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Original Article

The Structural Relationships among Academic Pressure, Independent Learning Ability, and Academic Self-Efficacy

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Abstract

Background: The coronavirus disease pandemic has caused significant disruption in the field of education, resulting in the need for more online classes and a blended offline and online teaching model. Therefore, understanding what makes this model effective is important. Accordingly, this study explored the structural relationships among academic pressure, independent learning ability, and academic self-efficacy in a blended teaching environment during the pandemic and independent learning ability's mediating effect on the relationship between academic pressure and academic self-efficacy.

Methods: Adopting a random sampling method, this study surveyed 761 Chinese college, Shaanxi Province, China in 2022 and university students. Factor analysis, correlation analysis, structural equation modeling, and path analysis were used to analyze the data.

Results: The results show that the academic pressure faced by Chinese English majors had a significant negative impact on academic self-efficacy (P<0.001). However, academic pressure had no statistical effect on students' independent learning ability (P=0.317). Moreover, independent learning ability had a significant positive effect on academic self-efficacy (P<0.001) and a mediating effect on the relationship between academic pressure and academic self-efficacy (P=0.032).

Conclusion: Independent learning ability can directly and indirectly affect academic self-efficacy. Thus, in an online and offline blended teaching model, teachers should guide students regarding self-exploration, communication, and cooperation based on existing knowledge and experience. They should also enable students to improve their learning process and independent learning ability. Various language learning situations should be established for learning English so that by experiencing success and failure, students can ultimately improve their academic self-efficacy.

Keywords: Academic pressure; Academic self-efficacy; Blended teaching; COVID-19; Learning

Introduction

The coronavirus disease (COVID-19) pandemic has led to many changes in our everyday lives. These include not only social, economic, political, and cultural impacts but also significant disrup-

tion in the field of education. The biggest educational change has been a shift from the "face-to-face" class environment (the traditional teaching method in which teachers lecture and students learn and communicate face-to-face) to "non-face-to-face online classes" (1). Like many other countries during the pandemic, China's Ministry of Education, following the advice of the Center for Epidemic Prevention and Control, implemented the initiative to "suspend classes without stopping teaching or stopping learning." This prompted 1,454 universities across the country to implement online teaching and 17.75 million college students to participate in online learning (2). Although online courses have the advantages of shorter learning cycles and lower costs while improving learning efficiency through student satisfaction, they also have various problems and limitations that impact student attention and engagement (3). In August 2020, China's Ministry of Education proposed the "close integration of online and offline education and teaching." As a result, in the post-epidemic era, an online and offline blended teaching model has become popular; it is now the new norm for the development of teaching in colleges and universities (4). This blended teaching model reduces the disadvantages of a single teaching model by combining online teaching's quick pace, timeliness, and freedom from time and place constraints with offline teaching, thus creating a strong sense of learning presence, interaction, and experience for students (5).

Naturally, changes in teaching methods require students to make positive adjustments to adapt to new learning methods. In the case of the blended teaching approach, students who are accustomed to offline teaching may face new academic pressures if they do not adapt. It is well-known that academic pressure can be caused by a mismatch between a student's skills and abilities and the requirements of the environment, or a mismatch between what the student wants and what the environment provides (6). A previous study has shown that academic pressure is a major source of daily pressure among college students (7). Although moderate academic pressure can stimulate students' learning and play a positive role, excessive academic pressure can negatively affect their studies and their physical and mental health.

Among contemporary Chinese college students, English learning pressure and learning burnout are common, particularly for English majors (8-9). With rapid globalization, society has higher requirements for English proficiency, particularly among English majors, which increases these students' learning pressure. We believe this topic requires further exploration to gain a better understanding of the current situation of English learning pressure and how to improve English majors' ability to adapt to such pressure.

When learning online, students must decide when and where to study. Although online students can study anytime and anywhere provided they have access to the Internet, there are limitations to online learning. While teachers can send online messages or notes to encourage students to study more, for students who exhibit slow class progress, their overall learning efficacy still depends on their motivation and willingness and on whether they are participating fully in class and submitting the work. Thus, if students do not have the ability to learn independently, the success and effectiveness of an online course cannot be guaranteed (10). A student's independent learning ability not only benefits the student in school but also lays the necessary foundation for lifelong learning. In the process of blended teaching, teachers are no longer the only source of knowledge, which makes it particularly important to cultivate college students' independent learning ability (11).

Independent learning is influenced by both external environmental factors and the student's personal factors. Controllable personal factors, such as motivation, strategy, and self-efficacy, can be improved through specific efforts, which are key to improving the student's independent learning abilities (12).

Bandura (13) defines self-efficacy as an individual's subjective assessment of their ability to achieve their goals. According to different fields, self-efficacy can be divided into general, social, and academic self-efficacy. Academic self-efficacy

is when an individual judges their ability in an academic situation. Such self-efficacy is often composed of the following three factors: homework difficulty preference, self-regulation efficacy, and self-confidence. Students with high academic self-efficacy will choose challenging tasks, put in more effort to successfully complete them, and persevere even when faced with difficulties (14). In the process of learning a language, self-efficacy plays an important role in students' self-confidence, as it is tied to their expectations for the language level they can attain. Related studies have shown there is a significant relationship between self-efficacy and foreign language learning performance, with self-efficacy acting as a significant predictor of foreign language learning achievement (15-16). The stronger the student's self-efficacy and the higher the goals they set, the stronger the self-regulation efficacy of their learning (17). Self-efficacy also has responsive effects during self-directed learning programs, behavioral performance, and self-reflection stages (18).

Referring to extant studies, we surveyed English majors from select universities in China to explore the structural relationship among academic pressure, independent learning ability, and academic self-efficacy in a blended teaching environment during the pandemic. We also examined the mediating role of independent learning ability in the relationship between academic pressure and academic self-efficacy. Subsequently, we proposed the following hypotheses. H1: The academic pressure faced by Chinese English majors significantly impacts their academic self-efficacy. H2: The academic pressure faced by Chinese English majors significantly impacts their independent learning ability. H3: The self-regulated learning ability of Chinese English majors significantly affects academic self-efficacy. H4: The independent learning ability of Chinese English majors has a mediating effect on the relationship between academic pressure and academic self-efficacy. Our research model is presented in Fig. 1.

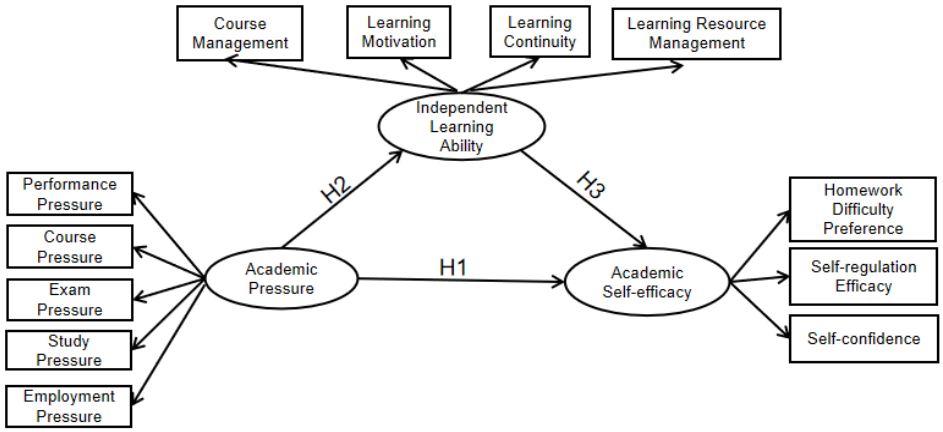

Fig. 1: Research Model

Materials and Methods

Participants

We adopted a random sampling method to identify English majors from select universities in Shaanxi Province, China in 2022. We used stratified sampling based on sex, grade, and other factors. A total of 761 questionnaires were distributed, and 727 questionnaires were returned. The general participant characteristics are shown in Table 1.

All participants provided informed consent, and this study design was approved by Xianyang Normal University (No. 2021Y034), China.

Table 1: General participant characteristics

Variables		n	%
Sex	Male	90	12.4
	Female	637	87.6
Grade	Freshman	390	53.6
	Sophomore	163	22.4
	Junior	110	15.2
	Senior	64	8.8
Total		727	100

Assessments

All scales were measured using Likert's 5-point method, with 1–5 representing "strongly disagree" to "strongly agree." To test the reliability and validity of the scale, we used exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). We also used the aggregation validity index reference standards (average variance extracted [AVE]>0.50) and composite reliability ([CR]>0.70) (19). The results are shown in Table 2. Cronbach's α for all variables was above 0.80, indicating that the internal factors of the latent variable had high consistency and good reliability. Meanwhile, the AVE and CR of the model were above 0.50 and 0.70, respectively, indicating that the research model had good aggregation validity.

Table 2: Reliability and validity test results

Variable		Item	Estimate	SMC	Standardized residuals	CR	AVE	Cronbach's α
Academic Pressure	Course pressure	28	0.693	0.480	0.520	0.887	0.496	0.889
		27	0.738	0.545	0.455			
		24	0.746	0.557	0.443			
		23	0.726	0.527	0.473			
		20	0.698	0.487	0.513			
		19	0.690	0.476	0.524			
		18	0.658	0.433	0.567			
		11	0.678	0.460	0.540			
	Exam pressure	21	0.715	0.511	0.489	0.841	0.470	0.836
		15	0.676	0.457	0.543			
		13	0.757	0.573	0.427			
		12	0.726	0.527	0.473			
		8	0.612	0.375	0.625			
		1	0.615	0.378	0.622			
	Study pressure	25	0.567	0.321	0.679	0.707	0.378	0.696
		6	0.597	0.356	0.644			
		5	0.709	0.503	0.497			
		2	0.575	0.331	0.669			
	Employment pressure	26	0.514	0.264	0.736	0.632	0.375	0.596
		14	0.535	0.286	0.714			
		3	0.524	0.275	0.725			
	Performance pressure	16	0.743	0.552	0.448	0.782	0.642	0.709
		7	0.740	0.548	0.452			
Independ-	Learning	10	0.750	0.563	0.438	0.911	0.631	0.900

ent Learning Ability	continuity	11	0.712	0.507	0.493			
		13	0.854	0.729	0.271			
		14	0.830	0.689	0.311			
		15	0.815	0.664	0.336			
		16	0.795	0.632	0.368			
	Course management	1	0.718	0.516	0.484	0.920	0.699	0.899
		2	0.782	0.774	0.226			
		3	0.803	0.757	0.243			
		4	0.804	0.740	0.260			
		5	0.836	0.706	0.294			
	Learning resource management	17	0.789	0.623	0.377	0.897	0.636	0.903
		18	0.829	0.687	0.313			
		19	0.816	0.666	0.334			
		20	0.816	0.666	0.334			
		21	0.733	0.733	0.463			
	Learning motivation	7	0.783	0.613	0.387	0.786	0.552	0.771
		8	0.801	0.642	0.358			
		9	0.634	0.402	0.598			
Academic Self-efficacy	Self-regulation efficacy	11	0.671	0.450	0.550	0.887	0.496	
		12	0.637	0.406	0.594			
		13	0.624	0.389	0.611			
		14	0.767	0.588	0.412			
		15	0.805	0.648	0.352			0.886
		16	0.769	0.591	0.409			
		17	0.639	0.408	0.592			
		18	0.700	0.490	0.510			
	Self-confidence	19	0.731	0.534	0.499	0.912	0.566	0.909
		20	0.842	0.709	0.291			
		21	0.820	0.672	0.328			
		22	0.790	0.624	0.376			
		23	0.802	0.643	0.357			
		24	0.697	0.486	0.514			
		25	0.631	0.398	0.602			
		26	0.677	0.458	0.542			
	Homework difficulty preference	2	0.673	0.453	0.547	0.806	0.511	0.802
		3	0.725	0.526	0.474			
		6	0.807	0.651	0.349			
		7	0.643	0.413	0.587			

Root mean square error of approximation=0.044, Tucker–Lewis index=0.897, comparative fit index=0.905, incremental fit index=0.906, χ^2=4218.954 (P<0.001), df=1741, χ^2/df=2.423

SMC, squared multiple correlation; CR, composite reliability; AVE, average variance extracted

Academic Pressure

The questionnaire measuring academic pressure among English majors was based on the Academic Stress Scale developed by Oh and Cheon (20). The factors of academic pressure consisted of 5 aspects and 28 questions. Cronbach's αs for exam, study, employment, and performance pressure (respectively) were 0.836, 0.696, 0.596, and 0.709, respectively.

Independent Learning Ability

The measurement of the Independent Learning Ability Scale was based on Bae and Lee's (21) questionnaire. Cronbach's α for each factor of the Independent Learning Ability Scale, as meas-

ured by Bang (22), was 0.90 or above, and it had good reliability and validity after the test; we used this in our study after modification and improvement. The scale comprised 21 questions relating to 4 aspects. Among them, Cronbach's αs for learning continuity, course management, learning resource management, and learning motivation were 0.900, 0.899, 0.903, and 0.771, respectively.

Academic Self-efficacy

Our questionnaire measuring English majors' academic self-efficacy was based on Kim and Park's (23) questionnaire, which we modified and advanced in our study. Academic self-efficacy consisted of 26 questions relating to 3 aspects. Among them, Cronbach's αs for self-regulation efficacy, self-confidence, and homework difficulty preference were 0.886, 0.909, and 0.802, respectively.

Statistical Analysis

We used SPSS 22.0 and AMOS 25.0 (IBM Corp., Armonk, NY, USA) for the data processing and statistical analysis. As stated, our data analysis methods included EFA and CFA, correlation analysis among the variables, structural equation modeling (SEM), path analysis, and bootstrapping mediation detection. After verifying the fit of the structural relationship for each variable in the hypothesized model, we analyzed the data. Statistical significance was set at $P<0.05$.

Results

Correlations among academic pressure, independent learning ability, and academic self-efficacy

The results of our correlation analysis among academic pressure, independent learning ability, and academic self-efficacy are shown in Table 3. There was a negative correlation between learning pressure under the academic stress variable and learning continuity. There was also a negative correlation between course management and learning motivation under the independent learning ability variable (r=0.130–0.211; $P<0.01$). This implies that the greater the learning pressure faced by these English majors, the weaker their learning continuity, course management, and learning motivation.

Moreover, there was a negative correlation between academic pressure and self-regulation efficacy under the academic self-efficacy variable (r=0.118–0.163; $P<0.01$). However, there was a positive correlation among independent learning ability, self-regulation efficacy, self-confidence, and homework difficulty preference under the academic self-efficacy variable (r=107–0.698; $P<0.01$). The implication here is that the stronger the independent learning ability of these English majors, the better their self-regulation ability and self-confidence, and the higher their preference for difficult homework tasks.

Suitability of the Research Model

We established an SEM to explore the relationships among academic pressure, independent learning ability, and academic self-efficacy for English majors in a blended teaching environment during the pandemic. The results show that the research model fit well, with the goodness-of-fit index, incremental fit index, Tucker–Lewis index, and comparative fit index all greater than 0.90 and the root mean square error of approximation<0.100 (Table 4).

Table 3: Correlations among academic pressure, independent learning ability, and academic self-efficacy

Variable	1-1	1-2	1-3	1-4	1-5	2-1	2-2	2-3	2-4	3-1	3-2	3-3
1-1	1.000											
1-2	0.680**	1.000										
1-3	0.515**	0.511**	1.000									
1-4	0.527**	0.439**	0.357**	1.000								
1-5	0.385**	0.376**	0.484**	0.425**	1.000							
2-1	-0.089*	-0.022	-0.211**	-0.023	-0.023	1.000						
2-2	0.030	0.077*	-0.130**	-0.013	-0.012	0.696**	1.000					
2-3	0.168**	0.165**	-0.061	0.091*	-0.044	0.646**	0.602**	1.000				
2-4	0.091*	0.037	-0.173**	0.088*	-0.024	0.659**	0.635**	0.601**	1.000			
3-1	-0.118**	-0.025	-0.163**	-0.002	0.030	0.698**	0.626**	0.511**	0.524**	1.000		
3-2	0.615**	0.529**	0.274**	0.384**	0.261**	0.032	0.107**	0.240**	0.120**	0.017	1.000	
3-3	0.371**	0.338**	0.258**	0.281**	0.252**	0.175**	0.204**	0.280**	0.175**	0.277**	0.345**	1.000

1-1. course pressure, 1-2. exam pressure, 1-3. study pressure, 1-4. employment pressure, 1-5. performance pressure, 2-1. learning continuity, 2-2. course management, 2-3. learning resource management, 2-4. learning motivation, 3-1. self-regulation efficacy, 3-2. self-confidence, 3-3. homework difficulty preference

$^{**}P<0.01$, $^{*}P<0.05$; tested via correlation analysis

Table 4: Suitability of the research model

Variable	χ^2	df	GFI	NFI	IFI	TLI	CFI	RMR	RMSEA
Model fit	303.606	46	0.933	0.926	0.937	0.909	0.937	0.020	0.088

GFI, goodness-of-fit index; NFI, normed fit index; IFI, incremental fit index; TLI, Tucker–Lewis index; CFI, comparative fit index; RMR, root mean square residual; RMSEA, root mean square error of approximation

Model fit cutoff values: RMSEA<0.100, TLI≥0.900, CFI≥0.900

Hypothesis Verification

We analyzed the path relationships among academic pressure, independent learning ability, and academic self-efficacy, as shown in Table 5. Among all the variables, academic pressure had a statistically negative effect on academic self-efficacy (β=-0.183, $P<0.001$), indicating that academic pressure affected academic self-efficacy. As academic pressure increased, academic self-efficacy decreased. The sense of self-confidence, which affects the impact of independent learning ability on academic self-efficacy (β=0.826, $P<0.001$), had a statistically positive effect; namely, the stronger the independent learning ability of these students, the stronger their academic self-efficacy and self-confidence.

Table 5: Path relationships among academic pressure, independent learning ability, and academic self-efficacy

Hypotheses	*Path*			*β*	*Standard error*	*Critical ratio*	*Assessment*
H1	Academic pressure	–	Academic self-efficacy	-0.183	0.046	-3.999*** (p=0.000)	Accept
H2	Academic pressure	–	Independent learning ability	0.061	0.061	1.001 (p=0.317)	Reject
H3	Independent learning ability	–	Academic self-efficacy	0.826	0.034	24.068*** (p=0.000)	Accept

***P<0.001, **P<0.01, *P<0.05; tested by path analysis

Mediating effect of independent learning ability between academic pressure and academic self-efficacy

Based on the research model, to test the mediating effect of independent learning ability between academic pressure and academic self-efficacy, we used the bootstrapping mediating effect, setting the confidence interval at 95%. The results shown in Table 6 indicate that the upper and lower limits of the indirect effect of academic pressure on academic self-efficacy were not included in the confidence interval 0.

Table 6: Direct, indirect, and total effects

Path of influence	Direct effect	Indirect effect	Total effect
Academic pressure → academic self-efficacy	-0.117***	0.032	-0.084***
Academic pressure → independent learning ability	0.043	-	0.043
Independent learning ability → academic self-efficacy	0.755***	-	0.755***

*P<0.05, **P<0.01; tested by the bootstrap method

Discussion

This study aimed to clarify the relationships among academic pressure, independent learning ability, and academic self-efficacy in a blended teaching environment during the COVID-19 pandemic by examining Chinese English majors. We also tested the mediating role of independent learning ability in the relationship between academic pressure and academic self-efficacy. The following discussion is based on our results.

Regarding H1, the academic pressure faced by Chinese English majors has a statistically significant negative impact on their academic self-efficacy: the greater the academic pressure faced by these students, the lower their academic self-efficacy. These results are consistent with Kouzma and Kennedy's results (24), confirming that the rate of change of academic pressure has a significant negative impact on the rate of change of self-efficacy. Thus, knowing how to deal with academic pressure can restore students' self-efficacy, which has significant implications for their personal development during their school years. Wu's (25) research also shows that academic emotions are closely related to self-efficacy. Excessive learning pressure and high academic self-efficacy are regarded as two separate poles. When individuals have excessive learning pressure, their academic self-efficacy will be low; when learning pressure is low, academic self-efficacy is relatively high. The results also show that the degree of learning pressure impacts academic self-efficacy. Students with high self-efficacy usually have higher self-regulation ability and self-judgment in terms of their ability to successfully complete their studies and tasks. As such, these students are more confident when encountering difficulties and setbacks in their studies and daily lives, and their academic pressure is relatively low. Students with low self-

efficacy tend to have low self-esteem and other negative emotions. These students have low self-evaluations of their studies and are more likely to feel pressure.

Regarding H2, academic pressure has no statistical effect on independent learning ability. However, the results of the correlation analysis for each sub-variable show that there is a negative correlation between learning pressure under the academic pressure variable and one for learning continuity, course management, and learning motivation under the independent learning ability variable. Thus, the greater the learning pressure faced by English majors, the weaker their learning continuity and learning motivation and the worse their course management. Lee and Bak (26) research results show that academic pressure and independent learning ability among nursing students are negatively correlated—the implication being the need to reduce the academic pressure students experience to improve their independent learning ability.

Regarding H3, independent learning ability has a statistically positive impact on academic self-efficacy: The stronger the independent learning ability of students, the better they are at choosing proper resources, using the right strategies, and employing reasonable practices. In the process of online learning, students can make full use of the resources provided by their teachers and classmates and can pay better attention to the internalization and externalization of knowledge, thereby improving the reciprocity and transformative power of learning (27) as well as their sense of academic self-efficacy. Li and Yang's (28) results show that learners with strong independent learning ability are more likely to achieve better learning effects through in-depth online learning interaction. Specifically, the multi-interactive experience between learners (the perceptual experience of sharing, discussing, cooperating, and receiving feedback among learners and peers) significantly impacts in-depth learning. Some researchers (20) believe students develop their sense of self-efficacy gradually in the process of learning independently, and that those with a higher level of independent learning ability have a higher sense of self-efficacy.

Regarding H4, independent learning ability shows a significant mediating effect in the impact of academic pressure on academic self-efficacy: To an extent, the impact of academic pressure on academic self-efficacy is realized through the mediating mechanism of the student's independent learning ability. This finding shows that the academic pressure faced by English majors not only directly but also indirectly affects their academic self-efficacy by affecting their independent learning ability. Relevant research results show that appropriate emotions and pressure are also important factors that affect learning autonomy, student goal setting, and academic self-efficacy (27), and that academic pressure has both negative and positive effects. According to the Yerkes-Dodson law (29), moderate academic pressure positively affects academics; namely, student adjustment to the degree of academic pressure can positively impact their academic and nonacademic activities. Appropriate learning pressure can make students believe they can solve learning difficulties and achieve learning goals through hard work and by adjusting their learning process, which affects their own learning initiatives and their sense of efficacy.

Conclusion

The academic pressure of English majors had a statistically significant negative impact on their academic self-efficacy, indicating that the greater their academic pressure, the lower their academic self-efficacy. Their independent learning ability had a statistically positive impact on academic self-efficacy. Moreover, their independent learning ability had a mediating effect on the relationship between academic pressure and academic self-efficacy; that is, the impact of academic pressure on academic self-efficacy was also realized to an extent through the intermediary mechanism of independent learning ability.

Journalism Ethics considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Declaration Statement

The author declares no conflicts of interest.

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