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Coaching leadership and athlete outcomes in Wushu Taolu: Cross-sectional evidence from elite athletes

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ABSTRACT

Background: Although coaching leadership has been widely examined in team sports, empirical evidence in individual martial arts, particularly wushu taolu, remains limited. Moreover, previous studies have typically focused on single psychological outcomes, such as motivation or satisfaction, rather than simultaneously examining multiple dimensions. Therefore, it remains unclear whether coaching leadership styles influence intrinsic motivation, training discipline, and athlete satisfaction in individual sport contexts. **Objectives:** This study aimed to examine the influence of coaching leadership styles on intrinsic motivation, training discipline, and athlete satisfaction among wushu taolu athletes. **Methods:** A quantitative cross-sectional survey design was employed involving 33 Wushu Taolu athletes from East Java selected through purposive sampling. Data were collected using standardised Likert-scale instruments, including an adapted Leadership Scale for Sports (LSS; 12 items), Intrinsic Motivation Inventory (IMI; 22 items), training discipline indicators (10 items), and Athlete Satisfaction Questionnaire (ASQ; 15 items). All instruments demonstrated acceptable reliability (Cronbach's $\alpha > 0.70$). Data were analysed using multiple linear regression at a 5% significance level. **Results:** The findings revealed that coaching leadership styles did not have a significant effect on intrinsic motivation, training discipline, or athlete satisfaction ($p > 0.05$). The regression models explained only a small proportion of variance across all dependent variables, indicating very weak predictive power. **Conclusion:** These results suggest that coaching leadership style alone may not be a strong predictor of psychological outcomes in wushu taolu athletes. Further research with larger samples and additional variables is needed to better understand the determinants of athlete motivation, training discipline, and satisfaction in individual sport contexts.

Keywords: Coaching leadership; intrinsic motivation; training discipline; athlete satisfaction; wushu taolu

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INTRODUCTION

Coaching leadership has been widely recognised as a key determinant of athletes' psychological outcomes, including intrinsic motivation, discipline, and satisfaction. A substantial body of research in team sports such as soccer, basketball, and volleyball has demonstrated that effective leadership behaviours contribute positively to athlete engagement, well-being, and performance (Li & Xing, 2025; Zahra et al., 2025). These findings are commonly grounded in established frameworks such as the multidimensional model of leadership

and transformational leadership theory, which emphasise the alignment between coaching behaviors, athlete needs, and situational demands (Lawrason et al., 2020; Rong, 2024; Thomas et al., 2022). Within these perspectives, coaches are viewed not only as technical instructors but also as leaders who shape athletes' psychological experiences during training and competition (Chu, 2020; Liu et al., 2024; Ramesberger, 2022).

Despite this extensive body of knowledge, several important gaps remain. First, most existing studies have focused predominantly on team sports, while empirical evidence in individual sports remains limited (Chhabra et al., 2024). This imbalance is notable because leadership dynamics in individual sports may differ substantially from those in team-based environments, particularly in disciplines that emphasise individual performance and technical precision (Cotterill et al., 2022; Duan, 2025). Martial arts such as Wushu Taolu represent a unique context where athletes rely heavily on individualised feedback, aesthetic execution, and structured technical routines, which may influence how leadership styles affect psychological outcomes (Liu et al., 2024; Mei & Yuan, 2024; Partikova, 2019).

Second, prior research has often examined coaching leadership in relation to single psychological outcomes, such as motivation or satisfaction, rather than simultaneously investigating multiple dimensions. However, athlete development is multidimensional, involving interconnected psychological constructs, including intrinsic motivation, training discipline, and athlete satisfaction (Baker et al., 2023; Yakob, 2025). Examining these variables separately may provide incomplete insights into the broader influence of coaching leadership. Therefore, a multi-outcome approach is needed to better understand how leadership styles relate to different aspects of athlete psychology within a unified framework (Abulfatth, 2025; Mamat & Wan Pa, 2024).

Third, limited attention has been given to the contextual dynamics of coaching leadership in Indonesia. Cultural characteristics such as hierarchy, collectivism, and strong coach authority may shape coach-athlete interactions differently compared to Western settings where most leadership research has been conducted (Ramadhan et al., 2024). These contextual factors may influence how athletes perceive coaching behaviours and how leadership styles relate to motivation, discipline, and satisfaction. Consequently, findings from previous studies may not be directly generalisable to Indonesian athletes, particularly in specialised sports such as wushu taolu (Sagala et al., 2023).

Given these limitations, it remains unclear whether coaching leadership styles exert a meaningful influence on multiple psychological outcomes among athletes in individual sports contexts such as wushu taolu. Furthermore, the extent to which leadership styles contribute to athletes' intrinsic motivation, training discipline, and satisfaction within the Indonesian sporting environment has not been sufficiently explored. Therefore, this study aims to examine the influence of coaching leadership styles on intrinsic motivation, training discipline, and athlete satisfaction among wushu taolu athletes in Indonesia using a cross-sectional survey design.

METHOD

Research Design

Our research employs a quantitative approach and cross-sectional survey design. This design was chosen as it matched the purpose of the present study in examining the direct and indirect effects of coaching leadership styles on athlete happiness, training discipline, and intrinsic drive. In this design, the independent variable is measured according to real-life conditions using questionnaires, with regression analysis applied to assess relationships—avoiding any experimental manipulation that could produce inaccurate data.

Participants

Participants were recruited from the East Java Wushu Team under the East Java KONI PUSLATDA, consisting of wushu taolu athletes. A purposive sampling technique was employed based on the following inclusion criteria: (i) participation in official regional or national competitions; (ii) being coached by a permanent coach; (iii) having at least one year of intensive training experience; and (iv) willingness to participate in the study. A total of 33 athletes were included and categorized into two groups: senior and junior athletes, based on their age and competitive level. This grouping was intended to reflect differences in training

intensity, expertise, and developmental stage, while minimizing potential confounding effects related to maturity and experience. The detailed characteristics of the participants are presented in **Table 1**.

This study adhered to institutional and national ethical guidelines for research involving human participants. All procedures were conducted in accordance with the principles of the Declaration of Helsinki. Participation was voluntary, and confidentiality and anonymity of the participants were strictly maintained throughout the study. Written informed consent was obtained from all participants prior to data collection. For participants under the age of 18 years, written informed consent was also obtained from their parents or legal guardians.

Table 1. Characteristics of Senior and Junior Wushu Taolu Athletes

Group	n	Age Range (years)	Males	Females
Senior	18	18-25	10	8
Junior	15	13-17	8	7

Instrument

Coaching leadership style was measured using an adapted version of the Leadership Scale for Sports (Chelladurai & Saleh, 1980), supported by previous studies that have developed and validated shorter versions of the LSS (Teques et al., 2021). Data were collected using a structured questionnaire measuring coaching leadership style, intrinsic motivation, training discipline, and athlete satisfaction. All items were rated using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Coaching leadership style was measured using an adapted version of the Leadership Scale for Sports (LSS). The instrument focused on two dimensions relevant to the study context: positive leadership and autocratic leadership. The adapted scale consisted of 12 items ($\alpha = 0.82$), with six items representing positive leadership and six items representing autocratic leadership. An example item for positive leadership was "The coach makes decisions based on input from athletes," while an example item for autocratic leadership was "The coach determines training methods without athlete input." Intrinsic motivation was measured using the Intrinsic Motivation Inventory (IMI), consisting of 22 items assessing interest, enjoyment, and perceived competence during training ($\alpha = 0.89$). An example item was "I enjoyed doing this activity very much."

Training discipline was assessed using 10 items reflecting attendance consistency, adherence to instructions, and commitment to training programmes ($\alpha = 0.76$). An example item was "I consistently attend all training sessions on time." Athlete satisfaction was measured using an adapted version of the Athlete Satisfaction Questionnaire (ASQ), consisting of 15 items evaluating satisfaction with coaching, training quality, and performance development ($\alpha = 0.85$). An example item was "I am satisfied with the support I receive from the coach."

Content validity was established through expert judgement involving two sport psychology academics and one wushu coaching practitioner. Internal consistency reliability was evaluated using Cronbach's alpha, with all constructs demonstrating acceptable reliability ($\alpha > 0.70$). However, construct validity using confirmatory factor analysis was not performed, which is acknowledged as a limitation of this study.

Data Analysis

Data were analysed using SPSS software. The analysis was conducted in several stages. First, descriptive statistics were computed to summarise the characteristics of each research variable. Second, classical assumption tests were performed, including normality (Kolmogorov–Smirnov test), multicollinearity, and heteroscedasticity, to evaluate the suitability of regression analysis. Pearson correlation analysis was then used to examine the relationships among variables. Finally, multiple linear regression analysis was conducted to determine the simultaneous and partial influence of coaching leadership style on intrinsic motivation, training discipline, and athlete satisfaction.

Although the normality test indicated that residuals were not normally distributed ($p < 0.05$), multiple linear regression was still applied. Linear regression is considered robust to violations of normality, particularly when sample size exceeds 30 observations and no severe outliers are present. Under these conditions, regression coefficients remain unbiased and hypothesis testing remains acceptable due to the central limit

theorem. Therefore, regression analysis was deemed appropriate for this study. However, the non-normal residual distribution should be interpreted cautiously, as it may reduce statistical power. All statistical tests used a 5% significance level ($\alpha = 0.05$).

RESULTS AND DISCUSSION

Results

Descriptive Statistics

Descriptive statistics for all study variables are presented in **Table 2**. Overall, the results indicate moderate-to-high levels across all constructs, suggesting that athletes generally perceived favourable coaching behaviours and reported positive psychological outcomes. **Table 2** shows that positive leadership exhibited the highest mean score (M = 3.74, SD = 0.41), indicating that athletes frequently perceived supportive and encouraging coaching behaviours. In contrast, autocratic leadership demonstrated a lower mean (M = 2.93, SD = 0.65), suggesting that directive or controlling behaviours were less dominant. Among the outcome variables, intrinsic motivation (M = 3.84, SD = 0.48), athlete satisfaction (M = 3.83, SD = 0.50), and training discipline (M = 3.60, SD = 0.51) were all rated relatively high, indicating generally positive psychological responses among the athletes.

Table 2. Descriptive Statistics of Research Variables

Variable	N	Minimum	Maximum	Mean ± SD
Leadership (Positive)	33	2.71	4.43	3.74 ± 0.41
Leadership (Autocratic)	33	1.67	4.00	2.93 ± 0.65
Intrinsic Motivation	33	2.60	4.60	3.84 ± 0.48
Training Discipline	33	2.40	4.40	3.60 ± 0.51
Athlete Satisfaction	33	2.75	5.00	3.83 ± 0.50

Assumption Testing

Normality Test

The normality test results are presented in **Table 3**. Both the Kolmogorov–Smirnov (p = 0.002) and Shapiro–Wilk (p = 0.042) tests indicated that the residuals were not normally distributed. However, regression analysis was retained as it is generally robust to moderate violations of normality, particularly when the sample size exceeds 30 and no extreme outliers are present, in line with the central limit theorem.

Table 3. Residual Normality Test

Test	Statistic	df	Sig.
Kolmogorov–Smirnov	0.200	33	0.002
Shapiro–Wilk	0.933	33	0.042

Multicollinearity Test

Multicollinearity diagnostics presented in **Table 4** indicate that all predictor variables met acceptable thresholds, with tolerance values above 0.10 and VIF values below 10. This suggests that no multicollinearity issues were present, and the predictors could be included simultaneously in the regression model.

Table 4. Multicollinearity Test

Variable	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Constant	3.628	0.869	–	4.176	0.000	–	–
Leadership (Positive)	0.028	0.212	0.024	0.134	0.894	0.996	1.004
Leadership (Autocratic)	0.035	0.135	0.047	0.257	0.799	0.996	1.004

Homoscedasticity Test

The heteroscedasticity test results are illustrated in **Figure 1**. The scatterplot shows that residuals were randomly distributed without forming any clear pattern, indicating that the assumption of homoscedasticity was satisfied.

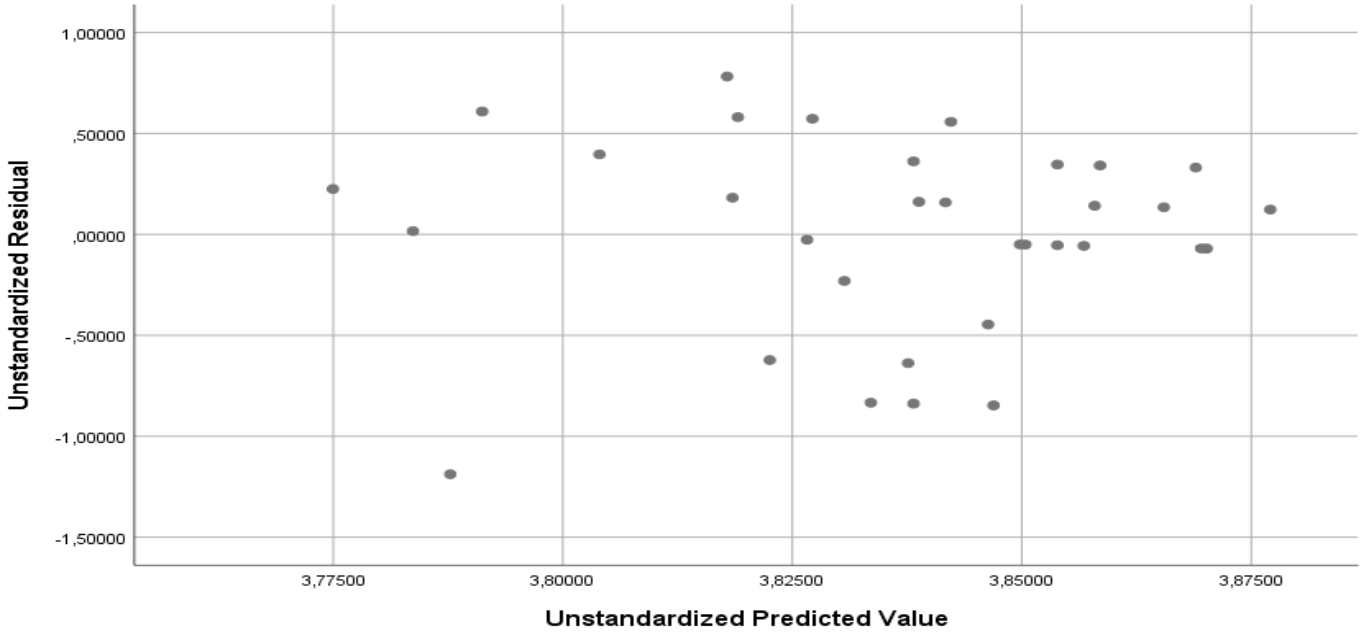

Figure 1. Heteroscedasticity Test (Scatterplot of Residuals)

Correlation Analysis

Pearson correlation analysis results are presented in **Table 5**. Overall, the relationships among variables were weak and statistically non-significant. Positive leadership showed a small positive correlation with training discipline (r = 0.305, p = 0.085), while autocratic leadership demonstrated a weak positive association with athlete satisfaction (r = 0.292, p = 0.099). However, none of these relationships reached statistical significance (p > 0.05), indicating limited linear associations among the variables.

Table 5. Pearson Correlation Matrix

Variable	1	2	3	4	5
1. Leadership (Positive)	1				
2. Leadership (Autocratic)	0.061	1			
3. Intrinsic Motivation	0.027	0.049	1		
4. Training Discipline	0.305	-0.157	-0.051	1	
5. Athlete Satisfaction	-0.058	0.292	0.176	-0.037	1

Multiple Linear Regression Analysis

The results of multiple linear regression analysis are presented in **Tables 6 and 7**. As shown in **Table 6**, the model demonstrated a very low explanatory power ($R^2 = 0.003$), indicating that coaching leadership style explained only 0.3% of the variance in intrinsic motivation.

Table 6. Model Summary

R	R Square	Adjusted R Square	Std. Error
0.054	0.003	-0.064	0.4958

Furthermore, the ANOVA results in **Table 7** indicate that the regression model was not statistically significant, F(2, 30) = 0.044, p = 0.957.

Table 7. ANOVA Results

Source	Sum of Squares	df	Mean Square	F	Sig.
Regression	0.022	2	0.011	0.044	0.957
Residual	7.375	30	0.246		
Total	7.396	32			

Additionally, individual predictors showed non-significant effects. Positive leadership (β = 0.024, p = 0.894) and autocratic leadership (β = 0.047, p = 0.799) demonstrated negligible contributions to intrinsic motivation. Similar patterns were observed for training discipline and athlete satisfaction, where regression models also yielded non-significant results and minimal explanatory power. These findings indicate that coaching leadership style did not significantly predict intrinsic motivation, training discipline, or athlete satisfaction among wushu taolu athletes.

Discussion

The present study examined whether coaching leadership style predicts intrinsic motivation, training discipline, and athlete satisfaction among wushu taolu athletes. The findings indicated that coaching leadership style was not a significant predictor of any of the psychological outcomes examined, suggesting that leadership behaviours had limited explanatory power in this context. These findings are consistent with previous research indicating that leadership may not always exert a strong direct influence on psychological outcomes when examined without considering additional contextual or mediating factors (Tanuwijaya et al., 2025). Furthermore, psychological outcomes in sport are often shaped by multiple interacting determinants, including training structure, individual characteristics, and performance demands (Yang et al., 2024).

From a theoretical perspective, these findings appear to contrast with the Multidimensional Model of Leadership proposed by Chelladurai, which suggests that effective alignment between coaching behaviour, athlete preferences, and situational demands enhances athlete satisfaction and performance outcomes (Chelladurai & Saleh, 1980). Likewise, Self-Determination Theory (SDT) developed by Ryan and Deci (2020) posits that supportive leadership should foster intrinsic motivation through the satisfaction of autonomy, competence, and relatedness. However, the present findings suggest that these theoretical mechanisms may not operate strongly in individual sport contexts such as wushu taolu. In such settings, athletes rely more heavily on internal regulation, personal mastery, and technical precision, which may reduce the relative influence of external leadership behaviours on psychological outcomes.

Previous studies have reported mixed findings regarding the role of coaching leadership. Some research has demonstrated that supportive and transformational leadership positively influences athlete motivation and satisfaction (Li & Xing, 2025; Liu et al., 2025). However, other studies indicate that these effects are often indirect and mediated by variables such as coach–athlete relationship quality or psychological needs satisfaction (Caling et al., 2025). The absence of such mediating variables in the present study may explain why leadership style did not emerge as a significant predictor. This suggests that leadership may function as a distal factor rather than a direct determinant of psychological outcomes.

Another important explanation relates to the specific context of this study. Wushu taolu is an individual sport characterised by high technical demands, aesthetic performance, and individual accountability. In such environments, athletes' motivation and discipline may be driven more by internal standards and performance goals than by coaching behaviour. Additionally, the cultural context of Indonesia may also play a role. Coaching environments in many Asian settings are often characterised by hierarchical relationships and strong authority structures. Research suggests that in such contexts, athletes may perceive coaching behaviours as normative rather than as influential factors (Wang et al., 2024; Zhao & Id, 2022). As a result, variations in leadership style may have a reduced impact on psychological outcomes.

Several methodological considerations should be acknowledged. First, the relatively small sample size (N = 33) may have limited statistical power, increasing the likelihood of Type II error. Second, the use of an adapted short version of the Leadership Scale for Sports (LSS), focusing on only two dimensions, may have constrained the ability to capture the multidimensional nature of coaching leadership (Teques et al., 2021). Additionally, the reliance on self-report measures introduces the possibility of common-method bias and social

desirability effects (Kreitchmann et al., 2019). The non-normal distribution of residuals and the cross-sectional design further limit causal interpretation.

Despite these limitations, this study provides important implications for both research and practice. The findings suggest that coaching leadership style alone may not be sufficient to explain athletes' psychological outcomes in individual sports. Future research should adopt more integrative models by incorporating mediating variables such as psychological needs satisfaction, self-regulation, and coach–athlete relationship quality. Methodologically, future studies are encouraged to employ larger sample sizes and longitudinal designs to enhance statistical power and causal inference. From a practical perspective, coaches should not rely solely on leadership style but also focus on fostering athletes' internal motivation, autonomy, and psychological skills to optimise performance and well-being.

CONCLUSION

The findings of this study indicate that coaching leadership style, both positive and autocratic, did not significantly predict intrinsic motivation, training discipline, or athlete satisfaction among wushu taolu athletes. The regression models explained only a very small proportion of variance across all dependent variables, suggesting that leadership style alone may not be a strong predictor of these psychological outcomes. These results should be interpreted cautiously due to several limitations, including small sample size, non-normal data distribution, and reliance on self-reported measures. Therefore, the absence of significant effects does not necessarily indicate that coaching leadership is unimportant, but rather that its influence may depend on additional factors not examined in this study. Future research should involve larger samples, additional psychological and contextual variables, and longitudinal designs to better understand the determinants of athlete motivation, training discipline, and satisfaction in individual sports such as wushu taolu.

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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