

Comparative Analysis of Mental Toughness Among Medallist and Non-Medallist University Archery Players

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Abstract— The well-documented relationship between sport performance and psychological factors shall, however, now be emphasized: While physical ability and technical skill associate high-performance athletes with each other, the question of how they deliver under pressure is defined by their psychological make-up. The current study evaluated and compared mental toughness between medal winning ($n=54$) university archery players with non-medallists ($n=32$) on four domains of Commitment/Motivation, Concentration/Focus, Control Under Pressure and Confidence/Self-Belief measured by The Mental Toughness Scale. Purposive sampling was conducted for selecting a total of forty archers (20 medallists and 20 non medals) in the age category of 18-25 years. A modified version of the Alan Heary Mental Toughness Test served to assess mental toughness through a 24-item questionnaire. Independent-samples t -tests revealed significant differences between groups for all four components of well-being and the global composite score ($p < 0.001$). As per the scoring system employed, Medallists earned a lower overall mean score ($M = 4.45$, $SD = 1.61$) than non-medallists ($M = 14.20$, $SD = 2.42$), which provides greater evidence for mental toughness compared to their mates who did not achieve medals. These findings provide the first evidence that commitment, attentional control,

pressure management and self-belief are potential resilience factors directly linked to competitive performance in university-level archery.

Keywords —archery, medallist, mental toughness, precision sport, sport psychology, university athletes.

I. INTRODUCTION

It is the interaction of physical characteristics, technical skills and tactical judgment with psychological readiness that determines sport performance. Athletes are often required to maintain emotional stability, sustained concentration, and self-assurance in the face of evaluative demands. This conceptualization of mental toughness has led to pervasive discussions about it being a multifaceted psychological trait that is linked to psychological consistency, persistence, control, and efficient coping in the context of demanding sport environments. [1]- [4].

Some small disturbances in attention, arousal, breathing, posture or confidence can affect shot execution; thus archery is a precision sport. Investigations in top-level and expert archers have been associated performance with attention, psychophysiological regulation, emotional control, and self-confidence. As a result, psychological preparation is not an additional layer on top of technical training; it constitutes a necessary

component of sustaining a reliable shot routine over long tournament rounds. [5]- [8].

At the university level, athletes often compete against opponents with broadly comparable technical preparation. Under these conditions, the ability to remain focused after an error, manage competitive stress, sustain motivation, and preserve self-belief may help distinguish medal-winning performances from non-medal-winning performances. Examining these dimensions among university archers can therefore provide practically relevant evidence for coaches and physical-education specialists. [3], [7]- [9].

II. OBJECTIVE & HYPOTHESIS

The objective of the study was to compare medalist and non-medalist All India Inter-University archery players on overall mental toughness and on four sub-components: Commitment/ Motivation, Concentration/Focus, Control Under Pressure, and Confidence/Self-Belief. The null hypothesis stated that no statistically significant group differences would occur, whereas the alternative hypothesis stated that medalists and non-medalists would differ significantly on the measured dimensions. [1], [4].

III. METHODOLOGY

A. Selection of Subjects: The study included forty (N = 40) All India Inter-University archery players aged 18-25 years. The sample comprised twenty medallists and twenty non-medallists selected through purposive sampling because participation status and competitive achievement were essential eligibility criteria. Medallists were players who had secured a gold, silver, or bronze medal at the All India Inter-University level; non-medallists had participated at the same competitive level without winning a medal. [19].

B. Selection of Variables: The performance status was considered the explanatory variable and divided into medallist or non-medallist. The dependent

variable was mental toughness as summarized by the composite score of Commitment/Motivation, Concentration/Focus, Control Under Pressure and Confidence/Self-Belief. This multi-dimensional treatment is consistent with established sport-psychology approaches that regard mental toughness as coalesced capacities of related but non-isolated psychological characteristics not merely a singular military trait. [2], [4].

TABLE I
VARIABLES OF THE STUDY

Type of Variable	Variable	Description
Independent Variable	Performance Status	Medalist / Non-Medalist
Dependent Variable	Mental Toughness	Composite score from four sub-components

C. Criterion Measure and Scoring: Mental toughness was assessed using an adapted questionnaire of the Alan Heary Mental Toughness Test. The instrument included a total of 24 items, with six in each of the four sections: Commitment/Motivation, Concentration/Focus, Control Under Pressure, and Confidence/Self-Belief. One point for each checked and zero points for each unchecked statement, yielding a possible total score ranging from 0 to 24. Scores in the range 0–4 are labelled as Thriving, scores 5–14 as Surviving, and scores 15-24 as Struggling, under the interpretation adopted (with lower scores indicating greater mental toughness). [12].

D. Statistical Techniques: We computed the means and standard deviations for both groups. Independent-samples t-tests were conducted to compare medallist's and non-medallist's on the four components, as well as the overall score. Statistical significance was judged at the 0.05 level, with 38 degrees of freedom for the reported group comparisons. Due to the fact that the design was cross-sectional, and group membership was not

experimentally manipulated: While the analysis identifies group differences, it does not demonstrate causation. [20].

IV. RESULTS

The descriptive statistics are presented in Table II. Because the adopted instrument is negatively scored, a lower mean indicates a stronger mental-toughness profile. Across every component, medallist's recorded lower scores than non-medallist's, indicating fewer reported weaknesses in commitment, concentration, control under pressure, and confidence. [12].

TABLE II
DESCRIPTIVE STATISTICS FOR MENTAL TOUGHNESS SCORES (N = 40)

Component	Medallists Mean (SD)	Non-Medallists Mean (SD)	Category (Med.)	Category (Non-Med.)
Commitment / Motivation	1.20 (0.83)	3.75 (1.25)	Low weakness	Moderate weakness
Concentration / Focus	1.05 (0.83)	3.85 (1.14)	Low weakness	Moderate weakness
Control Under Pressure	1.05 (0.60)	3.15 (1.31)	Low weakness	Moderate weakness
Confidence / Self-Belief	1.15 (0.93)	3.45 (1.05)	Low weakness	Moderate weakness
Overall Mental Toughness	4.45 (1.61)	14.20 (2.42)	Thriving (0-4)*	Surviving (5-14)

*Note: Lower Mean Scores Indicate Higher Mental Toughness. *The Medalist Group Mean of 4.45 Is Close to, But Slightly Above, The Individual-Score Thriving Cut-Off of 4; Therefore, The Category Label Should Be Interpreted Descriptively at The Group Level.*

The medalist group obtained an overall mean of 4.45 (SD = 1.61), whereas the non-medalist group obtained a mean of 14.20 (SD = 2.42). The medalist mean was close to the upper boundary of the Thriving band, while the non-medalist mean was at the upper boundary of the Surviving band. The same direction of difference was observed across all four sub-components, showing a consistent descriptive advantage for medalists under the questionnaire scoring framework. [12]

Table III presents the inferential comparisons. Every obtained t-value exceeded the critical value of 2.024 at $df = 38$, and each reported probability was below 0.001. The null hypothesis was therefore rejected for all four sub-components and for the overall mental-toughness score. [20].

TABLE III
INDEPENDENT-SAMPLES T-TEST COMPARISON OF MEDALISTS AND NON-MEDALISTS

Component	Medallists Mean	Non-Med. Mean	t-value	p-value	Result
Commitment / Motivation	1.20	3.75	7.585	< 0.001	Significant
Concentration / Focus	1.05	3.85	8.913	< 0.001	Significant
Control Under Pressure	1.05	3.15	6.513	< 0.001	Significant
Confidence / Self-Belief	1.15	3.45	7.322	< 0.001	Significant
Overall Mental Toughness	4.45	14.20	15.019	< 0.001	Significant

Significant at The 0.05 Level; Critical T = 2.024, Df = 38.

Commitment/Motivation differed significantly between medalists and non-medalists ($t = 7.585$, $p < 0.001$). Concentration/Focus produced the largest sub-component t-value ($t = 8.913$, $p < 0.001$), followed by Confidence/Self-Belief ($t = 7.322$, $p < 0.001$) and Control Under Pressure ($t = 6.513$, $p < 0.001$). The overall comparison was also significant ($t = 15.019$, $p < 0.001$), indicating a substantial

separation between the two groups on the composite score. [20]

V. DISCUSSIONS

From the analysis, medalist university archers reported a more positive mental-toughness profile than non-medalists. The outcome aligns with conceptual accounts in which mental toughness facilitates appraisal, coping, persistence, and performance under pressure or adversity for athletes. However, medal status and mental toughness were assessed concurrently, thus the finding should be regarded as an association rather than evidence of causation of competitive success by mental toughness. [1], [3], [4].

An important discrepancy in Commitment/Motivation indicates that medalists may be more steady about keeping at training goals and maintaining effort during adversity. Commitment diligence and perseverance with longer term goals are traits that show up in research on mentally tough performers. Those traits can allow players to maintain training standards post-poor performances and still pursue performance goals at the season level [1], [14], [17].

The area where this first really showed variance between the two groups was, not surprisingly given my previous writing, Concentration/Focus (the greatest difference of the four sub-components). This outcome is particularly important in archery, which demands that athletes focus attention on task-related information while ignoring opponent, rank, previous shots and expected outcomes. Similar results have also been shown through research conducted on archers, where attention and confidence play a role in determining performance (Gonzalez et al., 2014), with psychological-skills training being found to positively impact processes

relevant to both enhancements of these mental abilities. [5], [7], [8], [10].

The discrepancy in Control Under Pressure is consistent with the notion that high level of athletes is greater at self-regulating arousal and functional interpretation of competition sensations. For precision sport, high amounts of cognitive interference or unregulated anxiety might disrupt fine motor control and shot consistency. Consequently, medalists may have more consistent pre-shot routines and better control over emotional and physiological responding when it mattered most. [6], [11], [13].

The large difference in Confidence/Self-Belief is predicted by self-efficacy theory which states that perceived capability affects effort and persistence and responses to difficulty. A stable sense of competence may protect an archer from a sub-par shot and help them re-adjust their shot in light of better odds in overcoming a poor execution error on the next attempt. Similarly, more recent research on sport-confidence illuminates these constructs in archery contexts as substantial determinants of attention and subsequent competitive performance [8], [9].

VI. LIMITATIONS & PRACTICAL IMPLICATIONS

Several limitations should be considered in light of these findings. The results cannot be generalized to different age groups, competition levels or archery disciplines, as the sample was small and selected purposely from only All India Inter-University players. Moreover, this study used self-report data and the reliability or validity coefficients of the modified questionnaire were not provided for the current sample. Future work using larger samples, should report psychometric evidence and combine psychological characteristic in competitive archery. [5], [7], [8]. It is common for coaches to add

structured psychological preparation in addition to technical and physical elements as part of a training routine. That likely includes goal-setting, attentional-control exercises, imagery, breathing regulation, confidence-building routines and practice that simulates competition pressure. In our experience, because archers appear to react differently to specific emotion-regulation tactics, it is best that these strategies are individually tailored and continually monitored rather than implemented as a blanket programme [7], [8], [10].

VII. CONCLUSION

- Medalist All India Inter-University archery players recorded a lower overall mental-toughness score ($M = 4.45$, $SD = 1.61$) than non-medalists, indicating a stronger psychological profile under the scoring system used. [1], [4].
- Non-medalist players obtained an overall mean score of 14.20 ($SD = 2.42$), indicating greater reported weakness in commitment, concentration, pressure control, and self-belief than the medalist group. [3], [4].
- Statistically significant group differences were reported for Commitment/Motivation ($t = 7.585$), Concentration/Focus ($t = 8.913$), Control Under Pressure ($t = 6.513$), Confidence/Self-Belief ($t = 7.322$), and overall mental toughness ($t = 15.019$), with $p < 0.001$ in every comparison. [20].
- Concentration/Focus produced the largest sub-component difference, highlighting sustained task-relevant attention as a particularly important psychological characteristic in competitive archery. [5], [7], [8].

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