

학업성취, 교사의 자율성 지지 및 행복의 관계에서 성장 마인드셋의 조절된 매개 모형

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Moderated Mediation Model of Growth Mindset in the Link between Academic Achievement, Teachers' Autonomy Support and Happiness

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요약 본 연구는 학업성취와 행복의 관계에서 교사의 학생에 대한 자율성 지지의 매개효과를 성장 마인드셋이 조절 매개하는지를 검증하여 대학생들의 행복을 높이는 기초자료를 제공하는데 목적이 있다. 조사대상은 광저우의 한 대학에 재학 중인 공대생 중 기업실무 프로젝트를 수행한 396명을 의도적으로 표집하였다. 자료수집은 설문지 방법을 활용하였으며, 수집된 자료는 SPSS PC+ Win. 27.0과 PROCESS macro 4.2.를 이용하여 분석하였다. 적용된 통계기법은 빈도, 신뢰도, 상관관계, 조절된 매개효과분석을 수행하였다. 연구결과는 다음과 같다. 첫째, 학업성취, 교사의 자율성지지, 성장 마인드셋, 행복은 서로 유의미한 정적 상관관계가 있었다. 둘째, 성장 마인드셋은 학업성취가 교사의 자율성 지지를 경유하여 행복에 미치는 영향을 상승시키는 역할을 하였다. 따라서 성장 마인드셋이 학업성취와 행복의 관계에서 교사의 자율성 지지의 매개효과를 높이는 것으로 확인되었다. 연구결과를 토대로 대학생들의 행복을 향상시킬 수 있는 방안을 제안하였다.

주제어 학업성취도, 교사의 자율성지지, 행복, 성장 마인드셋, 조절된 매개효과

Abstract This study aims to provide basic data to increase the happiness of college students by verifying whether a growth mindset moderates the mediating effect of teachers' autonomy support for students in the relationship between academic achievement and happiness. The survey subjects were intentionally sampled from 396 engineering students attending a university in Guangzhou who performed a business practice project. The questionnaire method was used to collect data, and the collected data was analyzed using SPSS PC+ Win. 27.0 and PROCESS macro 4.2. The applied statistical techniques were frequency, reliability, correlation, and moderated mediation effect analysis. The research results are as follows. First, there was a significant positive correlation between academic achievement, teachers' autonomy support, growth mindset, and happiness. Second, a growth mindset played a role in increasing the impact of academic achievement on happiness through teachers' autonomy support. Therefore, it was confirmed that a growth mindset increases the mediating effect of teachers' autonomy support in the relationship between academic achievement and happiness. Based on the research results, measures to improve the happiness of college students were suggested.

Key Words Academic achievement, Teacher autonomy support, Happiness, Growth mindset, Moderated mediation model

1. Introduction

The traditional vocational education model generally emphasizes theory over practical teaching, and there is a disconnect between the professional skills cultivated and the skills required for market positions. Participating in real enterprise projects during school can enhance professional skills, but a common problem is that all students have a high level of participation at the beginning of the project, and after encountering difficulties in the task for a period of time, they have the idea of giving up. Without external intervention, students alone are very likely to give up the project, leading to the termination of the school-enterprise cooperation project midway.

The study of happiness in the scientific context is marked by Wilson's "Research on Subjective Well-being" published in 1967[1]. Psychological well-being is to be believed that happiness not only focuses on subjective emotional experiences but also values the realization of personal development and growth[1]. Subjective well-being refers to the individual's overall evaluation of their quality of life based on their own set standards and is an important comprehensive psychological indicator to measure the quality of personal and social life[2]. It is also proposed that happiness is the psychological perception of the individual's physical and mental development state under the premise of comprehensive consideration of the socioeconomic, political, cultural, and other external environments[3].

A sense of academic achievement not only refers to academic performance, but also includes the level of students' expression, understanding, logical analysis, and other aspects. A good sense of academic achievement can increase students'

learning confidence and promote the better completion of their studies, actively and efficiently participate in projects[12], and promote the development of school-enterprise cooperation.

On the other hand, teachers' autonomy support for students is defined from the perspective of teachers. Teachers' autonomy support refers to the ways that teachers reduce compulsion and control over students' learning, avoid compulsive behavior, understand students' basic needs, let students solve problems themselves, and provide more choices for students[5]. Teacher autonomy support is the process in which teachers take students as the main body, listen to their ideas and suggestions, cultivate students' logical thinking, autonomous thinking, and problem-solving abilities, encourage students' learning methods and behaviors, and stimulate their internal motivation[5]. In addition, teacher autonomy support refers to students believing that teachers support their autonomy motivation, providing them with multiple choices, supporting them in solving problems with autonomy, and believing that teachers understand their inner feelings and avoid stressful demands[6]. There are significant differences in teachers' autonomy support in majors, with students generally choosing their own fields of interest. Students in economics, management, and philosophy of literature and history can feel more teachers' autonomy support[7].

Meanwhile, for the teacher's autonomy support to play a mediating role, academic achievement must have a significant effect on the teacher's autonomy support, and the teacher's autonomy support must have a significant effect on happiness. In previous research, it is difficult to find research showing that teacher's autonomy support plays a mediating role in the relationship between academic achievement and happiness.

However, since academic achievement is the result of students' academic activities, it is an opportunity for teachers to observe students' results and grant autonomy to students when academic achievement is high. This makes students feel happy as they learn, and at the same time, it is expected that the teacher's recognition of students' autonomy will play a role in increasing students' sense of happiness. Based on this logical basis, it is predicted that teacher's autonomy support will play a mediating role in the relationship between students' academic achievement and happiness.

The growth mindset is a positive educational psychology-oriented thinking mode, and there are two types of human thinking modes: growth thinking and fixed thinking mode[8]. It was to achieve differentiated and responsive teaching under the guidance of a growth-oriented mindset[9], improving the growth mindset environment and educational methods within schools to encourage the development of students' growth-oriented thinking patterns [10]. According to previous research, it has been reported that individuals with a high growth mindset view a situation as an opportunity for learning when facing challenges, exhibit high resilience when encountering obstacles, and consider coping with obstacles as part of learning[11, 12].

A growth mindset plays a moderating role, and in many studies, the degree of influence of a growth mindset was found to be different depending on whether it was high or low. In the moderation effect analysis, the group with a high growth mindset experienced a smaller increase in depression when cyberbullying victimization increased. Still, on the contrary, the group with a low growth mindset experienced a relatively higher increase in depression when cyberbullying

increased[4]. Additionally, the impact of attitudes toward tourism on the sense of meaning in life was shown by the group with a high growth mindset, where the sense of meaning in life increased more[13]. Considering the results of these previous studies, it was predicted that a growth mindset would play a synergistic role in moderating the relationship between teachers' autonomy support and happiness, and thus we sought to verify this.

The purpose of this study is to provide basic data that can enhance the happiness in adolescents by verifying whether the growth mindset moderates the mediating effect of teacher's autonomy support in the relationship between academic achievement and happiness.

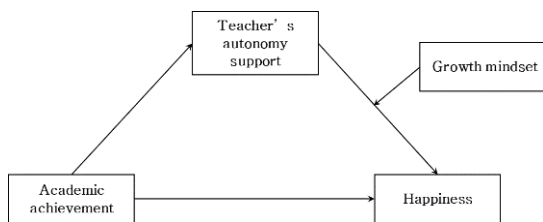
The research question is set as follows. Firstly, what is the correlation between academic achievement, teacher's autonomy support, growth mindset, and happiness? Secondly, does growth mindset moderate the mediating effect of teacher's autonomy support on academic achievement and students' happiness?

2. Methods

2.1 Research model

A model was established to verify the moderated mediation effect (conditional indirect effect) that the growth mindset moderates the path of academic achievement \rightarrow teachers' autonomy support \rightarrow happiness.

This model was analyzed according to the moderated mediation effect analysis procedure, which is Model 14 of PROCESS macro version. 4.2. The detailed model is shown in [Fig. 1].



[Fig. 1] Research Model

2.2 Research participants and data collection

In December 2022, freshmen and sophomores who performed enterprise practice projects in four majors (e-commerce, marketing, accounting, and all media) of Nanyang Polytechnic were selected as research participants. Students who did not participate in an enterprise practice project did not attend school during the survey period and took sick leave were excluded from the survey. A total of 456 questionnaires were distributed. Excluding 60 invalid questionnaires, 396 samples were analyzed. The participants of the survey were 216 males and 180 females, aged between 19 and 23, and 194 first graders and 202 second graders.

2.3 Measurement tools

2.3.1 Academic achievement

This study sets academic achievement as an independent variable. College Students' Academic Achievement Scale which was developed by Cheng Lan and Liu Ping[14] was used. It includes sub-groups such as learning cognitive ability, communication ability, self-management ability, and interpersonal promotion, and consists of 30 items. The scale was rated by a 5-point Likert, with scores of 1-5 for "very disagree", "quite disagree", "average", "quite agree", and "very agree". The higher the total score, the higher the academic achievement. The reliability

of academic achievement was Cronbach's α of .904.

2.3.2 Teachers' autonomy support

According to Deci and Williams[15], a "Academic Atmosphere Questionnaire" was developed for a wide range of students, and the "Learning Atmosphere Questionnaire" was revised based on the characteristics of students in the Chinese context[16] to measure teachers' sense of autonomy and support. There is a total of 14 items of teacher's autonomy support, rated by 5-point Likert, with scores of 1-5 for "completely non-compliant", "basically noncompliant", "uncertain", "basically compliant", and "fully compliant". The higher the score, the stronger teacher autonomy support. The reliability was Cronbach's α of .975.

2.3.3 Growth mindset

The growth mindset which was developed by Dweck[17] and adapted by Lee et al.[18] was used. There is a total of 8 questions on growth mindset with 4 opposite directions. A 5-point Likert was used, with scores of 1-5 for "very disagree", "quite disagree", "average", "quite agree", and "very agree". The higher the score, the stronger the growth mindset. The reliability was Cronbach's α of .898.

2.3.4 Happiness

This study sets happiness as the dependent variable. This questionnaire on happiness was measured on the scale developed by Xie Rongrong(2016)[19]. It includes two dimensions: subjective learning happiness and psychological learning happiness, with a total of 30 items. Using 5-point Likert ratings "strongly disagree", "somewhat disagree", "average", "somewhat agree", and "strongly agree" have scores of 1-5,

respectively. The higher the score, the higher the level of happiness of students. The reliability was Cronbach's α of .978.

2.4 Data analysis

The data analysis of this study was performed using SPSS PC+ Win. 27.0 and the PROCESS macro version 4.0 for SPSS proposed by [20]. Descriptive statistics, reliability analysis, and correlation analysis were performed using SPSS Win. 27.0, and moderated mediating effect analysis using PROCESS macro 4.2. Bootstrap was used as the verification method, and the confidence interval was set at 95%, the number of samples was 5,000, and the independent and moderating variables were centered on the mean.

3. Results

3.1 Correlation of main variables

Pearson's correlation analysis was performed to understand the correlation of major variables, and the results are shown in Table 1. Academic achievement, teachers' autonomy support, growth mindset, and happiness were all positively correlated with each other. In particular, the correlation coefficient between teachers' autonomy support and happiness was the highest ($r=.745$, $p<.01$), followed by the correlation coefficient between teachers' autonomy support and academic achievement ($r=.460$, $p<.01$).

As a result of descriptive statistics analysis, the average teacher's autonomy support was the highest at 3.9805, followed by the average happiness of 3.734 and average academic achievement of 3.5096, and the average growth mindset was the lowest with an average of 3.4556. Academic achievement, teachers' autonomy support, growth mindset, and happiness were all higher than the median score of 3 points.

(Table 1) Correlation and descriptive statistics of main variables

	Academic achievement	Growth mindset	Teachers' autonomy support	Happiness
Academic achievement	1			
Growth mindset	.543**	1		
Teachers' autonomy support	.599**	.334**	1	
Happiness	.745**	.675**	.473**	1
M	3.5096	3.4556	3.9805	3.734
SD	0.4576	0.74033	0.75997	0.67866

** $p<.01$

3.2 The moderated mediation effect of growth mindset

To verify whether a growth mindset moderates the mediating effect of teachers' autonomy support in the relationship between academic achievement and students' learning happiness, the SPSS PROCESS macro model 14 for analysis proposed by Hayes [20] was used. The number of bootstrap samples is set to 5, 000 with a confidence interval of 95%. The teacher's autonomy support and growth mindset were mean-centered. The analysis results are shown in Table 2.

(Table 2) Results of moderating effect of growth mindset

Mediating variable Model (DV: Teacher's autonomy support)						
Variable	coeffect	se	t value	p	LLCI*	ULCI**
Constant	-3.6649	.5577	-6.5721	.0000	-4.7613	-2.5685
Academic achievement	1.0098	.0682	14.8141	.0000	.8758	1.1439
Dependent variable model (DV: Happiness)						
Constant	.9222	.3874	2.3808	.0178	.1606	1.6838
Academic achievement	.7854	.0621	12.6423	.0000	.6632	.9075
Teachers' autonomy support	.0282	.0329	.8577	.3916	-.0365	.0929
Growth mindset	.3236	.0339	9.5458	.0000	.2569	.3902

Teachers' autonomy × growth mindset	.0060	.0303	2.6631	.0081	.0211	.1400
Conditional effect of autonomy support according to growth mindset value						
Growth mindset	Effect	se	t value	p	LLCI*	ULCI**
-.7403(M-SD)	-.0314	.0413	-7.605	.4474	-.1127	.0498
.0000(M)	.0282	.0329	.8577	.3916	-.0365	.0929
.7403(M+SD)	.0879	.0382	2.3003	.0220	.0128	.1630
Moderator value defining Johnson-Neyman significance region						
Value	% below		% above			
.5060	73.9899		26.0101			
Significance area of conditional effect of autonomy support according to growth mindset						
Growth mindset	Effect	se	t value	p	LLCI*	ULCI**
-1.6566	-.1053	.0622	-1.6913	.0916	-.2276	.0171
:						
.4234	.0623	.0343	1.8186	.0698	-.0051	.1297
.5060	.0690	.0351	1.9661	.0500	.0000	.1380
.5834	.0752	.0360	2.0901	.0373	.0045	.1460
:						
1.2234	.1268	.0474	2.6753	.0336	.2200	.1460
:						
1.5434	.1526	.0648	2.7844	.0056	.0448	.2603

*LLCI=Lower bootstrap value within 95% confidence interval
 **ULCI=Upper Bootstrap value with 95% confidence interval

In the mediating variable model, academic achievement had a significant positive effect on teachers' autonomy support (B=1.0098, p<.001), and in the dependent variable model, teachers' autonomy support did not have a significant effect on happiness (B=.0282, p>.05). Teachers' autonomy support did not play a mediating role in the relationship between academic achievement and happiness.

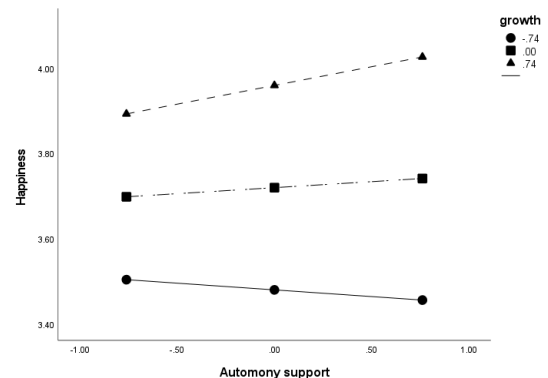
In the dependent variable model, the interaction term between teachers' autonomy support and growth mindset has a significant positive effect on happiness (B=.006, p<.01), and growth mindset moderated the relationship between teachers' autonomy support and happiness.

Looking at the conditional effect of teachers' autonomy support on happiness according to the

value of growth mindset, which is a moderating variable, the conditional effect was significant when the growth mindset was M+SD.

The Johnson-Neyman method, a lighting analysis method, was applied to identify the significant area of the conditional effect of teachers' autonomy support according to the growth mindset value. The moderating effect was significant in areas where the growth mindset value was higher than .5060, and 26.01% of the survey subjects fell into this area. However, the moderating effect was not significant in areas where the growth mindset was lower than .5060, and 73.99% of the survey subjects fell into this area.

Fig. 2 shows the moderating effect of growth mindset on the impact of teachers' autonomy support on happiness. When the growth mindset was M+SD, the slope of happiness increase was steep as teachers' autonomy support increased. Conversely, when the growth mindset was M-SD, happiness decreased gently as teachers' autonomy support increased. In other words, when teachers' autonomy support increased, happiness increased, and conversely, when it was low, happiness decreased.



[Fig. 2] The moderating effect of growth mindset

Direct effects and conditional indirect effects

were analyzed in the path from academic achievement to happiness. The direct effect between academic achievement and happiness was $B=.7854 (.6632 \sim .9075)$, which was significant because there was no 0 included between the lower bound of the bootstrap (BootLLCI) and the upper bound (BootULCI) of the bootstrap within the 95% confidence interval.

The conditional indirect effect does not contain 0 between the lower bound of the bootstrap (BootLLCI) and the upper bound (BootULCI) within the 95% confidence interval when the growth mindset is $M+SD (B=.0887, .0085 \sim .1963)$. Additionally, the moderated mediation index was significant at $.0814 (.0131 \sim .1702)$. These results confirmed the moderated mediating effect of a growth mindset on the path from academic achievement to happiness through teachers' autonomy support.

<Table 3> Analysis results of direct effects and conditional indirect effects

Direct effect (academic achievement → happiness)					
Effect	se	t value	p	BootLLCI*	BootULCI**
.7854	.0621	12.6423	.0000	.6632	.9075
Conditional indirect effect (academic achievement → teachers' autonomy support → happiness)					
Growth mindset	Effect	se	LLCI*	ULCI**	
-.7403 (M-SD)	-.0317	.0511	-.1334	.0661	
.0000(M)	.0285	.0396	-.0443	.1109	
.7403 (M+SD)	.0887	.0477	.0085	.1963	
Index of moderated mediation					
Growth mindset	Index	BootSe	BootLLCI	BootULCI	
	.0814	.0400	.0131	.1702	

4. Discussion and Conclusion

This study aims to verify the moderated mediation effect of growth mindset on the

mediating effect of teacher autonomy support between academic achievement and happiness targeting vocational college students. The discussion and conclusions of this study are as follows:

Firstly, through correlation analysis between the main variables, it was found that there is a significant correlation between academic achievement, teacher autonomy support, growth mindset, and happiness in learning. As academic achievement increased, happiness increased [10], and as growth mindset increased, happiness also increased. Additionally, as teacher autonomy support increased, academic achievement increased [11]. It is necessary to make adjustments so that students can live within these positive variables.

Second, growth mindset moderated the relationship between teacher autonomy support and happiness. Teacher autonomy support played a role in increasing the effect on happiness. Furthermore, growth mindset was found to increase the impact of academic achievement on happiness through teacher autonomy support. These results were consistent with the results that growth mindset played a role in enhancing the relationship between the two variables [13]. From these results, growth mindset plays a role in increasing the path through which academic achievement increases happiness through teacher autonomy support, so growth mindset can be applied to students whose happiness is reduced due to low academic achievement or low teacher autonomy support. Efforts to promote are needed. Specifically, university counseling centers or student support centers need to make efforts to develop and apply growth mindset promotion programs suitable for university students.

In conclusion, this study confirmed the role of growth mindset, and in particular, confirmed that it moderated the impact of college students'

academic achievement on happiness through teacher autonomy support.

A limitation of this study is the research subjects. This study selected only higher vocational students from four majors of Guangzhou Nanyang Vocational College of Technology. In future research, it is necessary to select various majors as research subjects and determine whether there are differences by major.

This study uses only surveys, making it difficult to understand specific phenomena. To solve this problem, a mixed study combining surveys and in-depth interviews is needed in future research.

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