

The Relationship Between Trait Mindfulness and Depression in Elementary Pre-Service Teachers: The Sequential Mediating Role of Flow Experience and Learning Engagement

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Objective: The purpose of this study is to investigate the relationship between trait mindfulness, flow experience, learning engagement, and depression among elementary pre-service teachers.

Methods: We employed the Five Facet Mindfulness Questionnaire, Flow Experience Scale, Learning Engagement Scale, and Center for Epidemiologic Studies Depression Scale to assess 614 elementary pre-service teachers.

Results: Trait mindfulness in elementary pre-service teachers negatively predicts depression. Trait mindfulness indirectly impacts depression through flow experience and learning engagement. Furthermore, flow experience and learning engagement serve as mediating factors in the relationship between trait mindfulness and depression among elementary pre-service teachers.

Conclusion: Flow experience and learning engagement play a mediating role in the relationship between trait mindfulness and depression among elementary pre-service teachers. This study enriches our understanding of depression cognitive theory, emphasizing the positive influence of internal resources on depression prevention. Additionally, it provides a deeper explanation of the mechanism through which trait mindfulness affects depression, offering valuable insights for future depression intervention programs.

Keywords: elementary pre-service teachers, trait mindfulness, flow experience, learning engagement, depression

Introduction

In today's society, the issue of people's mental health has become increasingly prominent and has garnered significant attention. Of particular concern is the rising problem of depression among college students, which has become a major risk factor affecting their mental well-being.^{1,2} Research indicates that over 20% of Chinese college students suffer from depression, and this proportion has been steadily increasing over the past decade.^{3,4} In China, elementary pre-service teachers refer to university students majoring in primary education. They study courses related to primary education during their university years and are primarily intended to become teachers in primary schools in the future. Elementary pre-service teachers play a crucial role in shaping the future generation. Their work not only influences students' academic performance but also has an impact on the mental health and social development of primary school students. However, depression can lead these future teachers into a cycle of physical and emotional exhaustion, and even pose a threat to the stability of the education system and the quality of student development. Therefore, this issue should receive widespread attention.

Existing research has demonstrated that depression has profound negative effects on college students. Depression can lead to difficulties in their learning, as it often accompanies impaired cognitive functions, including lack of concentration, decreased memory, and slow thinking, among others. These factors can reduce learning efficiency and capability, thereby affecting academic performance.⁵⁻⁷ Depression may also lead to difficulties in emotional expression and communication, causing individuals to exhibit detachment, indifference, or emotional distance in their social interactions.⁸⁻¹⁰ Depression

can result in college students losing interest and motivation for their future careers, making it challenging to make important decisions about their professional development.^{11,12}

While depression can be influenced by various factors, there are also positive factors that can effectively prevent its occurrence. Among these, mindfulness is considered an important protective factor that can have a positive impact on depression.^{13,14} However, the complex mechanisms by which trait mindfulness (TM) improves depressive emotions have not been fully researched and explored. Research has indicated that learning engagement and flow experience are closely related to mental health. High levels of learning engagement and frequent experiences of flow are typically associated with lower depressive symptoms and higher levels of happiness.^{15–17} Therefore, investigating these two mediating variables can help us understand the potential impact of mindfulness on the mental health of primary education preservice teachers. As a result, this study selects primary education preservice teachers as its subjects with the aim of exploring the relationships between TM, learning engagement, flow experience, and depression. The study also intends to provide relevant recommendations for reducing depression levels among primary education preservice teachers to better promote their mental health development.

Literature Review and Theoretical Hypotheses

TM and Depression

Mindfulness, also known as mental awareness, originates from Eastern spiritual traditions and is a meditation practice within Zen culture.¹⁸ Kabat-Zinn (2009) introduced mindfulness into Western psychology by dissociating it from its religious roots and defining it as the awareness that emerges through paying attention on purpose, in the present moment, and nonjudgmentally.¹⁹ Currently, researchers generally categorize mindfulness into two types: State Mindfulness and TM.^{20,21} State Mindfulness refers to a temporary and transient conscious state that an individual experiences, while TM refers to a long-term, stable, and inherent personality trait, known as a mindfulness disposition.^{22,23} This study explores the TM of primary education preservice teachers.

Depression refers to a combination of symptoms that occur in a person's life, including emotional low moods, decreased interest, self-doubt, and physical discomfort.²⁴ Depression can have a significant impact on the psychological well-being and career development of college students. For instance, depression may lead students to experience feelings of sadness, helplessness, and anxiety, disrupting their psychological balance. These negative emotions can affect their academic performance, resulting in decreased grades, reduced motivation for learning, and even academic discontinuation.^{25–27} Depression can also give rise to physical health problems such as insomnia and reduced physical activity, making students more susceptible to other physical illnesses.^{28,29} Furthermore, depression can impact the career development of college students, potentially causing them to lose interest and confidence in their future prospects.³⁰ This may result in their inability to actively engage in internships, extracurricular activities, and other opportunities, thereby diminishing their competitiveness in the highly competitive job market.

Mindfulness provides a positive psychological mechanism that enables individuals to focus more on their current tasks, reduce excessive worrying about the past or future, and avoid getting trapped in a vicious cycle of negative emotions, thereby reducing the occurrence of depression.^{31,32} Mindfulness can enhance an individual's ability to adapt to adversity and increase psychological resilience.³³ It allows individuals to view setbacks as opportunities for growth and learning, rather than self-criticism and self-deprecation, thereby improving their capacity to cope with life challenges and adversity. Furthermore, mindfulness contributes to improving an individual's self-awareness, helping them better understand their emotions, needs, and sources of stress.^{34,35} This self-awareness aids in the early recognition of signs of depression and the adoption of proactive measures to alleviate its occurrence. Therefore, TM plays a positive role in preventing and mitigating depression.

In summary, we propose the following hypothesis:

H1: There is a significant negative correlation between TM and depression.

TM, Flow Experience, and Depression

Flow is described as an immersive state in which individuals experience the intrinsic enjoyment and satisfaction of the activity itself, leading them to engage in the task with internal motivation. This process is referred to as a flow experience.³⁶ Flow experiences can also be studied in educational settings.³⁷ For example, when students are in a flow state, they can concentrate on their studies and are willing to explore and challenge themselves tirelessly.³⁸ This experience can be understood as an attentive state of immersion in valuable activities that leads to development and growth.³⁹ Rogatko (2009) also points out that the positive emotional experiences associated with flow can increase an individual's learning and exploratory behaviors, unleash their potential, enhance task completion capabilities, and, in turn, encourage individuals to repeatedly seek out this sense of enjoyment.⁴⁰ This self-reinforcement can lead to continuous improvement in an individual's level of behavioral development.

Previous research has shown that individuals can experience flow in various activities, including online gaming,^{41,42} online learning,⁴³ and sports.⁴⁴ However, Rogatko (2009) suggests that the experience of flow in individuals is not solely determined by the nature of the activity; individual characteristics also play a role in whether people experience flow during an activity.⁴⁰ Shiffrin and Schneider (1977) proposed that those more likely to experience flow may have stronger attentional capabilities since attention determines which information is processed in consciousness.⁴⁵ However, an individual's capacity for self-regulating attention is limited. Surprisingly, some researchers have indicated that individuals with mindfulness tend to have better sustained attention.⁴⁶ Therefore, it is suggested that through mindfulness meditation practices, an individual's ability for sustained attention can be enhanced, consequently boosting their experience of flow.^{47,48}

Flow experiences play a significant role in preventing and alleviating depression. When individuals enter a state of flow, they become completely absorbed in their current task,⁴⁹ forgetting previous worries and negative emotions, which can be highly beneficial for short-term relief of depressive symptoms. Flow states are often accompanied by intense feelings of joy, satisfaction, and a sense of achievement, and these positive emotions act as protective factors against depression, inhibiting its development.^{50,51} Moreover, depression often involves individuals underestimating their own abilities and self-doubt, while individuals immersed in a state of flow tend to have confidence in their capabilities, believing they can overcome challenges and achieve success.⁵² If individuals can frequently experience flow experiences, it can help them build a more positive self-awareness and reduce the risk of depression.

Based on the above analysis, this study proposes the following hypotheses:

H2: Flow experiences mediate the relationship between TM and depression.

H2a: A notable positive correlation exists between TM and flow experiences.

H2b: A significant negative correlation exists between flow experiences and depression.

TM, Learning Engagement, and Depression

The concept of learning engagement has its origins in the foundation of work engagement research.⁵³ Schaufeli et al (2002b) defines learning engagement as the holistic, stable, and sustained positive state that students exhibit during the learning process.⁵⁴ This includes three key aspects: vigor, dedication, and absorption. Vigor refers to students maintaining high levels of energy throughout the learning process, enabling them to actively and proactively engage in knowledge acquisition. Dedication entails students having a strong enthusiasm for learning, being willing to embrace various challenges, and experiencing a sense of purpose and pride during their learning journey. Absorption involves students focusing their attention for extended periods on the current learning process, feeling a lack of awareness of the passage of time, and deriving happiness and pleasure from this state. Learning engagement not only has the capacity to predict students' current academic performance,^{55,56} but also provides insight into their prospects for further education or work ten years down the line.⁵⁷

The Conservation of Resource theory (COR)⁵⁸ posits that individuals have an innate drive to acquire and maintain their personal resources. However, when individuals face continuous resource depletion, they may reduce or cease their

investment behaviors to protect their own resources. Brown et al (2007) suggest that mindfulness can support action by enhancing self-awareness of emotions, thoughts, and behaviors, fostering greater intrinsic motivation.²³ This kind of motivation can stimulate individuals to actively pursue the resources they need and can lead people to invest more effort and enthusiasm in their work. Furthermore, the research by Reschly et al (2008) also indicates that positive academic emotions can help students actively seek learning opportunities and resources, as well as better cultivate qualities such as diligence and willpower, enabling students to engage more effectively in their learning.⁵⁹

The Resource Conservation theory emphasizes that learning engagement, as a process of resource accumulation, can help individuals withstand the impact of stressors and negative emotions.⁵⁸ Specifically, resources related to the individual, including self-efficacy, optimism, hope, and resilience,⁶⁰ are believed to reduce stress symptoms, increase well-being,⁶¹ and aid in recovery from illness. Additionally, students actively engaged in the learning process can have a higher sense of control in the classroom, which helps them reduce academic stress levels and thereby prevent the occurrence of mental health issues.⁶² On the contrary, students who are not actively engaged in learning activities may feel helpless, which can lead to cognitive and behavioral disengagement in the classroom.⁶³ Furthermore, students with high levels of learning engagement often generate more positive emotions during their learning activities, which contributes to a sense of “achievement” and ignites enthusiasm and vitality for learning.⁶⁴ This positive learning attitude can divert individuals’ attention, reducing their focus on negative thoughts and emotions and, in turn, mitigating the occurrence of depression.

Therefore, we present the following hypotheses:

H3: Learning engagement mediates the relationship between TM and depression.

H3a: TM demonstrates a significant positive correlation with learning engagement.

H3b: Learning engagement shows a significant negative correlation with depression.

Flow Experience and Learning Engagement

According to researchers’ definitions of flow experience and learning engagement, the two concepts are closely related. Flow experience refers to an individual’s wholehearted involvement in an activity, leading to a psychological state of forgetting the surrounding environment, losing a sense of self-consciousness, and finding joy in the process.³⁶ Learning engagement refers to the positive and sustained psychological state displayed by students during learning activities.⁵⁴ Both involve individuals immersing themselves in an activity and completely disregarding other things. However, there are differences between the two; flow experience is characterized by a brief peak experience, while learning engagement is a relatively enduring psychological state.⁶⁵

Flow theory posits that flow is an intense interest in an activity that drives an individual to become fully immersed in it, resulting in an emotional experience.⁶⁶ This positive emotional experience further encourages individuals to engage in the next learning activity,⁶⁷ creating an ongoing cycle that transforms brief peak experiences into lasting intrinsic motivation for learning. As Mulik et al (2020) mentioned in their study, individuals influenced by flow experiences tend to have a positive impact on their willingness to learn, promoting continuous learning and active involvement in learning activities.⁶⁸ Furthermore, Shernoff et al (2014) used the Experience Sample Method to measure and analyze flow experiences generated by high school students in the classroom, studying how they learn in class and under what circumstances they become more engaged in learning.⁶⁹

In summary, we propose the following hypotheses:

H4: Flow experience is significantly positively correlated with learning engagement.

H5: Flow experience and learning engagement serve as sequential mediators between TM and depression.

The theoretical hypothetical model of this study is shown in [Figure 1](#).

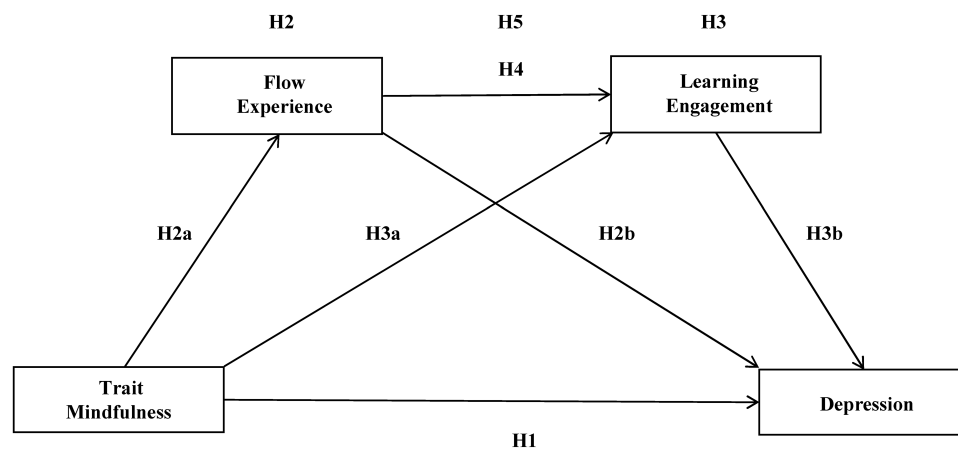


Figure 1 Conceptual framework.

Materials and Methods

Procedures and Participants

To ensure the integrity and representativeness of the sample, we employed a method of random cluster sampling to select three universities in Shandong Province, China, that offer elementary education programs. These three universities are located in different regions within Shandong Province and are categorized as normal universities with programs in elementary education. Our questionnaire was distributed between December 6 and December 14, 2022. In the end, the questionnaires of 614 primary school pre-service teachers were included in the research analysis. In all, there were 149 men (which accounted for 24.27% of the data) and 465 women (which accounted for 75.73%). The average age of the participants was 20.880, with a standard deviation (SD) of 1.186. The distribution of participants by academic year was as follows: 35.99% were college freshmen, 22.31% were college sophomores, 25.90% were third-year college students, and 15.80% were seniors in college. Demographic specific characteristics of the survey respondents are shown in [Table 1](#). The survey was handed out on-site by a pen-and-paper test. In this survey, 723 questionnaires were distributed, and 677 were returned. After excluding incomplete and obviously erroneous responses, 614 effective questionnaires were retained, resulting in a valid recovery rate of 84.92%. The Putian University Research Ethics Committee approved the ethical review of this study in accordance with the Declaration of Helsinki (NO.20221102).

Table 1 Social Demographic Features of Participants (N = 614)

Variables		Percentages
Gender	Male	24.27%
	Female	75.73%
Age	19	12.87%
	20	27.20%
	21	29.48%
	22	19.54%
	23	10.91%
Grade	College freshman	35.99%
	College sophomore	22.31%
	Third year college	25.90%
	Senior year of college	15.80%

Measures

Five Facet Mindfulness Questionnaire

The measurement of TM uses the Five Facet Mindfulness Questionnaire developed by Brown and Ryan (2003).²² The Chinese version of the Five Facet Mindfulness Questionnaire was translated by Deng et al (2011).⁷⁰ The scale has been shown to have fine reliability and validity in previous studies.⁷¹ The scale has 39 items. The scale includes observe, describe, actaware, nonjudge and nonreact five sub-dimensions. These items included statements like, “I could be experiencing some emotion and not be conscious of it until some time later”. The scale is measured on a 6-point scale (1 = almost always, 6 = almost never). High scores reflect the individual’s higher level of present-moment awareness and attention in daily life. In the current study, the coefficient alpha of the scale was 0.968, and the coefficient alpha of the sub-dimension scales were 0.938, 0.925, 0.933, 0.913, and 0.908, respectively.

Flow State Scale

The Flow State Scale compiled by Jackson et al (2001).⁷² The Chinese version of the Flow State Scale was translated by Liu et al (2012).⁷³ This scale has been employed in prior studies involving Chinese populations.⁷⁴ The scale includes nine dimensions of challenge- skill balance, action-awareness merging, clear goals, unambiguous feed-back, concentration on the task at hand, sense of control, loss of self-consciousness, time transformation, and autotelic experience. The Flow State Scale has 36 items such as, “I often feel like time flies”. The scale uses the Likert five-point scoring method (1 = strongly disagree, 5 = strongly agree). In the current study, the coefficient alpha of the scale was 0.957, and the coefficient alpha of the sub-dimension scales were 0.835, 0.886, 0.828, 0.863, 0.841, 0.878, 0.797, 0.831, and 0.846, respectively.

Learning Engagement Scale

This study uses the Learning Engagement Scale compiled by Schaufeli et al (2002).⁵⁴ Fang et al (2008) translated the scale into Chinese.⁷⁵ This scale has been widely used in previous studies on Chinese populations.⁷⁶ The 17-item scale consists of three dimensions: vigor, dedication and absorption. These items include statements like, “When studying, I am so focused that I forget everything around me”. The scale is measured on a seven-point (0 = never, 6 = always). The higher the score, the higher the level of learning engagement. In the current study, the coefficient alpha of the scale was 0.940, and the coefficient alpha of the sub-dimension scales were 0.911, 0.887, and 0.900, respectively.

Center for Epidemiologic Studies Depression Scale

The measurement was conducted using the Chinese version of the Center for Epidemiologic Studies Depression Scale (CES-D).⁷⁷ This scale consists of 20 items related to depressive symptoms and behaviors, with each item scored on a scale from 0 to 3. An example item is, “I was bothered by things that usually don’t bother me”. CES-D has been widely utilized in the Chinese population and demonstrates good reliability and validity.⁷⁸ The total score ranges from 0 to 60, and a CES-D score of ≥ 16 indicates a higher likelihood of depression in the surveyed individuals. In this study, the Cronbach’s alpha value was 0.914.

Data Analysis Ideas

In the current study, SPSS 22.0 was used for data entry, demographic analysis and correlation analysis. Mplus 8.3 was used for structural equation modeling analysis. Gender, age and grade of pre-service primary school teachers were used as control variables. We made gender a dummy variable in the data analysis (0 = female, 1 = male).

Results

We initially carried out a common method bias test to rule out method bias as the data were derived from a single report. This study adopted the Harman single factor test, which identified twenty factors with a characteristic root greater than one. There is only a 24.124% variation between the first factor pair, which is less than 40%.⁷⁹ This indicates that the study’s data do not include any major instances of common method bias.

Subsequently, we performed a descriptive statistical analysis of the data. Table 2 demonstrates that depression are significantly positively associated with the five dimensions of TM, the nine dimensions of flow experience, and the three dimensions of learning engagement.

We calculated the model fit using Mplus. The findings revealed that the model fitting index was $ML \chi^2 = 223.218$, $df = 175$, $\chi^2/df = 1.276$, CFI = 0.991, TFI = 0.990, RMSEA = 0.021, SRMR = 0.028. As a result, the model fit index is good. The relevant indicators are shown in Table 3.

Subsequently, we conducted 5000 resamples using the Bootstrap method in Mplus. The results indicate that TM, flow experience, learning engagement, and depression all exhibit significant path coefficients.

The finding that TM and depression are strongly negatively correlated ($\beta = -0.453$, $p < 0.001$) suggests that Hypothesis 1. Both Hypotheses 2a and 2b are supported by the findings that TM is positively correlated with flow experience ($\beta = 0.327$, $p < 0.001$) and that flow experience is negatively correlated with depression ($\beta = -0.245$, $p < 0.001$). The relationship between TM and learning engagement is positive ($\beta = 0.196$, $p < 0.001$), supporting Hypothesis 3a. There is a negative correlation between learning engagement and depression ($\beta = -0.165$, $p < 0.001$), supporting Hypothesis 3b. The relationship between learning engagement and flow experience is positive ($\beta = 0.347$, $p < 0.001$), supporting Hypothesis 4. See Table 4.

An analysis of the mediation path is presented in Table 5. Flow experience mediates the connection between TM and depression ($\beta = -1.657$, $p < 0.001$), the 95% confidence interval is -2.505 to -1.018 , excluding 0, supporting Hypothesis 2. The results also showed that the mediating effect of flow accounted for 13.70%. The link between TM and depression is mediated by learning engagement ($\beta = -0.666$, $p = 0.005$), the 95% confidence interval is -1.248 to -0.287 , excluding 0, supporting Hypothesis 3. The results also showed that the mediating effect of learning engagement for 5.50%. Flow experience and learning engagement sequentially modulate the link between TM and depression ($\beta = -0.387$, $p = 0.006$), the 95% confidence interval is -0.741 to -0.169 , excluding 0, supporting Hypothesis 5. The findings indicated that the flow experience and learning engagement sequence impact accounted for 3.20%. See Figure 2.

Discussion

Based on the research results, we have found a significant negative correlation between TM and depression. This finding supports the research hypothesis of this paper and is in line with the conclusions drawn by Goldberg et al (2018)⁸⁰ and Strohmaier (2020).⁸¹ The impact of mindfulness on depression can be explained through cognitive theory. This theory posits that the primary cause of depression lies in individuals' cognitive distortions regarding themselves, their environment, and the future.⁸² Mindfulness practices, by cultivating individuals' awareness and acceptance of internal experiences, help to break these cognitive distortions, such as overgeneralization and global negative evaluations, enabling individuals to perceive themselves, others, and their environment more objectively. Additionally, TM enhances individuals' emotional flexibility in the face of negative events, allowing them to swiftly return to baseline arousal levels and exert positive psychological effects,⁸³ thus aiding in alleviating depressive feelings. Consequently, prospective elementary education teachers with higher levels of mindfulness tend to exhibit lower levels of depression.

The findings of this study suggest that the flow experience serves as a mediator between TM and depression, demonstrating a mediation effect of 13.70%. This is a very high proportion, indicating that TM among elementary pre-service teachers can more effectively reduce the risk of depression with the support of flow experience. A plausible explanation for this finding is that the awareness and non-evaluative attitude brought about by TM help individuals better focus on current tasks or activities, avoiding excessive interference from negative emotions, thus facilitating easier entry into the flow state.⁸⁴ The flow experience can stimulate individuals' intrinsic positive motivation, prompting them to actively engage in activities, thereby enhancing individuals' sense of well-being during those activities.⁸⁵ Therefore, the flow experience often serves as a protective factor against depression, positively contributing to alleviating depression.^{50,51}

Furthermore, this study also found that learning engagement mediates the relationship between TM and depression, with a mediation effect of 5.50%. In other words, the stronger an individual's TM, the higher their learning engagement, and the weaker their experience of depression. This conclusion validates the relevant perspective of the Conservation of Resource theory (COR).⁵⁸ If prospective elementary education students are in a prolonged state of high-stress learning

Table 2 Means, Standard Deviations, and Correlations of the Major Study Variables

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Gender	0.24	0.429	I																				
2. Age	20.880	1.186	0.065	I																			
3. Grade	2.210	1.098	-0.087*	-0.036	I																		
4. Observe	3.263	0.830	-0.072	-0.037	-0.073	I																	
5. Describe	3.399	0.751	-0.037	0.005	-0.032	0.592**	I																
6. ActAware	3.317	0.798	-0.073	0.003	0.004	0.622**	0.555**	I															
7. NonJudge	3.159	0.742	-0.061	-0.003	-0.082*	0.583**	0.564**	0.546**	I														
8. NonReact	3.126	0.811	-0.062	-0.013	-0.028	0.714**	0.650**	0.651**	0.630**	I													
9. CSB	3.344	0.781	0.099*	-0.035	0.004	0.235**	0.219**	0.160**	0.201**	0.220**	I												
10. AAM	3.273	0.858	0.012	-0.079	-0.035	0.187**	0.159**	0.153**	0.176**	0.179**	0.566**	I											
11. CG	3.393	0.782	0.03	-0.073	-0.069	0.259**	0.210**	0.164**	0.186**	0.205**	0.516**	0.551**	I										
12. UFB	3.231	0.838	0.05	-0.044	-0.107**	0.242**	0.174**	0.140**	0.166**	0.207**	0.491**	0.499**	0.482**	I									
13. COTTAH	3.172	0.740	0.015	-0.023	-0.041	0.223**	0.220**	0.176**	0.211**	0.228**	0.482**	0.466**	0.483**	0.486**	I								
14. SOC	3.098	0.860	0.044	-0.060	-0.028	0.194**	0.190**	0.129**	0.216**	0.198**	0.552**	0.618**	0.538**	0.499**	0.500**	I							
15. LOS	3.275	0.725	0.020	-0.067	-0.024	0.181**	0.137**	0.127**	0.166**	0.155**	0.557**	0.502**	0.505**	0.517**	0.487**	0.533**	I						
16. TT	3.180	0.784	0.018	-0.032	-0.055	0.224**	0.180**	0.149**	0.128**	0.203**	0.507**	0.590**	0.509**	0.467**	0.426**	0.557**	0.467**	I					
17. AE	2.970	0.801	0.027	-0.068	-0.065	0.257**	0.164**	0.139**	0.208**	0.227**	0.625**	0.652**	0.621**	0.557**	0.542**	0.626**	0.575**	0.617**	I				
18. Vigor	3.500	1.127	0.005	-0.048	-0.036	0.237**	0.151**	0.131**	0.138**	0.237**	0.256**	0.245**	0.272**	0.261**	0.257**	0.266**	0.289**	0.247**	0.291**	I			
19. Dedication	3.338	1.150	-0.025	0.012	-0.060	0.215**	0.137**	0.114**	0.158**	0.214**	0.175**	0.193**	0.227**	0.208**	0.173**	0.200**	0.207**	0.214**	0.254**	0.554**	I		
20. Absorption	3.045	1.081	0.026	-0.017	-0.068	0.236**	0.160**	0.160**	0.211**	0.261**	0.252**	0.261**	0.282**	0.226**	0.236**	0.269**	0.253**	0.212**	0.302**	0.651**	0.660**	I	
21. Depression	37.212	13.982	0.025	0.035	0.015	-0.472**	-0.458**	-0.463**	-0.463**	-0.466**	-0.320**	-0.352**	-0.345**	-0.345**	-0.314**	-0.354**	-0.320**	-0.359**	-0.349**	-0.333**	-0.309**	-0.336**	I

Note: ** $p < 0.01$, * $p < 0.05$. Gender is the dummy variable (0 = female, 1 = male).
Abbreviations: CSB, Challenge-Skill Balance; AAM, Action-Awareness Merging; CG, Clear Goals; UFB, Unambiguous Feed-Back; COTTAH, Concentration on The Task at Hand; SOC, Sense of Control; LOS, Loss of Self-consciousness; TT, Time Transformation; AE, Autotelic Experience; PAE, Professional Aspirations and Expectations.

Table 3 Fit Indices of the Model

Fit Indices	Recommended Threshold	Scores	Remarks
ML χ^2	–	223.218	–
Df	–	175	–
χ^2/df	$1 < X^2/df < 3$	1.276	Acceptable
CFI	> 0.9	0.991	Acceptable
TLI	> 0.9	0.990	Acceptable
RMSEA	< 0.08	0.021	Acceptable
SRMR	< 0.08	0.028	Acceptable

Abbreviations: CFI, Comparative fit index; TLI, Tucker lewis index; RMSEA, Root mean squared error of approximation; SRMR, Standardised root mean squared residual.

Table 4 The Direct Effect of the Research Paths and Research Model Hypothesis Analysis

DV	IV	Std.Est.	S.E.	Est./S.E.	P-value	R ²	Hypo and Path	Remarks
Depression	TM	−0.453	0.038	−11.903	***	0.445	H1: TM → Depression	Support
	FE	−0.245	0.045	−5.387	***		H2b: FE → Depression	Support
	LE	−0.165	0.044	−3.773	***		H3b: LE → Depression	Support
FE	TM	0.327	0.049	6.712	***	0.120	H2a: TM → FE	Support
LE	TM	0.196	0.055	3.565	***	0.206	H3a: TM → LE	Support
	FE	0.347	0.045	7.652	***		H4: FE → LE	Support

Note: ***p < 0.001.

Abbreviations: PI, Professional Identity; TM, Trait mindfulness; FE, Flow Experience; LE, Learning Engagement.

Table 5 The Indirect Effect of the Research Paths

Path	Std.Est.	S.E.	Est./S.E.	P-value	Boot LLCI	Boot ULCI	The Proportion of the Effect
H2: TM → FE → Depression	−1.657	0.377	−4.400	***	−2.505	−1.018	13.70%
H3: TM → LE → Depression	−0.666	0.239	−2.786	0.005	−1.248	−0.287	5.50%
H5: TM → FE → LE → Depression	−0.387	0.142	−2.723	0.006	−0.741	−0.169	3.20%
TOTALIND	−2.711	0.496	−5.468	***	−3.800	−1.824	22.41%
TOTAL	−12.099	0.998	−12.123	***	−14.076	−10.171	100.00%

Note: ***p < 0.001.

Abbreviations: TM, Trait mindfulness; FE, Flow Experience; LE, Learning Engagement; PI, Professional Identity.

environments, it can lead to emotional exhaustion in various aspects of their physical and mental well-being, resulting in resource depletion, ultimately leading to fatigue and feelings of depression. Mindfulness, as a significant internal resource,^{86,87} can assist individuals in conserving energy and applying this energy to subsequent learning activities.⁸⁸ Sustained and robust learning engagement can stimulate students' enthusiasm and vitality for learning,⁶⁴ enhance academic self-efficacy, reduce academic stress levels, and thereby prevent the onset of depressive emotions.⁶²

In addition to identifying the mediating roles of flow experience and learning engagement individually in the relationship between TM and depression, this study further revealed that these factors jointly contribute to a sequential mediation in the association between TM and depression, demonstrating a combined mediation effect of 3.20%. Based on the research findings of this study, it is evident that students with a trait of mindfulness are able to attain positive outcomes in terms of the flow experience, recognizing that learning activities themselves can be a source of joy. As their sense of happiness and self-worth continues to grow, students gradually develop a sustained willingness to learn, actively engage in the learning process, and have confidence in their professional development and future career planning. This positive learning attitude contributes to their success in academic and professional domains, while also providing strong support for their psychological well-being.

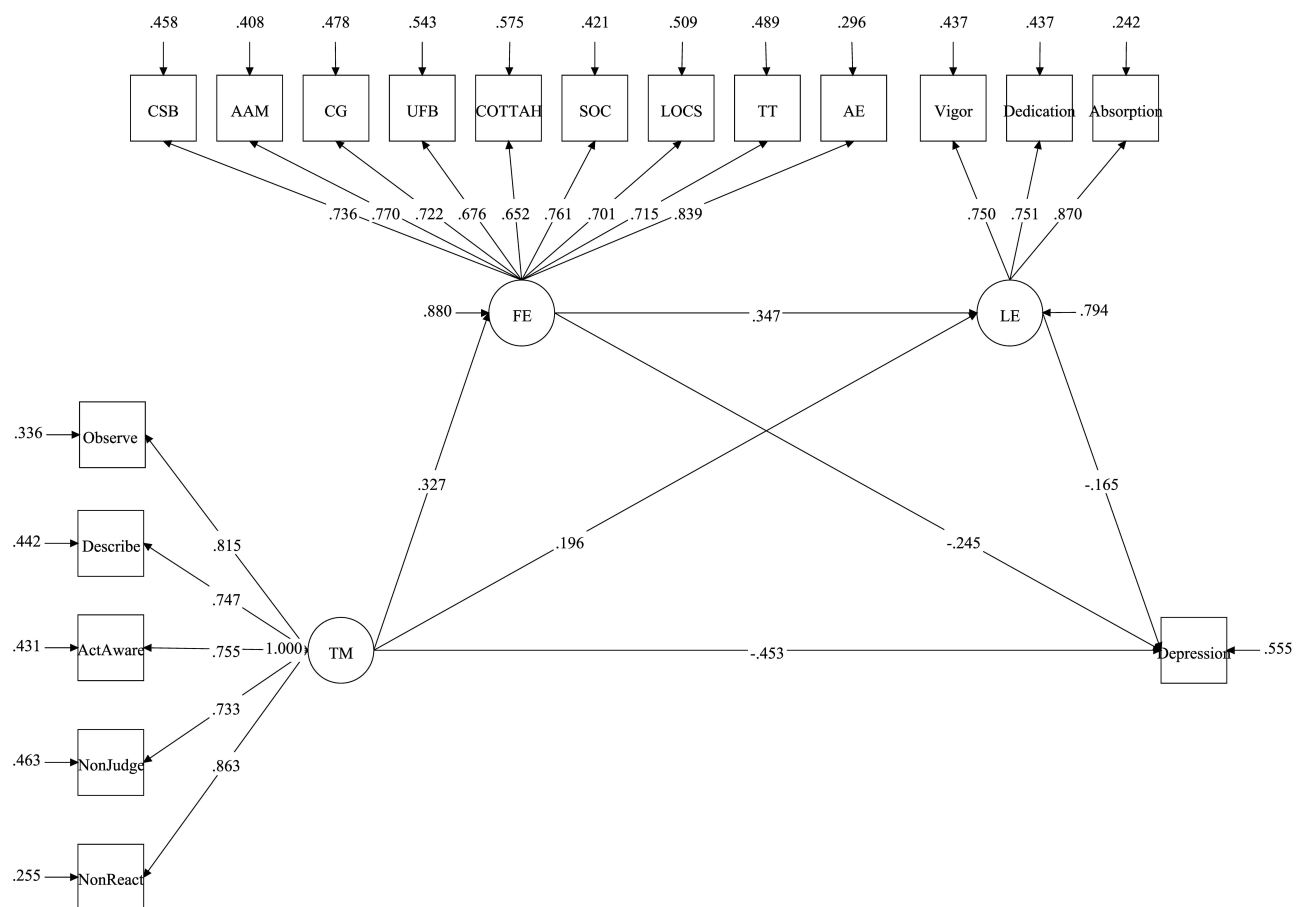


Figure 2 Structural equation model.

Abbreviations: TM, Trait mindfulness; FE, Flow Experience; LE, Learning Engagement; PI, Professional Identity; CSB, Challenge-Skill Balance; AAM, Action-Awareness Merging; CG, Clear Goals; UFB, Unambiguous Feed-Back; COTTAH, Concentration on The Task at Hand; SOC, Sense of Control; LOS, Loss of Self-consciousness; TT, Time Transformation; AE, Autotelic Experience.

Theoretical Contributions

This study holds considerable significance in augmenting current theories concerning depression, particularly the Cognitive Theory of Depression proposed by Beck (2002).⁸² Beck's Cognitive Theory of Depression emphasizes the impact of individuals' negative attributes on depression, including elements such as their thoughts, beliefs, and cognitive processes. However, this theory does not place enough emphasis on the influence of internal resources on depression. In reality, the onset of depression may be linked to a deficiency in positive resources or the underutilization of positive strengths. Hence, this study focuses on three elements of TM, the flow experience, and learning engagement- all of which contribute to enhancing an individual's internal resources. By accumulating these internal resources, individuals can harness the positive strength necessary to overcome adversity, advance resolutely, and ultimately steer clear of depression.

Practical Significance

This study also provides relevant practical insights. First, to prevent or reduce depression among prospective elementary education students, it is advisable to enhance their TM levels. Schools can stock mindfulness and stress reduction therapy books in their libraries for students to read, thereby reinforcing theoretical learning about mindfulness stress reduction techniques. Moreover, universities or educational departments can organize mindfulness practice-related lectures and training for students through various channels, teaching them how to focus on the present moment, reduce negative emotions, and effectively cope with stress and depression.

Second, to decrease depressive emotions and boost the flow experience among prospective elementary education students, it is essential to emphasize the importance of interest in learning activities, as per the Flow Theory.⁶⁹ Interest can stimulate learners' enthusiasm, leading to a positive impact on the flow experience. Therefore, teachers should employ diverse teaching methods and formats, motivating students to actively and wholeheartedly engage in the classroom. Providing timely feedback and rewards can help students recognize their progress and achievements, thus enhancing the flow experience and reducing depressive emotions.

Finally, to lower depression and enhance learning engagement among prospective elementary education students, it is essential to improve students' learning strategies and cultivate their interest in their chosen fields of study to stimulate internal motivation for learning. Schools should also organize student participation in practical teaching experiences and offer career guidance seminars, guiding students to develop the right attitudes and values, nurturing their love for their chosen fields of study, and increasing their learning engagement. This approach helps university students reduce the risk of depression.

Limitations and Prospects

Firstly, this study is a cross-sectional study. While this research utilized thorough theoretical and empirical rationale, employing high-validity and reliability measurement tools for data analysis, it is important to note that cross-sectional studies may not fully capture the long-term dynamics of the mechanisms under investigation. Consequently, future research endeavors should strive to enhance clarity through longitudinal tracking studies or experimental research.

Secondly, all data in this study were self-reported, which could introduce a degree of subjectivity. Future research could enhance the credibility of results by employing various research methods, such as interviews and observational methods, in conjunction with self-reporting.

Lastly, this study only considered the sequential mediating roles of the flow experience and learning engagement in the relationship between TM and depression. There may be other mediating variables to consider in future research, exploring additional factors that impact depression among prospective elementary education students.

Conclusion

The research findings indicate a negative correlation between TM among elementary education teacher candidates and depression. The influence of TM on depression can be realized through flow experiences and engagement in learning. This study enriches the cognitive theory of depression, emphasizing the positive impact of internal resources in mitigating depression. Moreover, it delves into the mechanism by which TM affects depression. These findings offer valuable insights and guidance for future depression intervention programs.

Ethics Approval

The studies involving human participants were reviewed and approved by the Research Ethics Committee of the Putian University. Written informed consent to participate in this study was provided by the participants.

Disclosure

The author reports no conflicts of interest in this work.

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