International Journal of Computer Information Systems and Industrial Management Applications
ISSN 2150-7988 Volume 18 (2026) pp. 1-12

https://doi.org/10.70917/ijcisim-2026-1016
Article

Social-environmental interventions for professional development geared toward sustainable education: the mediating role of pedagogical self-efficacy in enhancing physical education literacy teaching for early childhood teachers

Shijiao Li [1] and Denise KOH [2,*]

[1] Lingkungan Ilmu, 43600 Bangi, Selangor, Malaysia
[2] Universiti Kebangsaan Malaysia, 43600 UKM Bangi, Selangor, Malaysia
* Correspondence author: sdlsj2010@126.com

Abstract: Under the framework of sustainable education, improving the physical literacy teaching ability of kindergarten teachers is of great significance in promoting children's comprehensive development, and teaching self-efficacy was introduced as a mediating variable. A stratified random sampling method was used to conduct a questionnaire survey on 520 kindergarten teachers in Shijiazhuang city district and the surrounding districts and counties in Hebei Province, which was analyzed by using stepwise regression with Bootstrap mediation effect test. The results showed that the mean score of kindergarten teachers' career development social environment was 4.05, the mean score of teaching self-efficacy was 4.26, and the mean score of physical education literacy was 4.19, and there was a significant positive correlation between kindergarten teachers' career development social environment, physical education literacy, and teaching self-efficacy. The social environment of early childhood teachers' career development significantly predicted their physical literacy, and after teaching self-efficacy entered the regression equation, the regression coefficient of physical literacy decreased, but its significance level still existed. Early childhood teachers' physical literacy was influenced by both career development social environment and teaching self-efficacy, and teaching self-efficacy played a partial mediating effect between early childhood teachers' physical literacy and career development social environment.

Keywords: career development social environment; teaching self-efficacy; physical education literacy; stepwise regression analysis; mediation effect test

1. Introduction

Since the reform and opening up, with the prosperity of China's economy, the progress of science and technology and the thirst for skilled personnel, China's vocational education has developed greatly under the stimulation of relevant policies [1]. According to the statistics of relevant departments, 1562 higher vocational education in China in 2025, China's vocational education from weak to strong, has initially formed the basic framework of the vocational education system from the primary to the advanced level, a complete range of disciplines, a more reasonable structure, and the complementarity of school education and short-term training [2-4]. Not only has it made outstanding contributions to improving the modern education system, promoting labor and employment, and fostering social stability, but it has also cultivated hundreds of millions of production, technical, management, and service talents for the country, greatly improved the quality of laborers, and powerfully supported the

take-off of China's economy [5]. In order to meet the advent of the new century and adapt to the international competition brought about by economic globalization, as well as the new situation of the rapid development of the scientific and technological revolution and the strong demand for high education and high skills [6-7]. In recent years, especially since the Third Education Work Conference, China's vocational education has been developing relatively fast. The rapid development of vocational education is supposed to be a good thing, but the overly fast development speed, the operation of some regions in a hurry, and the hasty launching of programs without regard to the conditions often bring about a lot of negative impacts [8].

The professional development of kindergarten teachers includes both the mastery of teachers' professional skills and the enhancement of their subject knowledge, and also involves the growth of the inner world, such as the growth of the teacher's spiritual world or spirit world [9]. From this point of view, it can be seen that education is not just about teachers educating young children in a simple and mechanical way, but also requires teachers to use their own emotions to educate young children and put themselves in their children's shoes [10]. Early childhood teachers play different roles, will have a different impact on young children, for the teacher “teacher”, to provide young children with the opportunity to understand society; for the mother ‘companion’, to provide young children with a prepared environment; for the friend “collaborator”. As a mother, they are “companions”, providing a prepared environment for young children; as a friend, they are “collaborators”, adding fun to young children's independent play activities [11-13]. Therefore, early childhood teachers have a subtle influence on the development of children's day-to-day living habits and the cultivation of various abilities, and their effectiveness is irreplaceable by anyone else.

Professional self-efficacy, originated from a key concept in Bandura's social learning theory - self-efficacy [14]. Later scholars have found that high-performance early childhood teachers are confident in their career in ECE, have strict requirements for their own professional qualities, often set higher developmental goals, attempt difficult educational work, show strong commitment to their goals, and accelerate their professional development, i.e., they show that they are constantly updating their professional knowledge in accordance with the needs of pre-school education [15-17]. The quality of early childhood education work determines the future fate of the country, so early childhood teachers have a high professional value [18]. However, the professional value of early childhood teachers is characterized by latency and far-reaching, in addition, it is difficult to quantitatively judge the developmental state of young children, and it is difficult for the professional value of early childhood teachers to be reflected in the present, which will affect the attitude of educational work to a certain extent [19]. Therefore, professional self-efficacy affects the thinking patterns of early childhood teachers regarding professional issues and the choice of teaching behaviors, and determines the willingness of individuals to further improve their professional competence.

Most of the existing studies mainly focus on two elements of early childhood teachers' career development social environment, sports literacy and teaching self-efficacy, and fewer studies are conducted on all three elements at the same time. The research targets are mainly teachers and students in colleges and universities, as well as employees in enterprises, and the research perspective is seldom directed to the group of early childhood teachers. This study takes preschool teachers as the research subjects and uses the Occupational Development Social Environment Scale, the Preschool Teachers' Physical Education Literacy Scale, and the Teaching Self-efficacy Scale to investigate the preschool teachers' occupational development social environment, physical education literacy, and teaching self-efficacy. It aims to explore whether the occupational development social environment of preschool teachers has a predictive effect on their physical education literacy, the relationship between the occupational development social environment and physical education literacy of preschool teachers, and whether teaching self-efficacy can produce a mediating effect. The study not only explores ways and means to strengthen the social environment of early childhood professional development and improve their physical literacy, but also, furthermore, validates the feasibility of enhancing the pedagogical self-efficacy of early childhood teachers to improve the social environment of their professional development and physical literacy.

2. Research Objects and Methods

2.1. Research hypotheses and modeling

This study focused on 520 early childhood physical education teachers as the research object, through the questionnaire survey to understand the current situation of early childhood teachers' career development social environment, early childhood teachers' physical literacy teaching and teaching self-efficacy, and the three variables of early childhood teachers' career development social

environment, early childhood teachers' physical literacy teaching and teaching self-efficacy, with the purpose of exploring the relationship between career development social environment on early childhood teachers' physical literacy and the mediating role played by teaching self-efficacy. It further reveals the impact of career development social environment intervention on early childhood teachers' physical literacy, and provides theoretical and practical basis for the research on career development social environment intervention and early childhood teachers' physical literacy.

This study hypothesized that teachers' career development social environment intervention is conducive to the improvement of teachers' physical literacy and that teaching self-efficacy plays a mediating role between the two by searching for information, so it conducted a questionnaire survey on 520 early childhood teachers by using the Teaching Self-Efficacy Scale, Career Development Social Environment Intervention Scale, and Early Childhood Teachers' Physical Education Literacy Scale, and analyzed the results of the survey. Meanwhile, the following hypotheses were proposed in this study:

Hypothesis H1: There is a difference in demographic variables among social environment of early childhood teachers' professional development, teaching self-efficacy and physical literacy of early childhood teachers.

Hypothesis H2: Teacher professional development social environment intervention significantly predicts early childhood teachers' physical literacy.

Hypothesis H3: Instructional self-efficacy significantly predicts early childhood teachers' physical literacy.

Hypothesis H4: Instructional self-efficacy mediates the relationship between social-environmental interventions for teacher professional development and physical literacy among early childhood teachers.

Accordingly, the following mediation model was constructed.

The modeling constructs for this study are as follows:

$$\mathrm{Y} = c_1 X + \eta_i Z_i + \varepsilon_i \tag{1}$$

$$M = a\mathrm{X} + \eta_i Z_i + \varepsilon_i \tag{2}$$

$$Y = c_2 X + bM + \eta_i Z_i + \varepsilon_i \tag{3}$$

where Y denotes physical literacy of early childhood teachers, M is teaching self-efficacy, X is the social environment of teachers' professional development, and Z is a control variable. First, regress the sample using formula (1) to test the effect of career development social environment on physical literacy. Second, combining formula (2) and formula (3) to test whether there is a mediating effect of teaching self-efficacy in the effect of career development social environment on physical literacy. When the regression coefficient of c_1 is significant, it can be corroborated that the career development social environment has a significant effect on the physical literacy of early childhood teachers in order to further test the mediating effect of teaching self-efficacy through formula (2) and formula (3). In the mediation effect test, when the regression coefficients of a and b are both significant, it means that the mediation effect exists, at this time, if the regression coefficient of c_2 is significant, it means that teaching self-efficacy plays a part of the mediation effect in the influence of the career development social environment on the physical literacy; if the regression coefficient of c_2 is not significant, it means that teaching self-efficacy played a full mediating effect in the career development social environment on physical literacy. If one of the regression coefficients of a and b is not significant in the mediation effect test, further Sobel mediation effect test is required, and Figure 1 shows the mediation effect test procedure.

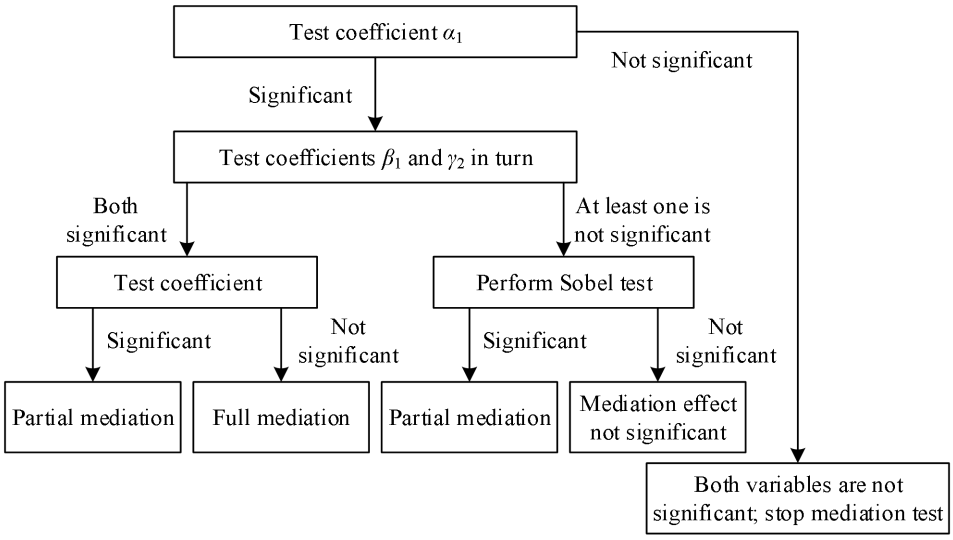

Figure 1. Intermediate effect test procedure

2.2. Study population

A stratified random sampling method was used, with Hebei Province as the main study area, focusing on covering Yuhua District, Chang'an District, Qiaoxi District, Xinhua District in Shijiazhuang City, as well as neighboring districts and counties, such as Zhengding County, Luancheng District, and Luquan District, and taking into account some of the institutes in Tangshan and Baoding to increase their representativeness. According to the 2023 preschool education statistics from the Hebei Provincial Department of Education, the institutions were stratified by nature (public, private) and geography (urban, county).

A total of 550 questionnaires were distributed to teachers through the online form, and among the 535 questionnaires recovered, 15 invalid questionnaires due to missing data, too short a time to answer, or regularity of answering were excluded, resulting in 520 valid questionnaires (the effective recovery rate was 94.5%). Among the survey respondents, 5 (0.96%) were aged 20 and below, 300 (57.69%) were aged 21-30, 170 (32.69%) were aged 31-40, 40 (7.69%) were aged 41-50, and 5 (0.96%) were aged 50 and above. There were 240 (46.16%) with less than 5 years of teaching experience, 120 (23.08%) with 5 to 10 years, 80 (15.38%) with 10 to 15 years, and 80 (15.38%) with more than 15 years. The literacy level was high school or junior college for 80 people (15.38%), college for 285 people (54.81%), bachelor's degree for 150 people (28.85%), and postgraduate for 5 people (0.96%).

2.3. Research tools

The questionnaire of this study consisted of four main parts: the basic information of early childhood teachers, the career development social environment intervention scale, the physical education literacy scale for early childhood teachers, and the teaching self-efficacy scale.

(1) Professional Development Social Environment Intervention Scale

The scale refers to the Teacher Professional Learning Community Scale and the Sense of Organizational Support Scale, which consists of 11 items in three dimensions: administrative support (4 items), peer cooperation (4 items), and professional development (3 items), and it is scored on a Likert 5-point scale (1=completely non-compliant, 5=complying fully), and the Cronbach's α coefficient of the scale was 0.79 in this study, and the reliability is good. The results of the validated factor analysis showed that the fit indicators were good (χ^2/df = 2.779, GFI = 0.952, AGFI = 0.945, CFI = 0.932, RMSEA = 0.061).

(2) Teaching Efficacy Scale for Early Childhood Teachers

The Teaching Efficacy Questionnaire for Early Childhood Teachers compiled by relevant scholars was used, with a total of 10 items, consisting of three dimensions: level of self-efficacy (3 questions), strength of self-efficacy (4 questions), and breadth of self-efficacy (3 questions), and scored on a Likert's 5-point scale, with positive scoring and reverse scoring, with the higher the scores, the higher the teaching efficacy of the early childhood teachers. The Cronbach's alpha coefficient of the questionnaire was 0.931 with good reliability. Validated factor analysis of the questionnaire showed good fit indicators (χ^2/df = 2.365, GFI = 0.981, AGFI = 0.962, CFI = 0.985, RMSEA = 0.049).

(3) Physical Literacy Scale for Early Childhood Teachers

With reference to the Physical Literacy Teaching Observation Tool, it was developed in four dimensions of physical education knowledge (3), physical education competence (3), physical education teaching competence (4), and physical education values (2) with a total of 12 questions.The scale was scored on a Likert 5-point scale, with higher scores indicating better physical education literacy of the early childhood teachers. The Cronbach's α coefficient for the total scale was 0.81, and the results of the validated factor analysis showed that the fit indicators were good ($\chi^2/df = 3.772$, GFI = 0.951, AGFI = 0.903, CFI = 0.867, RMSEA = 0.065).

2.4. Control and testing of common method bias

During the questionnaire survey to collect data, since the three questionnaires were used to administer the survey to the small group of teachers of young children, it was necessary to consider that there might be a common methodological bias, and the research team also adopted certain procedural control strategies in advance during the survey process, such as because of the scoring method of the three questionnaires is the same, so all the three questionnaires are randomly mixed together to form a whole questionnaire, then the questionnaire was Then the questionnaire was divided in half into 2 parts, one part of the scoring method was arranged positively in the layout, and the other part was arranged negatively in the layout, i.e., the scoring of the first part of the layout was from 1 to 5, and the scoring of the second part of the layout was from 5 to 1, so as to avoid stereotyping effect of the respondents' thinking. In order to scientifically and rationally verify whether common method bias is real in this study, the recovered data were examined using Harman's one-way test, which showed that the factor analysis KMO value for all entries was 0.858, the Bartlett's spherical test value was 2021.88 ($df = 580$, P = 0.000), and the number of the common factors with an eigenroot value of more than 1 was 8, and the number of common factors with an eigenroot value of more than 1 was 8. The 1st common factor explained 29.11% of the total variance, which is less than the critical value of 40.00%, so no significant common method bias effect was found in this study.

2.5. Data analysis methods

SPSS 26.0 and Process were used to process and analyze the data in this study. At the end of the questionnaire collection process, the study data after excluding invalid data were imported into SPSS 26.0 to form the original database, and then SPSS was used for further data processing. In this study, SPSS was mainly used for descriptive statistical analysis, independent samples t-test, one-way ANOVA, regression, and correlation analysis, and Process was used to mainly verify the mediating role of teaching self-efficacy that mediates the role of teaching self-efficacy in the interventions of the social environment of teachers' professional development between the physical education literacy of early childhood teachers.

3. Findings and analysis

3.1. Situation of the social environment for career development

(1) General status of the career development social environment

In this paper, a 5-point Likert scale with 11 questions was used to measure the career development social environment, and Table 1 shows the general characteristics of the career development social environment. In the whole survey of career development social environment in kindergarten, the mean score of career development social environment is 4.05, which is higher than the theoretical median of 3, indicating a high level of career development social environment in kindergarten. In these three dimensions, the mean scores from highest to lowest were: professional development (M=4.23) > peer collaboration (M=4.05) > administrative support (M=3.81).

Table 1. The characteristics of professional development social environment

	M	**SD**	**Maximum**	**Minimum**
Administrative support	3.81	0.85	5	1
Peer cooperation	4.05	0.77	5	1
Professional development	4.23	0.66	5	1
Overall scale	4.05	0.65	5	1

(2) Differences in the social environment for career development by region of the school

Table 2 shows the differences in the social environment of professional development in the garden

area, using independent samples t-test on the social environment of professional development in the garden area, the overall questionnaire on the social environment of professional development and peer cooperation ($p < 0.05$), there is a significant difference between urban teachers and rural teachers, are shown in the urban teachers scored higher than the rural teachers, the other two dimensions in the garden area there is no differences ($p > 0.05$).

Table 2. The differences in the social environment in the garden area

	Kindergarten region	M±SD	t value	p value
Occupational development	City	4.08±0.69	3.011	0.005
	Countryside	3.78±0.66		
Administrative support	City	3.88±0.85	2.572	0.337
	Countryside	3.55±0.75		
Peer cooperation	City	4.13±0.75	4.222	0.008
	Countryside	3.75±0.78		
Professional development	City	4.21±0.65	0.959	0.369
	Countryside	4.11±0.82		

(3) Differences in the social environment for professional development in terms of the type of establishment

Table 3 shows the differences in the social environment for professional development among different types of kindergartens. Through independent sample t-tests, it was found that there were significant differences ($p < 0.05$) in the overall questionnaire of the social environment for professional development and its three dimensions - professional development, peer collaboration, and administrative support - between teachers in public kindergartens and those in private kindergartens. Specifically, teachers in public kindergartens scored higher than those in private kindergartens.

Table 3. The difference in the type of social environment in the garden

	Kindergarten region	M±SD	t value	p value
Occupational development	Private	4.09±0.66	2.771	0.009
	Public	3.81±0.78		
Administrative support	Private	3.85±0.81	2.302	0.031
	Public	3.55±0.94		
Peer cooperation	Private	4.11±0.72	2.875	0.008
	Public	3.77±0.79		
Professional development	Private	4.26±0.69	2.077	0.043
	Public	4.07±0.69		

3.2. The case for teaching self-efficacy

(1) Overall status of teaching self-efficacy

Descriptive statistics were analyzed for each factor in the kindergarten teachers' self-efficacy scale, and the results are shown in Table 4. In this paper, a 5-point Likert scale with 10 questions was used to measure kindergarten teachers' self-efficacy scores to conclude that in the whole kindergarten teachers' self-efficacy survey, the average score of kindergarten teachers' self-efficacy level was 4.26, which was higher than 3, indicating that kindergarten teachers' self-efficacy was at a high level. The mean scores of the three dimensions, from highest to lowest, were: the highest level of intensity of teaching self-efficacy (M=4.35), followed by the level of teaching self-efficacy (M=4.22) and the breadth of teaching self-efficacy (M=4.22).

Table 4. The general condition of the self-efficacy of teaching

	M	SD	Maximum	Minimum
Self-efficacy level	4.22	0.68	5	1
Self-efficacy strength	4.35	0.75	5	1
Self-efficacy breadth	4.22	0.68	5	1
Self-efficacy	4.26	0.58	5	1

(2) Differences in Teaching Self-Efficacy by Kindergarten Area

Table 5 shows the differences in teaching self-efficacy in kindergarten districts, and using the independent samples t-test to analyze teachers' self-efficacy in kindergarten districts, it was concluded

that the overall level of teachers' self-efficacy in kindergarten districts did not reach the level of significance for the other three dimensions ($p > 0.05$).

Table 5. The teaching self-efficacy is different in the area

	Kindergarten region	M±SD	t value	p value
Self-efficacy level	City	4.20±0.65	0.525	0.601
	Countryside	4.15±0.60		
Self-efficacy strength	City	4.33±0.77	0.123	0.908
	Countryside	4.32±0.56		
Self-efficacy breadth	City	4.19±0.65	-0.058	0.962
	Countryside	4.21±0.63		
Self-efficacy	City	4.24±0.61	0.183	0.871
	Countryside	4.23±0.52		

(3) Differences in Teaching Self-Efficacy by Campus Type

Table 6 shows the differences in teaching self-efficacy by type of kindergarten, and using the independent samples t-test to test teachers' self-efficacy by type of kindergarten, it was concluded that there was no significant difference between the overall level of teachers' self-efficacy and the other three dimensions in terms of type of kindergarten ($p > 0.05$).

Table 6. The teaching self-efficacy is different from the type of the garden

	Kindergarten region	M±SD	t value	p value
Self-efficacy level	Private	4.20±0.65	0.938	0.345
	Public	4.11±0.58		
Self-efficacy strength	Private	4.35±0.77	0.875	0.378
	Public	4.25±0.52		
Self-efficacy breadth	Private	4.21±0.61	0.585	0.551
	Public	4.15±0.59		
Self-efficacy	Private	4.25±0.58	0.888	0.369
	Public	4.17±0.52		

3.3. The situation of physical education literacy among early childhood teachers

(1) Overall status of physical literacy among early childhood teachers

In this paper, a 5-point Likert scale scoring with 12 questions was used to measure the physical literacy scores of early childhood teachers, and Table 7 shows the overall status of physical literacy of early childhood teachers. The results show that in the whole survey of physical literacy of kindergarten teachers, the average score is 4.19, and the difference is significant compared with 3, which indicates that kindergarten teachers' physical literacy is high. The scores for the four dimensions were 3.81, 4.01, 4.38 and 4.51. Kindergarten teachers scored above 4 on physical education competence, physical education teaching competence, and physical education values, indicating that teachers demonstrated a high level of physical education literacy in these three areas.

Table 7. The overall condition of the child teacher's physical literacy

	M	SD	Maximum	Minimum
Sports knowledge	3.81	0.89	5	1
Athletic ability	4.01	0.78	5	1
Physical teaching ability	4.38	0.65	5	1
Sports values	4.51	0.75	5	1
Child teacher sports accomplishment	4.19	0.61	5	1

(2) Differences in Physical Education Literacy of Early Childhood Teachers by Campus Area

Table 8 shows the differences in physical education literacy of kindergarten teachers in terms of school districts. On the overall questionnaire of physical education competence, physical education teaching competence and physical education literacy, there is a significant difference between urban and rural teachers ($p < 0.05$), which is reflected in the fact that the scores of urban teachers are higher than those of rural teachers, and there is no difference in the other two dimensions in terms of school districts ($p > 0.05$).

Table 8. The differences in physical education in the garden area

	Kindergarten region	M±SD	t value	p value
Sports knowledge	City	4.52±0.65	1.525	0.135
	Countryside	4.31±0.99		
Athletic ability	City	3.85±0.88	2.855	0.005
	Countryside	3.38±0.86		
Physical teaching ability	City	4.03±0.75	3.018	0.004
	Countryside	3.71±0.97		
Sports values	City	4.35±0.61	0.602	0.602
	Countryside	4.33±0.86		
Child teacher sports accomplishment	City	4.22±0.58	2.641	0.012
	Countryside	3.99±0.72		

(3) Differences in Physical Education Literacy of Early Childhood Teachers by Type of Kindergarten

Table 9 shows the differences in physical education literacy of kindergarten teachers by type of school, and there is a significant difference between public and private kindergarten teachers on the physical education competence dimension ($p<0.05$), which is mainly reflected in the fact that the scores of public kindergarten teachers' groups are significantly higher than those of private kindergartens. The differences in the other dimensions of kindergarten teachers' professional identity and the overall scale were not significant ($p>0.05$) in different types of camps.

Table 9. The differences in the type of child teacher sports literacy in the garden

	Kindergarten region	M±SD	t value	p value
Sports knowledge	Private	4.51±0.75	0.765	0.452
	Public	4.41±0.61		
Athletic ability	Private	3.85±0.88	2.205	0.031
	Public	3.55±0.92		
Physical teaching ability	Private	4.01±0.80	0.805	0.435
	Public	3.89±0.68		
Sports values	Private	4.41±0.65	0.985	0.331
	Public	4.31±0.51		
Child teacher sports accomplishment	Private	4.20±0.63	1.515	0.135
	Public	4.05±0.55		

In summary, Hypothesis 1 was tested, which states that there are differences in the demographic variables of social environment for professional development of early childhood teachers, teaching self-efficacy, and physical education literacy of early childhood teachers.

3.4. Correlation analysis between variables

Correlation analysis is a method of analyzing the strength of the relationship between variables. This time, simple correlation was used to analyze the correlation between the variables, and the correlation coefficients between the variables are shown in Table 10. The serial numbers 1 to 10 are administrative support, peer cooperation, professional development, physical education knowledge, physical education competence, physical education teaching competence and physical education values, level of self-efficacy, strength of self-efficacy and breadth of self-efficacy, respectively.

First, there was a significant positive correlation between the social environment of professional development and all dimensions of physical education literacy of early childhood teachers. Administrative support was positively correlated with the dimensions of physical education literacy of early childhood teachers at $p<0.01$ level with correlation coefficients of 0.552, 0.611, 0.465, 0.685, respectively. Peer cooperation was positively correlated with the dimensions of physical education literacy of early childhood teachers at $p<0.01$ level with correlation coefficients of 0.571, 0.595, 0.499, 0.631, respectively. The dimensions of professional development and physical education literacy of early childhood teachers were positively correlated at the $p<0.01$ level with correlation coefficients of 0.602, 0.631, 0.521, and 0.685, respectively.

Second, career development social environment its dimensions were positively correlated with teaching self-efficacy. Administrative support was positively correlated with teacher self-efficacy at the $p<0.01$ level with correlation coefficients of 0.671, 0.665, and 0.615, respectively. Peer collaboration was positively correlated with teacher self-efficacy at the $p<0.01$ level with correlation coefficients of

0.521, 0.571, and 0.445, respectively. There was a positive correlation between professional development and teacher self-efficacy at the p<0.01 level with correlation coefficients of 0.613, 0.606, and 0.555, respectively.

Finally, teaching self-efficacy was positively correlated with all dimensions of early childhood teacher literacy. The level of teaching self-efficacy was positively correlated with all dimensions of early childhood teacher literacy at the p<0.01 level, with correlation coefficients of 0.433, 0.488, 0.344, and 0.575, respectively. Strength of teaching self-efficacy was positively correlated with the dimensions of early childhood teacher literacy at the p<0.01 level, with correlation coefficients of 0.492, 0.575, 0.425, and 0.611, respectively. Breadth of teaching self-efficacy was positively correlated with the dimensions of early childhood teacher literacy at the p<0.01 level, with correlation coefficients of 0.378, 0.441, 0.308, and 0.523, respectively.

Table 10. Correlation coefficient between variables

	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1	1									
2	0.759**	1								
3	0.755**	0.731**	1							
4	0.552**	0.571**	0.602**	1						
5	0.611**	0.595**	0.631**	0.771**	1					
6	0.465**	0.499**	0.521**	0.702**	0.656**	1				
7	0.685**	0.631**	0.685**	0.692**	0.759**	0.595**	1			
8	0.671**	0.521**	0.613**	0.433**	0.488**	0.344**	0.575**	1		
9	0.665**	0.571**	0.606**	0.492**	0.575**	0.425**	0.611**	0.628**	1	
10	0.615**	0.445**	0.555**	0.378**	0.441**	0.308**	0.523**	0.771**	0.561**	1

3.5. The Mediating Role of Instructional Self-Efficacy

(1) Mediating effect test

The mediation effect test produced by the teaching self-efficacy of early childhood teachers as a mediating variable is shown in Table 11. It can be seen that the mediation effect test of teaching self-efficacy (M) mainly contains four steps: first, the total mean score of early childhood teachers' professional development social environment was selected as the independent variable, and the total mean score of early childhood teachers' physical literacy was used as the dependent variable to conduct a linear regression analysis, and it was found that the social environment of early childhood teachers' professional development significantly predicted their physical literacy (the regression coefficient c_1=0.522, p< 0.001), which verified hypothesis H2. Second, the total mean score of physical literacy of early childhood teachers was set as the dependent variable, and the mean scores of the three factors of teaching self-efficacy of early childhood teachers were set as the independent variables, and a stepwise regression analysis was conducted, and it was found that the physical literacy of early childhood teachers significantly predicted their level of teaching self-efficacy (regression coefficient a_1=0.481, p<0.001), the strength of self-efficacy (regression coefficient a_2=0.468, p<0.001), and self-efficacy breadth (regression coefficient a_3=0.422, p<0.001) were all significant predictors (p all<0.001), which verified Hypothesis H3. Thirdly, the mean scores of the three factors of early childhood teachers' instructional self-efficacy were set as the dependent variable, and the total mean scores of the social environment for career development were set as the independent variable, and stepwise regression was conducted to analyze the results. Analysis, and it was found that early childhood teachers' career development social environment significantly predicted their level of teaching self-efficacy (regression coefficient b_1=0.355, p<0.001), intensity of teaching self-efficacy (regression coefficient b_2=0.405, p<0.001), and breadth of teaching self-efficacy (regression coefficient b_3=0.365, p<0.001) (p all <0.001). Fourth, the total mean score of early childhood teachers' professional development social environment was set as the independent variable, the mean scores of the three factors of teaching self-efficacy and the total mean score of early childhood teachers' physical literacy were jointly set as the dependent variable, and stepwise regression analyses were carried out using forced-entry method, and it was found that the effect of the social environment of early childhood teachers' professional development on their physical literacy was more significant than that of self-efficacy (regression coefficients c_2=0.422, p <0.001; b=0.208, p<0.01), which verified hypothesis H4.

Table 11. The results of the test results of the effect of the self-efficacy

Step	Independent variable	Dependent variable	*β*	*t*	*P*
1	Professional development social environment	Child teacher sports accomplishment	(c_1)0.522	8.742	0.000
2	Self-efficacy level	Child teacher sports accomplishment	(a_1)0.481	7.841	0.000
	Self-efficacy strength		(a_2)0.468	7.522	0.000
	Self-efficacy breadth		(a_3)0.422	6.505	0.000
3	Professional development social environment	Self-efficacy level	(b_1)0.355	5.362	0.000
		Self-efficacy strength	(b_2)0.405	6.325	0.000
		Self-efficacy breadth	(b_3)0.365	5.575	0.000
4	Professional development social environment	Self-efficacy	(*b*)0.208	3.058	0.005
		Child teacher sports accomplishment	(c_2)0.422	6.211	0.000

(2) Decomposition of the mediating effect of self-efficacy

According to the results of stepwise multiple regression analysis, the mediating effect of early childhood teachers' teaching self-efficacy was decomposed, and the results of the decomposition of the mediating effect of self-efficacy are shown in Table 12. According to Table 12, the path diagram of the mediating effect of early childhood teachers' self-efficacy between the social environment of career development and physical literacy was further drawn, and the results are shown in Figure 2. Analyzing the contents of Table 12 and Figure 2 together, it was found that before the introduction of teaching self-efficacy, the total effect of the social environment of early childhood teachers' career development on their physical literacy was 0.522, and after the introduction of the mediating effect of the three factors of teaching self-efficacy, the direct effect of the social environment of early childhood teachers' career development on their physical literacy was reduced to 0.422, and the three factors of self-efficacy (level, intensity, breadth) produced partial mediating effects between career development social environment and physical literacy (effect values: 0.171, 0.190, and 0.154, respectively). The ratio of the mediating effect to the total effect on the Career Development Social Environment → Teaching Self-Efficacy Intensity → Physical Literacy pathway was the largest (0.190, 0.363), the ratio of the mediating effect to the total effect on the Career Development Social Environment → Teaching Self-Efficacy Level → Physical Literacy pathway was the second largest (0.171, 0.327), and the ratio of the mediating effect to the total effect on the Career Development Social Environment → Teaching Self-Efficacy Breadth → Physical Literacy pathway was the highest (0.171, 0.154). The ratio of the mediating effect to the total effect on the pathway was the smallest (0.154, 0.295).

Table 12. The decomposition of the self-efficacy mediation effect

Mediation path	Total effect	Mediation effect(a*b)	Direct effect	Mediation effect/ Total effect
Professional development social environment→Self-efficacy level→Child teacher sports accomplishment	0.522	0.171	0.422	0.327
Professional development social environment→Self-efficacy strength→Child teacher sports accomplishment	0.522	0.190	0.422	0.363
Professional development social environment→Self-efficacy breadth→Child teacher sports accomplishment	0.522	0.154	0.422	0.295

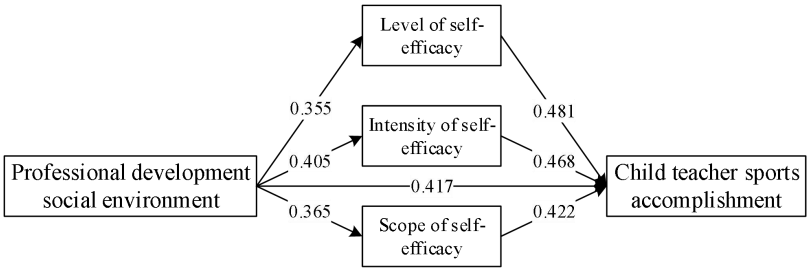

Figure 2. The teaching self-efficacy is committed to the mediation effect path diagram

4. Conclusion

The study showed, first, that ECE teachers' career development social environment, physical literacy, and teaching self-efficacy were all in the upper-middle range, with teaching self-efficacy scoring the highest, and self-career development social environment scoring lower. Second, the stronger the teachers' teaching self-efficacy the higher the career development social environment and physical literacy they acquired, i.e., teachers' career development and teaching self-efficacy significantly predicted physical literacy. Third, career development and teaching self-efficacy were significant predictors of physical education literacy, and self-efficacy partially mediated the relationship between career development and physical education literacy.

The self-efficacy and core literacy levels of elementary and middle school physical education teachers were high, and further measures should be taken to improve the levels of the above two dimensions in light of ethnicity, title, monthly income, age and years of teaching experience, and region, in order to promote the high-quality development of elementary and middle school physical education teachers. The positive contribution of teachers' self-efficacy to the core literacy level of physical education teachers should be fully emphasized, and measures should be taken to fully stimulate teachers' internal drive and improve their self-efficacy level in school teaching and research activities, so as to ultimately promote the development of the core literacy of physical education teachers.

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