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RESEARCH ARTICLE

The mediating role of academic self-efficacy in the influence of Thai sepak takraw coaches 'teaching style on athletes' learning engagement

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ABSTRACT

This study aims to explore the relationship and mechanisms between the teaching style of Thai sepak takraw coaches and athletes 'learning engagement, and to examine the mediating role of academic self-efficacy. Method: The study employed questionnaires on teaching style, learning engagement, and academic self-efficacy to survey 900 athletes from three different schools. In the data analysis phase, SPSS27.0 software was used to systematically process and analyze the collected data. To further investigate the mediating effect of academic self-efficacy in the relationship between Thai sepak takraw coaches' teaching style and athletes 'learning engagement, AMOS28.0 software was used to construct a structural equation model, and the path mechanisms among variables were analyzed in detail using the Bootstrap method. Results: There is a significant correlation between teaching style, learning engagement, and academic self-efficacy. Direct effect analysis shows that teaching style has a significant direct predictive effect on athletes' learning engagement (β=0.500, P<0.001). Mediation effect analysis indicates that academic self-efficacy partially mediates the impact of teaching style on athletes 'learning engagement, with a mediation effect value of 0.212, and a 95% confidence interval of [0.144,0.239]. Conclusion: The teaching style of Thai sepak takraw coaches not only directly positively influences athletes' learning engagement but also indirectly affects it through academic self-efficacy.

Keywords: Athletes; learning engagement; teaching style; academic self-efficacy

1. Introduction

The core of positive psychology research has increasingly focused on learning engagement, a vital psychological trait that has become a key area of academic exploration. Essentially, learning engagement refers to the sustained, proactive, and enthusiastic mental state demonstrated by athletes during their academic development.. This state manifests the athletes' ardor and dedication in the learning process, thereby providing a critical basis for evaluating their conscientiousness and the diligence of their efforts. In education, academic performance remains the primary measure of educational quality. Student performance is highly correlated with their degree of learning engagement; higher levels of involvement typically translate to superior academic outcomes.[1]. To achieve academic excellence, athletes must invest more energy and maintain high engagement levels throughout their learning process. It is essential to emphasize that learning engagement is not an isolated phenomenon but rather the result of multiple external factors

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working together. For athletic populations, research that delineates the precursors and functional pathways of learning engagement is of paramount importance for developing effective, actionable strategies[2]. These factors may include family environment, school education models, and social support systems. They influence athletes' learning engagement levels through various channels, thereby affecting their academic performance and overall development. Fostering deeper learning engagement among athletes represents a strategic imperative, one that not only elevates their educational outcomes but also serves to leverage broader improvements within China's tertiary education landscape.

The interaction between the coaching methodologies of Sepak Takraw trainers in Thailand and the involvement of athletes in learning has been widely examined by scholars globally. This area of inquiry is significant not only for its implications on instructional effectiveness but also for its role in shaping the developmental pathways of players. Current academic inquiry centers on two main aspects: firstly, examining the effects of various instructional strategies on the degree of athletes' active participation—that is, how coaching behaviors correlate with student engagement; and secondly, exploring the mediating processes that connect coaching style to learning involvement, how specific teaching styles impact athletes 'learning psychology and behaviors to enhance their engagement. In exploring the effects of teaching styles on athletes' learning engagement, this approach emphasizes not only academic outcomes but also emotional experiences during the learning process. Controlling-oriented teaching styles often lead to insufficient motivation, lack of positive emotions, and inadequate personal involvement among athletes. Under such teaching styles, instructors exert high levels of control over athletes, restricting their autonomy and creativity, thereby suppressing behavioral engagement—specifically, efforts and focus[3]. The influence of authoritarian coaching approaches on athletes' behavioral engagement appears more pronounced than their impact on cognitive and emotional involvement. This discrepancy may be attributed to athletes' preserved sense of autonomy and self-regulatory capacity in internal psychological processes. In addition to the direct effects of instructional styles on engagement, research also indicates a significant interplay between coaching methods and the quality of coach-athlete relationships. When teacher-student relationships become strained or distant, athletes may develop resistance toward learning, leading to diminished motivation. A positive and open teaching style creates a pleasant and relaxed learning environment, allowing athletes to experience greater joy and satisfaction during their studies. This enhances their interest and enthusiasm for learning, which in turn boosts their engagement. Such positive learning attitudes further drive students to be more proactive and enthusiastic in their studies. Conversely, negative and closed teaching styles may induce feelings of suppression and anxiety, fostering avoidance tendencies that reduce learning motivation[4]. Integrating research findings from domestic and international scholars, we conclude that the teaching style of Thai sepak takraw coaches significantly impacts athletes 'learning engagement. Autonomous teaching styles enhance learning commitment, while authoritarian approaches tend to suppress it. Teaching styles also indirectly influence learning engagement through the relationship between teachers and students. Mutual trust and support between teachers and students serve as crucial motivators for igniting athletic passion[5]. This study proposes Hypothesis H1: Teaching styles positively affect athletes' learning engagement levels.

While it is widely acknowledged that teaching styles may directly influence athletes 'academic engagement, this relationship isn't straightforward but involves multiple mediating variables. In pedagogical and psychological research, studies exploring the connection between Thai sepak takraw coaches 'instructional approaches and athletes' academic self-efficacy remain limited, particularly regarding specific disciplines[6]. Studies show that the use of multimedia-supported lessons and interactive pedagogical strategies by instructors can significantly boost student-athletes' confidence in their academic abilities[7]. These methods not only enrich the educational experience but also create greater opportunities for

experiential learning, thereby boosting students' students' confidence in learning capabilities. Scholar Li Xueliu demonstrated this through her study of young athletes from Zhuang ethnic communities in Guangxi, revealing a strong correlation. This study explores the interplay between classroom environments, academic self-efficacy, and academic performance. Research suggests that a positive classroom environment bolsters students' academic self-efficacy, which in turn plays a mediating role in enhancing their overall academic performance. Their findings underscored how environmental factors significantly impact athletes 'self-efficacy. Chen Yihua, another researcher, focused on teacher evaluations' effects on academic self-efficacy. His empirical study demonstrated that constructive feedback from instructors significantly enhances athletes' belief in their academic capabilities, whereas discouraging assessments can reduce their self-assurance or prompt disengagement from scholastic activities[8]. This finding highlights the pivotal role of teacher evaluation in shaping athletes 'academic self-efficacy, reminding educators to carefully craft evaluative language and provide more positive reinforcement during daily instruction to prevent negative impacts. The influence of teaching methodologies on student engagement and self-efficacy remains critical, extending beyond the impact of verbal feedback alone[9]. A 2010 investigation conducted by FAST researchers utilized empirical methods to assess the linkages among students' perceived learning environment, their confidence in mathematical abilities, and performance on standardized mathematics assessments. This discovery underscores how academic self-efficacy significantly impacts learning engagement, offering new approaches to enhance athletic learners' commitment[10]. Liao Youguo's study centered on the connections among athletes' learning values, academic self-efficacy, and their engagement in learning. Empirical findings from his work established academic self-efficacy as a mediating factor that shapes the degree of learning involvement. These results reinforce the significance of self-efficacy in academic settings and offer an evidence-based foundation for instructional strategies [11]. Teachers 'instructional styles influence athletes' academic self-efficacy through multiple approaches, which in turn affects their learning engagement. As a mediating variable linking teaching styles to learning engagement among Thai sepak takraw coaches, academic self-efficacy plays a pivotal role. Suppose H2: Under the mediating effect of academic self-efficacy, the instructional styles of Thai sepak takraw coaches positively impact learners' engagement.

A potential interconnection may exist among instructional approaches, student-athletes' learning engagement, and academic self-efficacy. This research employs a mediation model to specifically examine the intermediary role of academic self-efficacy in the relationship between teaching styles and learning engagement among athletes. The aim is to furnish theoretical support for mental health interventions through pedagogical adjustments.

1.1. Research objectives

The study primarily targeted 950 individuals from Chiang Rai University, Thammasat University, and Nakhon Si Thammarat International College of Technology in Thailand. The survey was conducted via Questionnaire Star, and the data collected were valid. Out of the initial 950 questionnaires, some invalid responses were excluded based on screening criteria, resulting in a final count of 900 valid responses, with a response rate of 94%.

1.2. Measuring tools

1.2.1. Teaching style scale

His study utilized the Teaching Style Scale developed by He Wen et al. [12], which innovatively adopts a "peer-assessment by athletes" method to objectively evaluate teaching styles, thereby minimizing measurement errors resulting from self-report biases. The instrument employs a five-point Likert scale to precisely quantify instructional approaches. By gathering evaluations from athlete peers, it offers a

multidimensional perspective on teaching performance, supplying robust data for guiding pedagogical refinement. In the present research, the scale demonstrated high reliability, with a Cronbach's α coefficient of 0.961, supporting its strong psychometric properties.

1.2.2. Learning input scale

This research adopted the Chinese adaptation of the Utrecht Work Engagement Scale for Students (UWES-S), originally created by Schaufeli and colleagues and later localized by Fang Wentan, Shi Kan, Zhang Fenghua, among others [13]. The instrument is structured to evaluate student-athletes' learning engagement through three primary subscales: energy, involvement, and concentration. It uses a five-point Likert scoring system which facilitates both simple and precise measurement. In the current sample, the scale exhibited high internal consistency, with a Cronbach's α value of 0.966.

1.2.3. Academic self-efficacy scale

This research utilized the Academic Self-Efficacy Scale developed by Liang Yusu [14] as the primary instrument. Consisting of 22 items rated on a five-point Likert scale, the tool is designed to assess academic self-efficacy among athletes in depth. It examines two key dimensions: self-efficacy in learning capability and self-efficacy in learning behavior. The measured Cronbach's α of 0.967 in this study indicates excellent reliability and validity of the scale.

1.3. Joint method bias test

To assess common method variance, Harman's single-factor test was performed. The analysis revealed the presence of nine factors with eigenvalues exceeding 1. The first factor accounted for 39.331% of the total variance explained, which falls below the 40% threshold, indicating that common method bias does not pose a substantial concern in this study.

2. Research results

2.1. Correlation coefficients of variables

Table 1. Correlation coefficient matrix of each variable

	1	2	3	4	5	6	7	8	9
Humorous and lively	1								
Rigorous logic	0.564**	1							
Care and sharing	0.614**	0.562**	1						
Innovative exploration	0.583**	0.631**	0.543**	1					
vigour	0.331**	0.250**	0.319**	0.295**	1				
offer as a tribute	0.286**	0.331**	0.303**	0.308**	0.638**	1			
follow with interest	0.323**	0.305**	0.331**	0.320**	0.617**	0.661**	1		
Learning ability self-efficacy	0.458**	0.467**	0.471**	0.498**	0.373**	0.394**	0.373**	1	
Learn self-efficacy in behavior	0.421**	0.426**	0.420**	0.450**	0.299**	0.317**	0.355**	0.582**	1

Note: ** represents p<0.05, ** represents p<0.01, and *** represents p<0.001*

Through correlation analysis of average scores across variables, we have established the following conclusions: Thai sepak takraw coaches 'instructional styles demonstrate a significant positive correlation with athletes' learning engagement. Similarly, teachers 'teaching approaches show a marked positive

correlation with athletes' academic self-efficacy. Furthermore, there is a significant positive correlation between the two.

2.2. Direct effect analysis

Employing AMOS 28.0, a structural equation model (SEM) was constructed to examine the direct effects of coaching approaches among Thai sepak takraw trainers on athletes' learning involvement. The model incorporates hypothesized relationships among observed and latent variables, along with associated error terms, as summarized in the accompanying figure. This schematic representation captures not only the direct pathways through which instructional style affects engagement but may also imply the presence of mediating factors or specific pathway strengths. Results are presented graphically below.

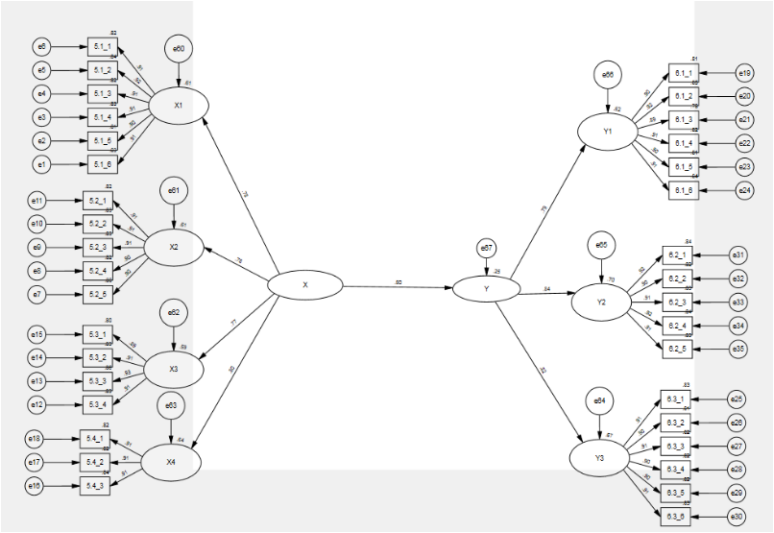

Figure 1. Direct influence model of teaching style on learning engagement

A direct effect model was constructed and evaluated for its model adaptability and goodness-of-fit. The specific fit indices are presented in the table below:

Table 2. Direct effect structural equation model fitting index

Index of suitability	*χ2/df*	*RMSEA*	*NFI*	*RFI*	*IFI*	*TLI*	*CFI*
actual value	2.142	0.040	0.975	0.973	0.986	0.987	0.979

As indicated in Table 2, the chi-square degree of freedom ratio (χ^2/df) was calculated as 2.142. while the root mean square error (RMSEA) of approximate errors measures 0.040—a figure significantly below the ideal threshold of 0.1. Furthermore, all metrics including RFI, NFI, TLI, IFI, and CFI exceed the 0.9 threshold, demonstrating excellent fit and adaptability.

Table 3. Path coefficient estimation table

way	Non-standardized coefficients	Standardization coefficients	*S.E*	*t*	*p*
Teaching style: learning commitment	0.448	0.425	0.032	14.174	0.000

As presented in the table, the standardized regression coefficient (β) was measured at 0.425, with a p-value of less than 0.001, demonstrating a statistically significant and positive influence of teaching style on learning engagement.

2.3. Test of mediation effect

This study utilizes structural equation modeling to examine the relationships among variables. Specifically, the mediation analysis approach introduced by Wen Zhonglin et al. [15]—a method widely recognized in psychological research—was adopted. Using Amos 28.0, a mediation model was built with academic self-efficacy as the mediating variable. The bias-corrected percentile Bootstrap method was applied with 5000 resamples to derive a 95% confidence interval, confirming the mediation effect. The corresponding model is illustrated in Figure 2.

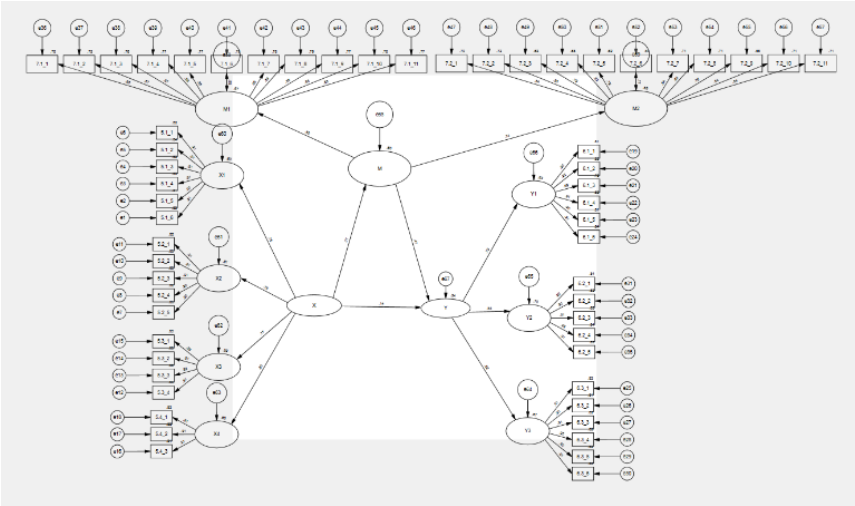

Figure 2. Mediating mechanism model of teaching style on learning engagement

Table 4. Intermediary effect structural equation model fitting index

Appropriate index	*χ2/df*	*RMSEA*	*NFI*	*RFI*	*IFI*	*TLI*	*CFI*
actual value	2.134	0.041	0.952	0.947	0.974	0.972	0.974

As indicated in Table 4, the model fit indices suggest a well-fitting structural model: the chi-square degree of freedom ratio (χ^2/df) is 2.134, and the root mean square error of approximation (RMSEA) is 0.041—well below the recommended threshold of 0.08. Moreover, the RFI, NFI, TLI, IFI, and CFI all surpassed the conventional benchmark of 0.9, further supporting the model's strong overall fit and adaptability.

Table 5. Path coefficient estimates of mediation effects

way	Non-standardized coefficients	Standardization coefficients	*S.E*	*t*	*p*
Teaching style: academic self-efficacy	0.580	0.610	0.025	23.033	0.000
Teaching style: learning commitment	0.251	0.241	0.038	6.493	0.000
Academic self-efficacy → learning commitment	0.349	0.321	0.040	8.601	0.000

Note: **** represents p <0.001*

As presented in Table 5, the standardized path coefficient from "teaching style" to "academic self-efficacy" is 0.610 ($p<0.001$), suggesting a substantial positive effect of teaching style on academic self-efficacy. Similarly, the path from "teaching style" to "learning engagement" also shows a significant positive association (β=0.241, $p < 0.001$). Additionally, academic self-efficacy is positively linked to learning

engagement, with a path coefficient of 0.321 ($p<0.001$), further supporting its role in facilitating learning involvement.

Table 6. Mediation effect test of academic self-efficacy

way	point estimate	The coefficient is multiplied by the product		*Boostrap 5000 times*			
				Bias-Corrected 95%CI		*Percentile 95%CI*	
		standard error	Z price	lower limit	superior limit	lower limit	superior limit
The total effect of teaching style on learning input	0.451	0.032	14.174	0.388	0.512	0.388	0.512
Teaching style-> academic self-efficacy-> indirect effect of learning engagement	0.212	0.025	7.956	0.144	0.239	0.144	0.239
The direct effect of teaching style on learning input	0.251	0.038	6.493	0.175	0.326	0.175	0.326

As indicated in Table 6, the direct effect of teaching style on learning engagement is 0.251. Both the Bias-Corrected and Percentile 95% confidence intervals for this effect range from [0.175, 0.326], excluding zero, which confirms a statistically significant direct effect. Furthermore, teaching style exhibits a significant indirect effect on learning engagement through academic self-efficacy, with an effect size of 0.212. The Bootstrap test for this mediating effect yielded 95% confidence intervals of [0.144, 0.239]—again excluding zero—supporting the presence of a significant mediation pathway. The total effect of teaching style on learning engagement is 0.451, with 95% confidence intervals of [0.388, 0.512] also excluding zero, indicating overall significance. Thus, academic self-efficacy serves as a partial mediator between teaching style and learning engagement.

Based on the aforementioned findings, this study proposed two hypotheses—H1 and H2—regarding the direct and mediating effects of teaching style among Thai sepak takraw coaches on athletes' learning engagement. Empirical testing confirmed both hypotheses, as summarized below:

Table 7. Results of hypothesis verification of direct and mediating mechanisms

Assumed numbering	Scenario content	result
H1	Teaching style has a positive effect on learning commitment	support
H2	Teaching style has a positive effect on learning engagement through the mediating role of academic self-efficacy	support

3. Discussion

3.1. The direct effect of teaching style on learning engagement

Based on the empirical findings, this study offers a detailed examination of the impact of teaching styles on athletes' learning engagement, demonstrating a clear and positive relationship between instructional methods and level of academic involvement. The four sub-dimensions of teaching style—humor and vitality, logical rigor, care and sharing, and innovative exploration—each contribute notably to athletes' learning

commitment. These findings align with research conclusions from scholars worldwide, further confirming the crucial role of Thai sepak takraw coaches' instructional styles in athletes' learning processes[16].

In the domain of physical education, a systematic review conducted by Guo et al. reaffirms the critical importance of teacher support within teacher-student interactions [17]. Their findings reveal that when instructors offer holistic support—addressing autonomy, skill development, and emotional well-being—students' learning engagement shows marked improvement. This insight extends beyond physical education, offering valuable applications for instructional practices in a wide range of academic disciplines.In real-world classrooms, teachers explore innovative teaching methods to create dynamic learning environments. Recognizing that a single teaching model cannot meet all student needs, educators flexibly adjust strategies based on learners' interests, cognitive styles, and learning requirements, making classes more engaging. Such diversified approaches effectively stimulate intrinsic motivation, encouraging deeper knowledge acquisition. Humorous and interactive teaching models serve as effective tools to enhance classroom participation. Rigorous logical teaching methods focus on cultivating critical thinking skills. Through structured knowledge organization, rigorous logical reasoning, and organized content presentation, teachers guide students to build systematic cognitive frameworks. This method not only enhances learning efficiency and academic outcomes but also strengthens students' scholarly literacy and research competence. The teaching philosophy centered on care and sharing fosters strong emotional bonds between instructors and learners. Meanwhile, innovative and exploratory pedagogical approaches encourage students to move beyond conventional frameworks. Through designing research projects, hands-on activities, and extended extracurricular tasks, teachers guide students in actively exploring unfamiliar domains, thereby cultivating creativity and practical skills. Such instructional strategies effectively broaden students' intellectual horizons while stimulating curiosity and a desire for knowledge. Furthermore, educators who prioritize mental well-being implement support mechanisms focused on stress management, psychological adjustment, and confidence building, thereby establishing a holistic support system for student development.

In summary, the coaching style of Thai sepak takraw trainers exerts a substantial positive influence on athletes' learning engagement. It is therefore recommended that coaches consciously refine and develop their instructional approaches in order to more effectively support player development and academic growth.

3.2. The mediating role of academic self-efficacy

Teaching style, learning engagement, and academic self-efficacy are longstanding cornerstones of educational psychology research.These three elements interact in complex ways to collectively shape athletes' learning outcomes and developmental trajectories. This paper aims to systematically analyze their dynamic relationships, with a focus on how teaching style indirectly enhances learning engagement through the mediating mechanism of academic self-efficacy. Based on this exploration, targeted educational intervention strategies are proposed to improve athletic performance.

The study first clarifies that the teaching styles of Thai sepak takraw coaches significantly influence athletes 'learning engagement and academic self-efficacy across multiple dimensions. In particular, three teaching styles—humorous and energetic, rigorous and logical, and caring and supportive—significantly enhance student engagement by strengthening their academic self-efficacy. The humorous and dynamic approach, for instance, fosters a positive and relaxed learning environment through its engaging and motivating nature. Teachers use witty language and vivid explanations to alleviate students 'academic stress while stimulating their interest and curiosity. Research by FAST et al. demonstrates that humor in math classes significantly enhances athletes' mathematical self-efficacy, thereby improving their standardized test performance. This positive affective experience enhances self-assurance and academic motivation, enabling

athletes to demonstrate greater resilience when confronting learning difficulties. The supportive and empathetic teaching approach prioritizes the establishment of interpersonal bonds between instructors and students [18]. Through demonstrated concern and respect, educators reduce the traditional distance, cultivating a trust-based dynamic. In such an environment, teachers act not merely as sources of knowledge, but also as mentors and emotional guides. When athletes encounter difficulties, timely encouragement and assistance from teachers create warmth, which significantly elevates their academic self-efficacy[19]. Adopting a rigorous and logical instructional approach demands that educators present concepts with precision and coherent reasoning, enabling athletes to comprehend underlying principles systematically and in depth. As athletes develop systematic cognitive understanding, their confidence and learning motivation increase, ultimately strengthening academic self-efficacy[20]. The innovative exploratory teaching approach encourages educators to adopt novel instructional methods, introducing fresh concepts and tools to broaden athletes' perspectives while stimulating their creative thinking and practical skills. This dynamic learning experience not only enhances academic self-efficacy but also cultivates an innovative spirit that lays the foundation for future development. Self-efficacy theory indicates that individuals with emotional or material support from key others can significantly boost their self-efficacy[20]. For athletes, support from families, teachers, and peers serves as crucial sources of academic self-efficacy. Athletes receiving adequate support are more confident in their ability to complete academic tasks and demonstrate greater willingness to engage in learning[21][22]. Such conviction and drive encourage students to devote greater effort and demonstrate sustained perseverance in their learning, leading to higher levels of academic achievement[23]. Such support proves particularly vital for graduate students in special education programs. Confronting challenges in this field, comprehensive support helps build positive academic self-efficacy, empowering them to overcome difficulties and achieve academic success. Simultaneously, this support ignites their passion for learning, making them more resilient when facing professional academic pressures[24].

In summary, the instructional approaches of Thai sepak takraw coaches, learners' engagement, and academic self-efficacy are closely interrelated and dynamically interactive. Teaching styles characterized by humor and vitality, logical rigor, and emotional support enhance students' involvement in learning indirectly by strengthening their academic self-efficacy.

4. Conclusion

This study examines athletes' learning engagement through the lens of academic self-efficacy. By developing a mediated-effects model linking Thai sepak takraw coaching styles to learning engagement, we investigate the underlying mechanisms between these constructs. Using correlational analyses and structural equation modeling, the following key findings were obtained:

(1) Coaching style significantly and positively predicts athletes' learning engagement. Furthermore, academic self-efficacy partially mediates this relationship.

(2) This research introduces academic self-efficacy as a novel mediator, establishing a new pathway through which instructional approaches enhance learning engagement.

(3) Empirical evidence from sepak takraw coaching reveals that varied and interactive teaching methods strengthen athletes'academic self-efficacy. This not only confirms the mediating role of self-efficacy but also offers practical guidance for sport educators.

Conflict of interest

The authors declare no conflict of interest

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