

# Mindfulness improves stress, anxiety and depression through chain mediation effect of self-control and mind wandering

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**Abstract:** The aim of this study was to understand the mechanism of mindfulness in improving stress, depression and anxiety, and to explore the chain mediating effect of self-control and mind wandering. In this study, 223 participants were recruited by online questionnaire on June 19, 2023, and filled in the Mind Wandering Questionnaire, Five Factor Mindfulness Scale, self-control scale and Anxiety, Depression and Stress Scale. After screening, 136 valid questionnaires were collected. The results showed that the total score of mindfulness was significantly positively correlated with self-control ( $r = 0.523$ ,  $p < 0.01$ ), mental wandering was significantly positively correlated with anxiety, depression and stress ( $ps < 0.01$ ), and self-control was significantly negatively correlated with mental wandering, anxiety, depression and stress ( $ps < 0.01$ ). Self-control and mind wandering play a chain mediating role in the relationship between mindfulness and stress, depression and anxiety. Individuals with higher levels of mindfulness had lower levels of stress, anxiety and depression. Mind wandering is an important mechanism by which mindfulness influences stress, depression and anxiety.

## 1. Introduction

Mindfulness is the non-judgmental attention and awareness of the present moment, and trait mindfulness is a quality that individuals generally possess, which includes attention, present attention, awareness, and acceptance/non-judgment<sup>[1]</sup>. Numerous reviews and meta-analysis results have shown that mindfulness-based training methods can effectively improve individual emotions. Although many studies have found the effect of mindfulness training on improving negative emotions, the reasons for this effect are still insufficient. <sup>[2]</sup> found that the factors of emotion regulation play a mediating/regulating role in the improvement of negative emotions by mindfulness. Studies have found that when people engage in mind wandering, they tend to be in negative emotional states <sup>[3]</sup>. They may shift from tasks to inner thoughts and feelings, triggering automated responses, or leading to ruminative redundancy<sup>[3]</sup>. And redundant thinking is an important cause of anxiety, depression, stress and other negative emotions. There is evidence that after eight weeks of mindfulness training, individuals in the training group experienced significantly less mental wandering compared to the control group<sup>[4]</sup>. To sum up, individuals with a high level of mindfulness can enhance their self-control ability, reduce mental wandering, and be less affected by automation and negative thoughts, thus reducing the impact of anxiety, depression, pressure and other negative emotions. However, no studies have yet explored the relationship between them, so this study intends to explore the chain mediation effect of self-control and mind wandering in improving mood through mindfulness

## 2. Method

### 2.1. Participants

Through the online questionnaire survey, 223 people completed the questionnaire, 136 valid questionnaires after screening, the effective rate of 61%. Among them, 86 were male and 50 were female, accounting for 36.8%. The age range was 18-66 years old; the average age was 23.24 years

±5.04, and the distribution of education level was as follows: 1 junior high school or below, 17 senior high school, 105 university or junior college, 13 postgraduate or above.

## **2.2. Procedure**

On the questionnaire, the subjects filled in the mental wandering questionnaire, the mindfulness five-factor scale, the self-control scale and the anxiety, depression and stress scale. After the subjects fill in, there will be 2 RMB test fee. Before filling in all questionnaires, all subjects read and signed the informed consent. The experiment was reviewed by the Ethics Academic Committee of the Institute of Psychology, Chinese Academy of Sciences.

## **2.3. Measurement**

The Mind wandering questionnaire was developed by Mrazek et al., to measure the degree of mind wandering. It has five questions, using a 5-point score, the higher the score, the more serious the degree of mind wandering. The results show that the scale has good reliability and validity in the Chinese population. The internal consistency reliability coefficient (Cronbah  $\alpha$ ) in this study is 0.867.

The Five Facet Mindfulness Questionnaire (FFMQ), developed by Yu-Qin Deng and Xing-Hua Liu, is an effective tool for assessing mindfulness. There are five sub-scales involved in mindfulness: Observing, describing, acting consciously, not judging inner experience, not reacting to inner experience. The overall reliability of internal consistency in this study is 0.601

The Self-Control Scale (SCS) was developed by June P et al. The research results showed that the SCS had good reliability and validity in Chinese population. The Self-control Scale is a self-reported measure that assesses individual differences in self-control characteristics. In this study, the internal consistency reliability coefficient is 0.620.

Depression anxiety stress scales, developed by P.F. Lovibond and S.H. Lovibond, are commonly used self-assessment scales to assess the severity of individual negative emotions. In this study, the internal consistency reliability coefficients were 0.903 for stress and 0.903 for anxiety and 0.917 for depression.

## **3. Analysis**

Using SPSS25.0 for data analysis. Pearson product difference correlation analysis was used to analyze the correlation between variables, and regression analysis and bootstrap method were used to conduct mediation analysis. The independent sample T-test was used to compare the gender differences among the variables.

## **4. Results**

### **4.1. The correlation between mindfulness, self-control and mind wandering**

Pearson product-difference correlation analysis showed that the total score of mindfulness was significantly positively correlated with self-control ( $r = 0.523$ ,  $p < 0.01$ ), and significantly negatively correlated with mind wandering, anxiety, depression and stress ( $ps < 0.01$ ). Self-control was negatively correlated with mental wandering, anxiety, depression and stress ( $ps < 0.01$ ). Mind wandering was positively correlated with anxiety, depression and stress ( $ps < 0.01$ ). The specific results are shown in Table 1. It shows that the higher the level of mindfulness, the stronger the self-control ability, the less mental wandering, the less anxiety, depression and stress.

The chain mediation effect of self-control and mind wandering between mindfulness and stress, depression and anxiety.

Aking self-control and mind wandering as mediating variables, mindfulness as independent variables, and stress, depression, and anxiety as dependent variables, bootstrap chain mediation analysis was conducted. The results showed that self-control and mind wandering had chain mediating effects on mindfulness, stress, depression, and anxiety (see Table 1-3).

Table 1 Self-control and mind wandering have a chain-mediated effect between mindfulness and stress

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	-.3787	.0735	-.5190	-.2293
Mindfulness → Self-control → Stress	-.1413	.0534	-.2438	-.0336
Mindfulness → Mind wandering → Stress	-.0716	.0514	-.1769	.0270
Mindfulness → Self-control → Mind wandering → Stress	-.1658	.0522	-.2861	-.0828

Table 2 Self-control and mind wandering mediate a chain effect between mindfulness and depression

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	-.3334	.0726	-.4773	-.1963
Mindfulness → Self-control → Depression	-.1334	.0646	-.2614	-.0075
Mindfulness → Mind wandering → Depression	-.0603	.0433	-.1520	.0197
Mindfulness → Self-control → Mind wandering → Depression	-.1397	.0479	-.2496	-.0652

Table 3 The mediation effect of self-control and mind wandering in the chain between mindfulness and anxiety

	Effect	BootSE	BootLLCI	BootULCI
TOTAL	-.3391	.0714	-.4804	-.1979
Mindfulness → Self-control → Anxiety	-.1197	.0587	-.2322	-.0031
Mindfulness → Mind wandering → Anxiety	-.0662	.0483	-.1686	.0237
Mindfulness → Self-control → Mind wandering → Anxiety	-.1533	.0513	-.2710	-.0727

#### 4.2. Gender differences in mindfulness and self-control and mind wandering

In order to further understand the differences in scores of different gender individuals on various variables, we conducted a gender-independent sample T-test. The results showed that there was a significant difference between the two groups in the descriptive index of mindfulness,  $t = 2.102$ ,  $p = 0.037$ , and the score of males ( $14.95 \pm 2.59$ ) was significantly higher than that of female ( $13.94 \pm 2.90$ ). There was no significant difference between groups on other measures.

### 5. Discussion

Through questionnaire survey, this study found the chain mediating effect of self-control and mind wandering between mindfulness and anxiety, depression and stress. It expands the previous research and helps to better understand the mechanism by which mindfulness improves negative emotions.

This study is the first to discover the mediating role of self-control in the regulation of negative emotions by mindfulness. Previous studies have found that mindfulness improves executive control function and increases self-control ability by regulating attention<sup>[5]</sup>. A significant positive association between mindfulness level and self-control was also found in the present study, supporting previous findings. In addition, we found that increased self-control can help mindfulness improve negative emotions. The reason may be that the strengthening of self-control ability can effectively reduce the trouble of automatic negative thoughts for individuals. Studies have shown that automated negative thoughts can lead to negative emotions such as anxiety, depression and pressure<sup>[6]</sup>.

In addition, this study also verified the chain mediation effect of self-control and mind wandering in the regulation of negative emotions by mindfulness. This shows that self-control and mind wandering that there was a certain degree of correlation between the mindfulness effects play a different role in the negative emotion. Self-control not only plays an independent role in mediating negative emotions, but also acts on mind wandering and reduces the occurrence of mind wandering. Mental wandering has a direct effect on negative emotions. The chained mediation model in this study can help us better understand the complex mechanism of mindfulness affecting

negative emotions.

This study also has certain limitation. First, this study was a cross-sectional study with a questionnaire, and no causal inference can be made. In the future, cross-lagged analysis or randomized controlled trial at multiple time points can be conducted to reveal the causal relationship. Secondly, there may be social expectation effect in this study, and the results can be further refined by behavioral response test in the future.

## 6. Conclusion

Self-control and mind wandering play a chain mediating role in the relationship between mindfulness and stress, depression and anxiety.

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