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Research on the Influence of Teacher-Student Education Expectation Consistency on Students' Physical Exercise: Based on Polynomial Regression and Response Surface Analysis



Abstract: - Students' physical exercise has important practical significance in enhancing students' physical health and promoting the health construction. Based on the expectation effect theory, this study explores the influence of teacher-student expectation consistency on students' physical exercise from a binary perspective. Using China Education Tracking Survey (CEPS) data, through polynomial regression and response surface analysis, it is found that: (1) There are four combinations of teacher-student educational expectation. Compared with the combination of "high-low", "low-high" and "low-low", when teacher-student educational expectation is consistent with "high-high", students' cognitive ability and students' physical exercise are higher; (2) Cognitive ability mediates the relationship between teacher-student educational expectation consistency and students' physical exercise; (3) The class atmosphere moderates the consistency of teacher-student educational expectation and cognitive ability. This study employs computer technology to validate the impact of the teacher-student duality interaction on students' physical exercise through polynomial regression and response surface analysis. Through the design and development of intelligent auxiliary education system, teachers can gain better insight into students' educational expectations while promoting their engagement in physical exercise.

Keywords: Expectation Consistency(EC), Cognitive Ability(CA), Students' Physical Exercise(SPE),Polynomial Regression(PR), Response Surface Analysis(RSA).

I. INTRODUCTION

"Widespread development of the national body-building campaign, and the strengthening the youth sports work." [1], has provided a clear direction for the school sports programs. Due to the rapid growth of physical education, schools are placing greater emphasis on students' physical exercise. As a result, teachers are paying more attention to students' physical education in order to encourage active participation in sports and improve physical fitness. It is important to consider how to enhance students' physical exercise. Rosenthal initially proposed that the application of teachers' expectation effect can effectively stimulate students' development potential [2]. Additionally, adolescent self-education expectations can directly play a significant positive role in their ultimate academic performance and career achievements [3]. However, there has been insufficient attention given to examining the consistency and disparity between teachers' educational expectations and students' self-education expectations. Exploring their interactive relationship will help elucidate the internal mechanism of students' physical exercise behavior.

Most studies on teachers' education expectations focus on two key areas: the influence of their academic relationship and the enhancement of students' abilities. It is worth noting that there is a significant correlation between students' creativity and teachers' expectation [4]. Furthermore, teachers' expectation have a predictive power over students' academic performance [5]. In relation to students' self-education expectations, research has shown that those who had expectations of attending university during their youth had a significantly higher chance of obtaining a university education [6]. Additionally, students' self-education expectations have been found to have a significant positive impact on their academic performance [7], and serve as the foundation for achieving their athletic learning goals [8]. The existing research on expectation focuses on its influence on academic achievement. Some studies have begun to examine the effects of consistency and differences between teachers' educational expectations and students' self-education expectations on students, but they have neglected to explore the effects on students' physical exercise behavior. During individual socialization, if important others provide consistent help with the individual expectation. It can motivate them to receive information and strengthen their motivation and behavior to achieve educational expectations. However, if the support provided by important others is not consistent with the individual's expectations, it can weaken their motivation and behaviour to achieve educational goals [9]. Therefore, by paying attention to the interactive

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relationship between teachers and students, provides a deeper understanding of the mechanism by which the impact of educational expectation on students' physical exercise.

According to Social Cognitive Theory, individual development is influenced by the interaction between the external environment, individual psychology, and behavior[10]. During adolescence, students form expectations for their self-roles and future possibilities, which shape their behavior. Physical literacy and school spirit are closely linked to the classroom atmosphere[11]. The class environment has a significant impact on students' physical and psychological well-being, as it is the place where they spend a considerable amount of time. Empirical studies have shown that the class atmosphere directly affects students' physical exercise. However, there is a lack of research on the relationship between the class atmosphere and physical exercise. Therefore, it is essential to conduct a thorough analysis to explore the role of the class environment in promoting physical exercise.

In summary, this study applies the 'emotion-cognition-behavior' model to the field of education. It explores the matching combinations between "teacher's educational expectations" and "students' self-educational expectations" from a binary perspective. The study also examines their impact on students' physical exercise, as well as the mediation effect of cognitive ability and the moderation effect of class atmosphere. The application of computer technology allows for the quantification of expected interaction. Advanced machine learning algorithms can extract deep information about educational expectations. Polynomial regression and response surface analysis methods can be used to reveal the influence of physical exercise on students at different levels. This can help to uncover the complex mechanisms behind the consistency of education expectations and physical exercise. The results of the response surface research can be presented using advanced visualization tools. This enriches the research on the variables and consistency of physical exercise, and has important practical significance for guiding students' physical exercise.

II. THEORETICAL BASIS AND RESEARCH HYPOTHESES

A. Teacher-students' Self-education Expectations and Their Matching Situation

Educational expectation generally refers to the hope and expectation that students will obtain the highest level of education in the future[12], Teacher expectations are based on subjective and intuitive perceptions of student information, as well as predictive perceptions of student-specific behavioral outcomes. If the effect of teacher expectation triggers the change of students' learning results, this is the expectation effect[13]. In this study, these two perspectives are incorporated into the model simultaneously. As shown in Figure 1, different levels of "teachers' education expectations for students" and "students' self-education expectations" will form four combinations:①high-high; ②low-low; ③high-low; and④low-high.

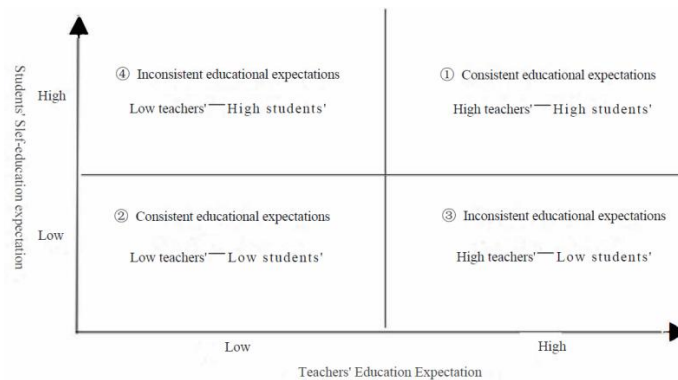


Figure 1: Combination of Teachers and Students' Educational Expectations.

①and②belong to the "consistent" situation and③and④in the "inconsistent" situation. The study shows that when teachers and students have high expectations of self-education, students will be better aware of the efforts of teachers, and pay attention to physical exercise. On the contrary, when both education expectations are low, students will lose confidence in themselves subjectively, on the other hand, additionally, without perceiving the attention of teachers, this can lead to a vicious circle[14]. Therefore, in the process of considering their interaction between education expectations and academic performance, it should not only explore the teachers' education expectations and students' self-education expectations "high-high" consistency relationship, but also be compared with the "low-low" consistency, in order to have a deeper understanding of the relationship between the two, and a more comprehensive understanding consistency matching research.

B. The Consistency of Teachers' Expectations-students' Self-education Expectations and Students' Physical Exercise

According to the expectation effect theory, this paper discusses the influence on students' physical exercise from the dual perspective of teachers' educational expectation and students' self-education expectation. In today's educational background, students' sports performance has become an important standard to measure students[12]. In exploring the matching of education expectations on the influence of students' physical exercise, first considering "high-high" consistency between teachers and students, when teachers' education expectations and students' self-education expectations are both high and reach a consensus, that is students will give full play to their subjective initiative, and teachers will provide as much as possible to promote students' physical exercise. This is also in line with the view of the expectation effect theory, that is when students get more support and care from teachers, students will be more active[15](① in Figure 1). Therefore, it is believed that when teachers' educational expectations and students' self-education expectations are high, students' physical exercise is also high.

Second, when the teachers-student's educational expectations are "low-low" consistency. On the one hand, students' self-education expectations are very low, which will produce weariness of learning, and they will invest less energy in physical exercise, thus affecting their physical exercise[16](② in Figure 1). On the other hand, if teachers' education expectations are low, teachers may not be willing to provide more resources and help to students, so the students' physical exercise will not be very high.

Finally, when "teachers-students' education expectations" are inconsistent, it is difficult to improve students' physical exercise. Specifically, when teachers' education expectations are high, while students' self-education expectations are low (③ in Figure 1), teachers will give students more guidance and help, but if students are not confident in themselves, they may be "indifferent" to teachers' help, and will not improve their own physical exercise. Similarly, when teachers' education expectations are low, and students' self-education expectations are high (④ in Figure 1), students will strive to strengthen physical exercise in order to achieve their goals, but teachers' education expectations are low, not necessarily providing help or resources. In the long run, students will be frustrated, and their physical exercise will decrease. Therefore, this study posits that a significant "expectation gap" between teachers and students may lead to communication barriers^[14], which in turn can result in psychological confrontation or frustration among students, subsequently reducing their physical activity. Hence, the following hypothesis is proposed.

Hypothesis 1: When teachers' expectations and students' self-education expectations are consistent in 'high-high', students engage in the highest amount of physical exercise compared to the 'high-low', 'low-high', and 'low-low' combinations of expectations.

C. The Consistency of Teachers' Expectations-students' Self-education Expectations on Cognitive Ability

Cognitive ability refers to the ability to process, extract and apply knowledge through the human brain[17]. Students' cognitive ability includes not only traditional Chinese, mathematics and English ability, but also logical thinking ability and other abilities. Domestic and international studies have shown that the assessment of students' cognitive abilities primarily relies on grades[18].

The expectancy effect theory posits that educational expectations influence students' physical exercise in two ways: firstly, by providing diverse opportunities for physical activity; secondly, indirectly through their impact on psychological traits such as self-concept[19]. When teachers and students have "high-high" educational expectations, teachers will invest more emotional and material resources in students, and students will also strive for physical exercise to achieve their goals, both of which jointly enhance students' cognitive abilities.

Secondly, when teacher-student education expectations are "low-low", it is difficult for teachers to provide additional care and resources to students with low expectations, leading to increased student resistance and potential hostility[16]. In such circumstances, the relationship between the two is primarily contractual, wherein teachers refrain from offering guidance and resources outside of the teacher-student context, and students do not express positive emotions towards the teacher, resulting in diminished cognitive capabilities.

Finally, when teachers' and students' educational expectations are inconsistent ("low-high" and "high-low" are inconsistent), students' cognitive ability level tend to be relatively lower. Studies indicate that when the beliefs of teachers and students are not consistent, it can diminish the the quality of their relationship, subsequently impacting students' cognitive abilities. Consequently, whether the teachers' educational expectations are high or the students' self-educational aspirations are high, when these expectations are

inconsistent, it becomes challenging to achieve mutual recognition and understanding, potentially leading to conflicts[20]. Hence, the following hypothesis is proposed.

Hypothesis 2: When teachers' expectations and students' self-education expectations are consistent in 'high-high', students exhibit the highest cognitive ability compared to the 'high-low', 'low-high', and 'low-low' combinations.

D. Mediation Effect of Cognitive Ability

Previous literature has had limited exploration of the relationship between expectations and students' physical exercise. However, as an emotional connection between the two, the expectation can motivate individuals to better achieve their goals. Therefore, exploring the relationship between emotions and behavior from the perspective of teachers-students' educational expectations can have a good predictive effect on students' physical exercise. First of all, students' cognitive ability can facilitate their physical exercise[21]. The improvement of cognitive ability will have an impact on their physical exercise capacity and motivation. Specifically, if students have higher cognitive abilities, students will have higher motivation to work hard in physical exercise, and will strive more actively to achieve their academic goals. Secondly, the consistency of educational expectations improves students' physical exercise by affecting students' cognitive abilities. Based on the expectation effect theory, when both teachers and students have high educational expectations, teachers are willing to provide more emotional and material support, so that students can get comprehensive encouragement from teachers, so as to improve their cognitive ability, and have the ability and confidence to work hard in physical exercise, exhibiting higher level of physical exercise. On the contrary, if both teachers and students have low education expectations, or if one party's expectations is lower than the other party, teachers will not provide more help to students, so students will find it difficult to invest more emotions in teachers. Teachers and students are only in a teacher-student relationship, and it is difficult for students to improve their cognitive abilities, resulting in lower levels of student physical exercise. Hence, the following hypothesis is proposed.

Hypothesis 3: Students' cognitive ability mediates the relationship between the consistency of teachers-students' education expectations and students' physical exercise.

E. Moderation Effect of Class Atmosphere

The theory of human-environment fit shows that individual behavior arises from the combined influence of the individual and environment[22]. Class environment refers to the personal traits of class members and their interactions[23], while class atmosphere better embodies the students' attitudes and behaviors regarding physical exercise within the class[24]. Existing research indicates that a positive class ethos has a positive impact on students' attitudes and motivation towards physical activity[25], a favorable class atmosphere facilitates teaching activities by teachers, enhances teacher-student interactions, boosts students' exercise motivation, and fosters good behavior. In terms of students' cognitive ability, students with better class atmosphere can be influenced by their peers, better comprehend the significance of physical education grades within the curriculum, exhibit greater autonomy in their learning and exercise habits, and better appreciate the efforts and toil of teachers, leading to enhanced cognitive abilities. Therefore, class atmosphere can serve as a robust predictor of cognitive ability in students.

Second, the teachers-students' educational expectations, in conjunction with class atmosphere influence students' cognitive abilities: (1) when the class atmosphere is low, the educational expectations of both teachers and students are either low or only one party is high, making it difficult for teachers and students to establish a mutual trust relationship. Teachers find it challenging to pour their energy and emotions into the class, and students may not recognize teachers or engage in physical exercise, leading to lower cognitive abilities. At the same time, the situation where both teachers and students have high educational expectations ("high-high" consistency) can also be altered due to the low class atmosphere: even if both teachers and students have high educational expectations and improve their cognitive abilities, they can still face negative impacts stemming from the poor class atmosphere. That is, teachers are reluctant to devote more resources and emotions to classes with poor class atmosphere, causing a decrease in students' cognitive abilities. (2) When the class atmosphere is high, both teachers and students have high educational expectations, leading to a strong emotional bond between them and higher cognitive abilities among students. For both teachers and students where educational expectations are low or only one party is high, students' cognitive abilities will still be influenced by the positive exercise atmosphere within the class and the teacher's dedication. Therefore, students' cognitive ability will be improved to some extent suggesting that the class atmosphere has mitigated the detrimental effects of low educational expectations on students' cognitive abilities. Therefore the following hypothesis is proposed.

Hypothesis 4: Class atmosphere moderates the relationship between the consistency of teachers-students' education expectations and students' cognitive ability

In conclusion, the research structure is presented in Figure 2.

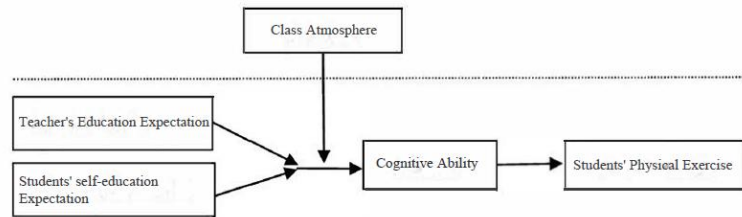


Figure 2: Research Structure Diagram.

III. RESEARCH DESIGN

A. Research Data and Sample

The data samples were adopted the tracking data of "China Education Tracking Survey Data" (CEPS) 2013-2014. The questionnaire collected the relevant information from families, schools and students, and investigated all the educational expectations, comprehensive cognitive ability and students' physical exercise. In this study, computerized techniques were used to select 11 variables related to this study such as students' cognitive ability scores. In order to have a higher quality of data, the cases with missing values of variables were deleted in list-wise mode, and machine learning algorithms were utilized for preprocessing and feature extraction of CEPS data, and the final sample size adopted in this study was the data of 6,543 students in 438 classes.

B. Measures

Educational expectations: Students evaluated their self-educational expectations and those of teachers based on the Likert-9 scale (1= Unread, 9= Doctorate) . The evaluation question is "What level of education do you hope to achieve?" for teachers and students respectively.

Cognitive ability: The CEPS survey process focused on students' cognitive ability in terms of students' logical thinking and problem-solving ability, including verbal, graphical, computational and logical skills, which are comparable and standardized. Therefore, it is highly credible to measure students' cognitive ability based on these scores.

Class atmosphere: The class atmosphere as perceived by students' self-assessment (based on Likert-4 scale, where 1= totally disagree, 4=totally agree) was used with the question "Do you agree that my class has a good atmosphere?". This study subsequently aggregated the individual measurements into class-level variables.

Students' physical exercise: Students' physical exercise was measured by the weekly exercise time, including the number of exercise days per week and the time of each exercise. The final score is calculated in minutes, and the two results are multiplied for standardized calculation.

Control variables: In addition to the above key variables, this paper also treated students' sex, household registration, whether the only child or not and family economic conditions as control variables.

C. Analytical Strategy

1) *Polynomial regression*: This study used polynomial and response surface methods to test hypotheses 1 and 2[26]. The students' physical exercise and cognitive ability were regressed on the five polynomial and control variables, respectively, namely the teacher's educational expectations (T), students' self-educational expectations (S), and the square of the teacher's educational expectation(T^2), The product item of teachers' educational expectations and students' self-educational expectations($T \times S$), and the square of students' self-educational expectations (S^2) The specific equation is as follows:

$$Y = b_0 + b_1T + b_2S + b_3T^2 + b_4T \times S + b_5S^2 + e \quad (1)$$

Where the curvature about the consistent diagonal ($T=S$) corresponds to $(b_3+b_4+b_5)$, The cross-section slope is (b_1+b_2) ; The inconsistent diagonal ($T= -S$) corresponds to the cross-section slope is (b_1-b_2) , and the curvature is $(b_3-b_4+b_5)$.

2) *Block variable*: Block variable method to test mediation effect: To test hypothesis 3, that is the influence of the teachers-students educational expectations on students' physical activity through their cognitive abilities,

five polynomials ($T, S, T2, T \times S, S2$) were merged into a block variable for better measure of their role in the mediation model.

3) *Multilevel linear model*: Multilevel linear model were used to test the moderation effect considering that different students are nested in the same class. In this study, class atmosphere was treated as a second level variable, and the measurements were aggregated from each students' questionnaire. According to the null model test conducted by M1, the within-group correlation coefficient $ICC(1)=4.93/(4.93+10.04) = 0.329 > 0.06$, indicating that there is a significant differences between classes[27], Which suggests that it is meaningful to consider the class atmosphere across classes, and to determine whether the moderation effect is valid by the significance of the regression coefficients of the interaction term.

IV. RESULTS

A. Confirmatory Factor Analysis

In order to test the discriminant validity between the core variables "teachers' education expectations", "students' self-education expectations", "class atmosphere", "cognitive ability" "students' physical exercise", this study used AMOS21.0 to conduct a validated factor analysis (CFA) on the core variables, and the results showed that the four-factor model has significantly better fit-indices than all other models (see Table 1). Thus, these variables have better discriminant validity among them.

Table 1: Models Fit Results for Confirmatory Factor Analyses.

Model	X ²	df	NFI	CFI	IFI	RMSEA
Four-factor model: AA; TE; SE; CA	187.84	6	0.989	0.989	0.989	0.068
Three-factor model: AA; TE + SE; CA	1643.69	9	0.900	0.900	0.900	0.167
Two-factor model: AA; TE + SE + CA	44458.3	11	1.720	0.000	-1.718	0.766
Single-factor model: AA + TE + SE + CA	52568.99	12	-2.213	0.000	-2.214	0.818

AA represents students' physical exercise; CA represents cognitive ability; TE represents teachers' education expectations, and SE represents students' self-education expectations.

Table 2: Descriptive Statistics and Correlation Analysis (N=9394).

Variable	MEAN	SD	1	2	3	4	5	6	7	8
sex	1.53	0.50								
Household registration	1.74	0.87	0.002							
Only one child or not	1.54	0.50	0.098**	-0.420**						
family economic conditions	2.98	0.54	-0.013	0.199**	-0.173**					
Teachers' education expectations	4.39	0.87	0.066**	0.107**	-0.082**	0.058**				
Students' self-education expectations	6.91	1.54	0.034**	0.154**	-0.094**	0.043**	0.439**			
Cognitive ability	9.49	3.83	-0.034**	0.233**	-0.271**	0.171**	0.284**	0.242**		
Students' physical exercise	154.93	180.12	0.135**	0.183**	-0.216**	0.169**	0.431**	0.329**	0.472**	
Class atmosphere	3.18	0.84	0.094**	0.033**	-0.047**	0.084**	0.102**	0.070**	0.094**	0.140**

** p < 0.01, * p < 0.05.

B. Descriptive Statistics and Correlation Analysis

Table 2 shows the mean, standard deviation and correlation coefficient of each variable in this study. As shown in Table 2, there was a significant positive correlation between teachers' educational expectation and cognitive ability ($r=0.284, p<0.01$) and physical exercise ($r=0.431, p<0.01$). Students' self-education expectations and students' cognitive ability have a positive correlation($r=0.242, p<0.01$) with students' physical exercise($r=0.329, p<0.01$). Students' cognitive ability was also positively correlated with students' physical exercise($r=0.472, p<0.01$).

C. Hypothesis Test

1) *Test results of teachers' -students' expectation consistency on students' physical exercise*: Table 3 shows the polynomial results of the response surface analysis. The current situation and the changing trend of the response surface are intuitively displayed through visual tools with the support of computer technology. First, according to the results of model 4, the regression of students' physical exercise is significant positive correlation

($F=301.371$, $p < 0.01$), but the slope of the response surface along the diagonal ($T=S$) did not reach a significant level (Slope₂=0.07, ns) that teachers' and students' educational expectations of "low-high" and "high-low" affect students' physical exercise. However, the slope of the surface along the consistent diagonal was positive and significant (Slope₁=0.37, $p < 0.01$), indicating that the "high-high" consistency is more significant than the "low-low" consistent on students' physical exercise. According to the results of the response surface in Figure 3, it was found that students' physical activity was higher in the back corner (high-high) than in the front corner (low-low), the left corner (low-high) and the right corner (high-low), and the educational expectations of both in the combination of "high-high". Hypothesis 1 is supported. It is worth noting that students' physical exercise did not reach the highest value in the back corner (high-high). When the teachers and students' educational expectations increased, students' physical exercise increased significantly, but decreased slightly after reaching the higher level, indicating that when both educational expectations are too consistently too high to improve students' physical exercise.

Similarly, As shown model 2 in Table 3, the regression of students' cognitive ability on quadratic items are significantly positively correlated ($F=165.305$, $p < 0.01$), while the slope of the inconsistent diagonal ($T=-S$) is not significant (Slope₂=0.01, ns), indicating that there is no significant difference between the "low-high" and "high-low" on students' physical exercise. The slope of the surface along the consistent diagonal is significant (Slope₁=0.19, $p < 0.01$), indicating that the "high-high" consistency improves students' cognitive ability more than the "low-low" consistency. The response surface results in Figure 4 also show that students' cognitive ability is higher in the back corner (high-high) than in the front corner (low-low), the right corner (high-low) and the left corner (low-high), and the educational expectations of both in the combination of "high-high". Hypothesis 2 is supported.

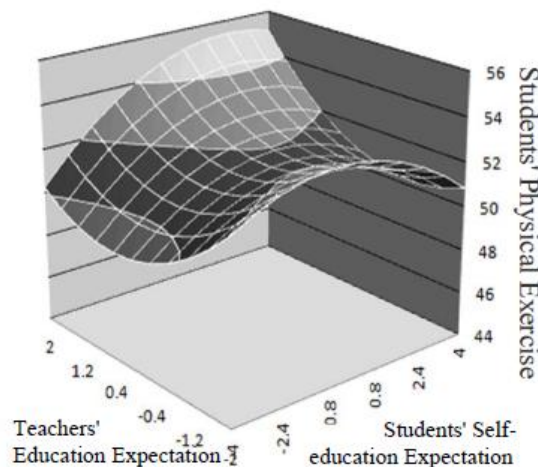


Figure 3: Effect of Teachers-students' Educational Expectation Consistency on Students' Physical Exercise.

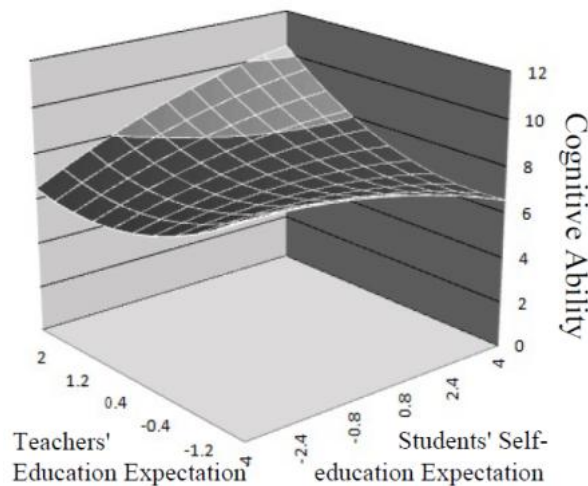


Figure 4: Effect of Teachers-students' Educational Expectation Consistency on Cognitive Ability.

Table 3: Results of Polynomial Regression and Response Surface Analysis.

variable	Students' cognitive ability				Students' physical exercise			
	model 1		model 2		model 3		model 4	
	B	SE	B	SE	B	SE	B	SE
constant	8.652**	0.356	7.343	0.351	64.529	2.444	51.846	2.234
sex	-0.014	0.09	-0.036	0.087	0.154	0.621	0.116	0.552
Household registration	0.129	0.058	0.095	0.055	0.084	0.396	0.035	0.353
Only one child or not	-0.196	0.1	-0.178	0.096	-0.174	0.689	-0.149	0.611
Family economic conditions	0.111	0.085	0.101	0.081	0.124	0.584	0.109	0.517
Teachers' Education Expectations (T)			0.091**	0.088			0.150**	0.558
Students' self-education expectations (S)			0.101**	0.043			0.223**	0.272
T ²			0.078**	0.050			0.138**	0.317
T×S			0.097**	0.031			0.095**	0.199
S ²			-0.034*	0.013			-0.125**	0.085
R ²	0.103		0.185		0.095		0.293	
F-statistic	186.905		165.309**		171.3**		301.371**	
Consistent diagonal line (T=S)								
Slope ₁			0.19*				0.37*	
Curvature ₁			0.14*				0.11	
Inconsistent diagonal line (T=-S)								
Slope ₂			0.01				0.07	
Curvature ₂			-0.05*				-0.08*	

** p < 0.01, * p < 0.05

Table 4: Analysis of the Direct and Indirect Effects of Cognitive Ability.

variable	Cognitive ability		students' physical exercise
Block variable (consistent / inconsistent direct effect)	0.26** (First-half path coefficient)	--	0.33 ** (Direct effect)
Cognitive ability (Y _{CA})	--	0.39** (Second half path coefficient)	--
Through an indirect effect of cognitive ability (=0.43 Y _{CA})	--	--	0.1 ** (Indirect effect)
Confidence intervals are given at the 95% confidence level			(3.260, 3.995)

** p < 0.01, * p < 0.05. CA: Cognitive ability

2) *Mediation effect*: Hypothesis 3 proposed the mediation effect of students' cognitive ability. According to Table 4, the teachers-students' educational expectation consistency has a positive and significant effect on students' cognitive ability (0.26, p < 0.01), while the students' cognitive ability also has a positive and significant effect on students' physical exercise (0.39, p < 0.01). The results showed that the direct effect of teachers-students' educational expectation consistency on students' physical exercise was significant (0.33, p < 0.01), and the indirect effect through cognitive ability was also significant (0.1, p < 0.01). Therefore, students' cognitive ability mediates the relationship between the consistency of teachers-students' educational expectation and students' physical exercise. Hypothesis 3 is supported.

3) *Moderation effect of class atmosphere*: Hypothesis 4 suggests that class atmosphere moderates the relationship between the consistency of teachers' and students' educational expectations and students' cognitive ability. Table 5 shows that in model 2, the moderation of class atmosphere is reflected in the intercept and slope, and the moderation of the intercept is γ_{00} and γ_{01} . The moderation of the slope is the γ_{10} and γ_{11} . Both γ_{00} and γ_{01} are significant ($\gamma_{00}=9.39, p < 0.01; \gamma_{01}=2.17, p < 0.01$); Both γ_{10} and γ_{11} are significant ($\gamma_{10}=0.98, p < 0.01; \gamma_{11}=0.35, p < 0.05$). This indicates that the class atmosphere moderates significantly the teachers-students' educational expectation consistency and students' cognitive ability. The moderation effect holds true, thus hypothesis 4 is supported. In order to explain the moderation effect more clearly, class atmosphere was grouped according to positive and negative standard deviation, simple slope analysis was conducted, and the moderation effect map was drawn (Figure 5). As shown in Figure 5, class atmosphere positively moderates the relationship between the consistency of educational expectation and cognitive ability. The consistency of educational expectation has a significant effect on cognitive ability, regardless of the class atmosphere. In high class atmosphere, there is a

stronger positive relationship between the consistency of educational expectations and cognitive ability, while in low class atmospheres, the positive relationship is weaker.

Table 5: Cross-level Moderation Effect of Class Atmosphere.

Model	Parameter Estimation					
	γ_{00}	γ_{01}	γ_{10}	γ_{11}	σ^2	τ_{00}
M1: null model $L1: CA_{ij} = \beta_{0j} + \gamma_{ij}$ $L2: \beta_{0j} = \gamma_{00} + \mu_{0j}$	9.4***				10.04	4.93***
M2: The moderation of class atmosphere affects the consistency of teachers' and students' educational expectations and cognitive abilities $L1: CA_{ij} = \beta_{0j} + \beta_{1j}(TS) + \gamma_{ij}$ $L2: \beta_{0j} = \gamma_{00} + \gamma_{01}(BF) + \mu_{0j}$ $\beta_{1j} = \gamma_{10} + \gamma_{11}(BF) + \mu_{1j}$	9.39***	2.17***	0.98***	0.35**	9.58	4.31***

(1) * means $p < 0.5$, ** means $p < 0.01$, *** means $p < 0.001$; (2) σ^2 represents the residual of layer 1, τ_{00} indicates the residual of intercept; (3) TS is the consistency of teachers-students' education expectation

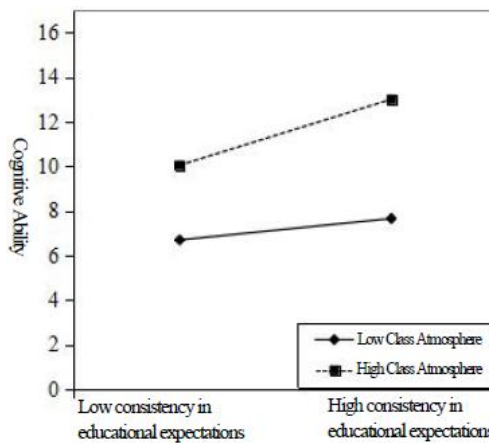


Figure 5: Moderation Effect of Class Atmosphere.

V. RESEARCH CONCLUSIONS AND FUTURE RESEARCH

A. Conclusion

Based on the expectation effect theory, this paper explores the impact of different combinations of "teachers' education expectation" and "students' educational expectation" on students' physical exercise, as well as the mediating effect of cognitive ability and the moderating effect of class atmosphere, using polynomial regression and response surface. Firstly, consistent educational expectations between teachers and students lead to a significant increase in students' physical exercise; However, when both educational expectations reach their highest, there is a slight decrease in students' physical exercise. Secondly, cognitive ability mediates the relationship between teachers' and students' educational expectation and students' physical exercise. Finally, the class atmosphere moderates the relationship between educational expectation and cognitive ability. When class atmosphere is high, teachers-students' educational expectations ("high-high") can significantly improve students' cognitive ability and mitigate the negative effect of low educational expectations.

B. Practical Implications

This study explores the influence of teachers-students' expectation consistency on students' physical exercise. A binary perspective is used to predict the students' physical exercise data by constructing and optimizing their response surface model. The conclusion provides important insights for improving students' physical exercise behavior.

First, to enhance the consistency of teachers 'and students' educational expectations, it is recommended to stimulate students' physical exercise motivation. The study found that students' motivation for physical exercise can only be improved when there is high consistency between teachers and students' self-education expectations.

Therefore, teachers should utilize an intelligent auxiliary education system during daily teaching and class management. This system can identify student educational expectations using machine learning algorithms, and conduct an in-depth analysis of these expectations through classification, clustering, regression, and other machine learning algorithms. By doing so, precise and personalized educational support can be provided for students. Teachers should ensure that students understand their expectations clearly. It is important to improve students' self-expectations, especially for those with low educational expectations. Teachers should pay more attention to improving their educational expectations. In addition, efforts should be made to stimulate students' physical exercise motivation and cultivate their self-confidence. It is important to create an agreement on expectations and transform it into motivation for physical exercise. However, when teachers and students have excessively high educational expectations, students may experience pressure from both their teachers and themselves. This pressure can lead to anxiety and fatigue, affecting students' emotional well-being and reducing their focus on sports. Therefore, when setting high expectations for students with high self-expectations, teachers should be mindful not to create excessive pressure, which could negatively impact their students' well-being.

Second, the aim is to improve students' cognitive ability and cultivate students' physical exercise accomplishment. Cognitive ability serves as a link between educational expectations and students' physical exercise. Improving students' cognitive abilities in physical education can be achieved through three main methods: fostering students' awareness of physical exercise, providing them with a wider range of physical education knowledge and experience, and guiding them in moderating non-intellectual factors. To improve students' awareness of physical exercise, teachers should encourage them to analyze the characteristics, nature, and difficulty of sports in daily lessons. This will help them learn to balance their time and energy between physical exercise and learning. Pay particular attention to developing students' awareness of using sports strategies. Adopt different exercise strategies for different sports and learn to consciously use effective sports strategies. Students should have a sense of control in sports, regulation, and self-control. Finally, students should maintain an appropriate intensity of long-term training and consciously monitor their ability to exercise. They should effectively combine intelligence and physical factors, establish a cognitive system, enhance their understanding and perception of physical exercise, and improve their motivation and confidence in physical exercise.

Third, the aim is to improve the class atmosphere, create students' physical exercise environment. Class atmosphere moderates the relationship between teachers' and students' educational expectation and cognitive ability. By improving the class atmosphere, we can mitigate the negative impact of "low-low" consistent educational expectations on cognitive ability. As an administrator of a school or class, it is important to not only improve the hardware facilities for physical education teaching, but also pay attention to the construction of the class atmosphere. It is crucial to establish and maintain a good class sports atmosphere, develop class activity plans that align with teachers' and students' expectations, and actively carry out sunshine sports activities. Additionally, it is important to combine the students' physical health standard test report with their daily exercise and carefully organize sports activities with distinct themes. To improve the participation of students in physical exercise and enhance their scientific exercise of cognitive ability, it is important to cultivate a positive class atmosphere during activities and competitions. Education should encourage and guide friendly cooperation between students, while creating a good class culture and physical exercise atmosphere. Positive reinforcement should be given to students who have won honors in activities, and other students should be guided to participate in sports activities and competitions to expand the influence of physical activity and improve the comprehensive quality of students.

The primary contribution of this research is the use of computer technology to analyze the consistency of teachers' and students' expectations on physical exercise, as well as the mediation effect of cognitive ability and the moderation effect of class atmosphere. Polynomial regression and response surface analysis were employed to chart the results visually, providing a more intuitive understanding of the influence of education expectation consistency on students' physical exercise and trends. The intelligent auxiliary education system proposed corresponding countermeasures to improve the precision and depth of the research. However, the data used in the current research are cross-sectional, and longitudinal studies can provide further analysis of dynamic data in the future. Additionally, the research level can be investigated from the perspective of family and school, in addition to individuals and classes. Finally, in addition to exploring the intermediary mechanism of students' cognitive ability, it is also possible to analyze teacher-student communication and physical exercise investment.

Follow-up research could integrate computer technology and other research methods to carry out studies based on different theories.

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