A Study of Factors Associated with Social-Emotional Competence in Chinese Adolescents Based on Meta-Analysis

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Abstract

[Objective] In recent years, research results on the factors related to adolescents' social-emotional competence are relatively abundant, but there is a lack of systematic research. The purpose of the article is to explore the relationship between the related factors and adolescents' social-emotional competence, to provide reference for subsequent empirical studies, and to provide theoretical guidance for the comprehensive development of students in China. [Methods] Using Meta-analysis method, the article included a total of 23 literatures containing 52,720 samples through literature search and screening, summarized and combed five antecedent variables and two outcome variables, and conducted heterogeneity test, publication bias test, effect value analysis and moderating effect test on the 40 extracted effect values. [Results] It was found that gender, family socioeconomic status, interaction, class officer experience, home-school cooperation, and academic achievement were significantly and positively related to adolescents' social-emotional competence, with peer and teacher-student relationships having the strongest effect on students' social-emotional competence. At the basic education level, there was a significant moderating effect between teacher-student relationships and students' socio-emotional competence; there was no moderating effect of gender on teacher-student relationships, peer relationships and students' socio-emotional competence.

Keywords

Adolescents, Socio-emotional competence, Correlates, Meta-analysis

Introduction

Social and Emotional Competence (SEC) is the ability of individuals to recognize, manage emotions developed in complex situations of growth and development (Elias et al., 2000; OECD, 2015). Domestic and international studies have shown that social-emotional competence plays an important role in promoting students' well-being, social adaptation, and whole-person development (Elias & Arnold, 2006; Greenberg et al., 2003).2023 In May, the General Office of the Ministry of Education issued a program for deepening action on the reform of the teaching and learning of the basic education curriculum, which puts forward the proposal of updating the concept of education and transforming the way of parenting, and promoting the all-round development of students' morality, intelligence, physicality, aesthetics and labor. The long-standing problem of "emphasizing cognition and neglecting emotion" in China's basic education has hindered the comprehensive development of students, and it is important to clarify the factors related to adolescents' socio-emotional competence in order to promote their comprehensive development.

Literature Review

Domestic and foreign scholars have different conceptual dimensional divisions of socio-emotional competence. For example, the six-dimensional model of social-emotional competence localized in China includes self-knowledge, self-management, others' knowledge, others' management, collective knowledge and collective management (Du Yuan, Mao Yaqing, 2018). The global youth social-emotional competence assessment program (SSES) conducted by the Organization for Economic Cooperation and Development (OECD) proposes a 15-dimensional social-emotional competence measurement model based on the "Big Five Personality Model," including the five competence domains of open-mindedness, task performance, interpersonal interactions, collaborative ability, and emotional regulation (OECD, 2018). 2018).

Students' social-emotional competence varies by gender. Investigating the current status of social-emotional competence of primary and secondary school students, it was found that girls' social-emotional competence was better than boys' overall (Liu Yang et al., 2024; Qu Xuewen, 2022). The family of origin is the earliest and most important socialization place for adolescents, and the influence of family-related factors on students' social-emotional competence is also crucial. On the one hand, parent-child interaction is a key factor influencing the development of students' social-emotional competence (Pang Shi, Wang Yunhong, 2024). On the other hand, family socioeconomic status and material culture level are important factors affecting students' academic opportunities and even academic performance. Children's socioeconomic status and early environment are closely related to the development of their verbal and executive abilities, and can further predict their higher cognitive skills and achievements (Baker et al., 2002; Huang et al., 2021).

The development of social-emotional competence in adolescents is multiply influenced by school factors. Several empirical studies have shown that good social-emotional competence can help students develop positive interpersonal relationships (Papadopoulos, 2020), enhance academic performance (Diperna et al., 2020), regulate negative emotions (Du Yuan, Mao Yaqing, 2018), and reduce problematic behaviors (Malhotra et al., 2021). Teacher-student relationship and social-emotional competence of elementary school students are bi-directionally predictive (Deng Yuzhe et al., 2024), and close teacher-student relationship can promote the development of social-emotional competence of elementary school students (Poulo, 2015, 2017). Students with higher levels of socio-emotional competence have more pro-social behaviors, less peer conflict and exclusion (Taylor et al., 2017), and are more likely to gain acceptance and recognition from their peers (Yang et al., 2020). Elementary and middle school students' academic performance and socio-emotional competence are closely related; the higher the academic ranking, the better the development of socio-emotional competence, and elementary and middle school students with the experience of being a class officer have a stronger socio-emotional competence than those who do not have that experience (Ng Eun-Chi, Mei Hung-Jie, 2022). In addition, students' social-emotional competence is significantly negatively correlated with student bullying (Zhang Jing et al. 2023), and social-emotional learning in schools is an effective measure to prevent school bullying (Du Yuan et al., 2018).

To summarize, most of the studies on adolescents' social-emotional competence have been in the areas of influencing factors and mechanisms of action, which can be classified into the following categories: (1) individual factors, such as gender; (2) family factors, such as family socio-economic status and parent-child relationships; and (3) school factors, such as teacher-student relationships, peer relationships, academic performance, and student bullying. However, there is a lack of systematic research on these related factors due to the different groups of subjects, different regional distributions, and differences in related measurement indicators among studies. Therefore, this paper will use Meta-analysis to summarize and sort out and quantitatively analyze the antecedent and outcome variables of social-emotional competence of adolescents in China, so as to provide references and lessons for future studies.

Research process

Literature search and screening

Since the research topic of the article is limited to "Chinese adolescents", this paper only searches the Chinese literature in China. We searched the CNKI China Knowledge Network database for relevant Chinese literature, and conducted an advanced search for "socio-emotional competence" (search) "adolescents"+ "students" (search in results). As of January 10, 2025, a total of 475 Chinese literatures were retrieved. To ensure the quality of the study, only papers published in academic journals were selected for this study, totaling 198 pieces of Chinese literature. After the search was completed, 72 papers that were not related to adolescents' social and emotional competence were excluded by browsing the titles and abstracts of the articles; then 89 papers that were purely theoretical and review-oriented were excluded by browsing the full text; finally, 23 papers that explicitly reported correlation coefficients (or statistics that can be converted into correlation coefficients, such as T-values) and sample sizes in the text were selected from the quantitative research literature, totaling 21 independent sample subjects, were included in the Meta-analysis.
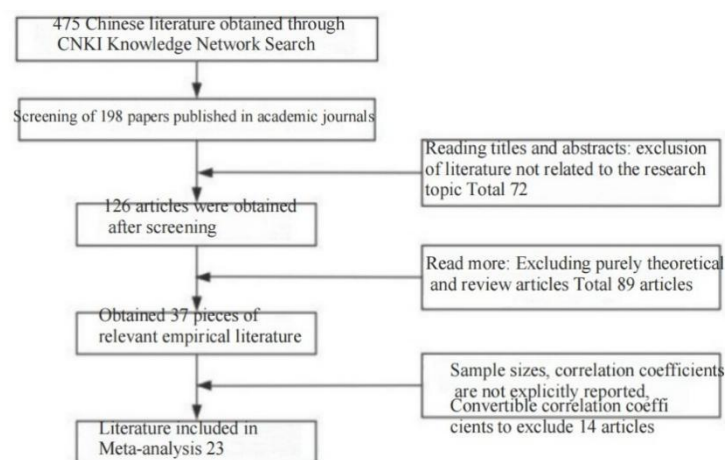

Figure 1 Literature screening process

Literature Coding and Processing

The screened relevant literature was coded with information including the basic information of the article (title, author, and year of publication) as well as the study population, research platform, sample size, effect factors, and correlation coefficients (or t-values that can be converted to correlation coefficients). Forty effect values were ultimately obtained for a total sample size of 52,720. Some of the information coded is shown in Table 1.

When the sample literature reports correlation coefficients between the variable and the dependent variable, the effect values are the corresponding correlation coefficients; when the literature reports only the significance t-value for the path, the effect values are shown in the following equation:

$$r = \sqrt{\frac{t^2}{t^2 + df}}$$

where t is the path significance; df is the degree of freedom.

Table 1 Basic Characterization Data Coding

Serial Number	First Author	Year of Publication	Periodicals	Sample Size	Research Target	Research Platforms
1	Shuming Wang	2024	Research in Physical Education	539	First to third year students	A city high school
2	Yang Liu	2024	Journal of Guilin Normal University	416	Elementary school students in grades 4-6	2 elementary school in Xiushan County, Chongqing
3	Yuze Deng	2024	Psychological development and education	4020	Same instalment two years apart Elementary school students in grades 4 and 6	elementary school
4	Enci Wu	2024	Research on children and adolescents	1903	Primary and secondary school students in grades 5-9	15 rural primary and secondary schools belonging to the 4 provinces of Henan, Hubei, Jiangsu and Shandong
5	Jialun Song	2024	Educational Measurement and Evaluation	3579	15-year-old secondary school student	SESS China Suzhou Student Data
6	Shenghua Huang	2024	Journal of Education of Renmin University of China	7246	10-year-old elementary school students, 15-year-old secondary school students	SESS China Suzhou Student Data
7	Zhiying Zhu	2024	psychological science	6534	elementary school student	Western Primary School
8	Mingwei Li	2021	Research on Teacher Education	834	All teachers	9 public elementary school in a district of Beijing
9	Yuan Du	2018	Scientific research in education	1617	Elementary school students in grades 3-5	12 elementary school in a district of Beijing
10	Yinghua Chen	2016	Special Education in China	3832	Elementary school students in grades 3-5	Guangxi and Ningxia 16 township central elementary

					school and rural complete elementary school
11	Sen Zhang	2020	Global education outlook	817	All teachers	9 public elementary school in a district of Beijing
12	Chuanli Yang	2023	Educational Scholarship Monthly	6032	primary and secondary school students	30 rural primary and secondary schools in the Guangxi Zhuang Autonomous Region
13	Wanying Zhang	2022	Educational Theory and Practice	2218	Parents of elementary school students in grades 3-5	9 elementary school in a district of Shenzhen
14	Zhengxian Liu	2022	education science	539	Elementary school students in grades 4-6	An elementary school in the main city of Chengdu
15	Jia Qian	2023	Education and the economy	6265	primary and secondary school students	SESS China Suzhou Student Data
16	Yang Chuanli	2017	elementary education	4948	Elementary school students in grades 3-5	16 rural elementary school in Guangxi and Ningxia
17	Chuanli Yang	2019	Ethnic Education Research	972	primary and secondary school students	8 primary and secondary schools in Sanjiang Dong Autonomous County, Guangxi
18	Wanying Zhang	2024	Journal of Beijing Institute of Education	1493	Parents of elementary school students	9 elementary school in Beijing, Anhui and Henan provinces
19	Xiaojie Huang	2022	Education Watch	887	Students in grades 3-5	An elementary school in Shanghai
20	Xiaoxia Chen	2018	Social Welfare (theoretical version)	1860	primary and secondary school students	20 urban and rural primary and secondary schools in city B of Sichuan province
21	Xiaoqian Ma	2022	Journal of Fujian Institute of Education	1380	Elementary school students in grades 4-6	3 elementary school in Chengdu
22	Cen Wang	2023	Mental health education in primary and secondary schools	1930	Elementary school students in grades 3-6	A school in Foshan City, Guangdong Province
23	Shi Pang	2024	vocational training	2703	middle-level student	3 Secondary Schools in Lu'an City, Anhui Province

By clarifying the definition and scope of use of each variable, this paper summarizes and organizes the variables related to adolescents' socio-emotional competence in the literature, and combines those variables that are synonymous, near-synonymous, or have a contextual relationship. After frequency counting of the collated variables, this paper selected five influencing factors, namely, gender, family socioeconomic status, interaction, home-school cooperation, and class cadre experience, as the antecedent variables, and two influencing factors, namely, academic achievement and student bullying, as the outcome variables to be included in the Meta-analysis. The relevant information of each variable is shown in Table 2.

Table 2 Antecedent and outcome variables of socio-emotional competence among Chinese adolescents

	Variant		K	N	Variable Description	References
Antecedent Variable	distinguishing between the sexes		6	10180	Physical characteristics of the individual	Yang Liu et al.
	Socio-economic status of the family		4	11442	Wealth, power and relative social status held by the family	Shenghua Huang et al.
	interaction	teacher-student relationship	8	22792	Relationships formed between teachers and students in a classroom through meeting, communicating and interacting in the teaching and learning process	Yuze Deng, et al.
		parent-child relationship	4	11186	Emotional, behavioral, and cognitive interactions between parents and children	Hu et al.
		peer relation	4	13603	Individuals in the classroom who are similar in age and have equal or similar levels of psychological development collaborate to achieve win-win relationships.	Jia Qian et al.
	home-school cooperation		4	14403	Mutual support and cooperation between families and schools in educating students	Chuanli Yang et al.
	experience as a class officer		3	8351	Experience as a class officer in school or classroom	Chuanli Yang et al.
Outcome Variable	academic performance		4	9853	The level of knowledge and skills acquired by students through study and assessment over a period of time	Yinghua Chen et al.
	student bullying		3	10766	Occurs between students when one party causes injury or damage to the other party through physical or verbal bullying or insults.	Yuan Du et al.

Note: K is the number of studies with combined effect sizes; N is the cumulative sample size of the K study samples.

Findings

On the basis of data coding, this paper inputs the correlation coefficient and sample size into the CMA (Comprehensive Meta-Analysis) V3 software as the effect value, and the CMA converts to obtain Fisher's-Z and its variance and other related indexes according to the input effect value, and carries out Meta-analysis of the comprehensive effect of each variable based on the result.

Heterogeneity test

In this paper, the heterogeneity test is first conducted to determine the consistency of the

study. In this paper, the Q test is used to test the heterogeneity of the data, and the test results are shown in Table 3, where the Q value indicates the value of heterogeneity, and I^2 indicates the proportion of the heterogeneity part in the total variation of the effect size, when $I^2 = 0$ indicates no heterogeneity, 0-40% indicates mild heterogeneity, 40%-60% indicates moderate heterogeneity, 50%-90% indicates large heterogeneity, and 75%-100% indicates very large heterogeneity. As can be seen in Table 3, the I^2 of all variables included in the paper is greater than 75%, and the results of the Q-test are significant (p<0.05), indicating that there is a great deal of heterogeneity among all variables. Therefore, the random effects model was used to test all the variables in the text.

Table 3 Results of heterogeneity test

	Variant		K	N	Heterogeneity (Q-test)				Tau-squared	
					Q-value	df(Q)	P-value	I^2	Tau	Tau²
Antecedent Variable	distinguishing between the sexes		6	10180	25.148	5	0.000	80.117	0.051	0.003
	Socio-economic status of the family		4	11442	78.619	3	0.000	96.184	0.079	0.006
	interaction	teacher-student relationship	8	25484	411.412	7	0.000	98.299	0.139	0.019
		peer relation	4	9940	295.338	3	0.000	98.984	0.180	0.032
		parent-child relationship	4	11186	1099.597	3	0.000	99.727	0.325	0.105
	home-school cooperation		4	14403	195.222	3	0.000	98.463	0.142	0.020
	experience as a class officer		3	8351	123.332	2	0	98.378	0.185	0.034
Outcome Variable	academic performance		4	9853	484.629	3	0	99.381	0.269	0.072
	student bullying		3	10766	182.346	2	0	98.903	0.184	0.034

Note: K is the number of studies combining effect sizes; N is the cumulative sample size of the K-study sample; df(Q) denotes the magnitude of the degrees of freedom; Q-value and P-value are the test statistic in the Q-test and the risk to be taken in rejecting the original hypothesis, respectively; and Tau² denotes the percentage of between-study variance that can be used to calculate the weights.

Publication bias test

In order to avoid the bias of analysis results due to publication bias, this paper conducts publication bias test on the effect values of each variable. Egger test is used for quantitative test and the test results of each variable are shown in Table 4.Egger test is used to determine whether there is publication bias by identifying whether there is significance between the regression

intercept and 0. Generally, the P value of the Egger test is greater than 0.05 indicating a low likelihood of publication bias. As can be seen from Table 4, the P-value of the Egger test is greater than 0.05 for all variables in the paper, and overall the Meta-analysis has a low likelihood of being affected by publication bias.

Table 4 Results of publication bias test

| | Variant | | K | N | Intercept | 95% Confidence Interval | | T-value | P-value |
						Lower Limit	Limit		
Antecedent Variable	distinguishing between the sexes		6	10180	2.065	-7.092	11.222	0.626	0.565
	Socio-economic status of the family		4	11442	-11.472	-42.607	19.664	1.585	0.254
	interaction	teacher-student relationship	8	25484	9.316	-9.841	28.472	1.190	0.280
		peer relation	4	9940	-6.211	-92.484	80.063	0.310	0.786
		parent-child relationship	4	11186	-2.317	-252.975	248.340	0.040	0.972
	home-school cooperation		4	14403	15.474	-32.620	63.569	1.384	0.300
	experience as a class officer		3	8351	9.832	-123.198	142.863	0.939	0.52
Outcome Variable	academic performance		4	9853	14.838	-82.077	111.752	0.659	0.578
	student bullying		3	10766	11.858	-236.442	260.158	0.607	0.653

Note: k is the number of studies with combined effect sizes; n is the cumulative sample size of the k-study sample; t-value and p-value are the test statistic in the Egger's test and the risk to be taken in rejecting the original hypothesis, respectively.

Analysis of Effect Values

Effect value analysis is to study the effect of each variable on adolescents' socio-emotional competence and the role of socio-emotional competence on behavior, and the results are shown in Table 5.Gignac et al. proposed the judgment criterion, when the absolute value of the average effect size is less than 0.3 it is weakly correlated, from 0.3 to 0.5 it is moderately correlated, and when it is greater than 0.5 it is strongly correlated (Gignac, Szodorai, 2016). As shown in Table 5, among the antecedent variables, teacher-student and peer relationships are moderately correlated with adolescents' social-emotional competence, and gender, family socio-economic status, parent-child relationship, home-school cooperation, and classroom cadre experience are weakly correlated with adolescents' social-emotional competence; and among the outcome variables, academic achievement and adolescents' social-emotional competence are weakly correlated, and all of these influences are positively correlated with adolescents' social-emotional competence, and student Bullying was negatively correlated with it. In addition, among these factors, parent-child relationship and bullying were not significantly correlated, while the rest of the

factors were significantly correlated.

Table 5 Results of effect value analysis

	Variant		K	N	R	95% Confidence Interval		Two-tailed Test	
						Lower Limit	Limit	Z-value	P-value
Antecedent Variable	distinguishing between the sexes		6	10180	0.088	0.042	0.134	3.740	0.000
	Socio-economic status of the family		4	11442	0.153	0.074	0.230	3.781	0.000
	interaction	teacher-student relationship	8	25484	0.419	0.336	0.436	8.960	0.000
		peer relation	4	9940	0.440	0.286	0.571	5.215	0.000
		parent-child relationship	4	11186	0.115	-0.201	0.408	0.708	0.479
	home-school cooperation		4	14403	0.272	0.138	0.397	3.892	0.000
	experience as a class officer		3	8351	0.251	0.043	0.437	2.36	0.018
Outcome Variable	academic performance		4	9853	0.27	0.012	0.495	2.052	0.04
	student bullying		3	10766	-0.091	-0.293	0.118	-0.854	0.393

Note: K is the number of studies with combined effect sizes; N is the cumulative sample size of the K study samples; R is the mean effect value; 95% Confidence Interval denotes the confidence interval for R at a confidence level of 95%; Z-value in the Two-tailed Test is the Z-value corresponding to the test of significance conducted by R; and P-value is the risk assumed by rejecting the original hypothesis.

Moderating effects test

In this study, gender (categorized as "1" and "0", and coded as 1 if the proportion of males in the study population is more than 50%) and basic education stage (categorized as elementary school, middle school, and elementary and secondary school) were used as moderating variables, and subgroup analyses were used to test the relationship between some variables and the Whether there is a significant effect on the social-emotional competence of adolescents was tested, and the results of the test are shown in Tables 6 and 7. As can be seen from the tables, gender does not have a significant effect on the relationship between teacher-student relationship, peer relationship and adolescents' socio-emotional competence; basic education stage has a significant effect on the relationship between teacher-student relationship and adolescents' socio-emotional competence, and does not have a significant effect on the relationship between gender, peer relationship and adolescents' socio-emotional competence.

Table 6 Results of the analysis of gender as a moderating variable

Variant	Moderator Variable	K	R	95% Confidence Interval		Two-tailed Test		Q Intergroup	df(Q)	P-value
				Lower Limit	Limit	Z-value	P-value			

teacher-student	1	5	0.357	0.293	0.417	10.267	0	0.044	1	0.834
relationship	0	2	0.39	0.062	0.642	2.306	0.021			
peer relation	1	3	0.401	0.208	0.591	3.909	0	2.939	1	0.086
	0	1	0.55	0.505	0.592	19.249	0			

Table 7 Results of the analysis of the basic education stage as a moderating variable

Variant	Moderator Variable	K	R	95% Confidence Interval		Two-tailed Test		Q Intergroup	df(Q)	P-value
				Lower Limit	Limit	Z-value	P-value			
distinguishing between the sexes	secondary schools	3	0.061	0.027	0.095	3.529	0.000			
	junior high school	1	0.090	0.057	0.122	5.397	0.000	1.679	2	0.432
	primary and secondary schools	2	0.121	-0.054	0.289	1.359	0.174			
teacher-student relationship	secondary schools	5	0.446	0.334	0.546	7.092	0.000			
	junior high school	1	0.290	0.255	0.324	15.531	0.000	7.367	2	0.025
	primary and secondary schools	2	0.414	0.148	0.624	2.964	0.003			
peer relation	secondary schools									
	junior high school	2	0.338	0.040	0.580	2.212	0.000	2.120	1	0.145
	primary and secondary schools	2	0.536	0.493	0.558	25.719	0.000			

Discussion of results

Influencing factors and the intensity of their influence

The results of Meta-analysis showed that the strongest correlation between interaction (peer and teacher-student relationships) and adolescent socio-emotional competence, followed by home-school cooperation, academic achievement, class officer experience and family socio-economic status, and gender had the weakest strength of influence on adolescent socio-emotional competence. The antecedent outcome model of adolescents' socio-emotional competence is shown in Figure 3.
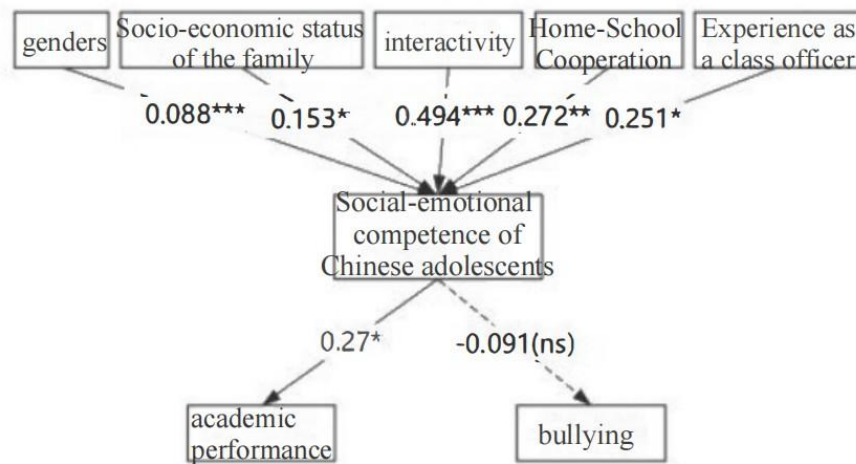
Figure 3 Antecedent and outcome models of adolescents' social-emotional competence

Interactive relationships play an important role in adolescents' socio-emotional competence, which confirms that students' socio-emotional competence is essentially the ability to "socially construct relationships" (Avolio, Gardner, 2005). School factors are the main factors affecting the level of socio-emotional competence of adolescents, and peer and teacher-student relationships are the most critical factors related to students' socio-emotional competence, which is in line with the findings of Kiuru, Rucinski, Salisch, et al. Good peer relationships have a positive impact on self-perception, emotion management and social interactions, and close teacher-student interactions can enhance students' pro-social competence in communication and collaboration and their emotional competence in empathy and sympathy (Sen Zhang, 2020). According to the multiple attachment theory, teachers can be used as the direct caregivers of students during the school years, while developing positive peer relationships and providing more emotional support to provide a favorable environment for the development of students' socio-emotional competence.

Analysis of Regulatory Role

Although some empirical studies have pointed out that there are significant differences in the development of socio-emotional competence among students of different genders and years (OECD, 2021; Huang, 2024), the present study found that gender differences did not have a significant moderating effect on teacher-student and peer relationships, the two key factors affecting adolescents' socio-emotional competence. This is a reminder to view gender differences in social-emotional competence cautiously and fully recognize the multiple influences brought about by family and school factors, rather than limiting the differences to individual factors. In this regard, it should be actively advocated that parents, teachers and students should coordinate and interact with each other to form a synergy to promote the development process of social-emotional competence among adolescents. In addition, students should be aware of the developmental differences brought about by the different stages of basic education as they move up the grades and undergo physical and mental changes, so as to enhance their ability to adapt and adjust.

The findings of this paper provide a reference for the subsequent quantitative analysis for

further detailed analysis, which is of theoretical reference significance for the construction of the model of factors related to the social-emotional competence of adolescents and the comprehensive development of students in China. There are some shortcomings in the current Meta-analysis study: although this study ensures the independence between effect sizes as much as possible, it is still unavoidable that some studies contain more than one effect size at the same time, and in the future, the three-level Meta-analysis model can be used to further subdivide the sources of error between studies in order to make the research results more accurate.

Conclusion

The results of the study found significant correlations between gender, family socioeconomic status, interaction, home-school cooperation, class officer experience, and academic achievement and adolescents' social-emotional competence, with the strongest correlations between peer and teacher-student relationships and students' social-emotional competence. In addition, the relationship between teacher-student relationships and adolescents' social-emotional competence was moderated by the stage of basic education.

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