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The Relationship Between Growth Mindset and Academic Achievement Among Secondary School Students: The Mediating Role of Academic Self-Efficacy

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Abstract: ***Research on the relationship between middle school students' growth mindset and academic self-efficacy was carried out by using the Academic Procrastination Questionnaire and the Academic self-efficacy Scale as research tools, and a survey was conducted among 634 junior high school students who were randomly selected in clusters. The results showed that: (1) Middle school students' growth mindset and academic self-efficacy were above the medium level; (2) The score of academic self-efficacy was higher than that of academic ability self-efficacy; (3) There was a significant positive correlation between middle school students' growth mindset and academic self-efficacy; (4) Academic self-efficacy played a partial mediating role between the growth mindset pattern and students' academic performance.***

Keywords: Growth Mindset, Academic self-efficacy, Academic Performance, Middle School Student**.**

1. Introduction

The growth mindset is a fundamental belief about intelligence or ability that intelligence or ability can be continuously developed and changed with people's experiences and learning. In contrast, there is a fixed mindset, which believes that intelligence or ability can be proven but is difficult to change. In real life, both kinds of mindsets will exist [1]. Although the growth mindset is beneficial to personal development and can be cultivated, it is difficult to maintain for a long time in real life. When facing challenges, accepting criticism, or performing poorly compared to others, individuals are prone to insecurity or defensiveness, and a fixed mindset emerges.

Research has found that the two kinds of mindsets will have a significant impact on academic and emotional experiences, causing individuals to show different "cognitive - emotional - behavioral" responses in situations such as success, failure and challenges, and then affecting individuals' learning behavior, academic achievement, learning motivation, learning engagement and mental health status [2]. Those with a fixed mindset believe that intelligence is innate, limited and unchangeable. Once they encounter failure, they will, in turn, question their own abilities and underestimate their psychological resilience and learning ability [3]. However, those with a growth mindset believe that abilities can be continuously developed and excellent personal qualities can be acquired or cultivated. Therefore, they will show a lasting willingness to learn, regard failure as temporary feedback on self - performance rather than a judgment on self - personality, potential or value. It can be seen that cultivating a growth mindset has a positive significance for an individual's growth and development.

1.1 Growth Mindset and Academic Performance

At the stage of basic education, academic performance is an important indicator reflecting students' learning situation. Research has found that the growth mindset has an important influence on students' academic performance. A meta - analysis of 46 studies shows that students with a growth mindset are more likely to achieve higher scores in specific subjects (language and mathematics) and overall performance. The relationship between the growth mindset and academic performance is not moderated by gender, but is influenced by grade level [4]. Training students in the growth mindset can improve their academic performance. The growth mindset can encourage students to actively remedy their mistakes, increase classroom participation, promote students' autonomous learning, and thus improve their academic performance [5].

However, the impact of the growth mindset on academic performance is not stable and may exhibit regional and cultural differences. Students in Asia and Oceania reported a positive correlation between the growth mindset and academic performance, while Europe showed a positive correlation between the fixed mindset and academic performance, and North America showed a negative correlation between the fixed mindset and academic performance [6]. Those with a fixed mindset are eager to get good grades to prove their abilities. However, those with a growth mindset do not attach great importance to grades, believing that good grades are a by - product of love for learning [7]. Therefore, there may be complex psychological mechanisms involved in the impact of the growth mindset on academic performance, and there are cultural differences. In China, academic performance is an important manifestation and feedback of learning effectiveness and is widely valued by parents and students. Therefore, this study proposes

Hypothesis 1: The growth mindset has a positive predictive effect on the academic performance of middle school students.

1.2 The Mediating Role of Academic self-efficacy in the Relationship between Growth Mindset and Academic Performance

Academic self-efficacy refers to an individual's belief and judgment about whether he or she has the ability to complete a certain task goal in the academic field. Studies have shown that academic self-efficacy can directly predict academic performance and is an important mediating variable. Simultaneous research on primary school and middle school students has found that academic self-efficacy is the most consistent and powerful predictor of their academic performance and plays a mediating role in the relationship between factors such as classroom practice and parents' educational expectations and primary school students' academic performance [8]. This study speculates that the growth mindset may work through individuals' internal and stable academic self-efficacy. Interviews with ninth - grade students found that students with a growth mindset tend to attribute internally, have a relatively clear understanding of themselves, and have strong academic self-efficacy [9]. Researchers used sixth - to eighth - grade students who received special education due to reading disabilities as subjects, and intervened in the experimental group with the growth mindset. It was found that this intervention could significantly improve the learning motivation level of the experimental group, but there was no significant difference between the experimental group and the control group in terms of self-efficacy and academic performance. The academic self-efficacy of these subjects was more constrained by the reading disability itself. Although the intervention of the growth mindset made them have stronger learning motivation, the short - term intervention could not bring about an improvement in academic self-efficacy, so it could not improve academic performance. The inconsistency of previous research results may be due to the insufficient exploration of the role of academic self-efficacy. Therefore, this study proposes Hypothesis 2: The growth mindset of middle school students can positively predict academic self-efficacy, academic self-efficacy can positively predict academic performance, and it plays a mediating role between the growth mindset and academic performance.

2. Research Objectives

2.1 Research Tools

2.1.1 Mindset Questionnaire

The adopted mindset questionnaire contains 6 items. The higher the total score, the more it indicates that middle school students have a growth mindset.

2.1.2 Academic self-efficacy questionnaire

The academic self-efficacy scale is composed of 22 items. The higher the score, the higher the level of academic self-efficacy.

2.1.3 Academic Achievement

In this study, the academic performance is obtained by standardizing the Chinese, mathematics and English scores at the end of the semester when middle school students participated respectively and adding up the z-scores.

2.2 Data Processing

Quantitative values are assigned to the results obtained from the survey questionnaires, and the SPSS26 software package is used for data entry and processing. Statistical processing methods include: descriptive statistics, correlation analysis, multivariate analysis of variance.

3. Analysis of Results

3.1 Descriptive Statistics

Descriptive statistics were developed for the six variables in order to analyze them in general, and the detailed research results are shown in the table. As can be seen from the table, the mean value of growth mindset is 3.620 and the mean value of students' self-efficacy is 3.94, which indicates that the students' thinking as well as their self-perceived abilities are at a moderately high level; and the mean values of the language, math and English scores are 86.78, 72.35, and 70.73 respectively, with the language being the highest and the English being the lowest, so that the English scores need to be upgraded. (See **Table 1**).

3.2 Gender Differences

Independent - sample t - tests were used to analyze the gender differences in growth mindset, academic self-efficacy and academic performance. The results showed that there were significant differences in growth mindset ($t = 2.152$, $P < 0.05$), academic self-efficacy ($t = 5.351$, $P < 0.05$), Chinese score ($t = 2.293$, $P < 0.05$), math score ($t = 6.127$, $P < 0.05$), English score ($t = 3.071$, $P < 0.05$) and total score ($t = 5.388$, $P < 0.05$) across different genders. (See **Table 2**).

3.3 Differences in Monthly Family Income

One - way analysis of variance was used to investigate the family monthly income differences in growth mindset, academic self-efficacy and academic performance. The results showed that only academic self-efficacy ($F = 2.451$, $P < 0.05$) had a significant difference. (See **Table 3**).

Table 1: Descriptive statistics (N=634)

	Sample size	Minimum value	Maximum value	Mean	Standard deviation	Variance
Growth Mindset	634	1.33	5.50	3.62	0.79	0.63
Academic self-efficacy	634	2.14	5.55	3.94	0.68	0.47
Language Arts Achievement	634	54	125	86.78	10.58	112.08
Math Achievement	634	12	142	72.35	23.10	534.06
English Grades	634	20	154	70.73	20.66	427.06
Overall Grades	634	107.00	388.00	229.87	42.66	1819.90

Table 2: Gender differences (N=634)

Variables	Gender	N	Mean	Standard deviation	t	Significance
Growth Mindset	Man	304	3.693	0.797	2.152	0.032
	Woman	330	3.557	0.792		
Academic self-efficacy	Man	304	4.096	0.631	5.351	<0.001
	Woman	330	3.812	0.705		
Language Arts Achievement	Man	304	87.791	10.437	2.293	0.022
	Woman	330	85.865	10.655		
Math Achievement	Man	304	78.047	22.627	6.127	<0.001
	Woman	330	67.103	22.324		
English Grades	Man	304	73.347	20.543	3.071	0.002
	Woman	330	68.334	20.515		
Overall Grades	Man	304	239.185	42.438	5.388	<0.001
	Woman	330	221.303	41.097		

Table 3: Differences in Monthly Family Income (N=634)

Variables	Monthly household income	N	Mean	Standard deviation	F	Significance
Growth Mindset	Less than 1000 RMB	25	3.613	0.701	2.123	0.061
	1000-3000RMB	170	3.479	0.811		
	3000-5000RMB	227	3.643	0.769		
	5000-8000RMB	121	3.732	0.807		
	8000-10000RMB	65	3.766	0.829		
	Above 10000RMB	26	3.519	0.805		
Academic self-efficacy	Less than 1000 RMB	25	4.158	0.741	2.451	0.033
	1000-3000RMB	170	3.812	0.726		
	3000-5000RMB	227	3.980	0.673		
	5000-8000RMB	121	4.033	0.659		
	8000-10000RMB	65	3.993	0.630		
	Above 10000RMB	26	3.860	0.604		
Language Arts Achievement	Less than 1000 RMB	25	85.220	13.570	1.070	0.376
	1000-3000RMB	170	85.550	11.077		
	3000-5000RMB	227	86.863	10.477		
	5000-8000RMB	121	87.686	10.071		
	8000-10000RMB	65	88.353	10.313		
	Above 10000RMB	26	87.653	7.488		
Math Achievement	Less than 1000 RMB	25	75.360	24.179	0.585	0.711
	1000-3000RMB	170	70.170	23.926		
	3000-5000RMB	227	73.790	24.430		
	5000-8000RMB	121	72.144	21.245		
	8000-10000RMB	65	71.776	19.933		
	Above 10000RMB	26	73.538	21.194		
English Grades	Less than 1000 RMB	25	70.480	23.716	0.535	0.750
	1000-3000RMB	170	68.894	21.493		
	3000-5000RMB	227	71.160	20.880		
	5000-8000RMB	121	71.376	18.253		
	8000-10000RMB	65	71.323	21.887		
	Above 10000RMB	26	74.923	18.369		
Overall Grades	Less than 1000 RMB	25	231.060	51.690	0.766	0.575
	1000-3000RMB	170	224.615	44.360		
	3000-5000RMB	227	231.815	43.825		
	5000-8000RMB	121	231.207	38.154		
	8000-10000RMB	65	231.453	39.560		
	Above 10000RMB	26	236.115	39.701		

3.4 Differences in Monthly Family Status

One - way analysis of variance was used to examine the differences in growth mindset, academic self-efficacy and academic performance among different family economic statuses. The results showed that there were significant differences in growth mindset ($F = 9.313$, $P < 0.05$), academic self-efficacy ($F = 6.945$, $P < 0.05$), Chinese score ($F = 7.062$, $P < 0.05$), math score ($F = 11.459$, $P < 0.05$), English score ($F = 7.247$, $P < 0.05$) and total score ($F = 14.480$, $P < 0.05$) among different economic conditions. (See **Table 4**).

3.5 Correlation Analysis

To test the correlation degree among multiple variables, SPSS27.0 software was used, and Pearson coefficient correlation analysis and two - tailed significance test were adopted. The specific results are shown in the table. Growth mindset is significantly positively correlated with academic self-efficacy ($r = 0.405$, $p < 0.01$), Chinese score ($r = 0.267$, $p < 0.01$), math score ($r = 0.346$, $p < 0.01$), English score ($r = 0.351$, $p < 0.01$) and total score ($r = 0.426$, $p < 0.01$); Academic self-efficacy is significantly positively correlated with Chinese score ($r = 0.270$, $p < 0.01$), math score ($r = 0.352$, $p < 0.01$), English score ($r = 0.309$, $p < 0.01$) and total score ($r = 0.407$, $p < 0.01$); Chinese score is significantly positively correlated with math score ($r = 0.374$, $p < 0.01$), English score ($r = 0.463$, $p < 0.01$) and total score ($r = 0.675$, $p < 0.01$); Math score is significantly positively correlated with English score ($r = 0.378$, $p < 0.01$) and total score ($r = 0.818$, $p < 0.01$); English score is significantly positively correlated with total score ($r = 0.804$, $p < 0.01$). (See **Table 5**).

Table 4: Differences in Monthly Family status (N=634)

Variables	Monthly household status	N	Mean	Standard deviation	F	Significance
Growth Mindset	Very good economic situation	37	3.680	0.888	9.313	.000
	Upper middle class	177	3.854	0.766		
	Lower middle	346	3.559	0.766		
	Difficult economic situation	74	3.335	0.829		
Academic self-efficacy	Very good economic situation	37	4.127	0.687	6.945	.000
	Upper middle class	177	4.063	0.638		
	Lower middle	346	3.931	0.680		
	Difficult economic situation	74	3.665	0.734		
Language Arts Achievement	Very good economic situation	37	91.297	11.222	7.062	.000
	Upper middle class	177	88.336	10.569		
	Lower middle	346	86.323	10.026		
	Difficult economic situation	74	83.008	11.566		
Math Achievement	Very good economic situation	37	82.324	23.920	11.459	.000
	Upper middle class	177	77.550	21.971		
	Lower middle	346	70.887	22.456		
	Difficult economic situation	74	61.770	23.709		
English Grades	Very good economic situation	37	74.675	19.490	7.247	.000
	Upper middle class	177	74.799	20.217		
	Lower middle	346	70.060	20.345		
	Difficult economic situation	74	62.223	21.226		
Overall Grades	Very good economic situation	37	248.297	44.845	14.480	.000
	Upper middle class	177	240.686	39.788		
	Lower middle	346	227.271	41.208		
	Difficult economic situation	74	207.001	43.919		

Table 5: Correlation analysis

	Growth Mindset	Academic self-efficacy	Language Arts Achievement	Math Achievement	English Grades	Overall Grades
Growth Mindset	1					
Academic self-efficacy	.405**	1				
Language Arts Achievement	.276**	.270**	1			
Math Achievement	.346**	.352**	.374**	1		
English Grades	.351**	.309**	.463**	.378**	1	
Overall Grades	.426**	.407**	.675**	.818**	.804**	1

Table 6: Regression analysis

Variables	academic performance							
	Language Arts Achievement	Math Achievement	English Grades	Overall Grades	Language Arts Achievement	Math Achievement	English Grades	Overall Grades
Gender	.288	-6.914***	-1.723	-8.349*	1.079	-4.805*	.020	-3.706
Grade	.782*	1.374*	.832	2.988*	.489	.578	.090	1.157
Ethnicity	.004	.127	-.307	-.175	-.040	.010	-.395	-.426
Family Economic Income	.264	-1.067	-.113	-.916	.324	-.903	.044	-.535
Family Economic Status	-1.813**	-3.118*	-2.458	-7.389**	-2.151***	-4.040**	-3.354**	-9.545***
Growth Mindset	3.581***	9.681***	8.827***	22.090***				
Academic self-efficacy					3.920***	10.466***	8.753***	23.139***
R^2	0.323	0.421	0.373	0.480	0.312	0.406	0.332	0.449
F	12.210**	22.572***	16.895***	31.313***	11.293***	20.574***	12.972***	26.441***

3.6 Regression Analysis

In this study, gender, grade, ethnicity, family monthly income and family economic status were taken as control variables, growth mindset and academic self-efficacy were taken as independent variables, and academic performance was taken as the dependent variable for regression analysis. It can be seen from the table that growth mindset has a significant positive effect on Chinese score ($\beta = 3.581$, $P < 0.001$), a significant positive effect on math score ($\beta = 9.681$, $P < 0.001$), a significant positive effect on Chinese score ($\beta = 8.827$, $P < 0.001$) and a significant positive effect on total score ($\beta = 22.090$, $P < 0.001$). Academic self-efficacy has a significant positive effect on Chinese score ($\beta = 3.920$, $P < 0.001$), a significant positive effect on math score ($\beta = 10.466$, $P < 0.001$), a significant positive effect on Chinese score ($\beta = 8.753$, $P < 0.001$) and a significant positive effect on total score ($\beta = 23.139$, $P < 0.001$). (See **Table 6**).

3.7 Mediating Effects

Using the PROCESS plugin and setting the sampling to 5000 times, 5000 sets of data were obtained, and the specific data are shown in the table.

The indirect effect of growth mindset on Chinese score through academic self-efficacy is 0.923, with a 95% confidence interval of [0.455, 1.107], indicating that the indirect effect is significant. This shows that academic self-efficacy mediates the relationship between growth mindset and Chinese score to a certain extent.

The indirect effect of growth mindset on math score through academic self-efficacy is 2.443, with a 95% confidence interval of [1.512, 3.478], which does not contain 0, indicating that the indirect effect is significant. This indicates that academic self-efficacy mediates the relationship between growth mindset and math score to a certain extent.

The indirect effect of growth mindset on English score through academic self-efficacy is 1.909, with a 95%

confidence interval of [1.014, 2.898], indicating that the indirect effect is significant. This shows that academic self-efficacy mediates the relationship between growth mindset and English score to a certain extent.

The indirect effect of growth mindset on total score through academic self-efficacy is 5.275, with a 95% confidence interval of [3.415, 7.369], indicating that the indirect effect is significant. This indicates that academic self-efficacy mediates the relationship between growth mindset and total score to a certain extent. (See **Table 7**).

Table 7: Mediating effects

Type of effect	Effect Value	Standard Error	95% confidence interval	
Growth Mindset-Academic Self-Efficacy-Language Arts Achievement	0.923	0.244	0.455	1.407
Growth Mindset-Academic Self-Efficacy-Math Achievement	2.443	0.504	1.512	3.478
Growth Mindset-Academic Self-Efficacy-English Grades	1.909	0.483	1.014	2.898
Growth Mindset-Academic Self-Efficacy-Total Grades	5.275	0.990	3.415	7.369

4. Discussion

4.1 Relationship between Growth Mindset and Academic Achievement of Secondary School Students

This study found that the growth mindset of middle school students significantly and positively predicts academic performance ($\beta = 0.16$, $p < 0.001$), which is consistent with the results of previous studies under the same cultural background. The correlation coefficient between the growth mindset and life satisfaction is 0.05, which is not significant and cannot predict life satisfaction, indicating that the growth mindset has little influence on the life satisfaction of middle school students. The life satisfaction measured in this study is the overall life satisfaction of middle school students. Surveys show that the life satisfaction of middle school students is mainly related to family, friendship, and school satisfaction, and is related to multiple factors such as family socioeconomic status, learning interests, peer relationships, teacher - student relationships, school atmosphere, and in - school and out - of - school academic burdens [10]. At present, quality education is generally valued in China, and the life satisfaction of middle school students may be affected by multiple factors. It is reasonable that the correlation between the growth mindset and life satisfaction is not high and it cannot predict overall life satisfaction. It may be more targeted to investigate the academic satisfaction of middle school students in the research. The growth mindset needs to be gradually cultivated in an individual's life and growth experiences, so we cannot overly hope for short - term growth mindset interventions, nor can we exaggerate the effects of such interventions [11].

4.2 The Mediating Role of Academic Self-efficacy between Growth Mindset and Academic Achievement

Besides directly promoting academic performance, the growth mindset also indirectly promotes academic performance through the partial mediation of academic self-efficacy. This is consistent with the results of previous studies [12]. Students believe that they have the ability to complete learning tasks, which is the foundation for achieving academic and personal success [13]. Dweck believes that the growth mindset can play a more important role when students encounter setbacks. When students have poor academic performance, elementary school students with a growth mindset are more likely to reflect on their behavior, re - evaluate their abilities, and then make more efforts [14]. Academic self-efficacy has always had a relatively stable positive predictive effect on academic performance. This study shows that a good growth mindset requires a stable and internalized academic self-efficacy to have a more long - lasting impact on individual development.

5. Conclusions and Recommendations

5.1 Conclusion

The results of this study show that the growth mindset can positively predict the academic performance of middle school students, and academic self-efficacy plays a partial mediating role between the growth mindset and academic performance; the growth mindset can predict academic self-efficacy. It can be seen that the advantages of the growth mindset of middle school students depend on the acquisition of academic self-efficacy. While cultivating the growth mindset of middle school students, it is necessary to actively help them obtain academic self-efficacy.

5.2 Recommendations

First, parents and teachers can help junior high school students with low academic self-efficacy to formulate and implement short - term achievable learning goals, regain their confidence in learning, improve their academic self-efficacy, and achieve the goal of increasing the growth mindset. Second, the whole society should actively create an environment of appreciation, praise and encouragement for junior high school students, and actively guide and encourage students with academic procrastination to complete their academic tasks on time. Third, carry out self - awareness improvement education for junior high school students to help them make objective and accurate attributions for their learning behaviors and learning abilities. Fourth, the government, society, community, school and family can join hands to further improve the teaching model, reduce the academic burden of junior high school students, and pay attention to and help them grow up healthily together.

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