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Exploring the Relationships between Pre-Service Preparation and Student Teachers' Social-Emotional Competence in Teacher Education: Evidence from China

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Abstract: The role of social-emotional competence in sustaining teachers' professional development has been increasingly gaining prominence. Using Bronfenbrenner's ecological systems theory, this study attempted to explore the deep internal mechanisms of the influence of university climate on student teachers' social-emotional competence in the context of China. A cluster sampling method was used to conduct a questionnaire survey on 1776 student teachers from 20 universities in 17 provinces of China. This study uses a structural equation model to analyze the effect of university climate and basic psychological needs on social-emotional competence, which is moderated by relative deprivation. This study found that university climate has a significant positive effect on social-emotional competence; the association between university climate and social-emotional competence is mediated by basic psychological needs; relative deprivation plays a moderating role. The direct effect of university climate on social-emotional competence and the path from university climate to basic psychological needs were moderated by relative deprivation. Specifically, compared with low relative deprivation individuals, the university climate had a weaker positive effect on social-emotional competence and basic psychological needs in high relative deprivation individuals. Based on above empirical evidence, this study shed light on the mechanism for cultivating student teachers' social-emotional competence, thus improving our understanding of the sustainable professional development of teachers from an emotional perspective.

Keywords: student teachers; social-emotional competence; university climate; teachers' sustainable professional development



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1. Introduction

In recent years, quality teacher education has gradually become a new hotspot in the field of education research worldwide [1,2]. Catering to the global trend, China's government constituted and promulgated National Professional Standards for Kindergarten Teachers, Primary Teachers and Middle School Teacher, as vital foundation for teacher cultivation, training and assessment [3,4]. These documents emphasized the integration of social-emotional competence. For example, teachers are required to have the ability to cooperate with relevant personnel (such as students, parents and colleagues), pay attention to vulnerable children, respect students' background differences and properly respond to various emergencies [4]. Yet teachers' emotional literacy has not been fully valued in the process of teacher education [5].

Teachers' social-emotional competence (SEC) has an important impact on their sustainable professional development. As many studies have shown, SEC is highly important in strengthening understanding of education, shaping professional identities, taking action to deal with changing educational needs and displaying professional emotional behavior [6,7]. Moreover, SEC can exert sustainable impacts on teachers' emotional development in terms of relieving work stress, reducing job burnout and improving job satisfaction and well-being [8,9]. Additionally, SEC is a powerful aid to help teachers better face unprecedented

challenges in education [10]. However, compared to many studies on students' SEC, less is known about student teachers' or pre-service teachers' SEC. A study of the Chinese case would contribute to our understanding of student teachers' SEC in different sociocultural contexts and expand the knowledge landscape on the role of SEC in teachers' sustainable professional development.

The university climate (UC) may have a positive influence on student teachers' SEC. Pre-service preparation is an important stage in the cultivation of student teachers' SEC [11,12]. SEC cannot be taught like a piece of information, but can be shaped by edification and cultivation in daily life. Bronfenbrenner's ecological systems theory believes that the development of an individual is the result of the interaction between external environmental and internal factors (e.g., basic psychological needs, BPN) [13]. Relative deprivation (RD) refers to some individuals or groups perceiving themselves as being at a disadvantage compared to the corresponding reference group and this is coupled with the emergence of negative emotions such as anger and resentment [14]. It ought to play a moderating role between UC and BPN and between UC and SEC. Ecological systems theory includes dimensions such as the microsystem, mesosystem, exo-system, macrosystem and chronosystem. As a factor of perceptions of macrosystem [13], RD is an important variable affecting student teachers' SEC.

Studies have found a significant correlation between UC, BPN, RD and SEC, but there is a lack of research on the relationship between the four variables [15,16]. Whether there is only a direct correlation or some indirect correlation has not yet been verified and further exploration is necessary.

This study, adopting the quantitative approach, aims to explore the mechanism for cultivating student teachers' SEC and can contribute emotional insights into teachers' sustainable professional development. Findings from this study can also provide stakeholders with implications regarding the cultivation of student teachers' social-emotional competence to cater to all-round development of student teachers and high-quality development of teacher education.

2. Hypotheses and Research Objectives

2.1. University Climate and the Social-Emotional Competence of Student Teachers

UC, as a factor in the microsystem, has a positive effect on student teachers' SEC. It refers to a relatively stable property of the university environment experienced by student teachers which can affect their behavior, the formation of SEC and the development of their social adaptation [17]. From a socio-psychological perspective, UC includes three dimensions: teacher educators' support, peer support and opportunities for autonomy [18, 19].

The concept of SEC is based on the theory of emotional intelligence, which is described as a set of abilities related to social adaptation and development in complex situations, including self-awareness, self-management, other-awareness, other-management, collective-awareness and collective-management [20,21]. SEC is no longer mere work performance or personal characteristics, but these two factors integrated into each other. When a person works in different circumstances, he/she always combines specific personal competence in work tasks with the new context, in order to work more appropriately and effectively [22]. SEC is embedded in work contexts. It includes knowledge, skills, personal traits and attitudes, but it represents how individuals interact with and adapt to different, complex and changing situations to generate appropriate actions to solve different problems. Thus, SEC is not fixed and static; instead, it is always evolving and developing [23].

First, teacher educators' support in pre-service preparation can provide emotional and academic support for student teachers, promoting the development of their SEC [20]. The support from teacher educators creates an external guarantee for the awakening of subjectivity among student teachers and the promotion of the development of their self-awareness [24,25]. A harmonious teacher–student relationship also fully motivates student teachers, which has a significant impact on their self-management ability [26]. The support

from teacher educators facilitates the development of positive affective attitudes toward university among student teachers, encouraging them to become more active in social activities [27] and increasing their altruistic behavior [28,29], which helps student teachers to develop their ability to influence others. Teacher ' support promotes pro-social behavior among student teachers [30] and helps them to clarify their rights and responsibilities in the group, contributing to the development of their collective management skills. Secondly, peer support is an important factor in the development of SEC. Intimate interpersonal relationships facilitate the development of empathy [31,32], thus contributing to the development of other-awareness skills. Third, opportunities for autonomy are prerequisite for student teachers to acquire that autonomy, which significantly predicts individual social competence [33]. Social competence refers to the practice of actively seeking help from others, instead of blindly rejecting all beneficial opinions, to foster a certain quality of socially appropriate psychological and behavioral characteristics in student teachers. In addition, research on Chinese principles has shown that approaches involving transformational leadership were positively associated with teachers' SEC [34]. Wang has also shown that school climates were significantly affected by the transformational leadership of school heads [35]. Accordingly, we believe that UC may affect the SEC of student teachers. Therefore, this study proposes the first hypothesis:

H1. UC can have a positive predictive effect on student teachers' SEC.

2.2. *The Mediating Effect of Basic Psychological Needs*

BPN are the internal factors that affect student teachers' SEC. Self-determination theory proposes that there are three BPNs: the need for autonomy, competence and relatedness. The need for autonomy refers to the desire to follow one's own will to act. The need for competence refers to the desire to have opportunities to develop personal competencies. The need for relatedness refers to the desire to experience a sense of belonging within a community (e.g., at university) and to have a close relationship with community members (e.g., teacher educators and peers) [36,37].

On the one hand, environmental factors, such as UC, can meet the BPN of student teachers [38]. First, teacher educator' support promotes BPN [39]. Research has shown that the support from teacher educators meets the need for relatedness and autonomy among student teachers [40,41]. The support for teacher autonomy also promotes social competence among Chinese undergraduate students, thus meeting their need to develop competence [42]. Second, peer support in college is also important to facilitate student teachers' satisfaction with BPN. Research has shown that friendly and trusting peer support can meet student teachers' relational needs [43]. Friendly peer relationships can facilitate the development of non-cognitive skills and meet their need for competence [44]. In addition, peer relationships can promote student teachers' self-efficacy [45], making student teachers more proactive in life and supporting them in maintaining a high level of continuous effort to meet their need for autonomy. Third, student teachers' perceived opportunities for autonomous expression can contribute to satisfying their need for autonomy [46].

On the other hand, BPN can contribute to the development of student teachers' SEC. According to self-determination theory, BPN satisfaction facilitates more positive results, whereas frustration leads to poorer results [37]. When BPNs are met, individuals are more likely to establish good relationships with others, to show fewer depressive symptoms and less apathetic behavior and to experience a greater sense of meaning in life [47]. SEC is a key skill for social development adaptation and the satisfaction of BPN can promote the development of SEC. First, BPN satisfaction promotes student teachers' overall perceptions of their own value, strengths and importance, thus contributing to their self-awareness [48]. At the same time, BPN satisfaction can promote student teachers to actively regulate and control their emotions [49], which is conducive to the development of self-management skills. Second, BPN satisfaction can encourage individuals to maintain positive connections with others [50] and BPNs are also associated with altruistic behaviors [51], thus promoting the development of student teachers' ability to be aware of and to manage others. Third,

BPN satisfaction significantly and positively predicts individual pro-social behaviors, allowing student teachers to develop collective cognition and management skills in the context of group interactions [52]. According to the context–process–outcomes model, school contextual factors (e.g., UC) influence developmental outcomes (e.g., SEC) by affecting student teachers' psychological processes (e.g., BPN satisfaction or frustration) [53]. As mentioned above, UC may be an antecedent predicting student teachers' BPN and thus positively predicts student teachers' SEC. Therefore, this study proposes the second hypothesis:

H2. BPN play a mediating role between UC and SEC.

2.3. The Moderating Role of Relative Deprivation

Although UC may trigger BPN and predict SEC, individuals with high or low RD are not equally influenced by its effects. RD is a psychosocial factor that responds to the macrosystem [54]. Social comparison theory suggests for student teachers that RD, in comparison to others, may have a greater impact on individuals' development than actual deprivation [55]. Research has shown that individuals with high levels of RD are more likely to experience negative interpersonal outcomes such as mistrust, prejudice, conflict and aggression [56]. The reserve capacity mode proposes three forms of reserve capacity on which people draw during times of need: tangible resources such as money, intrapersonal resources such as self-esteem and interpersonal resources such as social support [57]. People with a high level of RD tend to have limited intrapersonal and interpersonal resources and they tend to have relatively fewer opportunities to develop new resources. As a result, they have more negative emotion and less positive emotion when coping with pressure [58], which is detrimental to SEC.

This line of reasoning suggests that RD might have a moderating role in the association between UC and BPN and between UC and SEC, with the link being stronger for student teachers with low levels of RD than for those with a high level. Namely, at the same level of UC, student teachers with low levels of RD have greater BPN satisfaction and greater SEC relative to individuals with high levels of RD. This study thus proposes the third research hypothesis:

H3. RD plays a moderating role between UC and BPN and between UC and SEC.

In sum, UC, BPN and RD are important factors related to student teachers' SEC. However, what matters for student teachers' SEC in teacher education programs and how to strengthen their SEC within such programs remains unclear. Does UC affect the SEC of student teachers directly? Is the relationship between UC and SEC mediated by BPN? Is the relationship between UC and SEC moderated by RD? Using Bronfenbrenner's ecological systems theory, this study aims to address the research gap by investigating the relationships among UC, BPN, RD and SEC. The specific research objective is to investigate the influence of UC on SEC, explore the mediating role of BPN and the moderating role of RD.

3. Methods

3.1. Sample and Data Collection

We collected data on 1776 student teachers from 20 universities in 17 provinces of China, including Beijing, Shandong, Shanxi, Fujian, Shaanxi, etc. These participants were full-time undergraduate or graduate students majoring in education who had completed their educational internship. We collected data by distributing online questionnaires to student teachers by sending a Survey Star link in December 2020. It took approximately 5–10 min to complete the questionnaire. In the guidance part of the questionnaire, we explained the purpose of the research and assured participants that the data would only be available to the research team and would be for research use only. The data were collected anonymously. All of the participants could cease participation at any time if they wished.

3.2. Measures

3.2.1. University Climate

UC was assessed by a school climate scale [18]. The school climate scale includes 25 items, with three factors: teacher support, student support and opportunities for autonomy. Participants responded to these items (e.g., “I can talk to my teachers about my problem”; “Students respect one another”; and “Students get to help decide some of the rules”) on a 4-point scale ranging from 1 = “never” to 4 = “always.” Seven items were reverse coded. The final score was the mean of the item scores, with higher scores representing more positive UC. The scale has been found to have good reliability and validity in empirical research in the Chinese context [59,60].

3.2.2. Basic Psychological Needs

BPN were assessed by a BPN scale with 15 items adapted from Johnston and Finney, with three factors: the need for autonomy, competence and relatedness [61,62]. Participants responded to these items (e.g., “I feel like I am free to decide for myself how to live my life”; “In my life I do not get much of a chance to show how capable I am”; and “I consider the people I regularly interact with to be my friends”) on a 7-point scale ranging from 1 = “strongly disagree” to 7 = “strongly agree.” Nine items were reverse coded. The final score was the mean of the item scores, with higher scores representing more adequate BPN satisfaction. The scale has been found to have good reliability and validity in empirical research in the Chinese context [63].

3.2.3. Social-emotional Competence

SEC was assessed using a scale with 22 items consisting of these factors: self-cognition, self-management, other-cognition, other-management, collective-cognition and collective-management [64,65]. Participants responded to these items (e.g., “I knew what I was good at during educational practice”; “I was able to regulate my emotions when I needed to during educational practice”; “I was able to tolerate people who had a problem with me during educational practice”) on a 5-point scale ranging from 1 = “strongly disagree” to 5 = “strongly agree.” The final score was the mean of the item scores, with higher scores representing higher SEC. The scale has been found to have good reliability and validity in empirical research in the Chinese context [64,66].

3.2.4. Relative Deprivation

RD was assessed by a four-item scale [42]. Participants answered items (e.g., “My life should be better than it is now compared to all the hard work and effort I have put in”; “Compared with others around me, I am at a disadvantage in life, work and other aspects”; “Most of the rich people in society have made their fortunes through dishonorable means”) on a 6-point scale ranging from 1 = “strongly disagree” to 6 = “strongly agree.” The final score was the mean of the item scores, with higher scores representing a higher sense of RD. The scale has been found to have good reliability and validity in empirical research in the Chinese context [67,68].

3.3. Data Analysis

We used SPSS 26.0 and AMOS 23.0 to assess the measurement model. AMOS 23.0 was employed to conduct Confirmatory factor analysis (CFA) to assess the construct validity, discrimination validity and convergent validity of the measurement model. Several model-fit indices were employed, including root mean square error of approximation (RMSEA), normed fit index (NFI), incremental fit index (IFI), tuckerlewis index (TLI) and comparative fix index (CFI). Following previous studies, a series of indicators were used to robustness of fit: RMSEA < 0.08, NFI > 0.90, IFI > 0.90, TLI > 0.90 and CFI > 0.90 [69]. Moreover, Using SPSS 26.0 to examine reliability analysis. Cronbach’s alpha coefficients and MacDonald’s omega coefficients were used to evaluate the internal consistency of the scales.

SPSS 26.0 and Mplus 8.4 were utilized to analyze data. First, this study used SPSS 26.0 for descriptive statistics' mean difference tests and correlation analysis. Second, we used Mplus 8.4 to establish a structural equation model to test hypothetical models including both mediating and moderating variables. Listwise deletion was used to handle the missing data. The mediating effects were tested by bootstrapping methods. The bootstrapping approach involves calculating the indirect effect of an independent variable using a resampling estimation technique that generates confidence intervals (CIs) for the results. Third, we use Mplus 8.4 to construct a multi-group structural equation model to verify robustness of model at different educational levels. According to existing research, gender has an important effect on SEC [70,71]. This study therefore incorporated this information as a control into the model to test moderated mediation.

Self-reported data collection may lead to common method bias. Therefore, this study imposed procedural control through anonymity and reverse coding for some questions. At the same time, following the Harman single-factor method, we found nine factors with characteristic roots greater than one. The first principal component was 29.08%, which did not exceed the critical value of 40%. Therefore, by current standards, there appeared to be no serious common method bias [71].

4. Results

After excluding 53 invalid responses with 90% repetitious answers, 1723 students completed surveys and filled out all of the forms, for a 97.02% effective response rate. The age of the participants ranged from 18 to 24 years ($M = 23.66$, $SD = 1.85$). Of the 1723 participants, 839 were undergraduates (48.7%) and 884 were post undergraduates (51.3%). Almost half (48.69%) of the participants were undergraduates. There were 230 males (13.3%) and 1493 females (86.65%), which is consistent with the broader population of student teachers in China, most of whom are female. Table 1 reports the demographic characteristics of participating student teachers.

Table 1. Demographic Characteristics of Participating Student Teachers ($n = 1723$).

Demographic	Category	<i>n</i>	%	Mean (Standard Deviation)
Gender	male	230	13.3	
	female	1493	86.65	
Educational level	undergraduate	839	48.7	
	post undergraduate	884	51.3	
Age				23.66 (1.85)

4.1. Measurement Model

Using AMOS 23.0 to examine construct validity of the four instructions, the results showed the data to model fit was acceptable: the school climate scale (RSMEA = 0.07, NFI = 0.90, IFI = 0.91, TLI = 0.88, CFI = 0.91), the basic psychological needs scale (RSMEA = 0.06, NFI = 0.96, IFI = 0.97, TLI = 0.95, CFI = 0.97), the social-emotional competence scale (RSMEA = 0.05, NFI = 0.97, IFI = 0.97, TLI = 0.97, CFI = 0.97) and the relative deprivation scale (RSMEA = 0.06, NFI = 0.99, IFI = 0.99, TLI = 0.99, CFI = 0.99).

Using AMOS 23.0 to examine composite reliability (CR) of the measurement models for each latent variable and average variance extracted (AVE), the results are displayed in Table 2. CR ranges from 0.74 to 0.94, which meets the acceptable level of 0.60 [72]. Some AVE ranges between 0.35 and 0.49 and is below the recommended level of 0.5. AVE may be a more conservative estimate of the validity of the measurement model and "on the basis of CR alone, the researcher may conclude that the convergent validity of the construct is adequate, even though more than 0.5 of the variance is due to error" [72,73]. As the CR is well above the recommended level, the internal reliability of the measurement items is acceptable.

Table 2. Results of confirmatory factor analysis.

Variables	Composite Reliability	Average Variance Extracted
Peer support	0.79	0.35
Teacher support	0.88	0.47
Opportunity for autonomy	0.82	0.54
Need for relatedness	0.78	0.41
Need for competence	0.79	0.38
Need for autonomy	0.80	0.57
Relative deprivation	0.87	0.64
Self-cognition	0.83	0.56
Self-management	0.88	0.65
Other-cognition	0.88	0.65
Other-management	0.74	0.49
Collective-cognition	0.85	0.65
Collective-management	0.94	0.80

Comparing square root of the AVE and its coefficients and the interrelationships between the latent variables to examine discriminant validity test of the school climate scale and the basic psychological needs scale, the results are displayed in Tables 3 and 4. The tables show that the square root of the AVE and its coefficients are greater than the interrelationships between the latent variables. Thus, the school climate scale and the basic psychological needs scale have good discrimination validity.

Table 3. Discriminant validity test of the school climate scale.

	Peer Support	Teacher Support	Opportunity for Autonomy
Peer support	0.35		
Teacher support	−0.22 ***	0.47	
Opportunity for autonomy	−0.30 ***	0.36 ***	0.54
square root of the AVE	0.59	0.69	0.73

Note: *** $p < 0.001$. AVE = average variance extracted.

Table 4. Discriminant validity test of the basic psychological needs scale.

	Need for Relatedness	Need for Competence	Need for Autonomy
Need for relatedness	0.41		
Need for competence	−0.15 ***	0.28	
Need for autonomy	0.55 ***	−0.08 ***	0.57
Square root of the AVE	0.64	0.53	0.76

Note: *** $p < 0.001$. AVE = average variance extracted.

Using AMOS 23.0 to examine discriminant validity of variables of the social-emotional competence scale, compared with the primitive model, all the fitting indexes of the other models became worse, with a significance lower than 0.001 (see Table 5). Thus, six variables of social-emotional competence scale had good discrimination validity, representing six kinds of different variables.

Table 5. Discriminant validity test of the social-emotional competence scale.

Number	Model	X ²	df	NFI	RFI	IFI	TLI	CFI	RSMEA	Compare	ΔX ²	Δdf
1	six-factor model (primitive model)	928.276	192	0.97	0.96	0.97	0.97	0.97	0.05			
2	five-factor model	1443.33	197	0.95	0.94	0.96	0.95	0.96	0.06	2 vs. 1	0.956 ***	5
3	four-factor model	2192.53	201	0.92	0.91	0.93	0.92	0.93	0.08	3 vs. 1	0.929 ***	9
4	three-factor model	2336.056	204	0.92	0.91	0.92	0.91	0.92	0.08	4 vs. 1	0.924 ***	12
5	two-factor model	3138.126	206	0.89	0.88	0.896	0.88	0.90	0.09	5 vs. 1	0.896 ***	14
6	single factor model	5019.873	208	0.82	0.80	0.83	0.81	0.83	0.12	6 vs. 1	0.829 ***	16

Note: *** $p < 0.001$; five-factor model: F1 + F2, F3, F4,F5, F6; four-factor model: F1 + F2 + F3, F4, F5, F6; three-factor model: F1 + F2 + F3 + F4, F5, F6; two-factor model: F1 + F2 + F3 + F4 + F5, F6; single factor model: F1 + F2 + F3 + F4 + F5 + F6.

We used SPSS 26.0 to calculate Cronbach’s alpha coefficients and MacDonald’s omega coefficients to evaluate the internal consistency of the scales. The results showed that instruments of this study had good reliability (see Table 6). Thus, we concluded that the measurement model met the desired standards of reliability and validity.

Table 6. Reliability test of each scale.

	School Climate Scale	Basic Psychological Needs Scale	Social-Emotional Competence Scale	Relative Deprivation Scale
MacDonald’s omega	0.85	0.84	0.96	0.88
Cronbach’s alpha	0.87	0.84	0.96.	0.87

4.2. Descriptive Statistics and Correlation Analysis

Table 7 reports the correlation analysis for all variables in this study. The results showed that UC was positively correlated with BPN ($r = 0.65, p < 0.01$) and SEC ($r = 0.47, p < 0.01$) and negatively correlated with RD ($r = -0.18, p < 0.01$). The BPN variable was negatively correlated with RD ($r = -0.18, p < 0.01$) and positively correlated with SEC ($r = 0.54, p < 0.01$). Because gender in the control variable was correlated with SEC, gender was added as a control variable in the subsequent data analysis.

Table 7. Correlation analysis of each variable (gender, educational level, age, university climate, basic psychological needs, relative deprivation and social-emotional competence).

Variables	M	SD	1	2	3	4	5	6	7
1. Gender	1.87	0.34	1						
2. Educational level	1.51	0.50	0.03	1					
3. Age	23.66	1.85	-0.02	0.63 **	1				
4. University climate	3.02	0.38	0.03	0.02	0.00	1			
5. Basic psychological needs	4.98	0.68	0.00	0.01	0.00	0.65 **	1		
6. Relative deprivation	3.16	1.12	-0.06 *	-0.11 **	-0.06 *	-0.18 **	-0.18 **	1	
7. Social-emotional competence	4.02	0.59	0.06 *	-0.02	0.01	0.47 **	0.54 **	0.06 **	1

Note: $n = 1723$. M = mean. SD = standard deviations. * $p < 0.05$, ** $p < 0.01$, two-tailed test.

4.3. Testing for Mediation

To test for mediation, a structural equation model was constructed with UC as the independent variable, BPN as the mediating variable and SEC as the dependent variable.

Specifically, BPN mediated the relationship between UC and SEC and UC affected SEC. The results showed that the fit index of the model was ideal (RMSEA = 0.08, CFI = 0.92, TLI = 0.90, SRMR = 0.09). After controlling for gender, UC significantly and positively influenced SEC ($\beta = 0.20, p < 0.001$, β is normalized regression coefficient, similarly hereinafter) and BPN ($\beta = 0.65, p < 0.001$). BPN had a significant effect on SEC ($\beta = 0.41, p < 0.001$). We generated a bootstrapping sample with a capacity of 5000 to conduct a 95% confidence interval test. The result showed that the conditional indirect effect of BPN between UC and SEC was 0.57. The 95% bootstrap confidence interval was (0.35, 0.47) (excluding 0). The mediating role of BPN was therefore significant.

4.4. Testing for Moderated Mediation

To test for moderated mediation, a structural equation model was constructed with UC as the independent variable, BPN as the mediating variable, RD as the mediator and SEC as the dependent variable. Specifically, BPN mediated the relationship between UC and SEC and UC affected SEC. RD moderated the path from UC to SEC and the path from UC to BPN. The results showed that the fit index of the model was ideal (RMSEA = 0.08, CFI = 0.93, TLI = 0.91, SRMR = 0.01). First, UC ($\beta = 0.63, p < 0.001$) and RD ($\beta = -0.05, p < 0.01$) showed significant effects on BPN and the interaction of UC and RD showed significant effects on BPN ($\beta = -0.05, p < 0.01$). Second, UC ($\beta = 0.21, p < 0.001$) and RD ($\beta = 0.19, p < 0.001$) showed significant effects on SEC, BPN showed significant effects on SEC ($\beta = 0.42, p < 0.001$) and the interaction of UC and RD showed significant effects on SEC ($\beta = -0.08, p < 0.01$). The results are displayed in Figure 1.

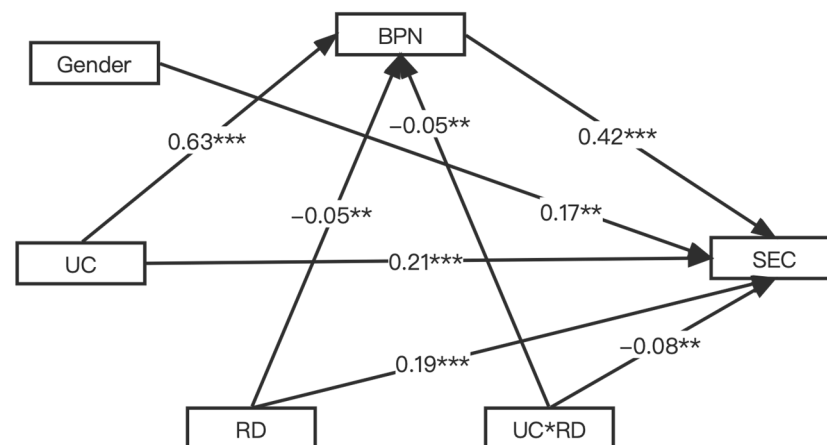


Figure 1. The structural equation model results of the relationships among university climate (UC), basic psychological needs (BPN), relative deprivation (RD), the interaction of university climate and relative deprivation (UC * RD) and social-emotional competence (SEC). Note: ** $p < 0.01$, *** $p < 0.001$.

To facilitate the interpretation of this moderating effect, RD was divided into high and low groups according to the mean plus or minus one standard deviation. Figure 2a,b present the predicted BPN and SEC as a function of UC and RD, respectively. First, simple slope tests revealed a significant regression slope of UC on BPN in individuals with high RD ($B_{simple} = 0.58, t = 21.22, p < 0.001$). The effect of UC on BPN was, however, much stronger in individuals with low RD ($B_{simple} = 0.68, t = 28.40, p < 0.001$). Second, simple slope tests revealed a significant regression slope for UC on SEC in individuals with high RD ($B_{simple} = 0.14, t = 4.13, p < 0.001$); however, the effect of UC on SEC was much stronger in individuals with low RD ($B_{simple} = 0.29, t = 9.45, p < 0.001$). The indirect and direct effects of UC on SEC through BPN were stronger for individuals with low RD than those with high RD.

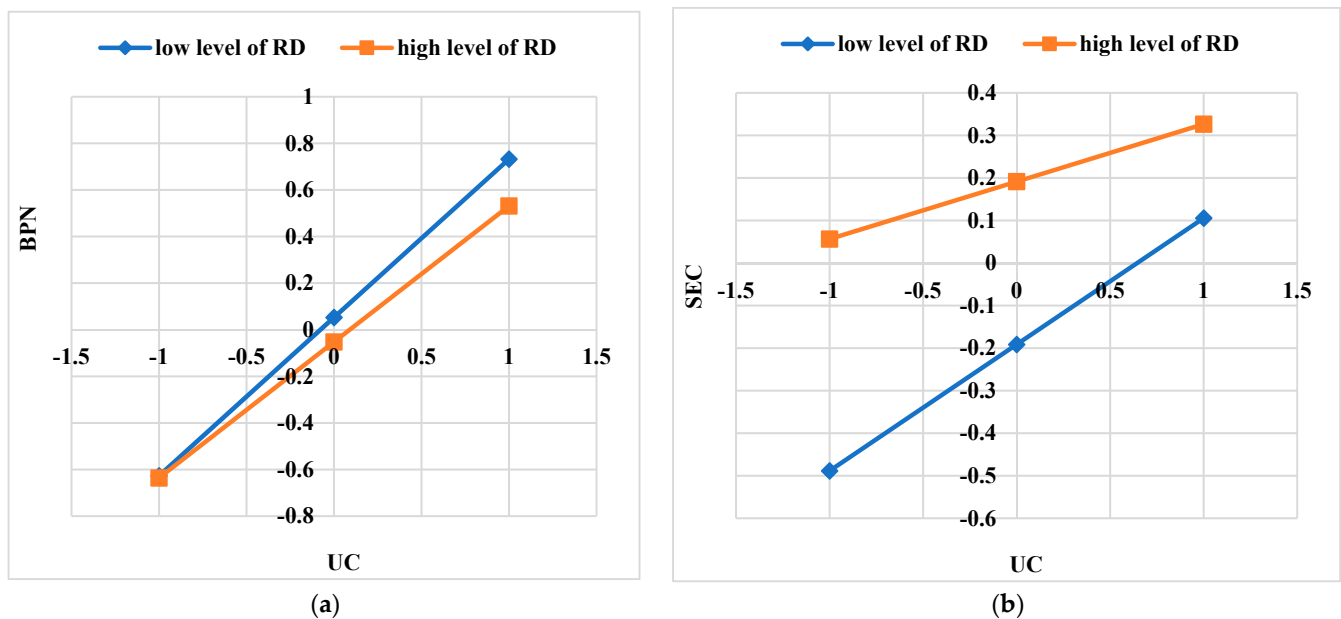


Figure 2. (a) Relative deprivation (RD) as a moderator in the relationship between university climate (UC) and basic psychological needs (BPN). (b) Relative deprivation (RD) as a moderator in the relationship between university climate (UC) and social-emotional competence (SEC).

Finally, the conditional direct and indirect effects of UC on SEC were calculated for different levels of RD [74]. RD was again divided into high and low groups according to the mean plus or minus one standard deviation. The results showed that the conditional direct effect was 0.29 (SE = 0.04, 95% CI = [0.21, 0.37], excluding 0) when the level of RD was low. The conditional direct effect was 0.14 (SE = 0.03, 95% CI = [0.06, 0.20], excluding 0) when the level was high. The conditional indirect effect was 0.29 when the level of RD was low (SE = 0.02, 95% CI = [0.25, 0.33], excluding 0) and 0.25 (SE = 0.02, 95% CI = [0.21, 0.29], excluding 0) when the level was high.

In addition, in order to test the applicability of the model, we added the constraint of educational level to the path coefficient of the model and conducted the multi-group structural equation model analysis. The results show that there is no significant difference in the fitting index between the restricted model and the unrestricted model ($\Delta\text{CFI} < 0.001$, $\Delta\text{TLI} < 0.005$), indicating the model of stability in this study among different populations.

5. Discussion

All three hypotheses were confirmed. Through focusing on student teachers' SEC, this study examines how UC impacts student teachers' SEC during pre-service preparation and its mediating mechanism and boundary condition in the context of China. This study revealed that UC not only directly influences the SEC of student teachers but also indirectly influences it through the mediation of BPN. At the same time, RD plays a moderating role between UC and BPN and between UC and SEC. That said, SEC was a product of the interaction between the individual and the external environment. This study is one of the first to clarify the moderating effect of RD on the relationship among UC, BPN and SEC in the Chinese university context. Our findings are valuable for understanding teachers' sustainable professional development from the perspective of emotion, which enriches our theoretical understanding of the mechanism for student teachers' SEC enhancement. Furthermore, it contributes to an understanding Bronfenbrenner's ecological systems theory for exploring the important factors in microsystem and macrosystem in ecological systems. This research supports that UC can be considered a factor of the microsystem, and RD can be considered as a macrosystem for student teachers' SEC.

We found that UC promoted SEC. This finding offers quantitative evidence to back the significance of UC in cultivating SEC, which is consistent with those of previous studies

that teaching beliefs and self-efficacy are significant antecedent variables of SEC [75]. In addition, researchers have also found that the support of teacher educators affects the teaching beliefs of student teachers and social support from peers and teacher educators positively predicts their self-efficacy [76,77], thus promoting student teachers' SEC. Our study also confirmed these findings. In addition, the better the perceived UC, the more engaged student teachers were in the university [78,79]. The theory of student involvement states that the more time and energy student teachers devote to meaningful activities at university, the more they will gain from their university experience [80]. Talent cultivation is usually achieved through educationally meaningful activities [81] and supportive UC is an important factor in improving the quality of student engagement [78].

This study has opened the "black box" of how UC influences student teachers' SEC to some extent, finding that UC can influence this either directly or indirectly through BPN, which ultimately contributes to student teachers' SEC. On the one hand, UC facilitates student teachers' BPN. The better UC student teachers perceive, the more fully their basic psychological needs are satisfied, which echoes prior studies [36]. This research supports Bronfenbrenner's theory, as UC can be considered an external environmental factor for student teachers' SEC. On the other hand, the satisfaction of basic psychological needs will promote the improvement of SEC, which confirms the self-determination theory and context-process-outcomes model above. In addition, according to Hobfoll's view, meeting basic psychological needs in time is conducive to supplementing personal resources [82], so that when facing interpersonal conflicts student teachers can keep a clear mind, think about the consequences of their behaviors, carefully choose emotional expression strategies and improve their SEC. This research has shown that UC positively influences internal BPN, which further predicts the internal SEC of student teachers.

Another important finding of this study is that RD has a moderating effect between UC and BPN and between UC and SEC, which is a novel finding. Specifically, when student teachers feel higher levels of RD, UC is less likely to satisfy BPN and less likely to predict SEC. This finding is in line with the reserve capacity model mentioned above. UC—such as teacher educators' support, peer support and opportunities for autonomy—is a significant resource for student teachers and RD can reduce the resources available to individuals.

The RD of student teachers may be caused by two factors. First, consistent with social comparison theory, the RD of student teachers is determined by social comparison: the resources available to college students from different social classes differ greatly [83]. A study found that most student teachers come from the lower middle class in China [84]. Guo has argued that student teachers in this group possess fewer social resources and are more likely to experience RD compared with others, especially in upward comparisons [85]. Some researchers believe that most Chinese student teachers are not "passionate about education" but want to "lighten the burden on families" [86] and they are mostly the "poor students" among all college students. The intention to become a teacher has very low status on the whole [87] and they inevitably feel that they are deprived of the right to pursue their favorite career, considering their choice to become a teacher as a last resort. Second, evolution in all areas of society exacerbates the RD of student teachers and this is a phenomenon that has caused social anxiety throughout China [88]. Student teachers have to compete fiercely with their peers to secure a good position in the teachers' labor market. On the one hand, under the "exclusive competition" for various resources such as honors competition and competitive selection, the important concern of student teachers is not only "am I good?" but also "am I better than you?" [89]. When peers are more capable, this may trigger a "frustration effect" that leads to subjective self-depreciation [90]. On the other hand, when looking for jobs, student teachers not only have to compete with other student teachers but also with graduates from comprehensive universities. In recent years, some key schools in China have wanted to recruit graduates from top comprehensive universities such as Tsinghua and Peking University [91] and student teachers may feel a more severe sense of RD in this fierce competition.

5.1. Implications

This study has the following implications regarding developing student teachers' SEC as well as sustaining their professional development. In pre-service teacher education, there are few teacher education courses or projects which improve the SEC of student teachers. Therefore, this study calls on teacher education institutions and teacher educators to cultivate student teachers' SEC. Following are some specific implications.

The significance of a humanistic and harmonious atmosphere should be highlighted. Firstly, it is significant for teacher educators to develop meaningful interpersonal relationships with student teachers [20,92]. Some universities have set up student activity platforms such as the college system [93], thus contributing to the emotional communication between teacher educators and student teachers. Secondly, administrators and leaders should take into account the reducing of competition and the encouraging of cooperation in university. Thirdly, a variety of teaching modes such as group workshops and group reports should be encouraged, to allow more student teachers to have opportunities for performance and self-development [94]. Lastly, in the information and communications technology (ICT) period, a supportive, collaborative and equitable university ecology is still of value [95]. Teacher educators may need to identify more creative ways to interact with student teachers, such as holding virtual office hours and organizing online group activities to provide academic-related support and emotional support [96].

Moreover, improving BPN should be valued. Teacher educators should pay timely attention to student teachers, especially when they have encountered difficulties in their training, to meet the need for relatedness in student teachers. In addition, administrators and university leaders need to properly empower student teachers to strengthen their consciousness and ability in independent management, in order to promote the need for competence and autonomy [97], for example, building a platform for communication among administrative leaders, teacher educators and student teachers and establishing student-centered resource allocation system.

Lastly, student teachers' incorrect negative cognition of society, such as RD, has been identified as a crucial factor. Firstly, some intervention strategies could be taken in advance to reduce RD, for example, psychological guidance and resilience training if necessary [98]. Secondly, career-planning guidance for student teachers should also be strengthened to reduce RD caused by competitive pressure. Teacher education institutes should regularly invite excellent schoolteachers to give lectures on career planning, so that student teachers can comprehend what basic qualities are required of teachers; this will help student teachers have a better understanding of social mechanisms, position themselves accurately, develop their own advantages and improve core competitiveness. From the student teachers' perspective, they should recognize the necessity for self-cultivation of social-emotional competence, strengthening their self-adjustment ability to better adapt to a changing and more demanding work environment.

5.2. Limitations and Further Research

It is noteworthy that there are some limitations to this study. First, it is necessary to note that this study used a cross-sectional design that cannot confirm causal relationships among UC, BPN, RD and SEC. Future studies should apply experimental and longitudinal designs to clarify the short- and long-term effects. Second, the study was conducted in December 2020, during the later outbreaks of COVID-19, when courses were mostly online. This form of online course may hinder student teachers' perception of the positive UC to some extent. Future research could examine the impact of the online learning environment on various aspects of students. Third, as in previous research, our outcome was assessed by student teachers self-reported data. It should be admitted that the self-report approach may produce data bias when some student teachers did not present their honest thoughts and feelings in the survey or did not take the questionnaire seriously. Future research might benefit from triangulation approach, collecting data from teacher educators and peers to avoid the drawback of self-report measures.

6. Conclusions

The research findings showed that UC can not only directly influence SEC, but also indirectly affects SEC through the mediating role of BPN. Additionally, the direct effect and indirect effect was also moderated by RD. Specifically, compared with low RD individuals, the UC had a weaker positive effect on SEC and BPN in high relative deprivation individuals. The study reinforces the important role of UC in China and provides suggestions for research in other school contexts.

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