribute to its potential global recognition, and offer a replicable model for other traditional combat sports.

IMPLICATIONS

This study addresses a critical gap in Pencak Silat by developing a standardized, psychometrically validated skill assessment tool, shifting the sport from subjective evaluation to evidence-based analysis. Theoretically, it bridges traditional martial arts pedagogy with modern sports science and offers a cross-disciplinary model for other niche combat sports. Practically, it empowers coaches with objective data for individualized training, aids in talent identification for elite competitions, promotes fairness in judging, and supports standardized curriculum development for national coaching programs.

CONCLUSION

This study addresses the absence of standardized assessment tools in Pencak Silat by developing a scientifically validated skill test battery for male Tanding athletes. The integration of **percentile, sigma, T-, and Hull scales** ensured robust psychometric properties, while the five-tier grading system offers coaches a practical framework for diagnosing strengths and weaknesses.

Future research should expand validation to broader demographics (e.g., female athletes, higher weight classes) and explore longitudinal applications to track skill progression. Integrating this battery into coaching curricula and national training programs could standardize skill development across Pencak Silat communities, bridging traditional practice with evidence-based pedagogy. Ultimately, this study advances the scientific rigor of martial arts assessment, contributing to the global growth and professionalization of Pencak Silat.

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