

Team Climate and Academic Aspiration of Chinese PhD students: The Mediating Roles of Research Engagement and Academic Adaptability

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Abstract. This study aims to examine the mediating roles of research engagement (RE) and academic adaptability (AD) on the relationship between team climate (TC) and academic aspiration (AS). Few studies are found in this field. A questionnaire research was conducted in Z university, a double first-class university with a complete range of doctoral disciplines in China. 419 valid online questionnaires were obtained, with an effective rate of 94.2%. ANOVA, a T-test and a chain mediation effect test were used to analyze data. The results show that the AS of the doctoral students in Z University is at middle level, and there is a significant difference in grades and major; TC positively predicts AS; RE and AD have a complete mediating effect on the positive impact of TC on AS, but have no chain mediating effect on the relationship between TC and AS. Suggestions are provided for improving doctoral students' AS and promoting their academic employment.

Keywords: academic aspiration; team climate; research engagement; academic adaptability; doctoral students

1. Introduction

The current international competition is ultimately the competition of innovative talents. Academic aspiration (AS) is individual's aspiration and interest in academic research, and it is also the basis and premise of training top-notch innovative talents. However, the level of AS of doctoral students in China is general, and many doctoral students take non-academic positions. Based on two national surveys respectively in 2017 and 2021, it is found that the proportion of doctoral graduates entering academic departments has declined in all disciplines except the humanities[1]. Based on the data of doctoral students from 2002 to 2019, more than three quarters of doctoral students delayed their graduation[2]. Apart from this, low academic interest and insufficient academic ability are important reasons for delaying the graduation of engineering doctoral students[3].

In the research on the influencing factors of graduate students' AS, one researcher recognized the influencing factors of doctors' AS as background, early academic experience, academic engagement, sense of academic gain, academic organizational support, academic labor market and academic identity[4]. Based on a comprehensive review of the existing studies, the influencing factors of graduate students' AS can be divided into external environment factors (such as graduate training system, peer assistance, teacher-student interaction, and scientific research training environment[5] and students' internal factors (such as grades, academic experience, and research engagement).

Team climate (TC) is team members' perception of the working environment conducive to mutual cooperation and trust among team members. Indifferent academic atmosphere reduces AS of doctoral students[3], and the utilitarian scientific research system and academic atmosphere can also frustrate AS of doctoral students[6].

Research engagement (RE) is a persistent and positive mental state in the process of scientific research, characterized by vigor, dedication, and absorption. A study shows that the more students engage in their research, the more their AS, and vice versa[7]. Another study shows that RE is the internal driving force of doctoral students' AS[4].

Academic adaptability (AD) refers to the degree of success an individual adjusting to a new academic environment and meeting their academic requirements. Postgraduates with good AD actively participate in scientific research training and taking courses, and show strong scientific

research ability[8]. Graduate students with good AD are more successful in their academic development, and are more likely to choose academic careers in the future[9].

Few studies have explored the influence mechanism of students' AS from the perspective of TC or comprehensively analyze the relationship between AS, TC, RE and AD. Studies on AS which focus on doctoral students are also seldom found. By comprehensively applying Academic Integration Theory, Social Exchange Theory, Student Involvement Theory and Career Construction Theory, this study aims to investigate AS, TC, RE and AD of doctoral students and to examine the mediating effect of RE and AD on the relationship between TC and AS. Suggestions will also be provided for improving doctoral students' AS and promoting their academic employment.

2. Materials and Methods

2.1 Participants

A random sampling method was used to obtain participants from Dec. 2023 to Jan. 2024. The participants were recruited in the campus forum of Z university, a double first-class university in China. 419 valid online questionnaires were obtained, with an effective rate of 94.2%. Among them, 49.4% were man, 50.6% were women, 20.5% studied in Humanities and Social Sciences, and 79.5% studied in Science, Agriculture and Medicine. They are between 21 to 32 years old, with an average age of 25.3 ± 2.1 years.

2.2 Measures

2.2.1 Academic Aspiration Scale

5 items were used to measure doctoral students' AS[10], and were rated on a 5-point Likert (from very inconsistent =1 to very consistent =5). The higher the score, the higher the AS of doctoral students. Cronbach's α reliability coefficient of the scale is 0.871 and confirmatory factor analysis (CFA) showed that $\chi^2/df=3.767$ (<5), RMSEA=0.081 (<0.10), and SRMR=0.0227 (<0.08), indicating that the model fit of the scale can be accepted.

2.2.2 Research Engagement Scale

Research Engagement Scale was adapted from an existing scale[11]. The scale in this research has 17 items and 3 dimensions (vigor, dedication, and absorption). The items are rated on a 5-point Likert. Cronbach's α coefficients of the scale and the subscales of three dimensions are 0.954, 0.906, 0.868 and 0.904 respectively. The model fit of confirmatory factor analysis of the scale can be accepted — $\chi^2/df=4.008$ (<5), RMSEA=0.085 (<0.10), and SRMR=0.0423 (<0.08).

2.2.3 Academic Adaptability Scale

Academic Adaptability Scale was conducted from existing scales[12, 13]. The scale in this research has 21 items and 3 dimensions (academic cognition, academic ability and academic interpersonal relationship). The items are rated on a 5-point Likert. Cronbach's α coefficients of the scale and the subscales of three dimensions are 0.937, 0.816, 0.914 and 0.857 respectively, and the model fit of CFA of the scale can be accepted — $\chi^2/df=4.906$ (<5), RMSEA=0.097 (<0.10), and SRMR=0.0660 (<0.08).

2.2.4 Team Climate Scale

Team Climate Scale was conducted from an existing scale[14] with 19 items and 4 dimensions (mentor communication, team belonging, team trust and innovation support). The items are rated on a 5-point Likert. Cronbach's α coefficients of the scale and the subscales of four dimensions are 0.962, 0.950, 0.918, 0.873 and 0.811 respectively. The scale has good structural validity — $\chi^2/df=2.934$ (<3), RMSEA=0.068 (<0.08), and SRMR=0.0351 (<0.08).

2.3 Data Analysis

SPSS 25 and process 3.3 were used for data analysis in this study.

3. Results

3.1 Common Method Biases Tests

As self-report method was used to collect data, there may be common method biases. Therefore, the Harman's single-factor test was used, and extracted 8 factors with eigenvalues greater than 1. The variance explained by the first factor was 46.368 (<50%), indicating that the common method bias had little impact on the results of the study.

3.2 Descriptive Analysis

3.2.1 Status of Each Variable

The level of AS is in the medium level ($M=3.10$, $SD=0.92$), and the degree of dispersion is relatively large. The level of doctoral students' TC is above the medium level ($M=3.42$, $SD=0.81$), the level of RE is also above average ($M=3.28$, $SD=0.89$), and the level of AD is also above the medium ($M=3.36$, $SD=0.68$).

3.2.1 Demographic Differences in Each Variable

ANOVA and T-tests were computed to analyze differences between group means in grades and major. As shown in Table 1, all variables have a significant difference in grades. In terms of AS, the post-hoc tests showed that the first-grade doctors' score ($M=3.45$) was higher than other grades, and the second grade ($M=3.16$) was higher than the fifth grade and above ($M=2.76$). In general, scores of senior doctors were lower than those of junior doctors. Only AS has a significant difference in major ($t=2.098$, $p<0.05$), and the mean score of students in Humanities and Social Sciences ($M=3.29\pm0.91$) is higher than that in Science, Agriculture and Medicine ($M=3.05\pm0.92$).

Table 1. Differences in grades (n=419)

	Grade					F	Post-Hoc Test (LSD)
	First Year (n=115)	Second Year (n=96)	Third Year (n=61)	Forth Year (n=62)	Fifth Year and Above (n=85)		
	M±SD	M±SD	M±SD	M±SD	M±SD		
TC	3.68±0.7 4	3.46±0.8 8	3.49±0.7 2	3.15±0.8 8	3.18±0.7 1	7.146* **	1>2, 4, 5; 2>4, 5; 3>4, 5
RE	3.51±0.7 3	3.34±0.8 6	3.30±0.7 6	3.08±0.7 1	3.02±0.7 7	6.016* **	1>4, 5; 2>4, 5; 3>5
AD	3.55±0.6 2	3.38±0.8 0	3.36±0.6 8	3.18±0.5 6	3.22±0.6 2	4.667* *	1>4, 5
AS	3.45±0.8 5	3.16±1.0 0	2.98±0.8 9	2.94±0.8 3	2.76±0.8 6	8.282* **	1>2, 3, 4, 5; 2>5

** $p<0.01$, *** $p<0.001$ (two tailed).

3.3 The Mediating Effect Analysis of AS

Correlation analysis indicated that there was a significant positive correlation between any two variables ($p<0.01$). A bootstrapping approach with 5,000 resamples and process 3.3 Model 6 put forward by Hayes were used to examine the mediating effect of RE and AD on the relationship between TC and AS.

Table 2. The regression analysis of chain mediation model between TC and AS

Outcome Variable	Predictive Variables	R2	F	β	t
AS	TC	0.267	152.185***	0.589	12.336***
RE	TC	0.350	224.334***	0.577	14.981***
AD	TC	0.922	2469.765***	0.201	14.170***
	RE			0.683	47.122***
AS	TC	0.532	157.515***	0.110	1.904
	RE			0.567	4.639***
	AD			0.255	1.550

*** $p < 0.001$ (two tailed).

According to Table 2, TC significantly positively predicted AS ($\beta = 0.589$, $p < 0.001$), RE ($\beta = 0.577$, $p < 0.001$) and AD ($\beta = 0.201$, $p < 0.001$), and RE significantly positively predicted AD ($\beta = 0.683$, $p < 0.001$). After adding the two mediating variables of RE and AD, only RE positively predicted AS ($\beta = 0.567$, $p < 0.001$), and AD had no significant effect on AS.

Table 3. Analysis of mediating effect between TC and AS

Effect	Effect Value	Boot SE	Bias-corrected 95% CI		Relative Mediating Effect
			Lower	Upper	
Total Effect: TC→AS	0.589	0.048	0.495	0.683	100%
Direct Effect: TC→AS	0.110	0.058	-0.004	0.223	18.68%
Total Indirect Effect	0.479	0.053	0.376	0.583	81.32%
Indirect Effect 1: TC→RE→AS	0.328	0.089	0.156	0.501	55.69%
Indirect Effect 2: TC→AD→AS	0.051	0.037	-0.019	0.127	8.66%
Indirect Effect 3: TC→RE→AD→AS	0.100	0.073	-0.037	0.248	16.98%

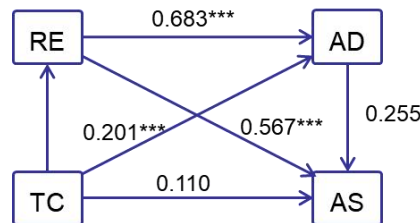


Fig. 1 Chain mediation model between TC and AS

As shown in Table 3, the total effect of TC on AS is significant, while the direct effect is not significant, indicating that RE and AD play a complete mediating role between TC and AS, with an effect value of 0.479 and a relative mediating effect of 81.32%, that is, the mediating effect accounts for 81.32% of the total effect of TC on AS. To be specific, indirect effect 1 is TC→RE→AS, and the CI did not include zero, showing that RE significantly mediated the effect of TC on AS. Indirect effect 2 is TC→AD→AS, and the CI included zero, showing that the indirect effect was nonsignificant. Indirect effect 3 is TC→RE→AD→AS, and the CI included zero, showing that indirect effect was nonsignificant as well.

4. Discussion and Implications

This article use questionnaire research method to investigate the influencing mechanism of doctoral students' AS based on the perspective of TC. Some limitations should be considered. First, the questionnaire research was carried out on a small scale. Second, cross-section data were used in this study, so the effect of time variation on each variable can not be obtained. In the future, the

sample group can be expanded to more universities from different regions or at different levels. Also, longitudinal research can be used to collect data to enhance the interpretation of hypothesis. Following are some implications given by this research:

4.1 Create a good team climate to improve doctoral students' academic aspiration

Build a great communication platform for students and teachers, and hold regular group meetings, especially encourage students to discuss topics or issues from a new perspective, express different points of view, and put forward new ideas. Tutors should be willing to listen to their students, understand and care about them, give timely and effective feedback to their students, and help them solve problems in their scientific research. Additionally, team members should help each other in scientific research, and they can also carry out a variety of team building activities in their spare time to enhance their mutual trust.

4.2 Promote doctoral research engagement to enhance doctoral academic aspiration

Doctoral students should devote themselves to scientific research with full spirit and enthusiasm, actively enhance their understanding of scientific research and their own field of study, and develop their interest in scientific research and their research direction. When encountering difficulties and setbacks, actively communicate with others. In addition, make reasonable research plan and time arrangement, enhance focus and efficiency in the process of research, and find sense of meaning, value, challenge and achievement in it.

4.3 Promote doctoral academic adaptability to improve doctoral academic aspiration

Schools, departments, tutors and other teachers should provide adequate and effective guidance to newly enrolled doctoral students, help them make personal study plans and career plans, and to learn about doctoral lives and scientists' lives. Open the feedback channels for doctoral students, care about their physical and mental health, and timely solve their problems and difficulties. In addition, provide guidance to help students master scientific research knowledge and skills, cultivate good academic values. Last but not least, pay attention to students' interpersonal relationship, and give both students and tutors guidance about effective communication.

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