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Career Exploration and Career Adaptability: Parallel Mediating Roles of Learning Engagement and Career Calling

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Abstract: ***To explore the connection between career exploration and career adaptability, this study constructs a concurrent mediation framework grounded in career structure theory. Using the Career Exploration Scale, Career Adaptability Scale, Learning Engagement Scale, and Sense of Career Calling Scale, we examined a sample of 996 college students. The findings indicated a strong positive correlation between career exploration and career adaptability (r=0.58, P<0.01). Additionally, learning engagement and career calling partially mediated this relationship (R^2=0.34, F=506.46; R^2=0.25, F=330.84). This study shows that career exploration, learning engagement, and career calling positively correlate with career adaptability, with career exploration predicting career adaptability both directly and indirectly through these mediators.***

Keywords: Career exploration, Career adaptability, Learning engagement, Sense of career calling, Parallel mediation**.**

1. Introduction

College students' career adaptability is the core ability for individuals to achieve sustained career success, and it is an important ability that helps individuals to successfully find employment, complete career change, and successfully develop their career, which has a significant impact on their career development. From the perspective of career construction, career adaptability, as a psychological resource for self-regulation, can effectively improve the adaptive ability of individuals when career exploration enters a difficult situation, using the perception of the self and the environment to make timely changes to help individuals cope with the challenges of career development (Jiang et al., 2019; Guan et al., 2017). With the changes in the professional environment, individuals' career development is no less challenging, and the exploration of self and environment is particularly important. Some studies have found that adequate career exploration is crucial in relation to an individual's ability to cope with the regulation of setbacks when facing future career tasks, career transitions, or career difficulties. However, whether the degree of career exploration has an impact on college students' adjustment ability and what the mechanism of action is needs to be further explored. Therefore, this study aims to empirically test whether career exploration affects college students' career adaptability.

In addition, this study aimed to further test the potential mechanisms by which academic engagement and career calling affect college students' career adaptability and to identify the boundary conditions of this relationship. Career exploration predicts students' emotional, behavioral and cognitive engagement in the learning process (Wong & Kaur, 2018) and students with a sense of career calling feel more resilient in terms of career focus, curiosity, and confidence (Douglass & Duffy, 2015), which contributes to personal career planning, career goal clarity and career decision-making. However, the potential pathway of career development from school to work is not yet well developed, and this study aims to further explore the boundary conditions of learning engagement and career calling as mediating effects at the personal growth and affective levels, and to help college students better cope with challenges in their careers as much as possible. The theoretical model of this study is summarized in Figure 1.

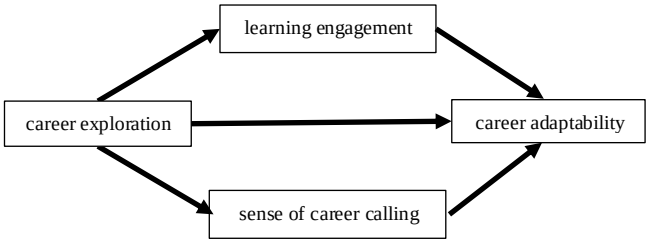

Figure 1: Parallel intermediary hypothetical model diagram

2. Career Exploration and Career Adaptability

Career construct theory suggests that an individual's career is a dynamic constructive process involving the interaction of individual characteristics and situational factors. The resilience that individuals demonstrate in the face of challenges and changes in their careers is key to achieving lifelong employability (Guan & Li, 2015), and career exploration is part of their career construction process (Rudolph et al., 2017). An important aspect of career adaptability at the time of early career establishment is the extent to which individuals are prepared to plan and choose a career (Hsu et al., 2022) in order to better cope with uncertainty and potential career risks in a changing labour market. Career exploration has been defined as a process in which individuals actively consider opportunities to develop and constitute their self-identity and actively explore in relevant settings (Jiang et al., 2019). Career exploration is a dynamic process that occurs throughout career development. Career exploration behavioral help individuals discover career goals, including exploration of self and environment. On the one hand, career exploration stimulates career concern and curiosity. Through active self-exploration and research on the characteristics of future career choices, students discover their interests, abilities and self-potential, develop career orientation and life orientation (Markova et al., 2020), and

then use self-assessment methods for career planning and development. On the other hand, career exploration stimulates career autonomy and self-confidence. Students are able to better understand their potential, set their own learning goals and pursuits, enhance self-regulated learning (Hsu et al., 2022), and put into practice adaptive resources in career development (Johnston, 2018). In summary, both career exploration and career adaptability are important factors in an individual's career development; therefore, it is necessary to clarify the relationship between the two, and Hypothesis 1 is proposed.

Hypothesis 1: Career exploration is positively related to career adaptability

3. The Mediating Role of Learning Engagement and Career Calling

Social Cognitive Career Theory (SCCT) suggests that an individual's interaction with the environment, which influences an individual's learning experience, self-efficacy, and outcome expectations, can explain and predict an individual's career and academic major choices (Moakler & Kim, 2014; Nayak, 2020). Engagement in learning refers to an individual's enthusiasm and immersion in learning (Rotgans et al., 2018). Students need to use various methods of self-assessment for career planning and exploration (Brown & Lent, 2020). Students engage in self-regulated learning and regulate the setting and pursuit of their learning goals in their ongoing career exploration (Hsu et al., 2022). Individuals with adaptive learning styles excel in environments that require task completion and decision making and are able to enhance career adaptability (Kolb et al., 2014). A recent study found that career adaptability is an important meta-competency in an academic or vocational setting, and that good career adaptability can help students reduce concerns about the future and increase life satisfaction (Oliveira & Marques, 2024).

Career calling has been defined as an individual's belief that his or her career is a central part of a broader purpose and meaning in life (Duffy & Dik, 2013), or it can be an individual's passion and professional identification with a career field, emphasising an individual's emotional investment in and personal significance of the career (Kaminsky & Behrend, 2015). Individuals with high career calling are invested in positive emotions and promote proactive behavioral during career development (Cai et al., 2022). According to Social Cognitive Career Theory (SCCT) and career development theory, career calling may enhance an individual's sense of self-efficacy (Lemke, 2021) and enhance adaptability. In summary, studies have been conducted to explore the respective importance of learning engagement and career calling, but in-depth analyses of the specific relationships and mediating mechanisms between these concepts are lacking, and there is a lack of systematic empirical research to support them; therefore, Hypothesis 2 is proposed.

Hypothesis 2: Learning engagement and career calling play a mediating role between career exploration and career adaptability

4. Methods

4.1 Participants

Between April and July of 2023, this research engaged subjects through a random selection process at six academic institutions located in Shaanxi Province, subsequently dispensing web-based surveys. Participants are informed and willing to participate. Out of the 2,786 questionnaires distributes, 996 valid responses were collected (valid response rate = 35.75%). The sample comprised 188 (18.9%) males and 808 (81.1%) females, with aged between 18 and 25 years old. In terms of grade distribution, there are 389 freshmen (39.06%), 213 sophomores (21.39%), 182 juniors (18.27%), 104 seniors (10.44%), and 52 fives (5.22%); and from the perspective of distribution of majors, there were 344 (34.54%) in education and 375 (37.65%) in medicine. This study was approved by the IEC of The Affiliated Hospital of Shaanxi University of Chinese Medicine Ethics Committee. Written informed consent was obtained from all participants.

4.2 Measures

Career Exploration Scale. We adopt the Career Exploration activities in the Career Exploration Scale (CES), which was revised by Shuhua Zhang and Guochun Shi in 2006. The scale consists of 12 entries, which include two dimensions: self-exploration and environmental exploration and employs a 5-point Likert scale from "hardly ever" to "often" on a scale of 1-5. Higher scores indicate that individuals are more active in exploring occupational information related to the self and the environment. The questionnaire has good applicability and good reliability among the university population in China. In this study, the total Cronbach's alpha coefficient for the scale was 0.919.

Career Adaptability Scale. We adopted the Chinese version of the career adaptability scale compiled by Savickas in 2002 and revised by Tan Li in 2015. The scale consists of 24 items and contains four dimensions: career curiosity (6 entries), career control (6 entries), career concern (6 entries) and career confidence (6 entries). The scale employs a 5-point Likert scale from "very non-compliant" to "very compliant" on a scale of 1 to 5, with higher scores indicating a stronger ability to adapt to an individual's career, and lower scores indicating a weaker ability to adapt to one's career. In this study, the total Cronbach's alpha coefficient for this scale was 0.945.

Learning engagement scale. We adopt the Learning Engagement Scale compiled by Youguo Liao in 2011 based on the characteristics of college students in China, which contains three dimensions: behavioral engagement (6 entries), emotional engagement (7 entries) and cognitive engagement (7 entries). The scale employs a 5-point Likert scale, ranging from 1 to 5 on a scale from "very non-compliant" to "very compliant", with higher scores indicating a deeper level of engagement in the learning process. In this study, the Cronbach's alpha coefficient for this scale was 0.938.

Sense of Career Calling Scale. We adopt the Career Sense of Mission Scale developed by Chunyu Zhang in 2015, which consists of 11 items. The scale has three dimensions, namely

altruistic contribution, meaning and value, and orientation. The questionnaire utilizes a 5-point Likert-type scale, spanning from 1 to 5, which corresponds to a continuum from "strongly disagree" to "strongly agree". Higher ratings on this scale suggest a greater perception of professional duty among individuals. In this study, the Cronbach's alpha coefficient for this scale was 0.902.

5. Data Analysis

This study used SPSS27.0 for data analysis and the PROCESS procedure (Hayes, 2013) for further testing. Pearson's correlation coefficients between the four core variables were analyzed; Using a sample of 5,000 and 95% confidence intervals, the Bootstrap method was used to test for the mediating effect, determining whether the confidence interval contained zero.

6. Results

6.1 Common Method Biases Test

We have gathered figures in the present study through online self-reporting, which may have introduced a significant bias. We performed a common method bias test using Harman's one-way test, extracted all items of career exploration, career adaptability, career sense of calling, and learning engagement to complete an exploratory factor analysis, and analyzed 10 factors with eigenvalues greater than one. In this study, the percentage of variance explained by the first common factor was 33.70%, which is less than 40%, indicating that there is no serious common method bias.

6.2 Current Status of College Students' Career Exploration, Learning Engagement, Career Adaptability, and Career Calling

The total score of 996 college students for career exploration was (43.10±8.27), with an overall entry mean of (3.59±0.69); the total score for engagement in learning was (70.68±12.75), with an overall entry mean of (3.53±0.64), and the scores of the three dimensions, from highest to lowest, were emotional engagement (3.55±0.71), cognitive engagement (3.53± (0.73), and behavioral engagement (3.53±0.67); the total career adaptability score was (95.02±11.95), the overall entry mean score was (3.96±0.50), and the 4 dimensions scores from highest to lowest were career control (4.02±0.57), career concern (3.96±0.58), career curiosity (3.96±0.58) The total score of career calling was (41.80±6.80), the overall mean score of the entries was (3.80±0.62), and the scores of the three dimensions, in descending order, were significance and value (3.99±0.74), altruistic contribution (3.96±0.63), and orientation (3.50±0.85).

6.3 Career Exploration, Learning Engagement, Career Adaptability, and Career Calling Scores of College Students with Different Demographic Characteristics

Table 1: Career exploration, learning engagement, career adaptability and career calling scores of university students with different demographic characteristics in Shaanxi Province, 2023 ($\bar{x} \pm s$)

Item	Number [persons (%)]	Career exploration	Learning engagement	Career adaptability	Career calling
Gender					
Male	188 (18.9)	44.39±8.75	70.86±15.88	96.77±12.96	41.82±7.64
Female	808 (81.1)	42.80±8.14	70.64±11.91	94.62±11.67	41.79±6.59
t-value		2.273	0.205	2.230	0.059
P value		0.024	0.838	0.026	0.953
Whether born alone					
Yes	281 (28.2)	44.30±8.06	72.73±12.89	96.53±12.10	42.41±6.89
No	715 (71.8)	42.63±8.32	69.88±12.61	94.44±11.84	41.56±6.75
t-value		2.895	3.182	2.494	1.780
P value		0.004	0.002	0.013	0.075
Residence					
Urban	598 (60.0)	43.74±8.23	70.90±13.03	95.26±11.56	41.86±6.80
Rural	398 (40.0)	42.15±8.26	70.36±12.33	94.67±12.51	41.70±6.81
t-value		2.992	0.657	0.769	0.368
P value		0.003	0.511	0.442	0.713
Year					
Freshman	389 (39.1)	42.75±8.71	70.63±12.27	95.07±11.31	41.80±6.51
Sophomore	213 (21.4)	43.31±7.58	70.84±12.80	95.98±11.68	42.28±6.80
Junior	182 (18.3)	42.90±7.31	70.14±12.54	94.34±11.21	41.28±6.86
Senior	104 (10.4)	43.59±8.49	70.75±13.73	94.27±11.74	41.30±7.70
Big	52 (5.2)	42.77±9.81	69.65±14.44	94.65±14.45	41.44±6.88
F value		0.967	0.455	1.269	1.161
P-value		0.454	0.867	0.262	0.323
Speciality					
Medical	375 (37.7)	41.97±8.08	68.23±12.74	94.29±11.50	41.63±6.97
Education	344 (34.5)	42.96±8.09	71.82±11.63	95.42±10.94	41.91±6.09
Management	88 (8.8)	45.16±7.93	74.16±11.13	96.63±12.31	42.68±6.61
Economics	72 (7.2)	44.33±9.95	69.25±16.73	96.76±14.09	41.50±7.69
Engineering	32 (3.2)	45.59±7.02	72.13±11.59	95.63±11.54	41.66±6.20
F value		2.249	3.472	3.022	1.010
P-value		0.008	0.000	0.000	0.437
Professional choice					
Self-choice	664 (66.7)	43.24±8.23	71.78±12.35	96.04±11.27	42.44±6.54
Parents' choice	223 (22.4)	42.45±8.77	68.44±13.25	93.05±12.00	40.45±6.94
Teacher's suggestion	86 (8.6)	43.24±7.67	68.14±13.91	93.97±12.92	39.92±7.59
Friends' suggestion	23 (2.3)	45.09±6.46	70.48±11.08	88.78±20.30	43.26±6.80
F value		0.972	5.148	6.048	7.621
P-value		0.405	0.002	0.000	0.000

The results showed that there were statistically significant differences in the comparison of college students' career exploration scores in terms of different genders, whether or not they were born alone, place of residence, and majors (all $P < 0.05$); and there were statistically significant differences in the comparison of college students' career adaptability scores in terms of different genders, whether or not they were born alone, majors, and major choices (all $P < 0.05$). See Table 1.

6.4 Analysis Related to Career Exploration, Learning Engagement, Career Adaptability, and Career Calling Among College Students

Pearson correlation analyses of the total scores of career exploration, learning engagement, career adaptability and career calling found that career exploration was significantly positively correlated with career adaptability and its dimensions, and significantly positively correlated with learning engagement, career calling and its dimensions; learning engagement and career calling were significantly positively correlated with career adaptability; and there was also a significant positive correlation between learning engagement and career calling (all $P<0.05$). See Table 2.

Table 2: Correlation analysis (r-value) of career exploration, study commitment, career adaptability, and career calling among college students in Shaanxi Province in 2023

Items	1	2	3	4	5	6	7	8	9	10	11	12	14
1.Career exploration	1.00												
2.Career confidence	0.48[a]	1.00											
3.Career curiosity	0.51[a]	0.72[a]	1.00										
4.Career control	0.45[a]	0.71[a]	0.77[a]	1.00									
5.Career concern	0.49[a]	0.63[a]	0.73[a]	0.68[a]	1.00								
6.Career adaptability	0.55[a]	0.86[a]	0.91[a]	0.90[a]	0.86[a]	1.00							
7. Emotional engagement	0.52[a]	0.66[a]	0.54[a]	0.56[a]	0.52[a]	0.64[a]	1.00						
8. Cognitive engagement	0.54[a]	0.62[a]	0.52[a]	0.49[a]	0.53[a]	0.61[a]	0.79[a]	1.00					
9.Behavioral engagement	0.50[a]	0.53[a]	0.42[a]	0.42[a]	0.41[a]	0.50[a]	0.67[a]	0.68[a]	1.00				
10.Learning engagement	0.58[a]	0.68[a]	0.56[a]	0.55[a]	0.54[a]	0.66[a]	0.92[a]	0.92[a]	0.85[a]	1.00			
11. Altruistic contribution	0.38[a]	0.41[a]	0.41[a]	0.39[a]	0.41[a]	0.46[a]	0.38[a]	0.40[a]	0.36[a]	0.42[a]	1.00		
12. Orientation	0.41[a]	0.37[a]	0.36[a]	0.35[a]	0.37[a]	0.41[a]	0.38[a]	0.41[a]	0.36[a]	0.43[a]	0.46[a]	1.00	
13. Meaning and value	0.46[a]	0.47[a]	0.50[a]	0.47[a]	0.49[a]	0.55[a]	0.44[a]	0.45[a]	0.40[a]	0.48[a]	0.62[a]	0.57[a]	
14. Career calling	0.50[a]	0.49[a]	0.50[a]	0.47[a]	0.50[a]	0.55[a]	0.48[a]	0.50[a]	0.45[a]	0.53[a]	0.80[a]	0.86[a]	1.00

6.5 Regression Analysis and Mediation Effect Test

We utilized Model 4 within the PROCESS software package. This application aimed to scrutinize the mediating paradigm and delve into the nexus between career exploration's impact on career adaptability, concurrently elucidating the involvement of learning engagement and career calling therein. As illustrated in Table 3, professional inquiry demonstrates a positive predictive association with career adaptability, alongside learning engagement, and career calling. When career adaptability was used as the dependent variable and career exploration, learning engagement, and sense of career calling were included in the regression equation at the same time, the equation of career exploration on career adaptability was still significant, indicating that learning engagement and sense of career calling mediated the relationship between career exploration and career adaptability.

Table 3: Mediation model test of study commitment, career calling between career exploration and career adaptability among college students in Shaanxi Province in 2023

dependent variable	independent variable	R^2	F	B	β	t
career adaptability	career exploration	0.30	419.54	0.39	0.55	20.48[a]
learning engagement	career exploration	0.34	506.46	0.54	0.58	22.51[a]
sense of career calling	career exploration	0.25	330.84	0.45	0.50	18.19[a]
career adaptability	career exploration	0.51	341.37	0.13	0.18	6.24[a]
	learning engagement			0.33	0.42	14.61[a]
	sense of career calling			0.19	0.24	8.83[a]

Notes: [a]$P<0.01$.

The mediation effect analysis's findings were as follows (see Table 4). With an effect value of 0.178, the 95% confidence interval for path 1: career exploration, learning engagement, and career adaptability was [0.137, 0.224], meaning that it did not contain 0. This suggests that the mediation effect was substantial. With an effect value of 0.087, the 95% confidence interval for path 2: career exploration, career calling, and career adaptability was [0.057, 0.117], meaning that it did not contain 0. This suggests that the mediation effect was substantial. A total of 45.29% of the path was accounted for by the mediating effect of path 1, and 22.14% was accounted for by the mediating effect of path 2. A significant direct effect is indicated by the 95% confidence interval [0.088, 0.169] for the direct effect of career exploration on career adaptability, which does not contain 0. Hence, the relationship between career exploration and career flexibility is mediated by learning engagement and career calling.

Table 4: Analysis of the mediating effects of learning engagement and career calling between career exploration and career adaptability among college students in Shaanxi Province in 2023

path	Effect Values	Bootstrap standard error	95% CI lower limit	95% CI upper limit	Relative effect value (%)
career exploration → learning engagement → career adaptability	0.178	0.022	0.137	0.224	45.29%
career exploration → career calling → career adaptability	0.087	0.015	0.057	0.117	22.14%
Total mediation effect	0.265	0.023	0.221	0.311	67.43%
Direct Effect	0.128	0.021	0.088	0.169	32.57%
Total effect	0.393	0.019	0.356	0.431	

7. Discussion

7.1 The Relationship between Career Exploration, Career Adaptability, Engagement in Learning and Career Calling Among College Students

The results of this study found a significant positive correlation between career exploration and career adaptability (r=0.55, P<0.01), validating Hypothesis 1, which is consistent with the results of the literature (Ran et al., 2023). The reason for this may be that individuals with higher levels of career exploration are more aware of self-relevant career and environmental information and have more theoretical experience in adapting to various situations. Career exploration was significantly and positively correlated with learning engagement (r=0.58, P<0.01), suggesting that individuals exploring information about their future careers may influence their current learning status and increase their behavioral engagement. The reason for this may be that for college students, career exploration focussed on one or a few careers may make it easier to perceive the connection between their current education and future careers, establish specific learning goals, and correspondingly increase the level of learning engagement (Wong & Kaur, 2018). This study also found a significant positive correlation between career exploration and career calling (r=0.50, P<0.01), indicating that the more active the career exploration, the stronger the individual's career calling. There was also a significant positive correlation between career calling, learning engagement, and career adaptability, which is consistent with the results of the literature (Datu et al., 2021), suggesting that a high level of career calling promotes students' career adaptability, as well as their learning engagement (Chen & Zhang, 2023).

7.2 Analysis of Parallel Mediating Effects of Learning Engagement, Career Calling

The results of this study found that study input and career calling all play a mediating role between career exploration and career adaptability, which verifies hypothesis 2. college students' study input has a partial mediating role between career exploration and career adaptability, with an indirect effect size of 45.29%, which may be due to the fact that college students enhance their self-knowledge and career orientation through in-depth study of knowledge related to their majors, thus more This may be due to the fact that college students enhance their self-knowledge and career orientation ability through in-depth study of knowledge related to their majors, thus planning for the future more effectively and improving their adaptability and flexibility in facing career challenges. College students' sense of career calling has a partially mediating effect between career exploration and career adaptability, with an indirect effect of 22.14%, which may be attributed to the fact that college students' strong sense of career calling drives them to actively explore their careers and clarify their career directions, thus showing higher adaptability and resilience in their career paths, and facilitating their career development. According to career construct theory, students with strong career adaptability are also highly motivated to learn, and the more cognitive, affective and behavioral input students have, the more it is conducive to career competence (Yu & Li, 2015).

8. Conclusion

This study empirically found that career exploration was significantly and positively related to career adaptability, learning engagement, and career calling. Career exploration not only directly enhances career adaptability, but also indirectly promotes adaptability through the enhancement of learning input and career calling. Learning engagement serves as a mediator, indicating that career exploration stimulates learning motivation, which in turn enhances career adaptation. Meanwhile, career calling also served as a mediator, reinforcing identification with career values and promoting resilience. These findings reveal the multidimensional effects of career exploration and its importance for career success. This study provides new perspectives on career development theory, which is of practical guidance for individual career planning and resilience enhancement.

9. Limitations and Further Studies

This study explored the relationship between career exploration and career adaptability based on the perspective of career construction, and investigated the role of learning input and career calling between career exploration and career adaptability from the aspect of learning and career, which is of some significance in integrating the research in the field of academic development and career development. For students, exploring career development paths and future career planning are closely related to their degree of learning engagement, but this study only initially explored the relationship between career exploration and learning engagement, and in the future, changes in cognitive, affective and behavioral engagement can be explored at the level of breadth and depth of career exploration. Career is a multidimensional concept, and there may be some limitations in inferring only from the results of the survey study, which can be further explored in future studies using methods such as content analysis and field experiments.

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