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Research on the factors influencing the identity of Chinese doctor of education candidates

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Doctor of Education (Ed.D) candidates are facing an identity crisis, and enhancing their identity has become an urgent issue. This study applies grounded theory methodology, targeting 32 Ed.D candidates from a university in China. Data were collected through semi-structured focus groups and one-on-one interviews, and analyzed using Nvivo11, following open, axial, and selective coding processes. The study found that cognitive tendency, doctoral motivation, emotional experience, and professional identity are the subjective factors influencing Ed.D candidates' identity. Learning environment, training model, relationship network, and development opportunity are the objective factors. Based on these findings, the study analyzed the deep-seated relationships between influencing factors and identity, establishing a model of influencing factors. Finally, targeted and systematic strategies to enhance the identity of Ed.D candidates were proposed based on the research conclusions.

The Doctor of Education (Ed.D) originated in the United States, with Harvard University awarding the world's first professional degree in education in 1921. In 2008, the 26th meeting of the Academic Degrees Committee of the State Council approved the establishment of the Ed.D degree program. In 2010, 15 universities, including Peking University, Tsinghua University, and Beijing Normal University, began piloting Ed.D training programs. However, the Ed.D has overly transplanted the traditional PhD training model, leading to a high degree of similarity and no essential difference between the two. The Ed.D is supposed to emphasize its professionalism, but this is not the case. The introduction of the Ed.D merely extended doctoral degrees to practitioners outside universities for the first time, yet it neither contributed to academic production like the PhD nor truly promoted practical transformation[1]. In students' minds, the professional doctorate is far less prestigious than the PhD. Applicants for doctoral degrees continuously question the status and reputation of the professional doctorate, while current students worry about the qualification and status of the professional doctorate. Within the academic community, the Ed.D is often not even recognized as a genuine doctoral degree[2]. The cultivation of Ed.D candidates faces an identity crisis[3,4].

With the advancement of society and education, rigorous Ed.D training has become a pivotal approach to fostering innovation in teacher education and facilitating career growth for educational administrators. It also represents a significant effort towards deepening graduate education reform. The 'Professional Degree Graduate Education Development Plan (2020–2025)' aims to significantly increase the number of doctoral graduates by 2025, with a particular emphasis on clinical medicine, engineering, and education[5]. The training program focuses on cultivating highly skilled professionals with practical expertise in education. However, similar to many Western countries, doctoral education candidates in China face an identity crisis, raising concerns about the overall quality of their training[6].

The concept of identity was initially proposed by Erikson, a psychologist who posited that identity encompasses answers to three fundamental questions: "Who am I?", "Who are others?", and "How do others perceive me?"[7]. At its core, identity represents an individual's subjective affirmation of their affiliation with a particular group[8]. The development of one's identity not only promotes academic motivation among Ed.D candidates but also enhances their sense of belonging and achievement, playing a crucial role in their educational training[9]. An identity crisis manifests primarily as feelings of anxiety, confusion, and dissociation from one's own sense of self, indicating a profound lack of direction and existential presence[10]. Cultivating the identities of Ed.D candidates while preventing identity crises is thus an essential mission within professional doctoral education[11]. Consequently, it becomes imperative to explore the factors influencing the formation of identities among Ed.D

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candidates. The research questions of this study include two: (1) What are the influencing factors of identity for Ed.D candidates in China? (2) What is the mechanism of action of these influencing factors?

Literature review
Identity
Overall, academic research on identity primarily focuses on three aspects. First is the analysis of the connotations and dimensions of identity. For example, Delahunty found that identity is formed and driven within social contexts, characterized by complexity, dynamism, and multifaceted nature, and is constructed through language[12]. Mantai indicated that the identity of doctoral candidates is determined by their roles and responsibilities, and the synergy between teaching and research can enhance their identity[13]. Zambo et al. conducted a survey to examine the differences in identity among Ed.D candidates as learners, leaders, and action researchers, finding no significant differences between freshmen and graduates[14]. Chapman and Pyvis identified five dimensions of identity: negotiated experience, community membership, learning trajectory, multi-membership relationships, and the relationship between local and national contexts[15]. The second aspect is the process and methods of identity. For instance, Boncori and Smith discovered through ethnographic methods that effective emotional management (self-doubt, stress, anxiety, pride, loneliness) and critical reflection contribute to identity[16]. Keefer, through narrative research, highlighted that overcoming isolation, lack of confidence, and research bias during the identity transition is crucial for establishing doctoral identity[17]. Barnard pointed out that multiple identities are organized within the self based on their relative prominence, determining how identity is formed in specific situations[18]. The third aspect is the study of factors influencing identity. For example, Smith et al. found that activities involved in the doctoral experience (related to dissertations, institutions, and family life) can promote identity[19]. Dowling and Mantai explored the relationship between the identity of Ed.D candidates and learning spaces, emphasizing the importance of recognizing the campus as a physical space[20]. Hall and Burns examined the relationship between doctoral students and their advisors. Their study found that the success or marginalization of doctoral students depends on the extent to which they attempt to adopt the identity valued by their advisors. In light of this, they argue that advisors must understand and consider identity formation, as this aids in the socialization of doctoral students' identities. Designing appropriate formal curricula helps students understand their identity[21].

Scholarly identity
Scholarly identity is a core component of the identity of Ed.D candidates. Existing research has explored the significant role and influencing factors of scholarly identity through action research, theoretical analysis, and other methods. Meuleners et al. surveyed 180 doctoral graduates and found a positive correlation between their social relationships during their studies and their willingness to remain in academia after graduation. Scholarly identity played a mediating role in this relationship[22]. Pappa et al. conducted in-depth interviews with 11 international education science doctoral students, revealing that while academic pressure is generally seen as a negative factor, most participants viewed it as a motivating force. When academic pressure is perceived positively, it can enhance scholarly identity and professional development[23]. Cotterall examined the experiences of six international doctoral students in Australia, focusing on how different individuals, events, and interactions influence their self-awareness as researchers. The study found that doctoral students with weaker cultural capital require more support[24]. Carra et al. conducted an action research project titled "Growing Academically," studying the experiences of 13 scholars in developing their scholarly identity. Through iterative and inductive qualitative data analysis, the study highlighted the significant role of both personal and macro factors, such as individual potential, collaboration, and support[25]. Mu et al. investigated the impact of the internationalization trend in current doctoral programs on scholarly identity from a cosmopolitan perspective, finding that the internationalization of doctoral programs complicates scholarly identity[26]. Leach, using autobiographical ethnographic poetry, examined the stagnation in scholarly identity among part-time doctoral students by reflecting on her fragmented identity. The study underscored the importance of the emotional dimension in forming scholarly identity[27]. Langum and Sullivan analyzed doctoral students' academic writing narratives to explore how they use their experiences to create productive learning strategies and resources. The study revealed the importance of virtual communities in scholarly identity[28]. Norris posited that scholarly identity is formed through the contrast with pre-graduate study identities, highlighting that conflicts in identity arise from the difficulty in balancing the values of teaching and becoming effective researchers. This shift from specific to general and from experience to theory disrupts their relationship with theory and practice[29].

Identity of Ed.D candidates
A review of the literature reveals that existing research focuses on the importance of identity for Ed.D candidates, the components of Ed.D identity, and the factors influencing identity. Akerlof and Kranton used a mixed-methods approach to reveal that identity can influence personal behavior (e.g., individual behavior, economic behavior, political behavior, and psychological behavior). They argued that identity is the foundation of behavior and a key internalized part of personal learning values[30]. Colbeck, based on identity theory, pointed out that integrating the multiple identities of Ed.D candidates, enhancing identity synergy, and improving identity recognition are crucial for increasing their productivity and well-being[31]. Chapman and Pyvis used a qualitative case study approach to collect data from students pursuing Ed.D degrees in Hong Kong. After analysis and synthesis, they described identity recognition as a series of dilemmas in students' educational experiences, including a sense of belonging, educational goals, learning style preferences, and relationships with supervisors[32]. Bakera and Lattuca combined network theory and the sociocultural perspective on learning to reveal the process of identity change during doctoral study and constructed a comprehensive conceptual framework. They suggested that identity recognition must be both internalized and externalized[33]. Buss employed a mixed-methods

approach to study the evolution of the threefold identity of Ed.D candidates as learners, leaders, and research professionals (RPs). The results indicated that over time, students enhanced or developed these identities, with the "RPs" identity experiencing substantial growth and change compared to the development of the "learner" and "leader" identities[34]. Taylor argued that the learning process for Ed.D candidates is a complex intellectual and critical educational endeavor characterized by unresolved tensions. His research revealed that university mentors' pedagogy, curriculum, and environment can influence the identity recognition of Ed.D candidates[35]. Crossouard and Pryor found through case studies that integrating similarities and differences into formative assessment development has significant value, and they suggested that assessment and feedback can impact identity recognition[36]. Olson and Clark developed and implemented signature pedagogy, and their qualitative research showed that this pedagogy could distinguish between existing Ed.D and PhD programs, demonstrating its substantial value[37]. McAlpine et al., after collecting data from Canada and the UK, found that activities are crucial for the development of doctoral students' identities. They categorized these activities into three types: formal activities, semi-formal activities, and informal activities[38]. Leshem, using an inductive narrative approach, studied the experiences of professional degree doctoral students and revealed the role of supervisors in enhancing doctoral students' learning motivation, independence, and identity recognition[39]. Research has shown that cognitive tendency can adaptively modulate the academic stress faced by Ed.D candidates. This modulation mediates the relationship between academic stress and negative emotions, thereby influencing their identity[40].

The current study

In summary, existing research often employs quantitative, ethnographic, and narrative descriptive methods to analyze identity and its influencing factors. Chen pointed out that ethnographic and narrative studies are limited to "impressionistic" descriptions, lacking sufficient theoretical advancement. This limitation results in relatively plain findings, similar to quantitative research, which often fails to deeply explore the underlying causes of phenomena and thus rarely achieves a high theoretical level[41]. The grounded theory research method is a bottom-up approach to theory building. It emphasizes the systematic collection of life experience data, identifying core concepts from these collected raw materials to reflect social phenomena, and finally establishing connections between concepts to form a certain theory. This method allows for an in-depth exploration of the deeper causes of phenomena[42]. Additionally, much of the existing research focuses on educational philosophy doctoral candidates and teachers, with a lack of studies on the identity of Ed.D candidates and its influencing factors. Due to the lack of research on the influencing factors and the mechanism of action of identity recognition for Chinese Ed.D candidates, this has resulted in an incomplete body of work in this field. This study aims to address this gap. On one hand, it explores the influencing factors; on the other hand, it constructs a model of these factors. Inspired by this study, higher education departments can formulate relevant policies to enhance the identity recognition of Ed.D candidates, improve training quality, and contribute to the construction of a strong education system. Supervisors can adjust their training strategies, improve teacher-student relationships, and strengthen the management of Ed.D candidates. Ed.D candidates themselves can shift their perspectives and reduce psychological issues. This study intends to use the grounded theory method within qualitative research to deeply understand the true thoughts of Ed.D candidates and summarize the factors influencing their identity.

Methods
Research design

Grounded theory is a bottom-up approach to theory development, initially proposed by Grass and Strauss. This method places emphasis on the systematic collection of life experience data, aiming to identify core concepts from the collected original data that reflect social phenomena. Subsequently, it establishes relationships between these concepts to form a coherent theory. In line with grounded theory principles, this study conducted in-depth interviews with Ed.D candidates within their natural context, capturing their experiences and sentiments throughout their academic journey. Convenience sampling was used to randomly select 32 Ed.D candidates. This non-probability sampling method, chosen by the researcher at a specific time and location within a particular community, was designed to align with the research theme. It not only reduced the cost of the survey but also increased the convenience of conducting it. The qualitative analysis software Nvivo11 was employed as a tool for encoding the original interview data at three levels: open coding, axial coding, and selective coding. The Nvivo11 software used in this study is a licensed version legally purchased and authorized by our institution. All data coding and analysis conducted during the research were carried out within the scope of this authorization, in full compliance with relevant software usage regulations. The research protocol has been approved by the Ethics Committee of Shaanxi Normal University (Approval number: 20230907).

Research context

This study was conducted at a public university in Xi'an, Shaanxi Province, China, which is one of the first institutions in China to establish a doctoral training program for Ed.D candidates, making it highly representative. The university offers four related programs, which are well-established and facilitate data collection from students across different disciplines. The enrolled Ed.D candidates are primary and secondary school teachers and school administrators with at least five years of full-time work experience in education and related fields, notable achievements, and strong research capabilities. According to the training program, Ed.D candidates are required to have at least one year of full-time study, with the remaining three years being flexible for part-time study while working. This structure often leads to a common work-study conflict. To obtain their degree, candidates must publish two papers in CSSCI journals. If this condition is not met, other criteria can be substituted, but these alternatives are also demanding, such as publishing a monograph of over 100,000 words or receiving a national-level honor.

Participants

This study focuses on Ed.D candidates as the research subjects. A total of 32 Ed.D candidates were interviewed, with 2 individuals participating in pre-interview offline focus groups to refine the interview outline. The remaining 30 participants underwent formal interviews conducted through a combination of face-to-face interactions and online in-depth discussions. Following theoretical saturation principles, coding was performed on randomly selected data from 20 out of these 30 participants while data from the remaining 10 individuals were utilized for theoretical saturation testing purposes. These 20 students represent various grades (first to fourth) within a university located in western China and encompass four different majors within education studies; comprising of 7 males and 13 females. From the perspective of proportion, the sample selection is relatively comprehensive and representative. Table 1 presents detailed demographic information about each respondent using unique identifiers ranging from T1 to T20.

Data collation

The semi-structured interview framework was developed by reviewing existing literature and incorporating suggestions from experts and scholars. Additionally, we randomly selected two respondents for a pilot survey, and based on their feedback, we made improvements to the initial interview framework. This process led to the finalization of the formal interview framework. It is evident from the existing literature that identity is a dynamic, multifaceted, and complex construct, closely intertwined with educational settings, occupations, disciplines, and teacher-student relationships. Identity development encompasses four distinct processes: identity imagination, identity acquisition, identity experience, and identity choice. To design the interview protocol for this research project, an extensive review of relevant literature was conducted. The interview questions were tailored to explore each of these four processes while also incorporating aspects related to educational environments, professions, disciplines, and teacher-student relationships. Additionally, participants were asked about their personal backgrounds as well as any changes they have experienced in relation to their family background throughout their doctoral studies. Follow-up questions were used to capture temporal changes over time in order to highlight the dynamic nature of identity as well as its multidimensional complexity. Prior to data collection phase of this study, two Ed.D candidates participated in pre-interviews which took place face-to-face using a focused interview format. The results of the interviews were subsequently shared with experts and scholars in the field. Experts posit that pivotal events can serve as transformative milestones for identity formation, thus emphasizing the need for a more comprehensive exploration of such key events. In accordance with their recommendations, the interview outline was revised to encompass various dimensions. Subsequently, this refined interview outline was employed to conduct interviews with the remaining Ed.D candidates. The questions incorporated within the interview outline primarily encompass six domains: educational background, disciplinary focus, career trajectory, familial context of Ed.D candidates; pre- and post-doctoral perceptions regarding Ed.D programs; emotional experience before and after pursuing a doctorate; interactions with academic institutions, supervisors, instructors, peers during doctoral studies; post-graduation career planning aspirations; moments when a sense of belonging to Ed.D program was most or least pronounced along with underlying factors. The specific guiding questions are as follows: (1) Please introduce your educational background, discipline, profession, and family background; (2) Please recall in detail the changes in your views on the Ed.D before and after your doctoral studies; (3) What are your specific feelings after pursuing your doctoral studies? Please provide examples; (4) How were your relationships with the college, teachers, and classmates during your doctoral studies, and what influence did they have on you? (5) What has the identity of an Ed.D candidate brought you, and what are your future plans? (6) During your doctoral studies, when did you feel the strongest or weakest sense of identity as an Ed.D candidate? Please describe the events in detail. Prior to conducting interviews, I assured the participants that their personal information would be kept confidential and that the data collected from the interviews would solely be used for academic research purposes. With their consent, I proceeded to solicit their preferences, ensured audio recording during the interview sessions, and obtained informed consent through signed agreements. The interview yielded a total of over 220,000 words of data, which were subsequently imported into Nvivo11 software.

Basic information	Options	Number	Percentage
Gender	Male	7	35%
	Female	13	65%
Majors	School courses and teaching	10	50%
	Education leadership and management	7	35%
	Student education and development	2	10%
	International education of Chinese language	1	5%
Grade	One	2	10%
	Two	5	25%
	Three	5	25%
	Four	8	40%

Table 1. Basic information table ($N = 20$).

Data analysis

The original data was encoded at three hierarchical levels within the "internal materials" menu. The first step is open coding, wherein researchers aim to suspend personal and research opinions. They meticulously analyze interview texts sentence by sentence, extracting semantic blocks and creating meaningful nodes. These nodes are then merged based on their similar meanings. Following these operations, a total of 28 free nodes were generated in this study, such as "document regulations and actual training goals" and "process at the time of admission" (refer to the first column of Table 2). Secondly, axial coding serves the primary purpose of establishing organic relationships between concepts, encompassing structural relations, equivalence relations, type relations, and more. For instance, phrases like 'greater likelihood of winning competitions,' 'abundance of valuable learning and teaching resources,' 'enhanced opportunities for doctoral students to participate in conferences,' 'significantly improved status within the academic unit,' 'potential for career advancement after graduation,' as well as accolades and job promotions can collectively be summarized as the broader category of 'development opportunity facilitated by the Ed.D candidate status.' Employing this approach results in a total of eight meaningful categories through spindle encoding (refer to Table 2, column 4). Finally, the process of selective coding involves identifying the central category that serves as both a command and an explanation within the theoretical framework established through open and axial coding. This study posits that subjective factors such as cognitive tendency, doctoral motivation, emotional experience, and professional identity influence the identity formation of Ed.D candidates. Among these factors, cognitive tendency, doctoral motivation, and professional identity are pre-influencing factors while emotional experience are post-driving factors. Objective influences on identity formation include learning environment, training model, relationship network, and development opportunity. Of these objective influences, learning environment and training model serve as guaranteeing influencing factors while relationship network and development opportunity play important roles in shaping identity." The interview data was concurrently coded by the two researchers, and the coding comparison revealed a coding consistency exceeding 87%, indicating high agreement. Inconsistencies were resolved through negotiation between the researchers. Subsequently, 12 respondents were contacted to assess the coding results, and all of them confirmed that their true feelings were accurately reflected in the coding outcomes.

Open coding			Axial coding	Selective coding
Node name	Sources number	Node reference number		
Documented and practical training objectives	8	8	The training model	Training model Learning environment Development opportunity Doctoral motivation Cognitive tendency Relationship network Professional identity Emotional experience
The admission process	7	7		
The level of teachers	2	2		
The curriculum system of Ed.D	11	12		
Teaching and learning in real situations	5	5		
Thesis requirements for Ed.D	7	8		
Physical learning environment at home and in school	5	6	Different learning environment	
Independent and group learning environment	3	4		
Competitions are easier to win	2	2	The development opportunity brought by the status of Ed.D in education	
Rich learning and teaching resources	3	4		
More opportunities to attend conferences as a Ed.D candidate	2	2		
The status of the unit is imperceptibly improved	10	10		
You have the choice to move up after graduation	8	9		
Awards and promotions	3	4		
The motivation of doctoral study is utilitarian	14	15	Motivation to get a Ed.D	
Come with an ideal and a sense of mission	12	14		
Ed.D on the presupposition of graduation outcomes	7	8	Expectations for academic outcomes	
The position of Ed.D on their own roles	4	4		
Assumptions about the input of Ed.D	5	5		
Classmates encourage and learn from each other	3	3	The relationship supervisors, teachers, peers, and classmates	
Regular and irregular groups communicate	9	10		
Conduct academic discussions with tutors and teachers	11	11		
Share reports at academic conferences at home and abroad	2	2		
To Ed.D on their professional cognition	4	4	To understand their profession	
The degree of match between personal preference and major	2	2		
Comply with and violate professional regulations	2	3		
The process of studying was smooth and enjoyable	4	4	Aware of their emotional states	
Always in a state of anxiety and insecurity	6	7		

Table 2. Coding scheme with three levels.

Researchers' role

The members of the research team all have a background in educational technology, with extensive experience in both quantitative and qualitative research, which ensures the reliability of the research design. In terms of the research field, the team has long been dedicated to studies in the field of basic education, with limited expertise in higher education, which may lead to insufficient depth in the interpretation of the research results. Since all the research team members belong to the same institution, convenience sampling was used during data collection, which may result in a narrow distribution of the research sample, reducing the generalizability of the findings. Moreover, the research team members themselves may have certain biases toward Ed.D candidates, which could influence the interview process, such as the tone and attitude during conversations.

Results

Through the three levels of coding in grounded theory, we found that training model, learning environment, development opportunity, doctoral motivation, cognitive tendency, relationship network, professional identity, and emotional experience influence the identity of Ed.D candidates. This study defines the relationship framework between these eight influencing factors and identity as the model of factors influencing Ed.D candidates' identity.

Analysis of influencing factors

Training model

 The training model of the school serves as a tangible manifestation of the Ed.D' training program and their identity orientation in practice, thereby delineating their distinction from other types of doctoral students. Proximately 70% of Ed.D candidates stated that differences in training model can clearly reflect their uniqueness, thereby influencing their recognition and acceptance of their own identity. For example, T4 stated: "Our courses are a combination of theory and practice, which helped me adapt quickly. The courses for Ed.D candidates should be taught this way, which also aligns with national regulations."If the training model deviates from the predetermined identity positioning outlined in the official document, it may lead to a significant decline in the professional standing of Ed.D, potentially resulting in their being labeled as deceptive practitioners. For example, T12 stated: "Just like them (PhD candidates), the admission process is the same, we attend classes together, have the same teachers, and there is very little practical work. What's worse is that the graduation requirements (thesis) are also the same. I even feel like I am in the wrong program."

Learning environment

The learning environment of Ed.D candidates is diverse, encompassing various settings such as schools (including dormitories, libraries, and laboratories), families, units, and other scattered locations. 80% of Ed.D candidates stated that within the school learning environment, they can distinctly feel a strong learning and academic atmosphere. This sense of belonging to the identity of an Ed.D candidate is particularly strong in a collective learning environment. For example, T1 stated: "Studying in the school library has significantly improved my progress. Everyone around me is studying, so you have to study too. After all, we are students first. If I were at my workplace, I wouldn't be able to study due to the many tasks. I wouldn't feel like a student at all."Once they depart from the academically focused school environment, their sense of belonging to their scholarly identity diminishes. For example, T8 stated: "Since returning to work after taking a leave of absence, I've been overwhelmed with tasks from both my workplace and home. I completely lost the motivation to study and didn't feel like an Ed.D candidate at all, but rather like a temp worker (moving wherever needed). It is only during the winter and summer breaks, when I return to school to study, that I regain that feeling of being an Ed.D candidate."

Development opportunity

50% of Ed.D candidates believe that their identity serves as an invisible asset, subtly providing development opportunity for those who are both teachers and administrators. This, to some extent, brings them a sense of accomplishment, thereby enhancing their identity as Ed.D candidates. For example, T5 stated: "This year, my unit was selecting municipal-level key teachers. Under the same conditions, the leadership considered my identity as an Ed.D candidate and saw me as a promising candidate, so they gave me the spot. This gave me a great sense of achievement and made me feel that my efforts to pursue a doctorate were not in vain. I am increasingly appreciating this identity." In addition to the imperceptible enhancement in unit status, it becomes more convenient to assess accolades, select honors, and advance positions. For example, T9 stated: "In the past, wanting to attend a conference required several layers of selection by the school, and even then, it wasn't certain that I could go. With my identity as an Ed.D candidate, I no longer need the leader's signature to attend conferences, and the organizers are very welcoming of our participation. This is something that regular teachers cannot achieve." Furthermore, the elevation of Ed.D' identity is also manifested through an expanded array of options. Furthermore, the expansion of choice is also evident in the increased upward mobility of graduation. T9 continued: "After graduation, I have the freedom to stay or leave as I please. Regular teachers still have to consider the principal's approval."

Doctoral motivation

The motivation of Ed.D candidates can be categorized into extrinsic and. intrinsic motivations. Approximately 30% of older Ed.D candidates, who have already attained senior professional titles and the highest honors in their field, choose to pursue a doctorate to fulfill personal dreams. They have strong intrinsic motivation. Their motivation is relatively straightforward, and their identity of Ed.D is primarily reflected in the title of "doctor." This group of Ed.D candidates with strong intrinsic motivation has relatively stable identity, which is less likely to be influenced by others and the environment. In contrast, Ed.D candidates with strong extrinsic motivation

have very fragile identity, which can easily be diminished by real-world challenges. For example, T15 stated: "I've heard that some universities don't highly regard the Ed.D degree. I was hoping to teach at a university with this degree, but it seems that the degree isn't very well recognized."

Cognitive tendency
The cognitive tendency refers to the conceptualization of Ed.D' roles, the assumption of graduation outcomes, and the anticipation of potential investments, encompassing positive or negative expectations towards doctoral studies, which manifest in two inclinations: optimism and negativity. 65% of Ed.D candidates believe that an optimistic cognitive tendency helps enhance their identity, while a pessimistic cognitive tendency weakens it. For example, T3 stated: "I see myself as an action researcher. As long as I continue doing this, I am confident that I can get my articles published in CSSCI journals. I don't engage in theoretical articles; those are not relevant to me." T19, however, expressed regret and remorse: "I had very low expectations for myself. I just wanted to get by for a few years and get my degree, letting others help with my articles. I didn't want to exert too much effort, and I focused mainly on my job, leaving graduation to chance. It's been almost four years, and I've accomplished nothing. Looking back, I realize my approach was very wrong, and I didn't fully understand my identity."

Relationship network
The relationship network of Ed.D candidates primarily encompasses a supervision, incentive, and learning network established with their supervisors, teachers, classmates, and peers. 80% of Ed.D candidates believe that a strong network of relationships can enrich their learning experience, mitigate the drawbacks caused by distance and class formats, and ensure the improvement of their academic and practical skills. This, in turn, promotes their identity. For example, T6 stated: "I was able to publish three articles (SSCI) within two years, thanks entirely to my mentor team and the classmates I stayed in contact with. Our work is usually very busy, and I didn't feel like writing articles, but my mentor team and classmates always encouraged me. We discussed our next steps with clear goals. I didn't want to fall behind. Initially, others pushed me forward, and later, I helped guide my junior colleagues, which gave me a great sense of achievement." A robust network of relationships plays a pivotal role in cultivating the identity of Ed.D candidates. However, bad network will reduce the identity of Ed.D candidates. T20 described it this way: "I feel like an abandoned child, with no group meetings or interactions, completely figuring things out on my own. Since I am inherently introverted, I rarely communicate with my mentor, colleagues, or classmates. There are many people I don't even know. I envy others who can present their work at academic conferences, but I can't do that. I feel like I don't deserve to be called an Ed.D candidate."

Professional identity
The professional identity of Ed.D refers to their cognitive and internal understanding of their own role and identity, which significantly influences their external performance and development approach within the field. It serves as an intrinsic driving force behind the formation of Ed.D' professional identity. During the interview, 50% of Ed.D candidates believe that professional identity is highly correlated with their self-identity. For example, a cross-disciplinary Ed.D candidate, T7, stated: "I originally studied linguistics, which is completely different from my current field. The research paradigms and modes of expression are entirely different, and I find it very challenging to keep up. Even now, I haven't adapted. I don't really like my current field. I feel very insecure and worried that I might not graduate." Another Ed.D candidate, T10, stated: "I am very satisfied with my current field, as it is a continuation of my master's degree. Many of the concepts and methods are similar, so I just need to continue my research to complete my studies. I have no concerns about graduating. I feel particularly happy, and this is the feeling that my Ed.D identity brings me."

Emotional experience
The emotional experience of Ed.D candidates primarily pertains to their emotional state during the process of doctoral research, which exhibits both individuality and subjectivity, and can be categorized into positive and negative forms. 75% of Ed.D candidates stated that when the doctoral process goes smoothly, it creates a pleasant emotional experience. This positive emotional state can enhance their identity. For example, T11 stated: "My mindset during the doctoral process was very steady. I didn't compete or rush; I focused on studying calmly. By the end of my first year, my article was accepted. I didn't have the same anxiety as others and proceeded step by step. I really enjoyed pursuing this Ed.D. It reinforced my academic identity. As long as I maintain this approach, I am confident I can become a leading scholar." However, when negative emotional experience become predominant, the extent of Ed.D candidates' identity is significantly diminished. For example, T13 stated: "I don't know why I feel anxious. Maybe it's because my article hasn't been published yet—you know it's a long process. Or perhaps it's because I haven't achieved my small goals. This anxiety peaked during the pandemic. To be honest, I somewhat regret pursuing this Ed.D; it's really been a struggle."

Influencing factor model
Based on the aforementioned analysis, this study constructs a conceptual framework illustrating the determinants influencing the identity formation of Ed.D candidates, as depicted in the Fig. 1.

The identity of Ed.D candidates is influenced by a combination of subjective factors, including cognitive tendency, doctoral motivation, emotional experience, and professional identity. Additionally, objective external factors such as the learning environment, training model, relationship network, and development opportunity also play a role. However, it is important to note that the fundamental driver for changes in Ed.D candidates' identity lies within their internal subjective perceptions and emotions; while external objective factors may contribute to these changes to some extent.
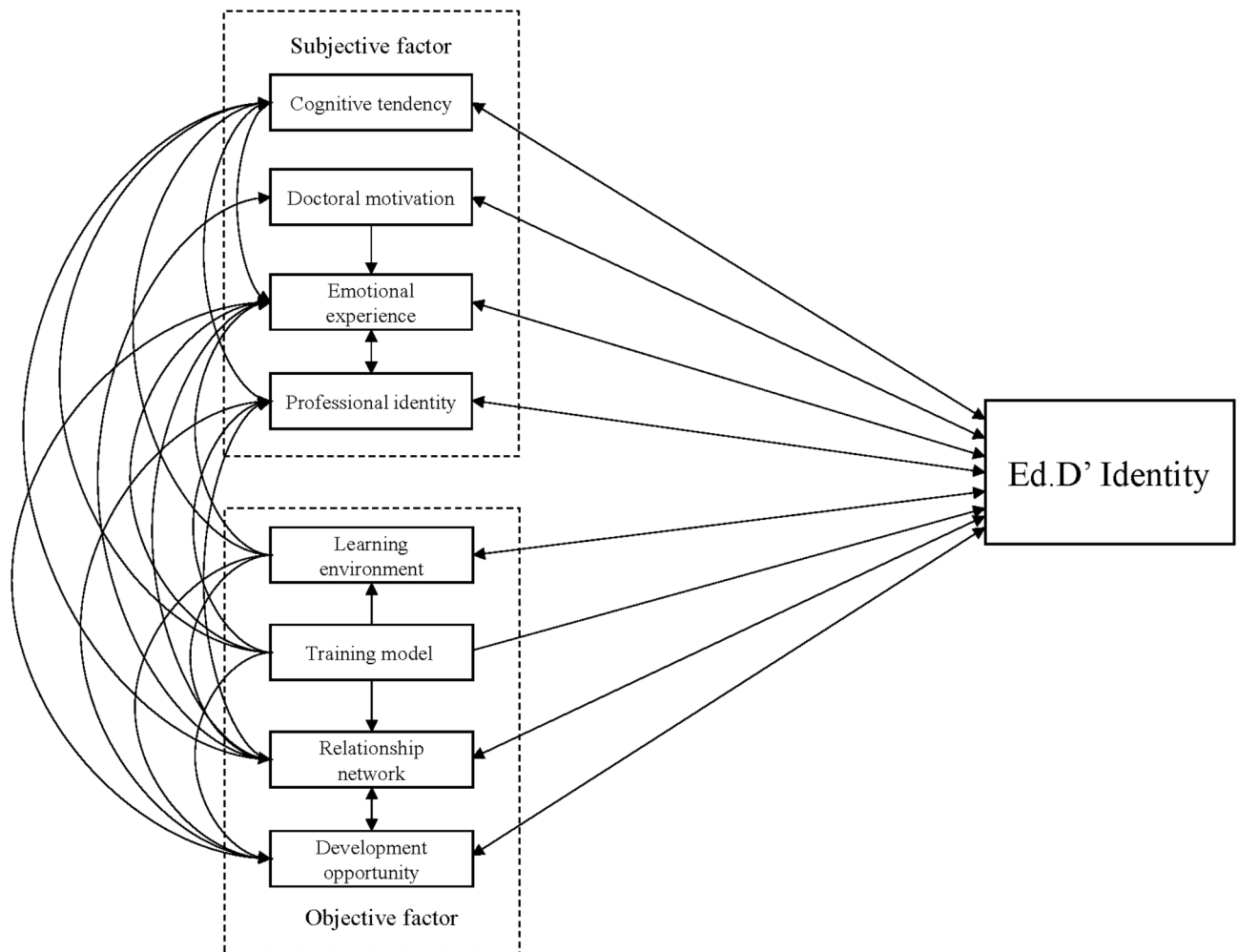
Fig. 1. Influencing factor model of Ed.D candidates' identity.

Firstly, the interplay of internal subjective factors and external objective factors contributes to the formation of identity, rather than any singular factor alone. In the interviews, 14 participants expressed similar views. For example, T16 said, "This is not something I can decide on my own." (1) Cognitive tendency, doctoral motivation, and professional identity serve as pre-influencing factors that partially determine the level of recognition and acceptance among Ed.D candidates. When Ed.D candidates have an optimistic cognitive tendency, strong intrinsic motivation for pursuing their doctorate, and high professional identity, their identity will be at a higher and more stable level. (2) Emotional experience act as subsequent influencing factors that shape the degree of contentment regarding one's identity among Ed.D candidates. Positive emotional experience play a pivotal role in bolstering the Ed.D identities of these individuals. (3) The learning environment and training model, as crucial factors, significantly influence the sense of belonging and recognition among Ed.D candidates. A school's conducive learning environment and a collaborative collective learning atmosphere support a stronger sense of identity among Ed.D candidates. Moreover, adherence to policy provisions in the training model enhances their recognition of their professional identity. (4) Development opportunity and relationship network, as pivotal influencing factors, determine the sense of accomplishment and belongingness experienced by Ed.D candidates within their professional identity. Increased development opportunity contribute to a heightened sense of accomplishment, while stronger relationship network supports a deeper sense of belonging.

Secondly, based on the research findings, external subjective factors affect internal objective factors, and then act on the identity of Ed.D candidates, that is, external factors act through internal causes, and internal causes act as mediating or regulating factors. In the interviews, 11 participants expressed similar views. For example, T5 said, "I can't focus; there are too many distractions at work." (1) Learning environment affects cognitive tendency and emotional experience. Cognitive tendency and emotional experience are themselves inextricably linked to learning situations, so it is not surprising that the learning environment has an impact on both. (2) The training model affects the professional identity, emotional experience and cognitive tendency of Ed.D candidates. The teaching teachers, teaching methods, curriculum system and thesis requirements involved in the training model are compared with the internal views and positioning of Ed.D candidates on the major, which will further affect their professional identity and cognitive tendency. In the process of assimilating or rejecting these requirements, Ed.D candidates' explicit behavior will gradually reveal their internal outcomes, subsequently

leading to a specific emotional experience. (3) The relationship network plays a significant role in influencing the cognitive tendency, motivation, emotional experience, and professional identity of Ed.D candidates. Continuous communication with tutors, teachers, classmates, and fellow students can alter the cognitive tendency of Ed.D candidates as well as their motivation and professional identity while eliciting diverse emotional experience. (4) Development opportunity can influence Ed.D candidates' professional identity and emotional experience. Achievement opportunities such as awards, evaluations, and speaking engagements provide positive emotional experience that reinforce professional recognition.

Thirdly, based on the research findings, the interaction between subjective and objective factors influences the formation of Ed.D candidates' identity. In the interviews, 8 participants expressed similar views. For example, T17 said, "It would be great if someone knowledgeable in statistical methods were around to help me." (1) The learning environment plays a crucial role in shaping the relationship network and providing development opportunity for Ed.D candidates. Different learning environment vary in terms of network density, intensity, and access to learning resources. (2) The learning environment influences the development opportunity for Ed.D candidates by influencing their information acquisition process, leading to diverse behaviors and results. (3) Additionally, the training model partially determines the learning environment as well as the relationship network and development opportunity available to Ed.D candidates. (4) Furthermore, personal connections within networks create favorable conditions for expanding development opportunity for Ed.D candidates while simultaneously broadening their relationship network through mutual promotion. (5) The emotional experience and professional identity of Ed.D candidates are influenced by cognitive tendency. Ed.D candidates with optimistic cognitive tendency are less prone to depression and anxiety, and more likely to develop a strong sense of professional identity. (6) The emotional experience of Ed.D candidates is influenced by their motivation levels. Ed.D candidates with strong intrinsic motivation typically have more steadfast willpower and positive, stable emotional experience. In contrast, those with strong extrinsic motivation are more likely to experience negative and "roller-coaster" emotional experience. (7) There is a reciprocal relationship between emotional experience and professional identity. Emotional experience can explicitly or implicitly influence the cognitive tendency of educational stakeholders, while emotional experience and cognitive tendency are inherently interconnected.

Finally, from the results, identity, as a dependent variable, will subsequently emerge as an independent variable and exert influence on the aforementioned seven factors (seven factors remain constant due to the unchanging nature of the training model for Ed.D candidates). In the interviews, 10 respondents expressed a similar view. For example, T11 stated, "As Doctor of Education students, we are the bridge between theory and practice. As long as we deeply engage in the field, we are sure to achieve greater success." (1) Identity influences cognitive tendency. The higher the identity of Ed.D candidates, the more optimistic their cognitive tendency tends to be. (2) Identity plays a pivotal role in doctoral motivation. While the impetus behind pursuing a doctoral degree may initially be utilitarian in nature, it is not immutable. A heightened sense of identity can guide Ed.D candidates towards transforming their utilitarian motivations into simpler idealistic aspirations such as becoming experts in the field of educational practice. (3) Identity plays a crucial role in shaping the emotional experience of Ed.D candidates. The transformation of one's identity also leads to corresponding changes in their emotions. (4) Identity significantly influences the professional development of Ed.D candidates in the field of education. A higher level of identity supports greater recognition and acceptance of professional values and norms among Ed.D candidates. (5) Identity serves as a driving force behind the selection of learning environment by Ed.D candidates. (6) Identity influences relationship network. The more individuals recognize their own identity, the more they will focus on building their personal relationship network. (7) Identity plays a pivotal role in creating opportunities for personal growth and development among Ed.D candidates who possess a high level of self-identity; this enables them to readily seize passing opportunities.

Discussion

Based on the interview materials collected in a real-life setting, the research methodology of grounded theory is employed to uncover the factors influencing the identity of Ed.D candidates and explore their intricate relationships. The research findings are as follows: Firstly, eight subjective and objective factors (cognitive tendency, doctoral motivation, emotional experience, professional identity, learning environment, training model, relationship network, and development opportunity) collectively influence the identity formation of Ed.D candidates, this further confirms the research of Nyunt et al.[43], Thomson[44], Park and Schallert[45], Tao and Tien[46], Amezcua[47], Jeong and Kim[48], Hardy[49], and Holly[50]. Influencing factors can have both direct and indirect effects. In this process, Ed.D candidates may either enhance their identity (positive effect) or experience an identity crisis (negative effect). Additionally, identity reciprocally influences four subjective factors and three objective factors (excluding training model), This is consistent with the findings of Pretorius and Macaulay[51], Choi and Bouwma-Gearhart[52], Hong and Cross Francis[53]. Secondly, cognitive tendency, doctoral motivation, and professional identity are considered as antecedent influencing factors; emotional experience acts as a consequential influencing factor; learning environment and training model serve as supportive influencing factors; while relationship network and development opportunity play crucial roles as influential determinants. Thirdly, subjective factors exert primary influence on the identity construction of Ed.D candidates followed by objective factors which affect it through their impact on subjective elements. Fourthly, the four subjective factors along with the four objective ones also exhibit mutual influence relationships. The subjective factors identified in this study, namely cognitive tendency and emotional experience, represent significant findings distinct from previous research, which has primarily focused on doctoral motivation[54] and professional identity[55]. Objective factors have been a notable area of attention in research on the influences of doctoral identity, with existing studies highlighting the importance of learning environment[56], training model[57], and relationship network[58]. This study not only confirms the importance of these three factors but also reveals the significance of development opportunity for doctoral identity. This contributes further refinement and supplementation to

existing research. Additionally, this study not only elucidates the impact of these factors on doctoral identity but also presents the interactions between these factors. However, whether individual factors are more dominant or if their interactions are more pronounced requires further research for validation.

Implications

Firstly, optimizing the training model of the college is crucial to create additional development opportunity for Ed.D candidates and enhance their professional identity. (1) One approach is to organize a diverse range of formal and informal activities, such as academic salons and gatherings specifically designed for Ed.D candidates[59]. (2) The courses should be systematically and logically organized, teaching methods need to be revamped, and practical components of the curriculum should be strengthened. For instance, implementing action research as a course model. Furthermore, it is crucial to provide opportunities for Ed.D candidates to engage in experiential learning. (3) The third approach involves optimizing the process of paper writing and reforming its format. This can be achieved through the establishment of small, structured learning communities that provide support throughout the paper writing process. Additionally, adopting a new approach to writing papers by incorporating elements commonly found in "ordinary books," such as narratives, photos, paintings, poems, and visual documents[60], can enhance the overall quality. Furthermore, maintaining creative diaries to express emotions and thoughts serves as an effective outlet for Ed.D candidates. These measures are instrumental in adjusting cognitive tendency and enhancing emotional experience among Ed.D candidates.

Secondly, it is crucial to enhance the professional training of doctoral supervisors in the field of education, elevating their guidance skills and professionalism. This will facilitate the establishment of a strong teacher-student relationship. As supervisors, they should not only provide academic guidance but also emphasize the application of theoretical knowledge in practical settings, thereby demonstrating its value and fostering a sense of accomplishment among Ed.D candidates. A positive teacher-student relationship has a significant impact on student satisfaction, competence, self-confidence, and role effectiveness[61]. (1) In teaching, make an effort to integrate current academic trends and practical cases to conduct roundtable discussions. (2) The second objective is to establish regular group meetings for Ed.D candidates, where they can present their recent academic accomplishments or nascent ideas. Rather than assuming a supervisory role, the group meetings should primarily serve as platforms for advisory and guidance from tutors, experts, and scholars[62]. (3) We need to proactively concern Ed.D candidates and assist them in overcoming challenges related to their studies, academia, and personal lives. When supervisors are unable to directly aid Ed.D candidates or guide them towards seeking assistance through alternative channels, it amplifies feelings of frustration and negative emotions among these individuals[63].

Finally, Ed.D candidates should proactively create conducive conditions for themselves, adjust their mindset, and swiftly adapt to their scholarly identity. (1) Abandon overly utilitarian motives for pursuing a doctoral degree and connect one's research to the needs of the people. (2) They should establish an optimal learning environment by utilizing winter and summer breaks for regular study at the university library or laboratory while actively engaging with mentors, professors, and peers. (3) It is imperative to actively seek diverse opportunities for engaging in discussions and presenting our research findings. This can be achieved through participation in various academic conferences and annual meetings organized by reputable journals. It is crucial to develop proficiency in submitting articles at an early stage while accumulating valuable experience in this regard. (4) Be a committed action researcher and establish your position within the academic community[64]. Focus on studying the localized issues encountered in the school environment[65]. (5) Cultivating the ability to manage personal stress levels positively contributes towards experiencing favorable emotional states. When stress transforms into a motivating force propelling academic growth and professional development[23].

Limitations

The results of this study are limited to Shaanxi Province, China. Although data saturation was reached with 20 Ed.D candidates, the small sample size may limit the generalizability of the findings. Although convenience sampling is effective in reducing survey costs, it cannot represent a clearly defined population, which may reduce the generalizability of the research findings. Additionally, the study only employed one research method without quantitative analysis, which limits the ability to further explore the degree of influence.

Conclusion

This study explores the factors influencing Ed.D candidates' identity using grounded theory and has initially constructed a model focusing on these factors. Among the influencing factors, the subjective factors of cognitive tendency and emotional experience, as well as the objective factor of development opportunity, are novel findings compared to previous research. The influencing factors model not only explains the interactions between subjective and objective factors but also discusses the relationships among the sub-factors within these categories, providing a more comprehensive and multidimensional perspective. However, since this research is based on a small sample of in-depth interviews and has not yet undergone validation through large-scale surveys, future work should involve quantitative data analysis to verify the strength of relationships between different influencing factors in the model. This includes identifying which subjective and objective factors have a greater impact on Ed.D candidates' identity. Further exploration of the mechanisms affecting Ed.D candidates' identity will aid in enhancing their academic engagement and outcome. Secondly, the subjects of this study are limited to Ed.D candidates in Western China. The varying levels of government support provided to universities in different regions may lead to differences in research results.

Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding authors upon reasonable request.

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Author contributions
Conceptualization, L.H.; methodology, W.Z.; investigation, J.C. and M.L.; data curation, S.Z. and Z.L.; writing original draft preparation, L.H.

Declarations

Ethical approval
All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional review board at Shaanxi Normal University (Ethics approval number is 20230907) and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent
Informed consent was obtained from all subjects involved in the study.

Competing interests

The authors declare no competing interests.

Additional information

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