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MECHANISMS AND PREDICTIVE EFFECTS OF PHYSICAL EDUCATION TEACHERS' PROFESSIONAL COMPETENCE ON STUDENTS' PARTICIPATION IN PHYSICAL ACTIVITY

DingRui Dai[#,*], QingXu Guo[#], MingYang Chen
Sport Institute, Yunnan University, Kunming 650500, Yunnan, China.
[#]*These authors contributed equally to this work.*
[*]*Corresponding Author: DingRui Dai*

Abstract: This study explored how physical education teachers' professional competence influences students' participation in physical activity, as well as the mechanisms underlying this relationship. Based on Self-Determination Theory (SDT), a mediation model was constructed to examine the role of students' motivation as an important pathway through which teacher competence affects behavioral engagement. The data were drawn from an open-access educational dataset including 1,248 secondary school students between the ages of 12 and 18. Structural equation modeling (SEM) was applied to evaluate the proposed associations. The findings showed that teachers' professional competence had a significant positive effect on students' participation in physical activity, both directly and indirectly. In particular, higher levels of teacher competence were associated with stronger student motivation, which subsequently promoted greater involvement in physical activity. In addition, the mediation results demonstrated that motivation served as a partial mediator in the association between teacher competence and students' participation. These results underscore the important role of teachers' professional competence in fostering students' engagement in physical activity and provide empirical evidence for the motivational mechanisms involved. By combining a competence-oriented perspective with a motivational framework, this study enriches the existing literature and offers practical insights for the improvement of physical education teaching.
Keywords: Student motivation; Physical activity participation; Self-determination theory; Structural equation modeling

1 INTRODUCTION

Physical activity plays a crucial role in promoting adolescents' physical health, psychological well-being, and overall development[1-2]. However, a growing body of evidence indicates that students' participation in physical activity remains insufficient across many educational contexts[3-4]. Schools, as primary environments for structured physical activity, have been widely recognized as key settings for fostering active lifestyles[5]. Within this context, physical education (PE) teachers are considered pivotal agents in shaping students' engagement in physical activity, as their instructional practices and professional qualities directly influence students' experiences and behaviors.

Existing research has predominantly focused on specific teaching behaviors, such as instructional strategies, classroom climate, and teacher support, in explaining students' physical activity participation[6]. While these studies provide valuable insights, they often overlook the broader construct of teachers' professional competence, which encompasses pedagogical knowledge, interpersonal skills, and instructional effectiveness[7]. Moreover, limited attention has been given to the underlying psychological mechanisms through which teachers' competence translates into student participation. Drawing on Self-Determination Theory (SDT), students' motivation has been identified as a key determinant of behavioral engagement, suggesting that teachers' professional competence may indirectly influence participation by enhancing students' motivational processes.

Against this background, the present study aims to examine the mechanisms and predictive effects of physical education teachers' professional competence on students' participation in physical activity. Specifically, this study investigates whether teachers' professional competence directly predicts students' participation and whether this relationship is mediated by students' motivation. By integrating a competence-based perspective with a motivational framework, this study seeks to provide a more comprehensive understanding of how teacher-related factors contribute to students' physical activity engagement.

2 THEORETICAL FRAMEWORK & HYPOTHESES

Drawing on Self-Determination Theory (SDT), this study proposes a theoretical framework to explain how physical education teachers' professional competence influences students' participation in physical activity[8]. SDT posits that individuals' behavioral engagement is largely driven by the satisfaction of their psychological needs and the quality of their motivation. In educational contexts, teachers play a crucial role in shaping students' motivational processes through their instructional practices, interpersonal interactions, and professional capabilities. Accordingly, teachers with higher levels of professional competence are more likely to create supportive learning environments that enhance students' intrinsic motivation and engagement in physical activity.

From this perspective, teachers' professional competence can be understood as a key contextual factor that fosters students' motivation. Competent teachers are better able to design effective learning tasks, provide constructive feedback, and establish positive teacher–student relationships, all of which contribute to students' sense of competence and enjoyment. These experiences, in turn, are essential for the development of autonomous motivation, which has been consistently linked to higher levels of behavioral participation. Therefore, students' motivation is expected to serve as a critical mechanism linking teachers' professional competence to students' participation in physical activity.
Based on the above theoretical reasoning, this study proposes the following hypotheses:

- H1: Physical education teachers' professional competence positively predicts students' participation in physical activity.
- H2: Students' motivation mediates the relationship between teachers' professional competence and students' participation in physical activity.

3 METHODS

3.1 Data Source and Participants

The data used in this study were derived from an open-access educational dataset focusing on adolescents' physical activity and school environments. The dataset includes a nationally representative sample of secondary school students. After data cleaning and removing incomplete responses, a total of 1,248 students (52.3% male, 47.7% female) aged between 12 and 18 years (M = 15.2, SD = 1.7) were included in the final analysis.

3.2 Measures

Physical education teachers' professional competence was operationalized using composite indicators available in the dataset, including students' evaluations of instructional clarity, feedback quality, and teacher support. These indicators were combined to form a latent construct of teacher professional competence.
Students' motivation was measured using items reflecting intrinsic interest and engagement in physical education, such as enjoyment of activities and willingness to participate. A composite score was calculated to represent students' motivational level.
Students' participation in physical activity was assessed based on self-reported frequency of engagement in moderate-to-vigorous physical activity, including both in-school and out-of-school activities.

3.3 Data Processing

Prior to analysis, missing values were handled using full information maximum likelihood estimation. All variables were standardized to ensure comparability. The internal consistency of the constructed variables was assessed, and all composite measures demonstrated acceptable reliability.

3.4 Data Analysis

SPSS 26.0 was used to calculate descriptive statistics and Pearson correlation coefficients. The hypothesized relationships among variables were then tested through structural equation modeling (SEM) in AMOS 24.0. Model fit was determined based on several widely used indices, namely the comparative fit index (CFI), Tucker–Lewis index (TLI), and root mean square error of approximation (RMSEA). The indirect effect of students' motivation was further assessed by applying the bootstrap method with 5,000 resamples.

4 RESULTS

4.1 Descriptive Statistics and Correlations

The means, standard deviations, and correlations of the principal variables are presented in Table 1.

Table 1 Descriptive Statistics and Correlations

Variable	M	SD	1	2	3
1. Teacher Professional Competence	3.68	0.74	—		
2. Student Motivation	3.75	0.69	0.42***	—	
3. Physical Activity Participation	3.54	0.71	0.38***	0.45***	—

*Note: **p < 0.001

As shown in Table 1, all variables were significantly correlated in the expected directions. Teacher professional competence showed a moderate positive correlation with student motivation ($r = 0.42$, $p < 0.001$) and physical activity participation ($r = 0.38$, $p < 0.001$). Furthermore, student motivation was moderately associated with participation ($r = 0.45$, $p < 0.001$). These results provide preliminary empirical support for the proposed mediation model.

4.2 Structural Model and Main Effects

The structural model was tested using SEM. The model demonstrated a satisfactory fit to the data ($\chi^2/df = 2.85$, CFI = 0.95, TLI = 0.94, RMSEA = 0.045), indicating that the hypothesized model adequately represents the observed data (Figure 1).

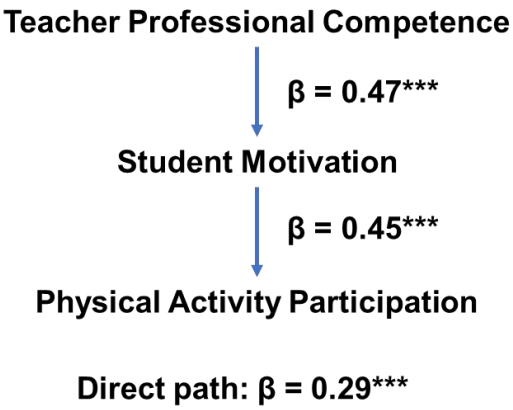

Figure 1 Structural Model Results

The results indicated that teacher professional competence had a significant direct effect on students' physical activity participation ($\beta = 0.29$, $p < 0.001$), supporting Hypothesis 1. In addition, teacher competence significantly predicted student motivation ($\beta = 0.47$, $p < 0.001$), and motivation significantly predicted participation ($\beta = 0.45$, $p < 0.001$). These findings suggest that both direct and indirect pathways exist between teacher competence and student participation.

4.3 Mediation Analysis

To further examine the mediating role of student motivation, a bootstrap analysis with 5,000 resamples was conducted (Table 2).

Table 2 Mediation Analysis Results

Path	Effect Size	95% CI Lower	95% CI Upper	Significance
Direct Effect	0.18	0.09	0.27	$p < 0.01$
Indirect Effect (via Motivation)	0.21	0.15	0.28	$p < 0.001$
Total Effect	0.39	0.31	0.47	$p < 0.001$

The results revealed that the indirect effect of teacher professional competence on physical activity participation through student motivation was statistically significant, as the confidence interval did not include zero. The indirect effect (0.21) accounted for a substantial proportion of the total effect (0.39), indicating that motivation plays a critical role in explaining the relationship.

After including the mediator, the direct effect remained significant but was reduced ($\beta = 0.18$, $p < 0.01$), suggesting a partial mediation effect. This finding indicates that teacher professional competence influences students' participation both directly and indirectly through motivational processes.

5 DISCUSSION

The purpose of this study was to explore both the mechanisms through which physical education teachers' professional competence affects students' participation in physical activity and its predictive effect on such participation. The findings strongly supported the hypothesized model, showing that teachers' professional competence directly contributed to students' participation and also affected it indirectly by enhancing students' motivation.

First, the results confirm that teachers' professional competence is a significant predictor of students' physical activity participation. This finding highlights the critical role of teachers as key contextual factors in shaping students' behavioral engagement. Compared with prior studies that primarily focused on specific teaching behaviors, the present study extends the literature by emphasizing the broader construct of professional competence, suggesting that teachers' overall capability—rather than isolated instructional practices—plays a fundamental role in promoting students' active participation.

Second, the mediating role of student motivation provides important insight into the underlying mechanism. Consistent with Self-Determination Theory (SDT), the results indicate that teachers' professional competence enhances students' motivation, which in turn increases their participation in physical activity. This finding underscores the importance of

psychological processes in explaining how external educational factors translate into behavioral outcomes. It also suggests that motivation serves as a key pathway through which teacher-related factors influence student engagement.

From a theoretical perspective, this study contributes to the literature by integrating a competence-based view of teaching with a motivational framework. By positioning teachers' professional competence as an antecedent of student motivation, the study extends SDT into the domain of physical education and highlights the importance of teacher-related variables in motivational processes. From a practical standpoint, the findings suggest that improving teachers' professional competence—particularly in terms of instructional quality and interpersonal support—may be an effective strategy for enhancing students' participation in physical activity.

Despite these contributions, several limitations should be acknowledged. First, the use of cross-sectional data limits the ability to draw causal inferences. Second, the reliance on self-reported measures may introduce potential bias. Future research could adopt longitudinal or experimental designs to further examine the causal mechanisms and explore additional mediating or moderating variables.

6 CONCLUSION

This study examined the mechanisms and predictive effects of physical education teachers' professional competence on students' participation in physical activity. The findings indicate that teachers' professional competence is a significant predictor of students' participation and exerts its influence both directly and indirectly through students' motivation. By identifying motivation as a key mediating mechanism, this study provides a clearer understanding of how teacher-related factors translate into student behavioral engagement.

Overall, the results highlight the importance of enhancing teachers' professional competence as a means of promoting students' active participation in physical activity. These findings offer valuable implications for educational practice and contribute to the development of more effective strategies for improving student engagement in physical education contexts.

COMPETING INTERESTS

The authors have no relevant financial or non-financial interests to disclose.

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