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Interplay in the Classroom: Correlation Matrix Analysis of Academic Resilience, Well-being, and Teaching Style

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Abstract. Although test scores remain the dominant metric of student success, mounting evidence indicates that an exclusive focus on grades overlooks long-term development and may impair mental health. Contemporary educational research therefore calls for evaluation frameworks that equally prioritize students' future trajectories and psychological well-being. This research discusses two factors closely associated with student outcomes: school well-being and academic resilience. It finds that both academic resilience and school well-being are correlated with teachers' teaching styles. Utilizing a correlation matrix analysis method, the study examines the relationships between these factors. Additionally, several suggestions are put forward for policymakers to enhance the happiness and academic resilience of Chinese middle school students. It should be acknowledged that the PISA data source only includes samples from major cities in China and may not be representative of the entire country.

Keywords: School well-being, academic resilience, teaching style, correlation matrix

1. Introduction

School well-being is a multidimensional system that is closely associated with various factors, such as academic performance, interpersonal relationships, and self-concept [1]. The sense of well-being plays a crucial role in student's future development. Nawaz indicated that a teacher's daily tone, gestures, and feedback either weave an atmosphere of belonging and motivation or sow seeds of stress and alienation, thereby shaping the broader social environment in which students learn and grow [2]. In the global sample analysis, the researchers identified self-efficacy, fear of failure and sense of belonging as decisive factors influencing happiness, finding no significant correlation between the teaching style of schools and students' happiness [3]. However, every country has its own situation; thus, a global conclusion cannot be universally applied. Therefore, it is essential to analyze samples from China separately to draw conclusions that better reflect the actual situation in the country [4].

Academic resilience is another important aspect, defined as the student's ability to maintain positive adjustment, recover quickly, and strive for academic success despite setbacks, stressors, or adverse circumstances [5]. Existing research indicates that undergraduate students can enhance their psychological resilience by fully engaging in and participating in the actual production processes

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related to their own majors [6]. However, middle school students, who do not select their own majors, may struggle to improve their academic resilience through this method. Thus, it is important to bridge the gap in the current research and identify feasible strategies for enhancing academic resilience among these students.

This paper aims to explore the correlations between the school teaching style and the student's happiness and academic resilience among the 15-year-old Chinese students. The findings can help identify the main factors that schools have on students, providing valuable reference for schools and policymakers seeking to enhance students' happiness and academic resilience.

2. Methodology

2.1. Data source

Data are drawn from the Program for International Student Assessment (PISA), a triennial survey launched by the OECD in 2000 [7]. Each round evaluates 15-year-olds' ability to apply reading, mathematics and science literacy to real-world problems. One subject is designated as the major domain while the other two serve as minor domains. Optional modules, such as collaborative problem-solving, financial literacy, global competence, are periodically included.

PISA not only assesses objective circumstances but also values students' subjective feelings. The survey includes a series of questions designed to measure student happiness using scales like the Likert Scale. Additional subjective information, such as students' perceptions of teacher support, direct guidance, and feedback received, is also collected.

The core uses of the program include cross-national benchmarking, equity diagnostics and evidence-based policy reform. In China, the 2018 cycle tested a stratified, school-based sample of 12,058 students drawn from four jurisdictions—Beijing, Shanghai, Jiangsu and Guangdong. While this sample is not nationally representative, it effectively captures the performance of the country's most economically developed urban systems.

The survey data of PISA has been widely recognized by researchers and policymakers as a reliable database, informing policies and changes in many countries and regions around the world [8]. Through analyzing the data from this database, the actual situation of Chinese students can be effectively inferred.

2.2. Descriptive statistics

This research uses three dimensions to describe teaching style: the student's perceived feedback, the teacher's direct instructions and the teacher's support. The data that this research has used are listed in table 1. The student's resilience (RESILIENCE) and well-being (SWBP)was measured by a series of questions in the questionnaire. In order to measure these variables on a unified scale, this study employed the Z-score standardization method. By describing the original data in terms of the number of standard deviations from the average value, these five variables will not affect the calculation results due to differences in units.

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Table 1. Descriptives

	RESILIENCE	SWBP	PERFEED	DIRINS	TEACHSUP
N	11982	11896	11968	11990	11988
Missing	76	162	90	68	70
Mean	-0.0754	0.102	0.348	0.508	0.415
Median	-0.0614	0.187	0.399	0.486	0.626
Standard deviation	0.957	0.892	1.04	1.02	0.886
Minimum	-3.17	-3.07	-1.64	-2.94	-2.71
Maximum	2.37	1.24	2.02	1.82	1.34
Skewness	0.923	-0.387	0.00197	-0.278	-0.828
Std. error skewness	0.0224	0.0225	0.0224	0.0224	0.0224
Kurtosis	1.05	-0.431	-0.692	-0.415	0.302
Std. error kurtosis	0.0447	0.0449	0.0448	0.0447	0.0447

Tip: RESILIENCE=academic resilience, SWBP=student's school well-being, PERFEED=student's perceived feedback, DIRINS= teacher's direct instructions, TEACHSUP= teacher's support.

The skewness of each variable is between -1 and 1 (RESILIENCE=0.923, SWBP=-0.387, PERFEED=0.00197, DIRINS=-0.278, TEACHSUP=-0.828) and the kurtosis for each variable is between -3 to 3 (RESILIENCE=1.05, SWBP=-0.431, PERFEED=-0.692, DIRINS=-0.415, TEACHSUP=0.302). Therefore, it can be clearly seen that these five variables are statistically approximately normally distributed. Thus, the relationship between these variables can be analyzed through Pearson correlation coefficients.

For the correlations between student's well-being and teacher's teaching style, three couples of the hypothesis have been figured out. Firstly, for the dimension of teacher's support, null hypothesis (H0) is teacher support and well-being are not related at all, while the alternative hypothesis (H1) says that higher levels of teacher support go hand in hand with noticeably better student well-being. Second, for the dimension of teacher's direct instructions, the null hypothesis is simple: direct instruction and well-being have no connection. The alternative hypothesis says that when teachers give more direct instruction, students' well-being is significantly different—pointing to a clear link between the two. Thirdly, for student's perceived feedback, the null hypothesis says that the two are unrelated—perceived feedback and well-being move independently. The alternative hypothesis claims the opposite: when students sense more useful feedback, their well-being changes in a meaningful way, showing a clear link between the two.

For the correlations between the student's academic resilience and teacher's teaching style, there were also three couples of hypotheses. Firstly, for the dimension of teacher's support, the null hypothesis says teacher support and academic resilience are not connected—the two move on their own. The alternative hypothesis says that when teachers give more support, students become noticeably more resilient, so the two are linked in a meaningful way. Secondly, for the dimension of teacher's direct instruction, the null hypothesis claims there is no link between direct instruction and academic resilience, whereas the alternative hypothesis states that greater direct instruction is connected to noticeably stronger resilience among students. Thirdly, for the dimension of the students' perceived feedback, the null hypothesis says perceived feedback and resilience are

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unrelated, while the alternative hypothesis claims that when students feel they are getting more helpful feedback, their ability to bounce back from school setbacks improves in a meaningful way.

Table 2. Correlation matrix

		TEACHSUP	DIRINS	PERFEED	SWBP	RESILIENCE
TEACHSUP	Pearson's r					
	df					
	p-value					
DIRINS	Pearson's r	0.605				
	df	11983				
	p-value	<.001				
PERFEED	Pearson's r	0.423	0.481			
	df	11961	11964			
	p-value	<.001	<.001			
SWBP	Pearson's r	0.186	0.176	0.180		
	df	11890	11892	11872		
	p-value	<.001	<.001	<.001		
RESILIENCE	Pearson's r	0.212	0.235	0.291	0.300	
	df	11975	11978	11957	11892	
	p-value	<.001	<.001	<.001	<.001	

Table 2 reveals that the P-value of the correlation between SWEP and TEACHSUP, SWEP and DIRINS, SWEP and PERFEED RESILIENCE and TEACHSUP, RESILIENCE and DIRINS, RESILIENCE and PERFEED are both lower than 0.05. It means that the well-being of students and student's academic resilience are correlated with teacher's support, teacher's direct instruction and student's perceived feedback. Also, the Pearson's R value both higher than 0.1, indicating the correlation are positive and slightly weak. Thus, the H0 can be rejected. It means that as the with teacher's support, teacher's direct instruction and student's perceived feedback become stronger, student's sense of well-being will also increase. Also, student's academic resilience will also increase with the rise of the quality and frequency of teacher's feedback, direct instructions and support to students. Not only that, this study also found that the P-values of SWBP and RESILIENCE were less than 0.05, indicating that students' sense of happiness and academic resilience are highly correlated.

3. Results and discussion

The result shows that the teacher's teaching style is an important aspect in forming student's academic resilience and influencing student's sense of well-being. Thus, through adjusting the policy that correlated with teacher's training, student's sense of well-being and the academic can be promoted. Most of the existing educational policies are formulated based on the hardware aspects. However, the conclusion of this study proves that the influence of teachers on students is equally significant. In addition to direct financial investment and infrastructure construction, improving the teaching skills of teachers enables them to play a more positive role in promoting students' mental health. At the same time, studies have also shown that currently in China, the training of teachers mainly takes place during their studies at teacher training universities, and examinations are used to

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ensure that teachers are familiar with theoretical knowledge. Today, the professional learning and growth of primary and secondary teachers is shifting toward mass training programs and increasingly uniform standards [9]. However, too much knowledge forces the teacher candidates to merely memorize mechanically, making it difficult for them to truly internalize the knowledge and apply it in their teaching, which is exactly what is referred to as the teaching style mentioned in this article [10].

In order to make the classes in Chinese schools more in line with students' needs, three small things can be done: Firstly, the school should consistently remind teachers to "put themselves in the students' shoes." This means offering more encouragement and actively listening to students to ensure they feel supported at all times. Secondly, "timely feedback" should be emphasized during teacher training. Whether it involves grading homework or responding to questions in class, students should receive immediate information about what they did right or wrong, along with explanations, on the same day. Finally, teachers should dedicate more time to thorough preparation before each class. This includes clearly explaining key concepts and outlining steps in detail, as well as providing ample direct instruction to facilitate understanding from the outset. When these three elements—more support, quick feedback, and clear explanations—are combined, they naturally contribute to increased student happiness and academic resilience.

4. Conclusion

This research has employed the correlation matrix method to demonstrate a significant relationship between teacher's teaching style and student's well - being and academic resilience. This relationship is of great importance, as it is closely related to student's future development and mental health. Based on the findings, some suggestions have been posted for the policy makers. However, it should be admitted that this study still has some limitations. The PISA data only contains the students and teachers in big Chinese cities. The schools in the rural area were ignored in the PISA investigation. As a result, the scope of this research's conclusion may not be suitable for the whole range of China. In the future, more research could focus on the comparison between different countries. Also, more diverse databases can be utilized to enrich the research and make the findings more comprehensive.

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