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The construction of career resilience among private university graduates in the digital era: A study on the multiple mediating effects of problem-solving ability and career decision-making self-efficacy

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Abstract : In recent years, the scale of higher education has expanded in parallel with the structural adjustment of the employment market, and the employment competition pressure for private university graduates has been increasing. Based on social cognitive theory and achievement goal theory, this study explored the relationship between problem-solving ability, academic performance and career adaptability, as well as the mediating role of career decision-making self-efficacy. Graduates from four private universities in Sichuan Province were selected as the research subjects. Structural equation model analysis showed that: (1) problem-solving ability and academic performance have significant positive effects on career adaptability; (2) career decision-making self-efficacy plays a partial mediating role between problem-solving ability and career adaptability; (3) career decision-making self-efficacy also plays a partial mediating role between academic performance and career adaptability. The research results provide theoretical support and practical guidance for the cultivation of career resilience of private university graduates in the context of digital transformation.

Keywords: Career Adaptability; Problem Solving Ability; Academic Achievement; Self-Efficacy in Career Decision-Making; Private University Graduates

I. Introduction

With the rapid advancement of the popularization of higher education, the employment situation of college graduates has become increasingly severe. Data show that China's unemployment rate has risen from 2.37% in 1991 to 4.2% in 2023 (Zhang et al., 2023; Zhang, 2022). Among them, the employment problem of college graduates is particularly prominent. In 2020, the number of college graduates in China reached 8.74 million, which increased to 9.09 million in 2021 and further increased to 10.76 million in 2022 (Mao et al., 2022). Faced with the severe employment situation, the cultivation and improvement of graduates' career adaptability has become an important part of talent training in colleges and universities.

In the higher education system, private university graduates face more severe employment challenges, especially in regions with relatively unbalanced economic development such as Sichuan Province. Relevant studies have shown that private university graduates often face fierce competition from public university graduates in the job market, and generally have problems such as insufficient practical experience and a poor match between professional skills and job market demand (Safavi & Bouzari, 2019; Wang et al., 2021).

Career adaptability, as an individual's ability to cope with various challenges and changes in the process of career development, has become an important indicator for predicting career success (Savickas, 1997; Savickas & Porfeli, 2012). However, there is currently limited research on the career adaptability of private university graduates, especially the lack of systematic research on the interaction of multiple factors affecting career adaptability (Pang et al., 2021; Ren et al., 2023).

This study takes private university graduates in Sichuan Province as the research subjects to explore the relationship between problem-solving ability, academic performance and career adaptability, as well as the mediating role of career decision-making self-efficacy. The study aims to construct and verify an integrative model to understand the formation mechanism of career adaptability of private university graduates and provide theoretical reference and practical guidance for talent training in colleges and universities.

II. Literature review and research hypothesis

2.1 Theoretical basis

This study is mainly based on two

theoretical frameworks: Bandura's Social Cognitive Theory (SCT) and Achievement Goal Theory (AGT).

Social cognitive theory emphasizes the role of self-efficacy beliefs in shaping individual thoughts, behaviors, and motivations. In career development situations, career decision self-efficacy, as an individual's confidence in their ability to make wise career decisions, has an important impact on career adaptability (Lent, Brown, & Hackett, 1994). According to SCT, individuals with stronger problem-solving skills and academic performance may have more positive mastery experiences in the career decision-making process, thereby enhancing their self-efficacy beliefs and thus improving career adaptability.

Achievement goal theory focuses on the different orientations of individual achievement motivation, distinguishing between mastery orientation (the pursuit of learning and improving ability) and performance orientation (the pursuit of surpassing others). AGT helps explain how academic performance, as an indicator of mastery orientation, affects career decision self-efficacy and ultimately career adaptability. Individuals with a mastery orientation tend to set challenging goals, seek growth opportunities, and show higher levels of career decision self-efficacy, thereby enhancing career adaptability (Fried & Chapman, 2012).

2.2 Occupational adaptability

Career adaptability refers to an individual's readiness and internal resources to cope with changes in the career environment (Savickas, 1997). According to Savickas & Porfeli (2012), career adaptability includes four dimensions: concern, control, curiosity and confidence. Concern refers to attention and planning for career future; control refers to the sense of responsibility for career choices and decisions; curiosity refers to the exploration of career opportunities; and confidence refers to the confidence in successfully coping with career challenges.

Research has shown that career adaptability is significantly correlated with individual career success, job satisfaction, and overall well-being (Magnano et al., 2021). Chen et al. (2020) conducted a literature review on career adaptability research and found that career adaptability not only has a direct impact on graduates' employment outcomes, but also helps individuals better cope with career transitions and challenges.

For private university graduates, improving career adaptability is particularly important. Wang et al. (2021) pointed out that compared with public university graduates, private university graduates usually face greater employment pressure, which makes the cultivation of career adaptability particularly critical.

2.3 Problem-solving ability and career adaptability

Problem-solving ability refers to an individual's ability to identify, analyze, and solve complex situations or difficulties, which requires the use of cognitive, emotional, and behavioral abilities (Maksum et al., 2021). Heppner et al. (1982) divided problem-solving ability into three dimensions: problem-solving confidence, approach-avoidance style, and personal control.

There is a close connection between problem-solving ability and career adaptability. Xu et al. (2020) found that individuals with stronger problem-solving ability showed higher career adaptability. This may be because good problem-solving ability enables individuals to assess situations, explore various options, and adjust plans accordingly, which are highly consistent with the core elements of career adaptability.

Federici et al. (2021) emphasized the cognitive and metacognitive aspects of problem solving. Research shows that individuals with greater cognitive structuring abilities are better at seeing patterns and connections between seemingly unrelated career situations, thereby demonstrating higher levels of career adaptability. Similarly, metacognitive awareness (i.e., the ability to reflect on and monitor one's own cognitive processes) showed a strong positive correlation with career adaptability.

Based on the above literature, the following hypothesis is proposed:

H1 : Problem-solving ability is significantly and positively correlated with career adaptability.

2.4 Academic performance and career adaptability

Academic performance is often assessed through grades, test scores, and overall academic achievement, representing not only knowledge acquisition but also reflecting an individual’s discipline, motivation, and cognitive ability (Jolles et al., 2020). In the college setting, academic performance is often measured by grade point average (GPA) or cumulative grade point average (CGPA) (Junco, 2021).

Regarding the relationship between academic performance and career adaptability, research by Tolentino et al. (2019) showed that individuals with better academic performance tend to show higher levels of career adaptability. This may be because improved academic performance can enhance self-efficacy, thereby increasing individuals' confidence in coping with career challenges and changes (Deng et al., 2022).

Par & Park (2020) found a positive correlation between academic performance, career self-efficacy, and career adaptability in a study of Korean engineering students. They proposed that sustained academic achievement would foster higher levels of confidence in professional competence, which in turn would enhance individuals' ability to adapt to different professional environments.

Based on the above literature, the following hypothesis is proposed:

H2 : Academic performance is significantly positively correlated with career adaptability.

2.5 Career Decision-Making Self-Efficacy

Career decision self-efficacy (CDSE) originates from Bandura's self-efficacy theory and refers to an individual's confidence in his or her ability to make effective career decisions (Betz et al., 1996). According to Betz and Hackett (2006), CDSE includes five dimensions: self-evaluation, career information collection, goal selection, future planning, and problem solving.

As a psychological resource, career decision-making self-efficacy has an important impact on career development. Hou et al. (2019) found that there is a significant positive correlation between career decision-making self-efficacy and career adaptability. Kim and Shin (2020) used a mixed research method to study nursing students and found that confidence in professional ability was significantly correlated with career adaptability. Rahim et al.'s (2021) quantitative research also confirmed the importance of career decision-making self-efficacy in cultivating students' adaptability in the face of a changing career environment.

Based on the above literature, the following hypothesis is proposed:

H3 : Career decision-making self-efficacy is significantly and positively correlated with career adaptability.

2.6 Problem-solving ability and career decision-making self-efficacy

The relationship between problem-solving ability and career decision-making self-efficacy has attracted the attention of researchers in recent years. Odacı et al. (2023) found that students with strong problem-solving skills tend to show higher confidence in career decision-making. This association may be because individuals with good problem-solving skills tend to develop a broader sense of self-efficacy that extends to specific domains, such as career decision-making.

Chuang et al. (2020) emphasized the role of cognitive factors in this relationship. They pointed out that the career decision problem-solving process requires individuals to process information, evaluate alternatives, and predict future outcomes. The cognitive demands of tasks are closely related to individuals' confidence in handling those tasks (i.e., self-efficacy). Therefore, improvements in problem-solving skills may lead to enhanced career decision-making self-efficacy.

Based on the above literature, the following hypothesis is proposed:

H4 : Problem-solving ability is significantly and positively correlated with career decision-making self-efficacy.

2.7 Academic Performance and Career Decision-Making Self-Efficacy

The relationship between academic achievement and career decision-making self-efficacy has also received attention in educational and vocational psychology. Lent et al. (1994) found in their study of social cognitive career theory that college students with higher academic performance showed higher levels of career decision-making self-efficacy. This association may be because academic achievement often enhances students' overall beliefs about their abilities, thereby improving career decision self-efficacy.

Wu et al. (2020) showed that career counseling interventions designed to improve career decision-making self-efficacy can indirectly promote academic engagement. This finding highlights the interconnectedness of these dimensions. Gebauer et al. (2020) also confirmed the positive correlation between academic performance and self-efficacy.

Based on the above literature, the following hypothesis is proposed:

H5 : Academic performance is significantly and positively correlated with career decision-making self-efficacy.

2.8 The mediating role of career decision-making self-efficacy

According to social cognitive theory, self-efficacy beliefs serve as mediating factors between individual cognition and behavior, affecting individuals' choices, effort levels, and persistence (Bandura, 1986). In career development contexts, career decision self-efficacy may mediate the relationship between personal traits (e.g., problem-solving ability) and outcome variables (e.g., career adaptability).

Akıncı and Eryılmaz (2022) found that career decision-making self-efficacy partially mediated the relationship between problem-solving ability and career adaptability in a study of 384 psychological counselor candidates. This suggests that problem-solving ability not only directly affects career adaptability, but also indirectly affects career adaptability by enhancing career decision-making self-efficacy.

Regarding the relationship between academic performance and career adaptability, Soeprijanto et al. (2022) found that career planning (a concept closely related to career decision-making self-efficacy) mediates the relationship between self-awareness and career adaptability. This suggests that career decision-making self-efficacy may mediate the relationship between academic performance and career adaptability.

Based on the above literature, the following hypothesis is proposed:

H6 : Career decision-making self-efficacy partially mediates the relationship between problem-solving ability and career adaptability.

H7 : Career decision-making self-efficacy partially mediates the relationship between academic performance and career adaptability.

2.9 Research Model

Based on the above literature review and research hypotheses, this study proposes the following theoretical model (Figure 1). The model assumes that problem-solving ability and academic performance, as independent variables, directly affect career adaptability, and indirectly affect career adaptability through the mediating role of career decision-making self-efficacy.

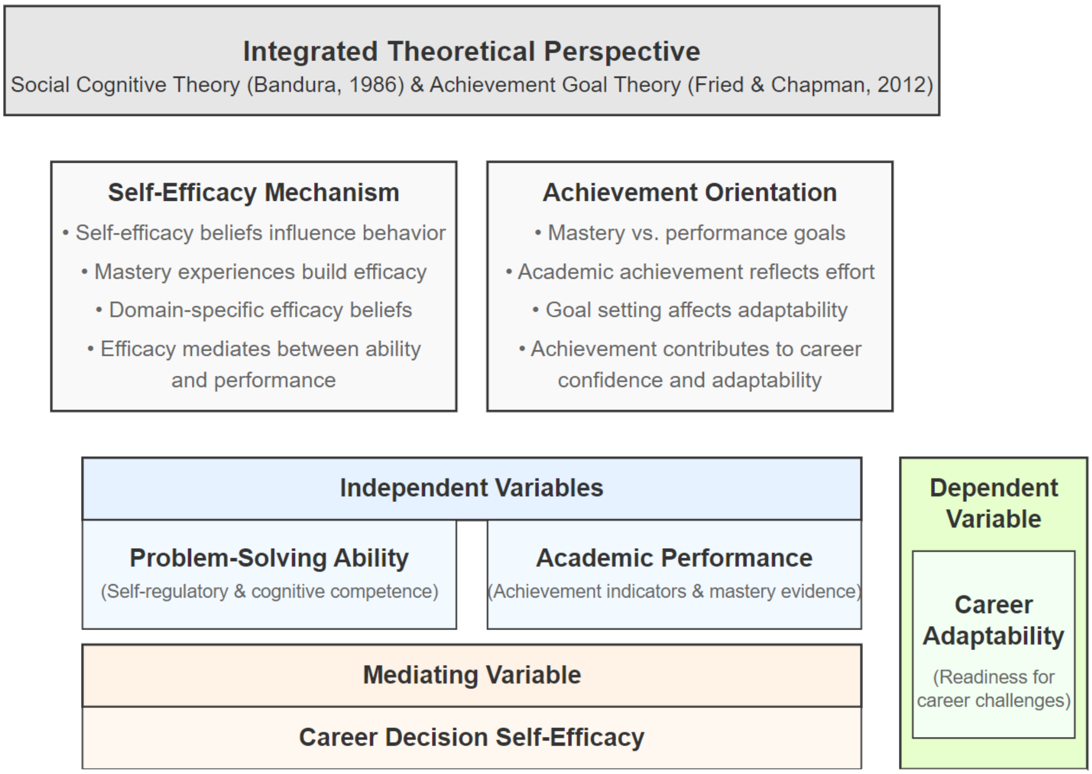

Figure 1: Research model

III. Research Methods

3.1 Research Design and Sample

This study adopts a quantitative research method and collects data through a questionnaire survey. The research subjects are fresh graduates from four private universities in Sichuan Province, including Chengdu Vocational University of the Arts, Sichuan Media College, Sichuan Culture and Art College, and Sichuan Film and Television Academy. These universities are all focused on art education, and their graduates face unique challenges in terms of career adaptability.

Proportional stratified random sampling was used to ensure sample representativeness.

According to G*Power analysis software, the effect size was set to 0.15 (medium effect), $\alpha = 0.05$, power = 0.80, and the minimum required sample size was 77. Considering the requirements of structural equation modeling (SEM) analysis techniques and potential invalid responses, the target sample size of this study was set at 550 people.

3.2 Research Tools

3.2.1 Career Adaptability Scale

The Career Adaptability Scale International Version 2.0 (CAAS-International) developed by Savickas and Porfeli (2012) was used. The scale contains four subscales: attention (6 items, such as "preparing for the future"), control (6 items, such as "taking responsibility for one's own behavior"), curiosity (6 items, such as "exploring the surrounding environment"), and confidence (6 items, such as "completing tasks efficiently"). A 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) was used. The scale has shown good reliability and validity in cross-cultural studies (Pong & Leung, 2023; Hughes & Behle, 2021).

3.2.2 Problem Solving Ability Scale

The Problem Solving Inventory (PSI) developed by Heppner et al. (1982) was used. The scale measures three dimensions: problem-solving confidence (11 items), approach-avoidance style (16 items), and personal control (5 items). A 6-point Likert scale was used (1 = very dissatisfied, 6 = very satisfied). The scale has shown good reliability and validity in multiple studies.

3.2.3 Academic performance

The student-reported cumulative grade point average (CGPA) was used as an indicator of academic performance. To ensure data accuracy, the research team worked with relevant academic departments of each university to cross-validate the CGPA data.

3.2.4 Career Decision-Making Self-Efficacy Scale

The Career Decision-Making Self-Efficacy Scale-Short Version (CDSE-SF) developed by Betz et al. (1996) was used. The scale consists of 25 questions and is used to measure students' personal ability beliefs when dealing with responsibilities. A 5-point Likert scale is used (1 = strongly disagree, 5 = strongly agree). The scale has high reliability and validity in measuring career decision-making self-efficacy (Cahyawulan & Yundianto, 2022; Winingsih et al., 2023).

3.3 Data Collection Procedure

First, a letter of recommendation from IUKL was obtained, and then the questionnaires were distributed to graduates of the four private universities through the Questionnaire Star software. The data collection process lasted for 14 weeks, and the distribution and completion of the questionnaires were carried out within the first 10 weeks. To ensure that the required number of completed questionnaires was reached, the research team conducted regular follow-ups. After receiving the completed questionnaires, the data were entered into a secure database for analysis.

3.4 Data Analysis Methods

Data analysis used a combination of descriptive and inferential statistics. Descriptive statistics included generating frequency distribution tables and calculating means and standard deviations. SPSS software was used to conduct these analyses. Frequency distribution tables were used to concisely present the characteristics of the participants, the mean was used to represent the central tendency of the data, and the standard deviation was used to represent the degree of variation or dispersion of the data (Huck, 2012).

Inferential statistical analysis includes correlation analysis and structural equation model (SEM). Correlation analysis is used to test the relationship between research variables, and SEM is used to test the hypothesized model and mediation effect. SEM analysis adopts a two-stage process: the first stage is to conduct measurement model analysis to verify whether the observed variables can satisfactorily measure the expected latent constructs; the second stage is to conduct structural model analysis to test the structural relationship between latent variables.

IV. Research Results

4.1 Sample Characteristics

Finally, 530 valid questionnaires were collected, with an effective response rate of 96.4%. Table 1 shows the demographic characteristics of the sample.

Table 1 Demographic characteristics of the sample (N=530)

feature	category	Frequency	percentage(%)
gender	male	224	42.3
	female	306	57.7
age	19-21 years old	153	28.9
	22-25 years old	347	65.5
	26-29 years old	30	5.6
major	business Administration	115	21.7
	Computer Science/Information Technology	87	16.4
	project	45	8.5
	educate	78	14.7
	Art Performance	164	30.9
	law	41	7.8

4.2 Descriptive Statistics and Correlation Analysis

Table 2 presents the descriptive statistics and correlation coefficients of the main study variables.

Table 2 Descriptive statistics and correlation analysis of main research variables (N=530)

variable	Mean	Standard Deviation	1	2	3	4
1. Problem Solving Skills	3.81	0.72	1			
2. Academic performance	3.47	0.68	0.28**	1		
3. Career decision-making self-efficacy	3.65	0.76	0.45**	0.37**	1	
4. Career adaptability	3.72	0.81	0.52**	0.41**	0.58**	1

Note: **p < 0.01

The results showed that there were significant positive correlations among problem-solving ability, academic performance, career decision-making self-efficacy, and career adaptability. The correlations between problem-solving ability and career adaptability ($r = 0.52$, $p < 0.01$), academic performance and career adaptability ($r = 0.41$, $p < 0.01$), and career decision-making self-efficacy and career adaptability ($r = 0.58$, $p < 0.01$) all reached significant levels. Similarly, there was a significant positive correlation between problem-solving ability and career decision-making self-efficacy ($r = 0.45$, $p < 0.01$) and between academic performance and career decision-making self-efficacy ($r = 0.37$, $p < 0.01$).

4.3 Measurement model analysis

Before conducting structural equation model analysis, the measurement model was first verified. The fit of the measurement model was tested by confirmatory factor analysis (CFA). Table 3 shows the fit indices of the measurement model.

Table 3 Measurement model fit index

Fit index	Numeric	Recommended Standards
χ^2/df	2.48	< 3
CFI	0.94	> 0.90
TLI	0.93	> 0.90
RMSEA	0.053	< 0.08
SRMR	0.042	< 0.05

The results showed that the measurement model had a good fit and all fit indices met the recommended standards. In addition, the combined reliability (CR) of all latent variables was greater than 0.70 and the average variance extracted (AVE) was greater than 0.50, indicating that the measurement model had good reliability and validity.

4.4 Structural model analysis

After the measurement model was verified, structural model analysis was conducted to test the research hypotheses. Table 4 shows the fit indicators of the structural model.

Table 4 Structural model fit indicators

Fit index	Numeric	Recommended Standards
χ^2/df	2.56	< 3
CFI	0.93	> 0.90
TLI	0.92	> 0.90
RMSEA	0.055	< 0.08
SRMR	0.045	< 0.05

The results show that the structural model has a good fit. Figure 2 shows the path coefficients of the structural model.

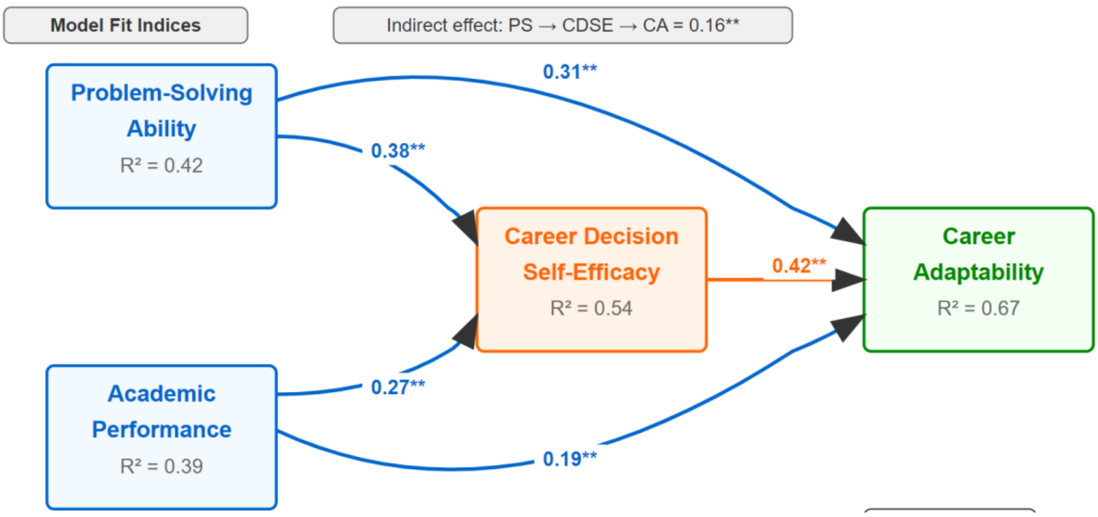

Figure 2: Structural model path coefficients

Table 5 shows the test results of the research hypotheses.

Table 5 Results of research hypothesis testing

Assumptions	path	Standardized path coefficients	t-value	result
H1	Problem-solving skills → Career adaptability	0.31	6.24**	support
H2	Academic performance → Career adaptability	0.19	3.87**	support
H3	Career decision-making self-efficacy → Career adaptability	0.42	8.65**	support
H4	Problem-solving skills → Career decision-making self-efficacy	0.38	7.42**	support
H5	Academic performance → career decision self-efficacy	0.27	5.36**	support

Note: **$p < 0.01$

The results showed that problem-solving ability ($\beta = 0.31$, $p < 0.01$) and academic performance ($\beta = 0.19$, $p < 0.01$) had significant positive effects on career adaptability, supporting H1 and H2. Career decision-making self-efficacy also had a significant positive effect on career adaptability ($\beta = 0.42$, $p < 0.01$), supporting H3. In addition, problem-solving ability ($\beta = 0.38$, $p < 0.01$) and academic performance (β = 0.27, $p < 0.01$) had significant positive effects on career decision-making self-efficacy, supporting H4 and H5.

4.5 Mediation Effect Test

To examine the mediating role of career decision-making self-efficacy, the Bootstrap method (5000 samples) was used to test the significance of the indirect effect. Table 6 shows the results of the mediation effect test.

Table 6 Results of the mediation effect test

path	Direct Effect	Indirect effects	Total Effect	Type of mediation effect
Problem-solving ability → Career decision-making self-efficacy → Career adaptability	0.31**	0.16**	0.47**	Some intermediaries
Academic performance → Career decision self-efficacy → Career adaptability	0.19**	0.11**	0.30**	Some intermediaries

Note: **p < 0.01

The results showed that career decision self-efficacy partially mediated the relationship between problem-solving ability and career adaptability (indirect effect = 0.16, $p < 0.01$), supporting H6. Similarly, career decision self-efficacy also partially mediated the relationship between academic performance and career adaptability (indirect effect = 0.11, $p < 0.01$), supporting H7.

V. Discussion

5.1 Main research findings

This study explored the relationships among problem-solving ability, academic performance, career decision-making self-efficacy, and career adaptability, as well as the mediating role of career decision-making self-efficacy. The research results show that problem-solving ability and academic performance not only directly affect career adaptability, but also indirectly affect career adaptability by improving career decision-making self-efficacy, which is basically consistent with previous studies.

First, the finding that problem-solving ability is significantly positively correlated with career adaptability supports the findings of Xu et al. (2020) and Federici et al. (2021). This suggests that graduates who are able to identify problems, explore solutions, evaluate options, and implement solutions show greater adaptability when faced with career challenges. The cognitive flexibility, creative thinking, and adaptive responses involved in problem solving are highly consistent with the core traits of career adaptability.

Secondly, the finding that academic performance is significantly positively correlated with career adaptability supports the findings of Tolentino et al. (2019) and Par & Park (2020). This suggests that graduates who perform well academically tend to perform better in terms of career adaptability. A possible explanation is that academic achievement enhances graduates' self-confidence and self-efficacy, making them more comfortable in facing career challenges. In addition, good academic performance also reflects the graduates' level of effort, learning ability and problem-solving skills, which are equally important in a professional environment.

Third, the finding that career decision-making self-efficacy is significantly positively correlated with career adaptability supports the findings of Kim and Shin (2020) and Rahim et al. (2021). This suggests that graduates who are confident in their ability to make effective career decisions tend to show higher career adaptability. This association may be because individuals with high career decision-making self-efficacy tend to be more proactive in exploring career options, setting career goals, and overcoming career barriers, thereby enhancing their ability to adapt to different career situations.

Fourth, the significant positive impact of problem-solving ability and academic performance on career decision-making self-efficacy supports the findings of Odacı et al. (2023) and Wu et al. (2020). This suggests that graduates with strong problem-solving skills and high academic performance tend to be more confident in their ability to make career decisions. This association may be because positive experiences gained in the problem-solving process and academic achievement enhance graduates' general self-efficacy, which then extends to the domain of career decision-making.

Finally, the partial mediation effect of career decision self-efficacy between problem-solving ability, academic performance, and career adaptability supports the findings of Akıncı and Eryılmaz (2022) and Soeprijanto et al. (2022). This suggests that problem-solving ability and academic performance affect career adaptability both directly and indirectly by enhancing career decision self-efficacy. This mediation mechanism can be explained by social cognitive theory: problem-solving ability and academic performance provide graduates with positive mastery experiences, enhance their career decision self-efficacy, and thus improve career adaptability.

5.2 Theoretical Contributions

The contributions of this study to the existing literature are mainly reflected in the following aspects:

First, this study constructed and validated a multidimensional model that integrates problem-solving ability, academic performance, career decision-making self-efficacy, and career adaptability. Through this model, this study revealed the formation mechanism of career adaptability of private university graduates and filled the research gap in the existing literature on the influencing factors of career adaptability of private university graduates.

Secondly, this study explored the mediating role of career decision-making self-efficacy and revealed the psychological mechanism by which problem-solving ability and academic performance affect career adaptability. This finding supports the view of social cognitive theory that self-efficacy plays a mediating role between individual cognition and behavior, and enriches the application of social cognitive theory in the field of career development.

Third, this study focuses on a special group of private university graduates, providing a new perspective for understanding the differences in career adaptability among graduates from different types of universities. This helps develop more inclusive and differentiated career development theories that meet the needs of students from different backgrounds.

Finally, this study integrates social cognitive theory and achievement goal theory to understand the formation process of career adaptability from a multi-theoretical perspective. This integration helps to more comprehensively understand the influencing factors and formation mechanism of career adaptability and promote the further improvement of career development theory.

5.3 Practical Implications

The results of this study provide the following practical implications for university educators, career counselors, and students:

For college educators, first of all, they should focus on the cultivation of problem-solving ability, integrate problem-solving training into curriculum design, and provide students with opportunities to face practical problems, such as problem-based learning, case teaching, and project-based learning. Secondly, while paying attention to academic performance, they should also pay attention to the cultivation of self-efficacy in the learning process, help students gain positive mastery experience from academic achievements, and enhance their self-confidence. Finally, career planning courses should be offered and career counseling services should be provided to help students improve their career decision-making self-efficacy and prepare for future career development.

For career counselors, first of all, they should focus on the assessment and training of graduates' problem-solving abilities and provide targeted problem-solving skills improvement programs. Secondly, they should attach importance to the cultivation of career decision-making self-efficacy and enhance graduates' confidence in career decision-making through career exploration, role simulation and accumulation of successful experiences. Finally, they should provide differentiated career counseling services based on the characteristics of graduates, paying special attention to the unique challenges faced by graduates from private universities.

For students, first of all, they should actively cultivate problem-solving skills, participate in practical activities, and exercise their ability to solve practical problems. Secondly, while pursuing academic achievements, they should also focus on cultivating self-confidence and self-efficacy from successful experiences. Finally, they should actively participate in career planning and career exploration activities, improve their career decision-making self-efficacy, and prepare for future career development.

5.4 Research limitations and future research directions

This study has the following limitations: First, the study adopted a cross-sectional design, and the causal relationship between variables cannot be established. Future research can adopt a longitudinal design to track the transition process of graduates from college to work and better understand the causal relationship between variables. Second, the research sample only comes from four private universities in Sichuan Province, and the research results may not be applicable to other regions or types of universities. Future research can expand the sample range to include universities in different regions and types to enhance the generalizability of the research results. Third, the study used self-reported data, which may have common method bias. Future research can adopt multi-source data collection methods, such as combining student self-evaluation, teacher evaluation and objective performance indicators, to reduce the impact of common method bias. Finally, the variables focused on in the study are relatively limited. Future research can include more factors that may affect career adaptability, such as personality traits, social support and work values, to build a more complete model of factors affecting career adaptability.

In terms of future research directions, first, we can explore the differences in career adaptability of graduates from different types of universities and their influencing factors, such as comparisons between public and private, comprehensive and professional, first-class and ordinary universities. Secondly, we can focus on the new connotations and new requirements of career adaptability in the context of digital transformation, and explore the relationship between digital capabilities and career adaptability. Third, we can conduct career adaptability intervention research, design and evaluate intervention programs for problem-solving ability, career decision-making self-efficacy, and career adaptability, and provide a basis for college vocational education practice. Finally, we can conduct cross-cultural comparative studies to explore the differences in career adaptability and its influencing factors in different cultural backgrounds, and promote cross-cultural applicability research on career adaptability theory.

VI. Conclusion

This study used graduates from four private universities in Sichuan Province as the research subjects to explore the relationship between problem-solving ability, academic performance, and career adaptability, as well as the mediating role of career decision-making self-efficacy. The results showed that problem-solving ability and academic performance not only directly affect career adaptability, but also indirectly affect career adaptability by improving career decision-making self-efficacy. This finding not only enriches the theoretical research on career adaptability, but also provides practical guidance for college educators, career counselors, and students.

In the face of the increasingly severe employment situation and the challenges brought by digital transformation, it is particularly important to cultivate graduates' career adaptability. Colleges and universities should help students enhance their career adaptability and prepare for future career development by cultivating students' problem-solving skills, focusing on academic performance and improving their career decision-making self-efficacy. This support is especially important for private university graduates who face more employment challenges.

Future research should further explore other factors that affect career adaptability and conduct longitudinal and cross-cultural studies to provide a more comprehensive understanding and support for the cultivation of career adaptability in a changing career environment.

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