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Psychological determinants of performance in competitive judo: A comparative analysis of high and low-performing judokas

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Abstract

The present study investigates the role of selected psychological variables-state anxiety, aggression, and mental toughness-in distinguishing high and low-performance judokas within the 66 kg weight category. A purposive sample of sixty male judokas, aged 18–25 years, was drawn from intercollegiate competition levels in Delhi, Madhya Pradesh, Uttar Pradesh, and Uttarakhand. Participants were divided into two groups: high-performance (n=30) and low-performance (n=30). Using reliable and valid tools, the State Anxiety Questionnaire (Spielberger, 1972), Smith's Aggressive Questionnaire (Smith, 1976), and the Sports Stress Questionnaire (Goldberg, 2004), psychological attributes were assessed. Descriptive statistics and independent sample t-tests analyzed differences between groups. Results revealed that high-performance judokas exhibited significantly higher mental toughness (p<0.001), indicating the pivotal role of resilience and stress management in achieving superior performance. Additionally, state anxiety was significantly higher in the high-performance group (p = 0.047), suggesting that optimal anxiety levels enhance focus and alertness. No significant difference was observed in aggression levels (p = 1.000), implying that controlled aggression may hold greater relevance than overall aggression levels in judo performance. The findings highlight the importance of psychological attributes, particularly mental toughness, in differentiating performance levels among judokas. Coaches and sports psychologists are encouraged to incorporate resilience-building strategies into training regimens to optimize performance. Future research could explore the interaction of psychological variables with fatigue, recovery, and technical skills to develop holistic training frameworks for combat sports athletes.

Keywords: Judokas, performance levels, psychological variables and independent t-test

1. Introduction

Sports have undergone a remarkable evolution, transforming from recreational pursuits into highly competitive domains where athletes strive to maximize their potential. The increasing emphasis on sports performance has led to significant advancements in training methods, scientific research, and technological integration, enabling athletes to achieve unprecedented levels of excellence (Kumar, 2018) [8]. Factors such as muscle architecture, including pennation angle, fascicle length, and muscle thickness, have emerged as critical determinants of physical performance and talent identification (Khare *et al*., 2023; Kumar, 2023a) [7, 10]. Non-invasive technologies, such as ultrasonography, now allow precise estimation of muscle fiber types, further aiding in personalized training (Kumar, 2023b; Kumar, 2023c) [11, 12]. In addition to physical factors, mental toughness and psychological resilience play pivotal roles in sports performance. Research has shown that high-level athletes develop mental fortitude to perform under pressure, as observed during the COVID-19 pandemic, which significantly impacted athletes' psychological states (Jadaun *et al*., 2021) [4]. Similarly, yoga and mindfulness practices have been identified as effective non-pharmacological approaches to enhance mental and physical well-being, highlighting their value in managing challenges like dysmenorrhea and stress in athletes (Aakash *et al*., 2023; Jain *et al*., 2023) [1, 5]. Training methodologies have also advanced, with a focus on skill-specific and plyometric exercises to improve physical fitness components such as strength, agility, and explosive power (Kumar & Jhajharia, 2020) [14]. The relationship between muscle fiber architecture and performance in movements like lunges

further underscores the importance of biomechanics in sports (Kumar, 2022) [15]. Furthermore, studies on team games reveal the impact of sleep deprivation on motor skills like catching accuracy in cricket and handball shooting precision, emphasizing the role of recovery in peak performance (Gautam & Kumar, 2018; Kumar, 2018) [2, 13]. Overall, the integration of sports science, technological innovations, and psychological strategies has significantly contributed to enhancing sports performance, creating opportunities for athletes to excel while promoting overall health and well-being (Kumar & Jhajharia, 2018; Kumar & Jhajharia, 2022) [13, 15]. As research progresses, sports will continue to thrive as a dynamic field bridging physical fitness, mental resilience, and societal development.

The performance of athletes, particularly in combat sports such as judo, is influenced by a combination of physical, physiological, technical, and psychological factors. Among these, psychological attributes often play a critical role in distinguishing high-performing athletes from their lower-performing counterparts. State anxiety, aggression, and mental toughness are particularly relevant in the context of competitive judo, where quick decision-making, resilience, and composure are required under high-pressure conditions (Jones *et al*., 2002; Maxwell, 2004) [6, 17]. Research has shown that athletes with higher mental toughness and controlled aggression tend to perform better in combat sports (Sharp, 2008) [19]. Similarly, managing anxiety effectively has been linked to enhanced performance, as it allows athletes to maintain focus and composure during crucial moments (Spielberger, 1972; Goldberg, 2004) [21, 3]. This study aims to compare psychological variables between high and low-performing judokas to better understand the psychological profiles that contribute to superior athletic performance.

2. Aim of the study

The aim of this study is to compare selected psychological variables, namely state anxiety, aggression, and mental toughness, between high and low-performance judokas in the 66 kg weight category, to identify significant differences that may influence performance.

3. Materials and Methods

3.1 Selection of Subjects: For the purpose of the study, sixty male (N=60) judokas in the 66 kg weight category were selected using purposive sampling. The participants were drawn from Delhi, Madhya Pradesh, Uttar Pradesh, and Uttarakhand, and all were of intercollegiate competition level. The age of the subjects ranged from 18 to 25 years. The sample was divided into two groups: thirty judokas (N1=30) in the high-performance group and thirty judokas (N2=30) in the low-performance group.

3.2 Selection of Variables: Psychological variables were chosen as independent variables for the study, with the selected high and low-performance groups as the dependent variables. The details of the selected psychological variables along with questionnaire are as follows in table 1:

Table 1: Psychological Variables and Measurement

S. No.	Variables	Questionnaire	Reliability	Validity	Unit of Measurement
1	State anxiety	State Anxiety Questionnaire (Spielberger, 1972) [21]	0.92	0.89	In numbers
2	Aggression	Smith's Aggressive Questionnaire (Smith, 1976) [20]	0.91	0.88	In numbers
3	Mental Toughness	Sports Stress Questionnaire (Goldberg, 2004) [3]	0.93	0.90	In numbers

3.3 Statistical Analysis: Descriptive statistics, such as mean and standard deviation, along with an independent sample t-test, were employed using IBM SPSS 20.0 to determine the significant comparative differences among the selected high and low-performance groups. Levene's test for equality of variances was also conducted to ensure homogeneity among the groups.

4. Results

Table 2: Descriptive Statistics of Selected Variables for 66 kg Weight Category Judokas

Variable	Group	Mean	Standard Deviation	N
State Anxiety	High Performance	51.60	3.02	30
	Low Performance	49.50	4.95	30
Aggression	High Performance	15.50	1.78	30
	Low Performance	15.50	1.87	30
Mental Toughness	High Performance	19.00	1.82	30
	Low Performance	17.03	1.16	30

Table 2 represents the descriptive statistics for selected psychological variables. The high-performance group had a slightly higher mean state anxiety score (M = 51.60) compared to the low-performance group (M = 49.50). This difference suggests that optimal levels of anxiety may contribute to heightened alertness and readiness in high-performing judokas. Both groups exhibited identical mean aggression scores (M = 15.50), indicating that aggression does not appear to differentiate performance levels in this sample of judokas. The high-performance group demonstrated a significantly higher mean mental toughness score (M = 19.00) compared to the low-performance group (M = 17.03), suggesting that psychological resilience is a key factor in distinguishing high-performing athletes.

Table 3: Independent Sample t-test Results

Variable	t-value	df	p-value
State Anxiety	2.028	58	0.047*
Aggression	0.000	58	1.000
Mental Toughness	4.724	58	0.000**

Table 2 represents the comparative statistics for selected psychological variables. The independent sample t-test revealed a statistically significant difference in state anxiety scores between the high and low-performance groups (t = 2.028, p = 0.047). This finding highlights the potential role of anxiety in enhancing performance when it remains within an optimal range. There was no significant difference in aggression scores between the two groups (t = 0.000, p = 1.000), further supporting the idea that aggression may not be a critical factor in determining judo performance. The difference in mental toughness scores was highly significant (t = 4.724, $p<0.001$), underscoring the importance of

psychological resilience and toughness in high-level judo performance.

5. Discussion on findings

The findings of this study emphasize the importance of psychological attributes in determining judo performance. The results indicate that the high-performance group displayed significantly higher state anxiety than the low-performance group. This finding aligns with studies by Jones *et al*. (2002) [6] that suggest moderate anxiety levels can enhance performance by increasing focus and arousal. However, excessive anxiety can impair performance, as noted in the research by Spielberger (1972) [21]. The significant difference observed in this study suggests that optimal anxiety levels may act as a motivator for high-performance athletes. Both groups showed identical aggression levels, consistent with findings by Maxwell (2004) [17], who argued that controlled aggression rather than overall aggression levels is critical for success in combat sports. This result supports the idea that judokas' success depends more on tactical application rather than raw aggression. It may also indicate that aggression is not a significant factor in differentiating performance levels within this sample. The high-performance group demonstrated significantly higher mental toughness, consistent with previous research by Goldberg (2004) [3] and Jones *et al*. (2002) [6]. Mental toughness allows athletes to manage stress, maintain focus, and recover quickly from setbacks, all of which are crucial in high-stakes judo competitions. The findings underscore the importance of psychological resilience in differentiating elite performers from their peers.

6. Conclusion

This study concludes that psychological variables such as mental toughness significantly differentiate high and low-performance judokas. While state anxiety and aggression did not show substantial differences, the role of mental toughness highlights the need for psychological training programs focusing on resilience and stress management. These findings suggest that incorporating mental toughness development into training regimens could enhance judo performance. Additionally, the results underscore the importance of understanding how psychological variables interact with other performance factors, such as technical and physical skills. Coaches and sports psychologists should prioritize individualized mental preparation strategies to foster both resilience and composure in athletes. Future research could explore how interventions aimed at improving mental toughness impact long-term performance outcomes and how these psychological attributes interact with other key factors like fatigue and recovery. By addressing these dimensions, the findings from this study can provide valuable insights into optimizing training methodologies and improving overall athlete development in combat sports.

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