Gender Heterogeneous Effects of Parental Emotional Involvement on Junior High School Students Core Literacy - CEPS-based Mechanism Analysis

Mingyang Li
College of Physics and Information Engineering, Minnan Normal University, Zhangzhou, China

Abstract: Based on gender socialization theory and using data from the China Education Follow-up Survey (CEPS), this study employs gender-stratified regression, interaction models, and Bootstrap mediation analysis to examine the gender-heterogeneous effects of parental emotional involvement on junior high school students' core literacy. Key findings include: (1) Parental emotional involvement significantly enhances core literacy among girls (coefficient = 0.725, $p < 0.05$), but shows no significant effect for boys (coefficient = -0.028, $p > 0.1$); (2) Interaction and marginal effect analyzes reveal a "girl-favoring" pattern, with a marginal effect of 0.556 for girls versus 0.115 for boys; (3) Mediation analysis indicates that while emotional involvement reduces loneliness in both genders, lower loneliness negatively predicts core literacy only among boys. These results underscore the moderating role of gender socialization in the effectiveness of parental emotional support. This study provides empirical evidence for gender-differentiated effects in family education and offers policy insights for promoting gender-equitable parenting practices.

Keywords: Core Literacy; Parental Affective Involvement; Gender Heterogeneity; Loneliness

1. Introduction

With the advancement of women's social status and the continuous advancement of family education policies, parents' participation in children's education has become a social consensus. However, traditional gender role concepts still deeply affect family rearing practices, such as father absence and gendered emotional participation. Most of the existing studies focus on the direct impact of parental involvement on academic achievement, lack of investigation on multidimensional core literacy, and less on gender heterogeneity mechanism of emotional involvement. Based on this, this study relies on CEPS data, constructs core literacy indicators from three dimensions: autonomous development, social participation and cultural foundation, systematically analyzes the impact of parental emotional participation on core literacy of junior high school students of different genders, and introduces loneliness as an intermediary variable to reveal its internal mechanism. The results can provide empirical support for optimizing family education policy and promoting parents 'participation.

2. A Theoretical Analysis of the Influence of Parents 'Emotional Participation on Students' Core Literacy

Coreliteracy is the "key literacy" needed to adapt to personal lifelong development and social development, and it is a comprehensive and interdisciplinary advanced literacy required by students to adapt to social and personal development[1]. In 2023, the Opinions of the Ministry of Education and other 13 departments on Improving the Cooperative Education Mechanism of School Family and Society clearly mentioned that family is the first classroom, parents are the first teacher's sense of responsibility, parents establish scientific family education concept, follow the concept of quality education and the law of physical and mental development of minors, so as to promote the development of children's good ideological character, behavior habits and healthy body and mind. However, how parents participate in students'education to improve students'core literacy and how parents influence students still need scientific and systematic research and discussion to prove it.

Parental involvement in education is a variety of activities that parents actively participate in their

children's education in order to improve their children's learning ability at home and school. It is an important part of family education [2]. In Han's study, it is pointed out that the degree of parental involvement and synergy can positively predict students'mental state. Generally speaking, the higher the degree of parental involvement and synergy, the better the students' mental health level and parent-child communication, but the difference between students 'academic performance is not significant. In Fan Yong's "Study on the Influence of Parental Education Participation on High School Students 'Academic Achievements", the types of parental education involvement are further divided into emotional participation, cognitive participation and behavior management. In Fan Yong's study, it is pointed out that parental emotional involvement is positively correlated with high school students'performance, parental cognitive involvement has less impact on academic performance, and behavior management has a negative predictive effect[3]. Fan Yong's conclusion is consistent with Xing Shufen's research analysis of school-age students in "Parents 'educational participation and school-age students' academic performance-more is better or less". According to previous theories, good intergenerational bonds between parents and children not only help foster emotional bonds within families, but also promote more effective child participation in learning. A large number of empirical studies have also shown that students with harmonious family relationships perform better in academic performance and mental health tests, while students with poor family relationships increase their academic performance, such as withdrawal and boredom[4]. Although the relationship between parental emotional involvement and students' psychology and academic performance has been explored extensively, There are still some limitations to existing research [3,5].

First, parental emotional involvement has a wide range of influences, and the tendency of either parent to influence students'behavior, psychology, and attitudes may vary[2]. Among them, the influence of parental emotional participation on core literacy can be divided into three dimensions, namely, autonomous development, social participation and cultural foundation. Most of the previous studies only studied single aspects of psychology or academic performance, and the reference standard of academic level was only one-sided achievement, which may ignore the integrity of students, which is contrary to the keynote of promoting students'all-round development in today's era. For example, Fan Yong et al. found that parents 'emotional involvement was positively correlated with high school students' scores, but ignored the related effects on psychology, behavior and attitude [3]. In view of the fact that relevant empirical research is not sufficient, it is necessary for us to conduct an in-depth investigation of the impact of parental emotional participation on students' core literacy, and how we can reasonably use emotional participation to promote the improvement of the comprehensive quality of junior high school students.

Second, previous studies have mainly examined the impact of parental involvement on children's academic performance [5-7]. Based on this, the researchers proposed that parental emotional participation has a positive impact on the improvement of children's core literacy, that is, with the improvement of parental emotional participation level, the development of children's core literacy presents an upward trend. In addition, the researchers also proposed that the tendency of parental emotional participation to improve the core literacy of children of different genders may be different, that is, under the same frequency of parental emotional participation, the impact on male and female students may be different. Influenced by the gender differences between male and female students, parents 'emotional participation in the process of education can not only promote junior high school students' academic performance and mental health, but also help to enhance their children's self-confidence. In reality, the absence of parental emotional education is not only detrimental to the cognitive development of junior high school students, but also likely to affect their mental health and self-confidence. Studies have shown that a high degree of parental and collaborative educational participation can effectively promote the development of cognition and ability in junior high school students [8]. Family education is a process of knowledge transmission and emotional value co-construction. Good family education can promote the all-round development of junior high school students [9].

At present, the research on the influence of parental emotional involvement on adolescent literacy development mainly focuses on single

factor, lacking comparative analysis of junior high school students'multi-aspect literacy. According to Bandura's social learning and role model theory, children's behavior comes from observing and imitating role models. Parents 'emotional participation can transmit values such as respect and responsibility, and enhance children's core literacy. Although previous studies have pointed out that parents'emotional involvement has a positive impact on children's development, there are still not enough studies on the impact and tendency of parents'emotional involvement on junior high school students'comprehensive improvement, so it is necessary to carry out further research.

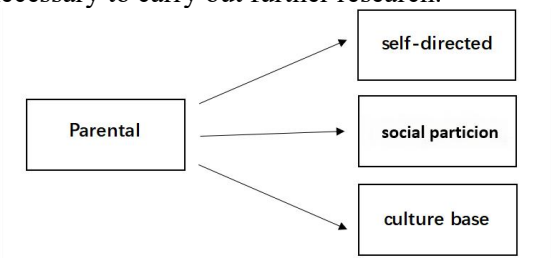

Figure 1. Hypothesis Diagram of Parental Emotional Involvement Affecting Core Literacy

To sum up, this study aims to analyze the relationship between parental emotional involvement and core literacy of junior high school students. According to Lin Chongde's "Research on Core Literacy of Junior High School Students in China", core literacy of junior high school students is divided into three areas: autonomous development, social participation and cultural foundation [1]. Based on previous studies, the following hypotheses are proposed, as shown in Figure 1.

H1: Parental emotional involvement has a gender-heterogeneous effect on the core literacy of junior high school students, with a significant positive impact on girls but not on boys.

3. The Relationship between Parent Affective Participation and Junior High School Students Core Literacy: A Quantitative Analysis

3.1 Data Sources

This study mainly adopts China Education Follow-up Survey (CEPS) 2014-2015 school year survey follow-up. The survey is a large-scale national follow-up survey project designed and implemented by China Survey and Data Center of Renmin University of China. This study is a cross-sectional study based on the second-round data of Grade 8 students.

3.2 Variables and Measurements

Emotional involvement of parents. The subjects of this study were selected from the China Education Follow-up Survey. There were 8 items in total, including 4 items of father's emotional participation (e.g.,"Does your father often discuss with you"), 4 items of mother's emotional participation (e.g.,"Does your mother often discuss with you"), and 4 items of parent's emotional participation (assigned by the first two items). A 3-point scale was used, ranging from "never" to "often" on a scale of 1-2-3, with an alpha coefficient of 0.87 in this study (see in Table 1).

Table 1. Explanatory Variable Questionnaire

variable name	measurement item	scoring method
Parental emotional involvement	Paternal emotional involvement + maternal emotional involvement	binomial addition
father's emotional involvement	What happened in school, your relationship with classmates, your relationship with teachers, your worries or worries	1= Never 2= Occasionally 3= Often
mother's emotional involvement	What happened in school, your relationship with classmates, your relationship with teachers, your worries or worries	1= Never 2= Occasionally 3= Often

Core literacy (see in Table 2). In this study, core literacy is defined as three dimensions: autonomous development (such as "stick to one's interests"), social participation (such as "whether to bully classmates often") and cultural foundation (such as "cultural achievements in various subjects"). Among them, autonomy development was scored by 4 points, from "completely disagree" to "completely agree" was 1-2-3-4 points; social participation was scored by 5 points, from "never" to "always" was 1-2-3-4-5 points, the coefficients of each dimension in this study were 0.80, 0.82, 0.85.

Control variables (see in Table 3). This study used individual and family-level factors of eighth-grade junior high school students as control variables to exclude their impact on core literacy. The control variables at individual level

included gender (0= female, 1= male), only-child (0= non-only child, 1= only child), student academic pressure, self-education expectation and pressure on parents'expectation. Family level control variables include family economic conditions, parents 'educational expectations, relationship with parents, parents' achievement requirements.

Table 2. Core Explanatory Variables Questionnaire

core literacy	Independent development + social participation + cultural foundation	triadic addition
self-directed development	I try to go to school even if I feel a little sick or have other reasons to stay home. I try my best to do homework I don't like. I try my best to do homework even if it takes me a long time to finish. I can stick to my hobbies	1= totally disagree 2= less agree 3= more agree 4= totally agree
social participation	Cursing, swearing; quarreling; fighting; bullying weak students; grumpy; lack of concentration; truancy, truancy; plagiarism, cheating in exams; smoking, drinking; Internet cafes, game halls	(Reverse scoring) 1= never 2= occasionally 3= sometimes 4= often 5= always
culture base	Language, math, English	Continuous variables (raw or normalized scores)

Table 3. Control Variable Questionnaire

control variable	**test item**	**scoring method**
gender	Are you a boy or a girl?	0= female 1= male
only-child or not	Are you an only child?	0= No 1= Yes
academic pressure	Are you having trouble learning math/Chinese/ English now	1= very laborious 2= somewhat laborious 3= not laborious 4= not laborious
self-education expectation	How far do you want to read?	1= junior high school graduation 2= technical secondary school/technical school 3= vocational high school 4= senior high school 5= college junior college 6= undergraduate 7= graduate student 8= doctor
parental expectation pressure	Do you feel that expectation?	1= No pressure 2= Some pressure 3= Average 4= High pressure 5= High pressure
family economic conditions	What do you think of your family's current economic conditions?	1= Very difficult 2= More difficult 3= Moderate 4= More affluent 5= Very affluent
parental educational expectations	Your parents 'expectations of your education	1= Don't study now 2= Junior high school graduation 3= Technical secondary school/technical school 4= Vocational high school 5= High school 6= College 7= Undergraduate 8= Graduate 9= PhD
Relation with parents	Your relationship with your mother, your relationship with your father	1= Not close 2= Average 3= Very close
Parental Performance Requirements	What do your parents expect of you in school?	1= average 2= above average 3= top five in class

3.3 Model Setting

The basic regression model is set as follows:

$$CoreLit_i = \alpha_0 + \alpha_1 ParentInvolve + + \varepsilon_i \quad (1)$$

In equation (1), is the explained variable, indicating the comprehensive score of students 'core literacy; is the core explanatory variable, indicating the total score of parents' emotional participation of students; if its coefficient is significantly positive, it means that parents 'emotional participation can improve students' core literacy; represents a collection of a series of control variables, including gender, only child, academic pressure, self-education expectation, parent expectation pressure, family economic condition, parents 'educational expectation, relationship with parents, parents' achievement requirements, etc. is the error term.

4. Data Analysis and Findings

4.1 Descriptive Analysis and Correlation Analysis

STATA 18 was used for data analysis in this

study. First, descriptive statistics and correlation analysis were performed on the primary variables. The mean, standard deviation, correlation coefficient and significance of each variable are shown in Table 4 and Table 5. Parents 'emotional involvement was positively correlated with junior high school students' self-development, social participation and cultural foundation. In addition, independent sample t-tests were used to analyze differences between father's and mother's affective involvement and students 'core literacy effects. The results showed that maternal affective involvement was higher than paternal affective involvement, and maternal affective involvement group scored higher than paternal affective involvement group in autonomy development, social involvement and cultural foundation.

Table 4. Descriptive Statistics for Variables

variable category	variable name	variable declaration	mean value	standard deviation	least value	maximum	Number of observations
core variable	Core_literacy	Core Literacy Total Score	294.96	72.13	31	504	7,159
	parent_involve	parental emotional involvement	16.83	3.96	8	24	7,159
	own	self-directed development	12.93	2.69	4	16	7,159
	social	social participation	44.75	4.4	10	50	7,159
	program	culture base	237.29	70.57	0	440	7,159
control variable	gender	Sex (M =1)	0.5	0.5	0	1	7,159
	kid	Only child (yes =1)	0.45	0.5	0	1	7,159
	work pressure	academic pressure	7.74	1.91	3	12	7,133
	w2b18	self-education expectation	6.86	1.53	1	9	7,119
	w2a29	parental expectation pressure	2.95	1.06	1	5	7,127
	w2a09	family economic conditions	2.96	0.59	1	5	7,136
	w2a28	parental educational expectations	6.79	1.43	1	9	7,107
	parent_relation	relation with parents	5.27	0.88	2	6	7,144
	work_require	Parental Performance Requirements	2.95	0.83	1	4	7,136

Table 5. Correlation Analysis of Primary Variables

variable	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
(1) Core Literacy Total Score	1						
(2) parental emotional involvement	0.193*	1					
(3) self-directed development	0.226*	0.206*	1				
(4) social participation	0.266*	0.220*	0.269*	1			
(5) culture base	0.997*	0.175*	0.176*	0.199*	1		
(6)gender	0.182*	0.046*	0.049*	0.139*	0.176*	1	
(7) only-child or not	0.156*	0.139*	0.057*	0.121*	0.150*	0.069*	1
(8) academic pressure	0.477*	0.265*	0.228*	0.284*	0.461*	0.128*	0.198*
(9) self-education expectation	0.468*	0.220*	0.210*	0.223*	0.456*	0.092*	0.147*
(10) parental expectation pressure	0.140*	0.098*	0.027*	0.119*	0.134*	0.088*	-0.083*
(11) family economic conditions	0.108*	0.134*	0.060*	0.089*	0.103*	-0.004	0.195*
(12) parental educational expectations	0.435*	0.215*	0.192*	0.187*	0.426*	0.078*	0.136*
(13) relation with parents	0.111*	0.411*	0.150*	0.194*	0.096*	-0.004	0.082*
(14) Parental Performance Requirements	0.414*	0.147*	0.156*	0.176*	0.406*	0.082*	

* $p < 0.05$

4.2 Regression Analysis

The baseline regression data as shown in Table 6:

Core explanatory variable: parental affective involvement () has a coefficient of 0.322, but it is not significant at the 10% level, indicating that after controlling for other variables, the direct impact of parental affective involvement on core literacy is not significant.

Control variables:

Gender (male) has a significant negative impact on core literacy (Coefficient=−15.259, $p<0.001$)

Only child status has a significant positive impact on core literacy

(Coefficient=9.863, p<0.001)
Academic pressure, self-education expectation, parents 'education expectation and parents' achievement requirement have significant positive effects on core literacy.
Parental expectation pressure has a significant negative impact on core literacy
Model fit: $R^2 = 0.379$, indicating that the model explains 37.9% of the variation in core literacy, and the model fit is good.

Table 6. Baseline Regression Data

variable	coefficient	SE	t value	p-value	lower bound of the 95% confidence interval	the upper 95% confidence interval
parental emotional involvement	0.322	0.195	1.65	0.100	-0.061	0.704
gender(male=1)	15.259	1.385	-11.02	0.000	-17.974	-12.545
only child or not	9.863	1.432	6.89	0.000	7.055	12.671
academic pressure	9.784	0.435	22.50	0.000	8.932	10.636
self education expectation	8.872	0.699	12.69	0.000	7.502	10.243
parental expectation pressure	-3.241	0.684	-4.74	0.000	-4.581	-1.900
family economic conditions	-2.229	1.203	-1.85	0.064	-4.588	0.130
parental expectations	5.161	0.748	6.90	0.000	3.695	6.626
Relationship between children and parents	-0.983	0.852	-1.15	0.249	-2.654	0.688
Parental Performance Requirements	17.932	0.931	19.27	0.000	16.108	19.757
_cons	89.540	6.540	13.69	0.000	76.719	102.361

4.3 Robust Test

In order to ensure the reliability of benchmark regression results, this paper first tests the results by replacing the measurement methods of core explanatory variables (. In addition, this paper further examines the heterogeneity and robustness of benchmark results by subsample regression.

4.3.1 Test for replacing core explanatory variables

Two alternative measures were used: (1) the raw total score of parental affective involvement was normalized (mean 0, standard deviation 1); and (2) the mean score of parental affective involvement (raw total score divided by 2) was used as the new core explanatory variable rather than the total score. Regression estimates are re-performed after variables are replaced, as shown in Table 7.

Table 7. Substitution of Core Explanatory Variables

variable	**(1) Standardized parental involvement**	**(2) Average parental involvement**
core explanatory variable		
parental emotional involvement	1.273 (0.773)	0.643 (0.391)
control variable		
gender (F =0)	-15.259*** (1.385)	-15.259*** (1.385)
Only child (not =0)	9.863*** (1.432)	9.863*** (1.432)
academic pressure	9.784*** (0.435)	9.784*** (0.435)
self-education expectation	8.872*** (0.699)	8.872*** (0.699)
parental expectation pressure	-3.241*** (0.684)	-3.241*** (0.684)
family economic conditions	-2.229 (1.203)	-2.229 (1.203)
parental expectations	5.161*** (0.748)	5.161*** (0.748)
relation with parents	-0.983 (0.852)	-0.983 (0.852)
Parental Performance	17.932*** (0.931)	17.932*** (0.931)

Requirements		
constant term	94.952*** (7.037)	89.540*** (6.540)
model statistic		
observed value	6,986	6,986
R^2	0.379	0.379
Adjust R^2	0.378	0.378
F value	425.61	425.61

Note: Robust standard errors are in parentheses; significant at 1%, 5%, 10% levels, respectively.

As shown in the table above, regardless of the measurement method, the coefficient of parental emotional involvement failed the statistical test at the 10% significance level. At the same time, the coefficient size, sign and statistical significance of all control variables remained highly consistent with the baseline model and did not change substantially. The goodness of fit and overall significance of the two robust test models were also identical to those of the baseline model.

4.3.2 Regression results of sex-specific samples

Theoretically, there may be systematic differences in the impact of parental emotional involvement on children of different genders. Daughters, for example, may be more sensitive to emotional signals, while traditional social role expectations may also lead parents to interact differently with their children of different genders. If the baseline regression model ignores this significant heterogeneity, the results may be biased or not robust. For this reason, the whole sample was divided into two sub-samples according to the sex of children (female sample N=3,525; male sample N=3,461) and regression estimation was performed respectively, as shown in Table 8.

Table 8. Regression Data for Sex-Specific Samples

variable	**Female sample (N=3,525)**		**Male sample (N=3,461)**	
	coefficient	**SE**	**coefficient**	**SE**
core explanatory variable				
parental emotional involvement	**0.725*** **	(0.281)	-0.028	(0.273)
control variable				
Only child (yes =1)	6.356***	(1.993)	13.088***	(2.057)
academic pressure	9.691***	(0.623)	9.798***	(0.608)
self-education expectation	9.170***	(1.035)	8.506***	(0.954)
parental expectation pressure	-3.881***	(0.972)	-2.794***	(0.963)
family economic conditions	-2.052	(1.819)	-2.447	(1.615)
parental expectations	4.990***	(1.099)	5.207***	(1.025)
relation with parents	-1.268	(1.217)	-0.782	(1.197)
Parental Performance Requirements	14.621***	(1.256)	21.441***	(1.377)
constant term	96.814***	(9.350)	68.669***	(9.058)
model statistic				
R^2	0.323		0.390	
Adjust R^2	0.322		0.388	
F value	186.63		245.16	

Note: Significant at 1%, 5%, 10% levels; robust standard errors in brackets.

As shown in the table above, subsample regression revealed an important heterogeneity: significant gender differences in the impact of parental emotional involvement on core literacy. In the female subsample, the coefficient of parental emotional involvement was 0.725, which was statistically significant at the 5% level, indicating that parental emotional involvement could significantly improve the core literacy of daughters. However, in the male subsample, the coefficient was not only numerically small, but also far from statistically significant. This result confirms, in another way, that the baseline regression finding that the overall effect of parental affective involvement is not significant is robust. The intrinsic reason is that the positive female effect and the almost zero male effect cancel each other in the whole sample, thus concealing the true positive effect in the female group. Subsample regression not only verifies the robustness of the baseline model, but also reveals the hidden mechanism

behind it, that is, the educational return of parents 'emotional participation is mainly reflected in daughters, which provides a new empirical basis for understanding the complexity of family education.

4.4 Heterogeneity Analysis

4.4.1 By sex group

According to Money and Erhard's "Gender Role Socialization Theory", women are more likely to internalize emotional signals, while men are more likely to compensate for lack of emotional support through peer networks. Therefore, there may be differences in the effects of male and female junior high school students in the parental emotional participation model. This part examines the moderating effect of child gender on the causal relationship between parental affective involvement and core literacy through sex-based regression, interactive term model and marginal effect analysis.

According to the OLS regression results of the female group. The coefficient of the core explanatory variable "parental affective involvement" was 0.7246, indicating that after controlling for the variables of only child, academic pressure and educational expectation, the core literacy level of girls increased significantly by 0.725 points for each unit of parental affective involvement. From the control variables, the coefficients of academic pressure, self-education expectation and parental education expectation were all significantly positive at 1% level, which was consistent with the theoretical expectation that education investment could strengthen core literacy, while parental expectation pressure showed significant negative effect, which also verified the mechanism that excessive expectation inhibited autonomous development.

According to the regression results of male students, the coefficient of parental emotional involvement was-0.0276, which was not statistically significant, indicating that parental emotional involvement had no significant direct effect on male students'core literacy. It is worth noting that the coefficients of "only child" and "parental achievement requirements" in boys 'group are significantly higher than those in girls' group, suggesting that the effects of the "one-child policy bonus" and "instrumental academic requirements" are more prominent in boys 'growth process. This finding is consistent with the discipline logic of "boys focus on achievement orientation and girls focus on emotional connection" in gender role socialization theory.

In order to overcome the "information fragmentation bias" of sub-sample regression, a full-sample model of "gender × parental emotional involvement" interaction was further constructed.

The main effect for girls was 0.5563 and the coefficient for interaction was-0.4417, quantifying the difference in effects between boys and girls. Although the coefficient of interaction term did not reach the traditional significance level, but combined with the test between groups, it can be seen that there is a significant gender difference.

The study also calculated the average marginal effect of parental emotional involvement by gender through margins command, as shown in Table 9, and the results were logically consistent with the interaction term model.

Table 9. Marginal Effect Data and Plots

gender	marginal effect (dy/dx)	SE	t value	P>|t|	lower bound of the 95% confidence interval	the upper 95% confidence interval
Girls (0)	0.5563287	0.2679474	2.08	0.038	0.0310704	1.081587
Boys (1)	0.1146644	0.2535376	0.45	0.651	-0.3823464	0.6116752

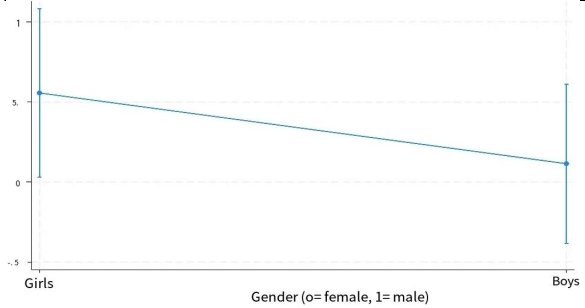

Figure 2. The Marginal Effect of Parental Emotional Engagement Gender Differences

As shown in the above table 9 and Figure 2, the marginal effect of the female group is 0.5563, indicating that the effect of emotional participation on the improvement of female core literacy is stable and significant, while the marginal effect of the male group is only 0.1147, and the effect amplitude is less than 1/5 of the female group and statistically insignificant. The results show that the positive effect of parental emotional involvement on core literacy has obvious heterogeneity of "favoring girls over

boys". Girls can internalize family support and improve comprehensive literacy through emotional interaction, while boys rely more on instrumental academic guidance, and the educational effectiveness of emotional investment is diluted.

4.4.2 Groupings by household economic conditions

This study further explored the moderating effect of family economic conditions on the relationship between parents 'emotional involvement and children's core literacy. According to the median of the test sample as the dividing point, the groups are divided into "economically poor group" and "economically good group" as shown in Table 10.

Table 10. Household Grouping

economic condition grouping	frequency	Percentage (%)	Cumulative percentage (%)
poor economic conditions	1,001	14.03	14.03
better economic conditions	6,135	85.97	100.00
aggregate	**7,136**	**100.00**	-

Group regression analysis showed that there was no statistical significance between parental affective involvement and core literacy in families with different economic conditions. At the same time, other variables such as gender, only-child or not, work stress showed significant differences among different groups, indicating that economic conditions had moderating effects on some influencing factors. In addition, to test for significance of coefficient differences between groups, we used tests. The results showed that there was no significant difference in the components of parental affective involvement, indicating that economic conditions could not significantly moderate the impact of parental affective involvement on core literacy, as shown in Table 11.

Table 11. Family Group Regression and Test Data

variable	poor economic condition group (N=979)		Group with better economic conditions (N=6015)		tests on differences between groups (p-value)
	coefficient	SE	coefficient	SE	
parental emotional involvement	0.397	0.484	0.179	0.195	0.434
gender	-13.267***	3.857	-15.467***	1.486	<0.001
only child or not	9.989**	4.643	9.075***	1.512	0.034
academic pressure	8.803***	1.132	9.659***	0.469	0.000
self educational expectation	8.186***	1.538	9.028***	0.788	0.000
parental expectation pressure	-0.772	1.736	-3.489***	0.745	0.676
parental educational expectations	3.641**	1.687	5.350***	0.836	0.069
Parental Performance Requirements	20.204***	2.456	17.813***	1.006	0.000
Frequent items	80.777***	12.597	80.460***	5.614	
R^2	0.3478		0.3747		

Note: ***p 0.01, **p 0.05, *p 0.1

4.4.3 Groups by parent-child relationship

The moderating effect of parent-child relationship on children's core literacy was further explored. According to the relationship score of the test sample between "2-4 points" is divided into "bad relationship group", the relationship score of "6 points" is divided into "good relationship group", as shown in Table 12.

Table 12. Relationship Grouping

Parentage quality	frequency	Percentage (%)
Bad relationship (2-4 points)	1,637	30.43
Good relationship (6 points)	3,742	69.57
aggregate	**5,379**	**100.00**

Note:***p 0.01, **p 0.05, *p 0.1

Group regression and interaction analysis showed that the effect of parental emotional involvement on core literacy was not statistically significant in different groups of parent-child relationship quality. The results of cross-item test showed that there was no significant difference between groups, indicating that parent-child relationship quality did not moderate the effect of parental emotional involvement on core literacy. At the same time, other variables such as job stress and job requirements showed significant effects between the two groups, and the degree of impact was different. The results showed that, after controlling for other variables, the poor

parent-child relationship group had higher levels of basic core literacy, as shown in Table 13.

Table 13. Parentage Group Regression and Test Data

variable	Relationship difference group (2-4 points)		Good relationship group (6 points)		difference between groups
	coefficient	SE	coefficient	SE	p-value
parentalemotional involvement	0.375	0.396	0.227	0.270	0.7606
gender (F =0)	-15.880***	2.895	-15.755***	1.931	0.9715
whether only	14.940***	2.990	10.328***	1.998	0.1959
academic pressure	7.985***	0.861	10.829***	0.611	0.0161
self-education expectation	8.293***	1.259	10.487***	1.065	0.2298
parental expectation pressure	-3.957***	1.352	-1.241	0.975	0.1150
family economic conditions	-2.410	2.502	-1.305	1.663	0.7349
parental expectations	4.753***	1.360	3.944***	1.127	0.6867
Parental Performance Requirements	20.876***	1.853	15.481***	1.323	0.0379
constant term	95.810***	11.326	72.614***	8.627	
sample size	1,603		3,654		
R^2	0.3823		0.3687		

4. Mediation Analysis

In order to reveal the gender heterogeneity mechanism of parental affective involvement affecting core literacy, this study examined the mediating role of "low loneliness". Booststrap The indirect effect of this pathway was significantly negative for boys and insignificant for girls. Further analysis of path coefficients revealed an unexpected pattern: parental emotional involvement significantly reduced loneliness for both boys and girls. However, the predictive effect of low loneliness on core literacy showed significant gender differences. For girls, low loneliness had no significant effect, but for boys, low loneliness significantly predicted lower core literacy, as shown in Table 14.

Table 14. Pathway Analysis of Parental Emotional Involvement Affecting Core Literacy through Low Loneliness

variables and paths	Female sample (N=3,509)		Male sample (N=3,422)	
	Coefficient (SE)	p-value	Coefficient (SE)	p-value
Path A: Parent Involvement → Low Loneliness				
parental emotional involvement	0.026 (0.008)	0.001	0.021 (0.007)	0.005
Path B: Low Loneliness → Core Literacy				
Low loneliness	-0.938 (0.617)	0.129	-2.281 (0.628)	0.000
Parental emotional involvement (direct effect)	0.761 (0.282)	0.007	0.022 (0.275)	0.936
Indirect effects (A*B)	-0.025		-0.048	
Bootstrap 95% CI	[-0.060, 0.011]		[-0.094, -0.002]	

This indicates that although parental emotional involvement can generally alleviate children's loneliness, its final effect is deeply regulated by gender socialization process. For male students, traditional gender role norms may cause the state of low loneliness to conflict with their expected goals of independence and achievement orientation, thus producing negative effects that inhibit their core literacy development. This finding highlights the critical importance of considering children's gender traits in family education.

5. Conclusions and Recommendations

5.1 Research Conclusions

The influence of parents 'emotional involvement on children's core literacy in family education shows significant differences due to gender's socialized discipline and parenting practice bias. Combining sex-specific regression, interactive term model and marginal effect analysis, the core findings are as follows:

From the perspective of effect direction, parental affective involvement has a significant positive effect on core literacy for girls, but no statistical significance for boys. This differentiation stems from a dual mechanism: under the sociocultural "emotion-achievement" discipline of gender roles, girls are often expected to be "emotionally

sensitive" and are more likely to internalize family support through parent-child interaction; boys are oriented to "achievement priority", and instrumental academic guidance in family education explains core literacy much more than emotional input. At the same time, the parenting practice bias of "mother pays attention to daughter's emotional communication, father pays attention to son's study" in intergenerational transmission further magnifies the influence of gender socialization.

As for the effect strength difference, the interaction model and marginal effect analysis showed that the effectiveness of parental affective involvement in boys group was lower than that in girls group, and the difference between groups was significant at 10% statistical level. This means that the emotional empowerment of boys 'core literacy is suppressed by both instrumental academic orientation and emotional investment bias, and the hidden inequality of "favoring girls over boys" in family education needs to be paid attention to.

There are limitations in this study:

This study is based on cross-sectional data, making it difficult to establish a strict causal relationship. Firstly, there may be biases in omitted variables. For instance, the innate personality traits of children (such as extraversion and emotional sensitivity) may simultaneously affect the intensity of parents' emotional investment and the development of their core competencies, and such variables are difficult to be fully controlled. Secondly, there may be a reverse causal interference, that is, students with higher core literacy may be better at communicating with their parents and actively seeking emotional support, thereby "triggering" a higher level of parental emotional participation. Although we introduced the mediation effect analysis, the cross-sectional data still could not completely solve these endogeneity problems.

Limitations of measurement tools: The core variables "Parental emotional engagement" and "core literacy" both rely on students' self-reports, which may lead to common method bias. Furthermore, the measurement items of emotional participation are relatively broad (such as "discussing what happened at school"), failing to precisely distinguish the emotional quality of interaction (whether it is a supportive or controlled discussion) from specific topics (such as academic studies, interpersonal relationships), and the educational effects of interactions of different qualities and contents may vary significantly. This may to some extent mask the complexity of the impact of emotional engagement on boys.

Limitations of sample and historical background: This study utilized CEPS data from 2014-2015, which is several years ago. The concepts of family education, gender role cognition in Chinese society, and educational practices after the "double reduction" policy are all undergoing rapid changes. The timeliness of the research conclusions and their universality in the contemporary context need to be verified with updated data.

5.2 Policy and Practical Recommendations

In view of the gender heterogeneity of parents 'emotional participation, empowerment core literacy, coordinated measures should be taken from the dimensions of family upbringing, school guidance and policy guarantee:

Family upbringing: breaking gender stereotypes, balancing emotions and instrumental support. Parents need to abandon the inherent cognition of "girls attach importance to emotion, boys attach importance to achievement" and complement each other in daily interaction: for boys, increase emotional communication scenes (such as discussing interests and sharing emotions together), enrich instrumental academic guidance with emotional connection; for girls, rationally analyze academic difficulties, dismantle target tasks, and balance emotional sensitivity traits with achievement orientation. We can try to record the frequency and topic type of parent-child interaction in "family emotion diary", or quantitatively monitor the emotional input bias with the help of "gender equality parenting checklist", and gradually eliminate the unconscious gender parenting bias.

School guidance: embed gender-sensitive family education services, primary and secondary schools should incorporate "emotional education of gender equality" into the curriculum of parents 'schools, and improve the accuracy of guidance through three types of practice: firstly, case teaching presents counter-examples such as "boys' emotional neglect causes academic burnout" and "girls 'lack of instrumental support causes self-doubt" to reveal gender-biased risks; Second, role-playing simulates cross-gender interaction scenarios such as "father and daughter talk about emotions, mother and son

analyze studies" to break down parenting role stereotypes; Third, the head teacher combines the students'psychological files to push targeted resources for families with unbalanced emotional input (such as issuing "emotional interaction tips" to boys' families and providing "academic planning guides" for girls 'families).

Policy guarantee: Strengthen the gender equity orientation of family education public services. Education administrative departments need to anchor the goal of "emotional participation gender equality" in the implementation of the Family Education Promotion Law: firstly, innovate evaluation indicators, incorporate "gender balance of parent-child emotional interaction" into the family education evaluation system, and guide the fairness of resource allocation; secondly, supplement public services, relying on community family education guidance stations, to provide special services of "transgender emotional support" for families in difficulty such as single parents and left-behind children; Third, encourage academic research, set up a special topic of "gender heterogeneity in family education" jointly with the Social Science Fund, promote the academic community to dig deep into the social structure motivation of gender difference in emotional investment (such as patriarchal culture and allocation of educational resources), and provide theoretical support for policy optimization.

References

[1] Chen, H., Huang, S., & Liu, X. (2023). A study on the pattern and path of parent participation in education—A case study of American outside school education. Chinese Family Education, (6), 86–92.

[2] Fan, Y. (2024). A study on the influence of parents' educational participation on senior high school students' academic achievement (Master's thesis). Shandong Normal University. https://doi.org/10.27347/d.cnki.gssdu.2024.001717

[3] Han, X. (2023). An analysis of the types and characteristics of parent education involvement (Master's thesis). Zhejiang Normal University. https://doi.org/10.27464/d.cnki.gzsfu.2023.000776

[4] Huang, X., Ma, D., & Xiu, Y. (2025). From competitive tool to complete person: Value reconstruction and path analysis of family education. Continuing Education Research, (9), 108–112.

[5] Lin, C. (2017). Research on core literacy of China students. Psychological and Behavioral Research, *15*(2), 145–154.

[6] Liu, S. (2022). A study on the influence mechanism and intervention of parental academic stress and parental academic participation on junior high school students' academic stress (Master's thesis). Guangxi University for Nationalities. https://doi.org/10.27035/d.cnki.ggxmc.2022.000469

[7] Wang, M., Yu, M., Long, B., Li, Y., Xu, D., & Liu, Y. (2025). Parents' educational participation and junior high school students' learning involvement—A comparative analysis based on mobile and urban families. Journal of Beijing Normal University (Social Sciences Edition), (2), 23–32.

[8] Xing, S., & Liu, Y. (2023). Parental educational involvement and school-age children's academic achievement—More is better or less. Educational Research, *44*(8), 130–142.

[9] Yu, P. (2025). An investigation on the influence of father participation on pupils' academic achievement (Master's thesis). Shanghai Normal University. https://doi.org/10.27312/d.cnki.gshsu.2025.001320

