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Research on the Mechanism of Psychological Capital on Academic Achievement

-- An Analysis of the Mediating Effect of Academic Burnout

Chenyuan Wang

Qingdao No.9 high school, Qingdao, Shandong, 266000, China

13869855201@163.com

Abstract

Based on the theory of resource conservation and social cognition, this study constructs and tests the intermediary model of "psychological capital (PC) → academic burnout (AB) → academic achievement" (AA) to explore the mechanism of PC on AA. Using three-stage stratified cluster sampling method, 605 middle school students were selected as samples, and data were collected by PC questionnaire, AB scale and AA indicators, and the mediating effect was tested by structural equation model and Bootstrap method. Results indicated that PC was positively associated with AA and negatively with AB. AB partially mediated the relationship between PC and AA, explaining 50% of the total effect. The research reveals that PC not only directly promotes AA, but also indirectly improves students' performance by alleviating AB, which provides theoretical basis and practical path for improving AA through psychological intervention in educational practice.

Keywords

Psychological Capital; Academic Achievement; Mediating Effect; Academic Burnout.

1. Introduction

Academic achievement (AA), as an important indicator to measure students' academic ability and future development potential, not only directly affects key life choices such as further studies and employment, but also comprehensively reflects individual social adaptability and lifelong learning ability [1]. However, with the intensification of educational competition and the complexity of learning tasks, the widespread phenomenon of academic burnout (AB) among students has become the core obstacle to the improvement of AA [2]. The theory of "psychological capital" (PC) in the field of positive psychology provides a new perspective for solving the academic dilemma. As an internal positive psychological resource of individuals, PC covers four core elements: self-efficacy, hope, optimism and resilience, which has been proved to be a key protective factor to promote academic investment and ease the pressure burden [3-4].

Although previous studies have confirmed the direct promotion of PC and the negative influence of AB on AA, there is still a theoretical gap between them [5]. Existing research focuses on the direct effect of a single variable on academic results, but ignores the dynamic transmission mechanism of emotional state between psychological resources and behavior performance [6]. For example, do students with high PC indirectly achieve academic breakthroughs through stronger emotional regulation? Does AB play the role of "complete intermediary" or "partial intermediary" in this process? In addition, is there any difference between PC reserve and burnout experience of different student groups, which leads to the group heterogeneity of mediation effect? The answers to these questions not only help to

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deepen the understanding of the psychological mechanism of academic development, but also provide scientific basis for differentiated intervention in educational practice.

Based on the theory of resource conservation and social cognition, this study constructs a conduction chain model of "PC → AB → AA", breaks through the direct correlation paradigm of "resources-results" in traditional research, and emphasizes the intermediary role of emotional resources in the transformation of PC. This theoretical expansion is helpful to improve the integrated framework of influencing factors of AA and provide a new analytical perspective for the research in the field of positive education. For educators, clarifying the path of PC to improve AA by alleviating AB can guide schools to design more targeted psychological intervention programs. For example, students' stress coping ability can be enhanced through resilience training, or their goal-oriented behavior can be stimulated through hope training, so as to maximize their academic performance with limited resources. For policy makers, the results of this study can provide an empirical reference for how to optimize the educational ecology and reduce the consumption of psychological resources by non-academic burdens under the "double reduction" policy.

2. Research Design

2.1. Hypothesis

This study constructs and tests a model of the relationship between PC and AA with AB as the intermediary variable. Specifically put forward the following assumptions:

H1: PC has a significant positive predictive effect on AA [7].

H2: PC has a significant negative predictive effect on AB [8].

H3: AB has a significant negative predictive effect on AA [9].

H4: AB plays a mediating role between PC and AA [10]. That is, PC not only directly promotes AA, but also indirectly promotes AA by reducing the level of AB.

2.2. Method

2.2.1. Participants and Procedure

Three-stage stratified cluster random sampling method is adopted to ensure the representativeness of the sample [11-12]. According to the level of regional economic development, the cities of a province in China are divided into three levels: high, medium and low. From each level, 1 prefecture-level city is randomly selected. In each selected city, two ordinary middle schools are randomly selected (junior middle schools and senior high schools are separately selected), and then two classes are randomly selected from each grade (grade one, grade two and grade three), and all the students in the selected classes are taken as the research objects.

Using G*Power 3.1, an a priori power analysis for a medium effect size, $\alpha = 0.05$, power = 0.95, and 5 predictors yielded a required sample size of approximately 500. Accounting for invalid questionnaires and attrition, 650 questionnaires were planned for distribution, resulting in an effective sample size of 605 participants.

The sample covers junior high school and senior high school, with the ratio of male to female close to 1: 1, and covers students with different academic levels. Demographic variables such as students' gender, grade, age and family socioeconomic status will be recorded during data collection, and they will be used as control variables in subsequent analysis to exclude their interference with the relationship between major variables.

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2.2.2. Measuring Tool

All scales are revised in Chinese with good reliability and validity at home and abroad, and Likert 6-point scoring method (1= "completely inconsistent" to 6= "completely consistent") is adopted to reduce the tendency of intermediate options and improve the data discrimination.

(1) PC questionnaire

The Positive PC Questionnaire (PPQ) revised by Zhang Kuo et al. (2010) was adopted. This 26-item scale comprises four dimensions: self-efficacy (e.g., "I believe I can effectively cope with any unexpected events"), resilience (e.g., "Even after repeated setbacks, I can bounce back quickly"), hope (e.g., "There are many solutions to any problem"), and optimism (e.g., "I always see the bright side of things"). In this study, the Cronbach's α coefficient for this scale is expected to exceed 0.90.

(2) AB scale

The revised Secondary School AB Scale by Wu Yan and Dai Xiaoyang (2010) was adopted. This 16-item scale comprises three dimensions: physical and mental exhaustion (e.g., "Studying makes me feel physically and mentally exhausted"), academic disengagement (e.g., "I find studying monotonous and tedious"), and low sense of accomplishment (e.g., "Studying allows me to experience the joy of success"—reverse-scored). This scale is more aligned with the context of Chinese secondary school students. In this study, the Cronbach's α coefficient for this scale is expected to be above 0.85.

(3) Measurement of AA

Adopt the way of combining subjective and objective indicators. The objective AA collects the sum of the standard scores of Chinese, mathematics and foreign languages in the final exam of last semester as the core index. Standard scores can eliminate the differences in difficulty and scoring methods of different subjects. Subjective AA adopts self-evaluation scale of AA (3 items, such as "Overall, I am satisfied with my AA this semester") as a supplement to objective indicators.

2.2.3. Data Analysis

Data analysis was performed using SPSS 26.0 and AMOS 24.0. Following data coding and elimination of invalid responses, Harman's single-factor test confirmed acceptable common method bias with the first factor accounting for less than 40% of the variance. Descriptive statistics and Pearson correlations were calculated for PC, AB, AA, and demographic variables. Confirmatory factor analysis in AMOS evaluated the four-factor PC and three-factor AB models, with model fit determined by $\chi^2/df < 5$, CFI > 0.90, TLI > 0.90, and RMSEA < 0.08. Hierarchical regression analyses in SPSS tested hypotheses: PC predicting AA (H1) and AB (H2), and AA with AB entered (H3), after controlling for demographics. To examine mediation (H4), a structural equation model was built in AMOS using the Bootstrap method with 5,000 resamples to estimate the bias-corrected 95% confidence interval for AB's indirect effect; significance was indicated if zero was not within the interval. This method provides enhanced robustness and statistical power compared to traditional approaches.

3. Empirical Analysis

3.1. Common Method Bias Test, Reliability and Validity and Descriptive Statistics

Harman's single-factor test revealed the first factor accounted for 28.5% of the variance, below the 40% criterion, suggesting minimal common method bias. Confirmatory factor analysis indicated good fit for the four-factor PC and three-factor AB models, supporting structural validity. All scales demonstrated high internal consistency. As shown in Table 1, Pearson

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correlations indicated that PC was positively associated with AA, supporting H1; negatively linked to AB, supporting H2); and AB was negatively correlated with AA, supporting H3.

Table 1. Descriptive statistics and correlation analysis results of each variable (N=605)

Variable	M	SD	1	2	3	4	5
1. Gender	-	-	1				
2. Grade	-	-	.02	1			
3. PC	4.32	0.78	.05	-.08	1		
4. AB	3.15	0.85	-.04	.12*	-.51	1	
5. AA	0.00	0.95	.08	-.10*	.42	-.48	1

Note: Gender is a dummy variable (male =1, female = 2); * $p < 0.05$, ** $p < 0.01$ (two-sided test); AA has been standardized.

3.2. Test of Direct Effect and Indirect Effect

To examine direct effects, hierarchical regression analyses were conducted controlling for gender and grade, with results presented in Table 2. As shown in Model 2, PC significantly and positively predicted AA, supporting H1. In Model 3, PC significantly and negatively predicted AB, supporting H2. Model 4 indicates that AB remained a significant negative predictor of AA after including PC, supporting H3.

Table 2. Hierarchical regression analysis results

Dependent variable	Predictor variable	AA (Model 1)	AA (Model 2)	AB (Model 3)	AA (Model 4)
Control variable	Gender	0.07	0.05	-0.03	0.04
	Grade	-0.09*	-0.06	0.14**	-0.01
Independent variable	PC		0.40*	-0.53*	0.20*
Mediator variable	AB				-0.38*
	R^2	0.01	0.18	0.28	0.30
	ΔR^2	0.01	0.17*	0.27*	0.12*

Note: *** $p < 0.001$; The values in the table are standardized regression coefficient β.

In order to strictly test the mediating effect of AB (assuming H4), the SEM was constructed by AMOS software, and the confidence interval of mediating effect was calculated by Bootstrap sampling method (repeated sampling 5000 times). The result of path analysis is shown in Figure 1, and all path coefficients are significant.

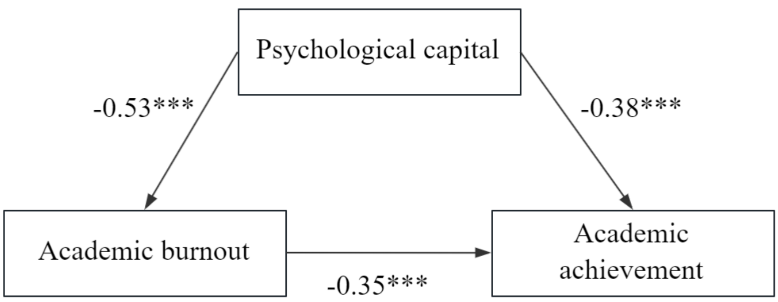

Figure 1. Model diagram of intermediary effect of AB

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Bootstrap results (Table 3) show a significant indirect effect of PC on AA through AB, with the interval excluding zero. The direct effect of PC on AA is also significant. Thus, AB partially mediates the PC–AA relationship, supporting H4.

Table 3. Bootstrap analysis of intermediary effect

Effect type	Effect value	Standard error	95% confidence interval	conclusion
			Lower limit	Upper limit
Direct effect	0.20	0.04	0.12	0.28
Indirect effect	0.20	0.03	0.15	0.26
Total effect	0.40	0.04	0.33	0.47

4. Discussion and Suggestion

(1) The direct influence of PC on AA

This study confirms a significant positive effect of PC on AA, aligning with findings in positive psychology. As an internal resource comprising self-efficacy, hope, optimism, and resilience, PC enhances students' academic engagement and performance [13], highlighting the value of fostering positive psychological traits in education.

(2) The relieving effect of PC on AB

The results show that PC has a significant negative predictive effect on AB ($\beta = -0.53$, $p < 0.001$). Students with high PC can cope with the pressure and challenges of study more effectively, reduce physical and mental exhaustion and academic alienation, thus reducing the level of AB [14]. This finding provides a theoretical basis for reducing AB through psychological intervention.

(3) The mediating role of AB between PC and AA

Bootstrap analysis confirms that AB partially mediates the relationship between PC and AA, with an indirect effect of 0.20, supporting a significant mediating role. This indicates that PC enhances AA both directly and indirectly by reducing AB, highlighting the importance of emotional resources in PC's transformative process.

(4) Consideration of group heterogeneity

Although this study does not directly discuss the differences between PC reserve and burnout experience of different student groups, the theoretical framework and model construction provide the direction for subsequent research. Future research can further refine the student groups, such as grouping by gender, grade, family background and other factors, and explore the group heterogeneity of intermediary effect, so as to provide more personalized educational intervention strategies.

Based on the above research, the following suggestions are put forward:

Enhance students' PC. Schools should attach importance to the cultivation of students' PC, and improve students' self-efficacy, hope, optimism and resilience by offering psychological health courses, organizing psychological counseling activities and carrying out positive psychological quality training. For example, we can design goal setting and path planning activities for students who want to cultivate, and help students establish clear learning goals and feasible paths to achieve them.

Implement targeted intervention on AB. In view of the problem of AB, schools should formulate specific intervention measures. On the one hand, we can reduce the learning burden and improve the learning interest by optimizing teaching methods and curriculum design; On the other hand, stress management and emotional adjustment training can be carried out to help

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students effectively cope with learning pressure and alleviate physical and mental exhaustion and academic alienation.

Establish a comprehensive support system. Schools should build a comprehensive support system including psychological support, academic guidance and home-school cooperation. Psychological teachers can provide professional consultation and guidance, class teachers and classroom teachers can pay attention to students' learning status and emotional changes, and parents should actively participate in their children's learning life to form a good atmosphere of home-school co-education.

Integrate policy with practice by using these findings to guide educational reforms and alleviate non-academic burdens. Under the "double reduction" policy, efforts should focus on minimizing students' extracurricular load and supporting holistic development. At the same time, schools are encouraged to carry out active educational practice and explore effective ways to improve students' PC and AA.

Strengthen follow-up research and evaluation. Future research should continue to deepen the discussion on the relationship among PC, AB and AA, especially focusing on the differences and dynamic changes of different student groups. At the same time, establish a long-term follow-up evaluation mechanism to scientifically evaluate the effect of intervention measures, and provide a basis for continuous improvement in educational practice.

5. Conclusion

These findings provide important enlightenment for educational practice: schools should attach importance to the cultivation of students' PC, implement targeted AB intervention and establish a comprehensive support system to promote students' all-round development. Future research can further explore the differences of PC reserve and burnout experience of different student groups, and provide basis for personalized education intervention.

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