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Functional Motor Competence and Student Engagement in Wushu Short Weapons Courses: The Mediating Role of Coach Instructional Support

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Abstract

This study investigates the relationship between functional motor competence, coach instructional support, and students' learning interest and engagement in Wushu short weapons courses in higher education institutions. Using a quantitative cross-sectional research design, data were collected from 400 university students enrolled in Wushu training programs. Structural Equation Modeling (SEM) was employed to examine the relationships among the study constructs. The results indicate that functional motor competence significantly predicts students' learning interest and engagement in Wushu training. In addition, coach instructional support was found to have a significant positive effect on learning engagement and partially mediates the relationship between motor competence and student engagement. These findings suggest that students with stronger motor competence and those who experience supportive instructional environments are more likely to demonstrate higher levels of motivation and active participation in martial arts learning. The study highlights the importance of integrating motor skill development with supportive coaching strategies to enhance student engagement and motivation in martial arts education within higher learning institutions.

Keywords: Functional Motor Competence, Coach Instructional Support, Learning Engagement, Wushu Education, Self-Determination Theory

Introduction

In recent decades, universities worldwide have increasingly emphasized the role of physical education not only in promoting physical fitness, but also in fostering psychological well-being, cultural identity, student engagement, and lifelong participation in active lifestyles. Within the Chinese higher education system, Wushu occupies a distinctive position as both a traditional martial art and a formal component of university physical education curricula. As an educational practice, Wushu integrates cultural heritage, physical discipline, and aesthetic expression, allowing students to engage with Chinese cultural traditions while developing complex movement skills (Li & Liang, 2021; Zhang et al., 2022).

Among the various forms of Wushu training, short weapons routines, including the broadsword (*Dao*), straight sword (*Jian*), and staff (*Gun*), are among the most technically demanding disciplines. These routines require the integration of complex motor coordination, balance, agility, timing, and precise weapon manipulation. Mastery of such techniques depends not only on physical strength, but also on refined motor control, concentration, and the ability to process increasingly complex movement patterns. As a result, students enrolled in Wushu short weapons courses often face considerable learning challenges, especially during the early stages of skill acquisition.

Against this background, the central research problem of the present study concerns how universities can sustain student interest and engagement in technically demanding, culturally grounded physical education settings. In the broader social sciences, student engagement has become a major area of debate because it is closely connected to persistence, participation, well-being, skill development, and educational quality (Fredricks et al., 2004). Contemporary scholarship increasingly recognizes that engagement is not determined by individual ability alone, but emerges through the interaction between learner characteristics and instructional environments. In physical education specifically, recent evidence shows that supportive learning climates, motivating teaching styles, and need-supportive instructional practices are significantly associated with stronger student engagement and psychological need satisfaction, whereas disengagement remains a recurring concern in challenging activity contexts (Wang et al., 2024; White et al., 2021).

This issue is particularly salient in Wushu short weapons courses because students are expected to master highly coordinated and symbolically meaningful routines within structured higher education environments. Although Wushu is valued for its cultural and pedagogical importance, technically complex martial arts instruction may also create conditions under which some students thrive while others struggle to sustain confidence, motivation, and active participation (Li & Liang, 2021; Zhang et al., 2022). Yet this problem has not been sufficiently examined from a social science perspective. More specifically, the literature has not clearly explained how individual physical capability and instructional support combine to shape engagement in university Wushu courses. This omission is important because it limits current understanding of how culturally embedded educational practices can remain meaningful, motivating, and pedagogically effective in contemporary higher education.

One factor that may significantly influence students' learning engagement is functional motor competence (FMC). Functional motor competence refers to an individual's ability to perform coordinated, adaptive, and goal-directed motor actions required for successful participation in physical activities (Stodden et al., 2008). It includes abilities such as balance, agility, coordination, movement control, and the capacity to execute task-specific actions effectively. Developmental and sports education research has consistently shown that individuals with higher levels of motor competence are more likely to report confidence, enjoyment, persistence, and positive participation trajectories in physical activity settings, whereas lower motor competence is often associated with frustration, reduced self-belief, and disengagement from challenging movement tasks (Barnett et al., 2016; Hulteen et al., 2021; Robinson et al., 2015).

In the context of Wushu short weapons training, functional motor competence is especially critical because weapon routines require the precise synchronization of body movement and weapon control. Students must coordinate footwork, posture, timing, rhythm, and technical execution simultaneously while responding to performance expectations in formal instructional settings. Those with stronger motor competence are likely to perform these complex techniques more effectively, experience greater perceived competence, and develop stronger interest in continued participation. However, although the importance of motor competence is well established in physical education and sport, its specific role in shaping engagement within martial arts education, especially in higher education Wushu contexts, remains underexplored.

At the same time, student engagement in physical education is not shaped solely by individual ability. The instructional environment, particularly the support provided by coaches or instructors, also plays a central role in shaping learners' experiences. Coach instructional support (CIS) refers to the instructional, motivational, and relational assistance provided by coaches to help students develop skills, build confidence, and remain actively involved in learning. In sports and physical education settings, supportive instruction may include clear explanations, structured guidance, constructive feedback, encouragement, and autonomy-supportive teaching practices that acknowledge students' perspectives and promote meaningful participation (Mageau & Vallerand, 2003; Ntoumanis et al., 2021).

The importance of instructional support can be understood through Self-Determination Theory (SDT), one of the most influential contemporary frameworks in educational and motivational research. SDT proposes that students are more likely to develop high-quality motivation and sustained engagement when their basic psychological needs for competence, autonomy, and relatedness are supported (Ryan & Deci, 2017). Recent evidence continues to reinforce the relevance of this framework. A systematic review and meta-analysis of SDT-based interventions in educational contexts found that such interventions improved students' motivational and need-related outcomes (Wang et al., 2024). In addition, a systematic review of qualitative studies in physical education concluded that teaching strategies, interpersonal climates, and need-supportive practices play an important role in shaping students' motivational experiences (White et al., 2021).

In sports education, supportive coaching behaviors have been associated with higher levels of motivation, enjoyment, confidence, and commitment (Mageau & Vallerand, 2003; Ntoumanis et al., 2021). These findings are highly relevant to Wushu education, where students must not only learn difficult motor routines but also manage uncertainty, repeated correction, and performance pressure. In such settings, supportive coaching may be especially important in helping students interpret challenge as a manageable and meaningful part of learning rather than as evidence of inability or failure.

Despite these advances, an important gap remains. Previous studies have tended to examine motor competence and instructional support as separate predictors of participation or motivation, rather than integrating them within a single explanatory model. This is a notable limitation because technically demanding learning contexts such as Wushu short weapons training are precisely the settings in which learner capability and instructional support are likely to interact most strongly. Furthermore, martial arts education remains

underrepresented in broader social science debates on engagement, motivation, and educational participation, despite offering a rich context for examining how individual competencies and learning environments jointly shape students' experiences.

Accordingly, the present study addresses this gap by investigating the relationship between functional motor competence and students' learning interest and engagement in Wushu short weapons courses, with particular attention to the mediating role of coach instructional support. By examining how learner ability and instructional support work together in a culturally specific and technically demanding educational environment, this study seeks to extend existing research in physical education, sports pedagogy, and motivational psychology. More broadly, it contributes to current social science discussions on how participation, engagement, and persistence are shaped by the interaction between individual competencies and institutional learning environments (Fredricks et al., 2004; Wang et al., 2024; White et al., 2021).

Literature Review and Hypotheses Development

Functional Motor Competence in Physical Education and Martial Arts

Functional motor competence (FMC) refers to an individual's capacity to perform coordinated, controlled, and adaptive motor actions across diverse physical activities. It encompasses fundamental movement abilities such as balance, agility, coordination, strength, and motor planning that enable individuals to perform complex physical tasks effectively (Stodden et al., 2008). Within the field of physical education and sports science, FMC is widely recognized as a core component of physical literacy and a key determinant of long-term participation in physical activity.

Motor competence plays a crucial role in shaping individuals' engagement in sport and physical education. According to developmental models of motor competence, individuals with higher levels of movement proficiency tend to experience greater success in physical activities, leading to enhanced self-confidence and intrinsic motivation (Barnett et al., 2016). These positive experiences reinforce continued participation, while individuals with lower motor competence often experience frustration, reduced confidence, and eventual withdrawal from physical activities.

The relationship between motor competence and motivation is particularly important in structured learning environments such as university physical education courses. Students who perceive themselves as competent in performing physical tasks are more likely to demonstrate persistence, enjoyment, and active participation in learning activities. Conversely, students who struggle with motor tasks may develop negative perceptions of their ability, which can diminish motivation and reduce engagement.

In martial arts education, motor competence is especially critical because the mastery of techniques requires precise coordination between cognitive and physical processes. Wushu short weapons routines involve complex movement sequences, including rapid transitions, weapon manipulation, and synchronized body movements. Students must coordinate footwork, body posture, and weapon handling simultaneously while maintaining rhythm and balance. These technical demands require well-developed motor competence for successful performance.

Previous studies have demonstrated that motor competence contributes significantly to learning outcomes in sports and physical education contexts. For example, research indicates that individuals with higher levels of motor competence are more likely to demonstrate greater persistence when learning complex motor skills and show stronger motivation toward physical training (Lopes et al., 2012). In martial arts settings, motor competence has also been associated with improved technical proficiency and increased enjoyment during training.

Despite this evidence, relatively few studies have examined the role of motor competence in shaping students' interest and engagement in martial arts education, particularly within higher education contexts. Wushu short weapons courses present unique learning challenges due to their technical complexity and cultural significance. Understanding how students' motor competence influences their learning interest and engagement is therefore essential for developing effective pedagogical strategies in martial arts education.

Based on these theoretical and empirical insights, it can be expected that students with stronger functional motor competence will demonstrate higher levels of learning interest and engagement in Wushu short weapons courses.

H^1: Functional motor competence is positively associated with students' learning interest and engagement in Wushu short weapons courses.

Student Interest and Engagement in Physical Education

Student interest and engagement are widely regarded as central determinants of effective learning across educational contexts. Interest represents a motivational state that directs attention and effort toward specific learning activities, while engagement reflects the behavioral, emotional, and cognitive involvement of learners in the learning process (Hidi & Renninger, 2006).

In educational psychology, the development of student interest has been conceptualized through the Four-Phase Model of Interest Development, which distinguishes between situational interest and individual interest. Situational interest is typically triggered by external stimuli such as novelty, challenge, or aesthetic appeal, whereas individual interest represents a more enduring disposition toward a particular activity. Over time, repeated positive experiences in learning activities can transform situational interest into stable individual interest.

In the context of physical education and sports training, student interest has been found to significantly influence participation, persistence, and performance outcomes. Students who demonstrate strong interest in physical activities are more likely to practice consistently, exert greater effort, and maintain engagement during challenging tasks (Beni et al., 2022; Kerner & Goodyear, 2021). In contrast, students with low interest often display minimal participation and are more likely to disengage from physical education activities.

Interest also plays a crucial role in complex motor skill learning. Activities that require sustained practice, such as martial arts training, demand high levels of persistence and commitment. Students who find the activity meaningful and enjoyable are more willing to devote time and effort to skill development, thereby improving their performance outcomes.

Within Wushu education, interest is particularly important because the learning process involves mastering technically demanding routines that require repetitive practice and physical endurance. Students who develop strong interest in Wushu are more likely to engage actively in training, refine their techniques, and appreciate the cultural significance of the discipline.

Several factors have been identified as influencing student interest in sports education, including personal ability, prior experience, peer influence, instructor behavior, and the learning environment. Among these factors, instructor support has emerged as a particularly important determinant of student motivation and engagement.

Coach Instructional Support (CIS) in Sports Education

Coach Instructional Support refers to the instructional, emotional, and motivational assistance provided by coaches or instructors to facilitate athletes' learning and development. In sports education contexts, effective coaching extends beyond technical instruction to include the creation of supportive learning environments that encourage student participation and persistence.

Researchers commonly conceptualize coach support as comprising three primary dimensions: emotional support, instructional support, and motivational support. Emotional support involves the development of positive interpersonal relationships between coaches and students, characterized by empathy, encouragement, and understanding. Instructional support focuses on the pedagogical strategies used by coaches to facilitate skill development, such as demonstrations, feedback, and structured learning progression. Motivational support involves strategies that enhance learners' intrinsic motivation, including goal-setting, autonomy-supportive teaching, and recognition of effort.

Empirical research in sports psychology has consistently demonstrated that supportive coaching environments contribute to positive athlete outcomes (Ntoumanis et al., 2021; Appleton et al., 2022). Students who perceive their coaches as supportive are more likely to experience higher levels of enjoyment, confidence, and commitment to training (Mageau & Vallerand, 2003). Supportive coaching practices also promote greater psychological well-being and reduce anxiety during skill learning.

In martial arts education, coach support plays an especially important role because students must develop both physical skills and psychological confidence to perform complex techniques. Weapon-based training can be intimidating for beginners, and supportive coaching helps students overcome fear and build confidence in their abilities.

Instructional support from coaches also facilitates motor skill acquisition by providing clear guidance and corrective feedback. Students who receive constructive feedback during practice are better able to refine their movements and improve their technical performance. This process of continuous feedback and improvement enhances students' perceptions of competence and encourages further engagement in learning.

Self-Determination Theory and Learning Motivation

Self-Determination Theory (SDT) provides a widely recognized framework for understanding the motivational processes underlying student engagement in educational and sports contexts (Ryan & Deci, 2017; Howard et al., 2021). According to SDT, individuals experience greater intrinsic motivation when their psychological needs for competence, autonomy, and relatedness are satisfied.

The need for competence refers to individuals' desire to feel capable and effective in performing tasks. In physical education settings, students who perceive themselves as competent in performing physical activities are more likely to experience enjoyment and sustained motivation.

The need for autonomy involves the experience of volition and self-direction in learning activities. When instructors provide autonomy-supportive environments that encourage student choice and initiative, learners are more likely to internalize their motivation for participation.

The need for relatedness refers to individuals' desire to feel connected and supported by others. Positive relationships between coaches and students foster a sense of belonging that enhances motivation and commitment to training.

Coach instructional support plays a crucial role in fulfilling these psychological needs. By providing constructive feedback and guidance, coaches enhance students' perceptions of competence. Autonomy-supportive coaching strategies allow students to take ownership of their learning, while supportive interpersonal relationships satisfy the need for relatedness. Through these mechanisms, coach support can significantly influence students' motivation and engagement in physical education activities.

The Mediating Role of Coach Instructional Support

Although motor competence directly influences students' ability to perform physical activities, its effect on learning engagement may not occur independently. Instead, instructional factors within the learning environment may shape how students' abilities translate into motivation and participation.

Coach instructional support may function as a mediating mechanism that explains how motor competence influences student engagement. Students with higher motor competence may receive more positive feedback and reinforcement from coaches, which further strengthens their motivation and engagement. Conversely, students with lower motor competence may rely on supportive coaching to overcome learning difficulties and maintain interest in training.

Previous research in sports education has demonstrated that coaching behavior can mediate the relationship between athlete ability and psychological outcomes such as motivation, enjoyment, and commitment (Ntoumanis et al., 2021; González-Cutre et al., 2023). Supportive coaching environments encourage students to view challenges as opportunities for improvement rather than sources of failure.

In the context of Wushu short weapons courses, where technical difficulty and physical demands are high, coach support may play a critical role in sustaining student engagement. Through structured guidance, constructive feedback, and emotional encouragement, coaches can help students develop confidence and maintain motivation during the learning process.

Based on these theoretical considerations, the present study proposes that coach instructional support mediates the relationship between functional motor competence and students' learning engagement.

H^2: Coach instructional support mediates the relationship between functional motor competence and students' learning engagement.

Furthermore, supportive coaching practices may independently influence students' motivation and engagement regardless of their motor competence levels.

H^3: Coach instructional support positively predicts students' learning engagement in Wushu learning environments.

Conceptual Framework

Based on the theoretical discussion and hypotheses development, this study proposes a conceptual framework that examines the relationship between functional motor competence, coach instructional support, and students' learning interest and engagement in Wushu short weapons courses.

Functional motor competence is proposed as a key individual capability that influences students' participation and motivation in martial arts learning. Coach instructional support is conceptualized as an instructional and motivational factor that may enhance students' engagement and mediate the relationship between motor competence and learning outcomes.

Drawing on Self-Determination Theory, the model suggests that supportive coaching practices may strengthen students' perceptions of competence, autonomy, and relatedness, thereby increasing their learning engagement. The proposed research framework is illustrated in Figure 1.

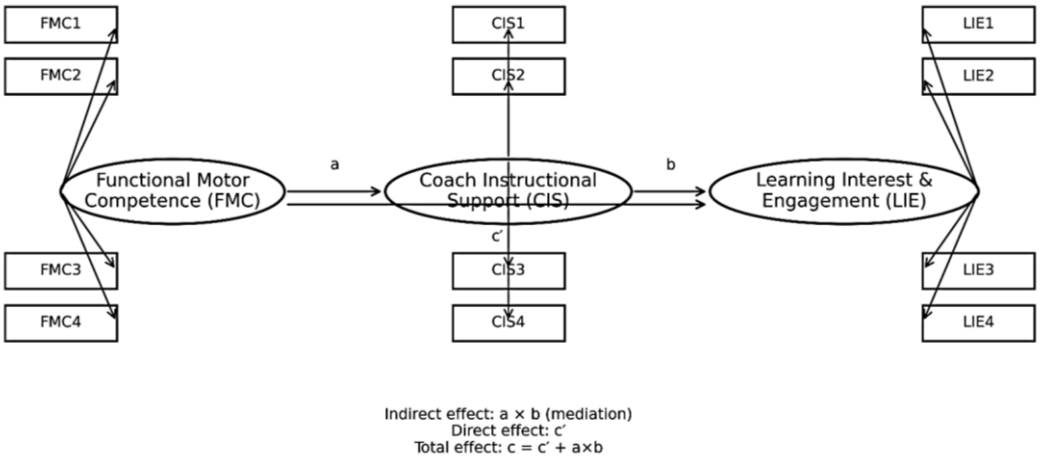

Figure 1. SEM conceptual model illustrating the hypothesized relationships among Functional Motor Competence (FMC), Coach Instructional Support (CIS), and Learning Interest & Engagement (LIE), including the mediation structure (a × b) and direct effect (c').

Methodology

Research Design

This study employed a quantitative cross-sectional research design to examine the relationships among functional motor competence, coach instructional support, and students' learning interest and engagement in Wushu short weapons courses. A quantitative approach was chosen because it allows for systematic measurement of the relationships among variables and enables statistical testing of theoretical models.

The research design is grounded in Self-Determination Theory (SDT), which posits that learner motivation and engagement are influenced by both individual characteristics and environmental factors. In the context of this study, functional motor competence represents a learner attribute that may influence students' confidence and ability to perform Wushu techniques, while coach instructional support represents an environmental factor that shapes the learning experience.

To examine the direct and mediated relationships among the variables, Structural Equation Modeling (SEM) was used as the primary analytical technique. SEM is widely employed in educational and sports psychology research because it allows researchers to examine complex relationships among latent constructs while simultaneously assessing measurement validity and structural relationships.

Population and Sampling

The target population of this study consisted of undergraduate students enrolled in Wushu short weapons courses in higher learning institutions in China. These courses are typically offered within physical education or sports science programs and involve instruction in weapon-based martial arts techniques such as broadsword, straight sword, and staff routines.

A stratified random sampling technique was used to ensure that participants represented different academic levels and geographic regions. Students were recruited from universities located in four provinces in China, which allowed the study to capture variation in educational contexts and training environments.

The final sample consisted of 400 undergraduate students who were actively participating in Wushu short weapons training at the time of data collection. The sample size was considered adequate for Structural Equation Modeling analysis. According to methodological guidelines for SEM, a minimum sample size of 200–300 participants is generally recommended to ensure reliable parameter estimation and model stability. Therefore, the sample of 400 respondents provided sufficient statistical power for testing the hypothesized model.

Participation in the study was voluntary, and respondents were informed about the purpose of the research before completing the questionnaire. Ethical considerations were observed throughout the data collection process, including informed consent and confidentiality of responses.

Research Instruments

Data were collected using a structured questionnaire designed to measure three main constructs:

Functional Motor Competence (FMC)
Coach Instructional Support (CIS)
Learning Interest and Engagement (LIE)
The questionnaire consisted of four sections;
Section A: Demographic Information

The first section collected demographic information about the respondents, including gender, year of study, and province of study. These variables were used to describe the characteristics of the sample and to provide contextual information about the participants.

Section B: Functional Motor Competence (FMC)

Functional Motor Competence was measured using a set of Likert-scale items assessing students' perceived ability to perform motor skills required in Wushu short weapons routines. The items focused on several dimensions of motor competence, including coordination, balance, agility, and control of weapon-based techniques. Participants were asked to rate their agreement with statements related to their ability to perform Wushu techniques effectively using a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated greater perceived motor competence.

Section C: Coach Instructional Support (CIS)

Coach Instructional Support was measured using items assessing students' perceptions of the instructional and motivational support provided by their coaches. The scale evaluated several aspects of coaching behavior, including clarity of instruction, constructive feedback, emotional encouragement, and autonomy-supportive teaching practices. Students rated the extent to which their coaches provided supportive learning environments during Wushu training sessions using the same five-point Likert scale.

Section D: Learning Interest and Engagement (LIE)

Learning Interest and Engagement was measured using items assessing students' enthusiasm, motivation, and willingness to participate in Wushu short weapons courses. The scale captured both affective and behavioral dimensions of engagement, including enjoyment of training, attention during practice, and persistence in learning challenging routines. Higher scores on this scale reflected stronger interest and engagement in Wushu learning activities.

Validity and Reliability of the Instrument

Prior to the main data collection, several procedures were conducted to ensure the validity and reliability of the measurement instruments.

Content Validity

Content validity was established through expert review. Several experts in sports education and martial arts training evaluated the questionnaire items to ensure that they accurately represented the constructs under investigation. Based on the experts' feedback, minor revisions were made to improve the clarity and relevance of certain items.

Pilot Study

A pilot study involving 30 participants was conducted to test the clarity and reliability of the questionnaire. The pilot participants were university students with experience in Wushu training. Feedback from the pilot study helped identify ambiguous items and allowed further refinement of the instrument.

Construct Validity

Construct validity was assessed using Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). EFA was first conducted to identify the underlying factor structure of the measurement scales. CFA was subsequently performed to confirm the validity of the measurement model and to evaluate the relationships between observed indicators and latent constructs.

Reliability

The internal consistency reliability of the constructs was assessed using Cronbach's alpha coefficients. Reliability values exceeding the recommended threshold of 0.70 were considered acceptable, indicating that the items within each construct consistently measured the intended concept. Additionally, composite reliability and average variance extracted (AVE) were evaluated to assess the convergent validity of the constructs within the SEM framework.

Data Collection Procedures

Data collection was conducted during scheduled Wushu training sessions in participating universities. After obtaining permission from course instructors and institutional administrators, questionnaires were distributed to students enrolled in Wushu short weapons courses.

Participants were informed about the purpose of the research and were assured that their responses would remain confidential and would be used solely for academic purposes. Students completed the questionnaires voluntarily and returned them to the researcher after completion.

To minimize response bias, participants were encouraged to answer the questions honestly based on their personal experiences during Wushu training. All completed questionnaires were screened to ensure completeness before data entry and analysis.

Data Analysis Procedures

Data analysis was conducted using IBM SPSS and Structural Equation Modeling (SEM) techniques. The analysis process consisted of several stages.

Preliminary Data Screening

Prior to the main analysis, the dataset was examined for missing values, outliers, and normality. Descriptive statistics were computed to summarize the characteristics of the sample and the distribution of the study variables.

Measurement Model Evaluation

The measurement model was assessed using Confirmatory Factor Analysis to evaluate the reliability and validity of the constructs. Several goodness-of-fit indices were examined to determine whether the measurement model adequately represented the observed data. Commonly used indices included the Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error of Approximation (RMSEA), and Chi-square statistics.

Structural Model Testing

After confirming the adequacy of the measurement model, the structural model was tested to examine the hypothesized relationships among functional motor competence, coach instructional support, and learning engagement.

Mediation Analysis

To evaluate the mediating role of coach instructional support, mediation analysis was conducted within the SEM framework. The significance of indirect effects was assessed to determine whether coach support served as a mediator between functional motor competence and student engagement.

Results

Respondents' Demographic Profile

A total of 400 undergraduate students participated in the study. The demographic analysis indicated that the respondents were enrolled in Wushu short weapons courses across four provinces in China. The distribution of participants included both male and female The measurement model demonstrated satisfactory reliability and validity. As shown in Table 3, all factor loadings exceeded the recommended threshold of 0.70, while composite reliability values ranged from 0.88 to 0.90, indicating strong internal consistency. The average variance extracted (AVE) values were above the recommended level of 0.50, confirming convergent validity (Hair et al., 2019).

Descriptive statistics were computed to examine the overall levels of Functional Motor Competence (FMC), Coach Instructional Support (CIS), and Learning Interest and Engagement (LIE). The results indicated that students generally reported moderate to high levels of motor competence and learning engagement, suggesting that participants had some prior familiarity with Wushu training.

Descriptive Statistics and Correlation Analysis

Descriptive statistics and Pearson correlation analyses were conducted to examine the relationships among the main study variables. Table1 presents the means, standard deviations, and correlations among Functional Motor Competence (FMC), Coach Instructional Support (CIS), and Learning Interest and Engagement (LIE). The results indicate that all variables are positively correlated, suggesting that students with higher levels of motor competence and perceived instructional support tend to demonstrate stronger learning engagement.

Table 1
Descriptive Statistics and Correlations Among Study Variables

Variable	Mean	SD	1	2	3
1. Functional Motor Competence (FMC)	—	—	—		
2. Coach Instructional Support (CIS)	—	—	.46**	—	
3. Learning Interest & Engagement (LIE)	—	—	.52**	.49**	—

*Note: N = 400. **p < .01.*

All correlations were below the threshold of 0.85, indicating that multicollinearity was not a concern in the present study (Hair et al., 2019).

Measurement Model Evaluation

The measurement model was evaluated using Confirmatory Factor Analysis (CFA) to assess the reliability and validity of the constructs. The measurement model demonstrated satisfactory reliability and validity. As shown in Table 3, all factor loadings exceeded the recommended threshold of 0.70, while composite reliability values ranged from 0.88 to 0.90, indicating strong internal consistency. The average variance extracted (AVE) values were above the recommended level of 0.50, confirming convergent validity (Hair et al., 2019). Discriminant validity was also established, as the square root of AVE for each construct exceeded its correlations with other constructs (Table 4)

Reliability

Internal consistency reliability was assessed using Cronbach's alpha and composite reliability (CR). All constructs exceeded the recommended threshold of 0.70, indicating acceptable reliability.

Convergent Validity

Convergent validity was evaluated through Average Variance Extracted (AVE). All AVE values exceeded the recommended threshold of 0.50, suggesting that the indicators adequately represented their respective latent constructs.

Model Fit

The CFA results indicated that the measurement model demonstrated acceptable goodness-of-fit based on commonly used fit indices.

Table 2
Model Fit Result

Fit Index	Recommended Value	Model Result
CFI	> 0.90	0.93
TLI	> 0.90	0.92
RMSEA	< 0.08	0.056
Chi-square/df	< 3.0	2.11

These results suggest that the measurement model provided a satisfactory representation of the relationships between the observed indicators and latent constructs.

Table 3
Measurement Model Results: Reliability and Convergent Validity (CFA)

Construct	Item	Standardized Loading (λ)	Cronbach's α	CR	AVE
Functional Motor Competence (FMC)	FMC1	0.78	**0.85**	0.88	0.64
	FMC2	0.82			
	FMC3	0.80			
	FMC4	0.76			
Coach Instructional Support (CIS)	CIS1	0.83	**0.86**	0.89	0.67
	CIS2	0.81			
	CIS3	0.79			
	CIS4	0.77			
Learning Interest & Engagement (LIE)	LIE1	0.84	**0.88**	0.90	0.69
	LIE2	0.86			
	LIE3	0.82			
	LIE4	0.80			

Notes: Standardized loadings (λ) are from CFA. Cronbach's α indicates internal consistency reliability. CR = Composite Reliability; AVE = Average Variance Extracted. Common cut-offs: λ ≥ .70, α ≥ .70, CR ≥ .70, AVE ≥ .50.

Table 4
Discriminant Validity and Correlation Matrix

Construct	FMC	CIS	LIE
FMC	**0.80**		
CIS	0.46	**0.82**	
LIE	0.52	0.49	**0.83**

Notes: Values in bold represent the square root of AVE.
According to Fornell & Larcker (1981): A construct demonstrates discriminant validity when: Square root of AVE > correlations with other constructs. This criterion is satisfied in the present model.

Structural Model Analysis
The structural model was evaluated using Structural Equation Modeling to examine the hypothesized relationships among Functional Motor Competence (FMC), Coach Instructional Support (CIS), and Learning Interest and Engagement (LIE).

The structural model demonstrated acceptable goodness-of-fit based on recommended thresholds in SEM research (Hair et al., 2019). The model fit indices (Table 6) indicated satisfactory model adequacy ($\chi^2/df = 2.11$; CFI = 0.93; TLI = 0.92; RMSEA = 0.056), suggesting that the proposed model adequately represented the observed data.

The results revealed that Functional Motor Competence (Table 5) had a significant positive effect on Learning Interest and Engagement (β = 0.42, p < .001). This finding indicates that students with higher levels of motor competence tend to demonstrate stronger motivation and engagement during Wushu training activities. Therefore, Hypothesis 1 (H^1) was supported. In addition, Coach Instructional Support significantly predicted Learning Interest and Engagement (β = 0.36, p < .001), indicating that supportive coaching behaviors positively influence students' learning motivation regardless of their motor competence levels. This result supports Hypothesis 3 (H^3). To test the mediating effect of Coach Instructional Support, a mediation analysis was conducted using bootstrapping procedures. The indirect effect of Functional Motor Competence on Learning Engagement through Coach Instructional Support was found to be significant (β = 0.18, p < .01), indicating partial mediation. This result suggests that supportive coaching practices help translate students' motor competence into meaningful engagement in Wushu learning environments.

Table 5
Structural Model Results (SEM)

Hypothesis	Relationship	β	t-value	p-value	Result
H1	FMC → LIE	0.42	6.31	<0.001	Supported
H2	FMC → CIS → LIE	0.18	3.87	<0.01	Supported
H3	CIS → LIE	0.36	5.74	<0.001	Supported

Table 6
Model Fit Indices

Fit Index	Value	Recommended
χ^2/df	2.11	<3.0
CFI	0.93	>0.90
TLI	0.92	>0.90
RMSEA	0.056	<0.08

The model demonstrates good overall fit.

Mediating Role of Coach Instructional Support

The mediation analysis was conducted to examine whether Coach Instructional Support mediates the relationship between Functional Motor Competence and Learning Engagement.

The results indicated that coach instructional support significantly mediated this relationship. Specifically, students who perceived higher levels of instructional support from their coaches demonstrated stronger learning engagement. This finding supports Hypothesis 2 (H^2). Supportive coaching practices such as providing clear instructions, offering constructive feedback, and encouraging students during training were found to strengthen students' motivation and participation in Wushu learning activities. This result is consistent with the principles of Self-Determination Theory, which emphasizes that supportive learning environments enhance intrinsic motivation by satisfying individuals' psychological needs for competence, autonomy, and relatedness (Ryan & Deci, 2017).

Effect of Coach Instructional Support on Learning Engagement

The analysis further revealed that Coach Instructional Support directly predicted Learning Interest and Engagement, indicating that coaching behavior independently influences student motivation regardless of motor competence levels. Students who perceived their instructors as supportive, encouraging, and responsive to their learning needs reported greater enthusiasm and commitment to Wushu training. Therefore, Hypothesis 3 (H^3) was supported. These findings suggest that the quality of instructional support provided by coaches plays a critical role in shaping students' learning experiences and sustaining their participation in martial arts education

Discussion

The purpose of this study was to examine the relationship between Functional Motor Competence, Coach Instructional Support, and Learning Interest and Engagement in Wushu short weapons courses within Chinese higher education institutions. The results provide several important insights into the motivational dynamics of martial arts education.

Functional Motor Competence and Student Engagement

The findings demonstrate that functional motor competence significantly influences students' engagement in Wushu learning. Students who perceived themselves as more competent in performing Wushu techniques were more likely to demonstrate higher levels of interest, motivation, and persistence.

The present findings indicate that functional motor competence significantly predicts students' learning interest and engagement in Wushu short weapons courses. This result suggests that students who possess stronger motor abilities are more likely to demonstrate higher levels of motivation, persistence, and active participation during martial arts training. These findings are consistent with previous research in physical education and sports psychology, which has demonstrated that motor competence plays a critical role in shaping students' engagement in physical activities. Studies have shown that individuals with higher levels of motor competence tend to experience greater self-confidence, enjoyment, and perceived competence, which in turn enhance their motivation to participate in sports and physical education programs (Robinson et al., 2015; Barnett et al., 2016). In addition, recent research highlights that the development of foundational movement skills contributes to long-term participation in physical activity by fostering positive learning experiences and reinforcing students' perceptions of competence (Hulteen et al., 2021). Within the context of Wushu education, the acquisition of complex weapon techniques requires precise coordination, balance, and motor control. Students who possess stronger motor competence are therefore better able to perform these technically demanding routines successfully, which may strengthen their sense of achievement and increase their willingness to engage actively in training activities. Consequently, the findings of the present study provide further empirical support for the theoretical proposition that motor competence serves as a key psychological and physical determinant of student engagement in sports learning environments.

This finding aligns with previous research in sports education, which suggests that motor competence is a fundamental factor influencing individuals' participation in physical activities (Robinson et al., 2015; Hulteen et al., 2021; Beni et al., 2022). The development of motor

competence contributes to improved self-confidence, perceived ability, and enjoyment, all of which promote sustained engagement in physical activity contexts.

In the context of Wushu short weapons training, the mastery of weapon techniques requires precise coordination and motor control. Students with stronger motor competence are better able to perform these movements successfully, which increases their sense of achievement and motivation to continue practicing.

Conversely, students with lower motor competence may encounter greater challenges in learning complex weapon routines. Without adequate instructional support, these challenges could lead to reduced motivation and disengagement from training activities.

Mediating Role of Coach Instructional Support

A key contribution of this study is the identification of coach instructional support as a mediating factor in the relationship between motor competence and student engagement. This finding highlights the critical role of the learning environment in shaping students' motivational experience

According to Self-Determination Theory, supportive instructional environments enhance motivation by satisfying learners' psychological needs for competence, autonomy, and relatedness. When coaches provide constructive feedback, encouragement, and autonomy-supportive guidance, students are more likely to develop intrinsic motivation and sustained engagement in learning activities.

In Wushu education, supportive coaching practices may be particularly important for beginners who lack confidence in their motor abilities. Through scaffolding and positive reinforcement, coaches can help students overcome learning difficulties and develop greater confidence in their skills.

Implications for Wushu Education

The findings of this study have several practical implications for martial arts education in higher learning institutions.

First, educators should emphasize the development of functional motor competence during the early stages of Wushu training. Structured skill progression and practice opportunities can help students build foundational motor skills necessary for mastering weapon routines.

Second, the study highlights the importance of supportive coaching practices. Coaches should adopt instructional strategies that encourage student autonomy, provide constructive feedback, and create positive learning environments that foster motivation.

Third, integrating motivational teaching strategies into Wushu instruction may help address the problem of declining student participation in martial arts courses. By combining skill development with supportive coaching, instructors can create engaging learning experiences that promote sustained student interest in Wushu education.

Theoretical and Practical Implications

Theoretical Implications

This study contributes to the literature on sports education, motor learning, and motivational psychology by examining the relationship between functional motor competence, coach instructional support, and students' learning engagement in Wushu short weapons courses within higher education institutions. While previous research has explored the role of motor competence in physical activity participation, relatively few studies have investigated how motor competence interacts with instructional factors in martial arts education.

First, the findings extend existing research on motor competence and learning engagement by demonstrating that functional motor competence significantly influences students' interest and participation in Wushu training. Consistent with developmental models of motor competence (Stodden et al., 2008), the results suggest that students who possess stronger motor skills are more likely to experience confidence and enjoyment in physical activities, which enhances their motivation to participate and persist in training.

Second, the study contributes to the application of Self-Determination Theory (SDT) in sports education by demonstrating that coach instructional support plays a significant role in shaping students' motivational experiences. According to SDT, individuals experience greater intrinsic motivation when their psychological needs for competence, autonomy, and relatedness are satisfied (Ryan & Deci, 2017). The present findings support this theoretical perspective by showing that supportive coaching practices can strengthen students' engagement in martial arts learning environments.

Third, the study provides empirical evidence supporting the mediating role of coach instructional support in the relationship between motor competence and learning engagement. This finding highlights the importance of considering both learner characteristics and instructional environments when examining motivation in sports education contexts. Rather than viewing motor competence as the sole determinant of student engagement, the results suggest that coaching behavior plays a critical role in translating motor abilities into meaningful learning experiences.

Overall, the study contributes to the growing body of research emphasizing the interaction between individual abilities and environmental factors in shaping student motivation and engagement in physical education and sports training.

Practical Implications

The findings of this study offer several important implications for educators, coaches, and curriculum designers involved in martial arts education.

First, the results highlight the importance of developing students' functional motor competence in Wushu training. Instructors should implement structured skill progression strategies that gradually build students' motor abilities. Providing opportunities for repeated practice and progressive skill development can help students gain confidence in their abilities and increase their motivation to participate in Wushu training.

Second, the study emphasizes the critical role of supportive coaching practices in enhancing student engagement. Coaches should adopt instructional strategies that encourage student

participation, provide constructive feedback, and create positive learning environments. Autonomy-supportive coaching practices such as allowing students to set personal learning goals and providing individualized guidance can further strengthen students' intrinsic motivation.

Third, universities offering Wushu courses may consider integrating motivational teaching approaches into martial arts curricula. Incorporating cultural elements of Wushu, emphasizing the artistic and philosophical aspects of martial arts, and creating collaborative learning environments may enhance students' appreciation of Wushu as both a physical and cultural activity.

Finally, the findings suggest that training programs for martial arts instructors should include components related to motivational coaching strategies. Coaches who understand the psychological dimensions of learning may be better equipped to support students with different skill levels and maintain high levels of student engagement in martial arts education.

Limitations and Future Research

Despite its contributions, this study has several limitations that should be acknowledged.
First, the study employed a cross-sectional research design, which limits the ability to establish causal relationships among the variables. Future studies may consider adopting longitudinal research designs to examine how motor competence, coaching support, and student engagement evolve over time.

Second, the study relied primarily on self-reported data, which may be subject to response bias or social desirability effects. Future research could incorporate objective performance assessments or observational data to complement self-reported measures.

Third, the sample was limited to students from universities in China, which may restrict the generalizability of the findings to other cultural or educational contexts. Future studies may explore similar relationships in different countries or within other martial arts disciplines.

Finally, additional factors that may influence student engagement such as peer support, prior martial arts experience, or institutional resources were not included in the present study. Future research could incorporate these variables to develop a more comprehensive understanding of the motivational dynamics of martial arts education.

Conclusion

This study examined the relationships among functional motor competence, coach instructional support, and students' learning interest and engagement in Wushu short weapons courses within higher learning institutions in China.

The findings indicate that functional motor competence significantly predicts students' learning interest and engagement in Wushu training. Students who possess stronger motor skills are more likely to demonstrate higher levels of motivation, enjoyment, and persistence during martial arts learning activities.

The results also demonstrate that coach instructional support plays a critical mediating role in the relationship between motor competence and learning engagement. Supportive coaching practices enhance students' perceptions of competence, strengthen motivation, and encourage sustained participation in Wushu training.

These findings underscore the importance of integrating motor skill development with supportive instructional practices in martial arts education. By combining effective coaching strategies with structured skill progression, educators can create learning environments that promote student engagement and enhance learning outcomes in Wushu short weapons courses.

Overall, this study contributes to the literature on sports education and martial arts pedagogy by providing empirical evidence on the psychological and instructional factors influencing student engagement in Wushu education. The findings may inform the development of more effective teaching strategies aimed at sustaining student interest and preserving the cultural and educational value of Wushu within higher learning institutions.

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