



Original Article

Evaluation of the causal relationship model of mindfulness with anxiety and depression by mediating unintentional mind wandering

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Abstract

Introduction: Past studies have found mindfulness to be associated with improved mental health. Anxiety and depression are the most common problems in the field of mental health. The present research aims to indicate that the unintentional mind wandering is a mechanism mediating the relationship of mindfulness with anxiety and depression.

Materials and Methods: In order to test the mediator model, 300 female students of Shahid Chamran University of Ahvaz-Iran in 2017 were selected by multistage random sampling method. So, in the first stage of sampling, 5 faculties (psychology and education, engineering, literature and humanities, basic sciences, economics and social sciences) were selected randomly from 12 faculties of this university. Then, among the undergraduate students in 23 different disciplines, 300 students were selected. They fulfilled the Mindful Attention Awareness Scale (MAAS), Depression Anxiety Stress Scale (DASS), short-form of the Spielberger State-Trait Anxiety Inventory (SSTAI), and the Intentional/Unintentional Mind Wandering Scale. Collected data were analyzed by SPSS and AMOS and using structural equations modeling method. In order to earn the suitable model fitness indices, the item parceling method was used.

Results: Based on the values of some indices (for example, RMSEA= 0.07 and GFI= 0.95), model had a good fit. Also, the results showed that mindfulness has significant relationships with unintentional mind wandering, depression, and anxiety and unintentional mind wandering has significant relationships with anxiety and depression ($P \leq 0.01$). In addition, the indirect effects of mindfulness on anxiety and depression were also significant through unintentional mind wandering.

Conclusion: Unintentional mind wandering is a factor that facilitating the anxiety and depression and mindfulness can affect the anxiety and depression with reducing the unintentional unrelated thoughts.

Keywords: Anxiety, Depression, Mindfulness, Mind wandering

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Introduction

A person's mind does not always remain focused on an assignment that he/she is doing. Instead, it deviates from an external assignment and attends to other internal thoughts like memories or future events. Mind wandering refers to mental processes which destroy attention and deviate it from external assignments to a person's internal thoughts (1). The concept of "mind wandering" has been taken from theories of "executive control", which accounts for people's ability in controlling and regulating cognitive or attention sources in achieving their aims and completing their task, especially when they face interfering factors and distraction (2). In most cases, mind wandering fills 30 to 50 percent of our life (3). Researches show that mind-wandering has continuous destructive effects on the main functions, including sustained attention, intelligence testing, and reading function (4,5), and negative mood (3). A kind of mind-wandering is spontaneous (unintentional) (6). Spontaneous thoughts are defined as mental states or a range of mental states that are relatively freely excited due to the absence of severe constraints on the contents of each mode and the transition from a mental state to another. In order to make a theoretical explanation for spontaneity (unintentional) mind wandering, we should refer to the "classic capacity model of attention", which includes the "allocation policy" (7). According to this policy, the distribution of "available capacity" for various assignments is controlled, and this allocation strategy is guided by several factors, including sustainability trends that reflect the rules of involuntary attention and momentary intentions (8). Spontaneous wandering reflects the process of capturing attention despite the efforts of individuals to focus their attention on the current assignment. In spontaneous mind wandering, the stimulus can be a high activation node in the person's semantic network, below its threshold of consciousness (9).

Past research has worked on the type and content of wandering thoughts on mood as anxiety and depression (10). Results have shown that mind wandering is positively associated with boredom or depression (11). A large sample analysis has also indicated that wandering minds tend to think about something unpleasant (3). Response Style Theory suggests that rumination negatively impacts individuals

through the activation of negative thoughts and memories, strengthening the impact of depressed mood on thinking and increasing the likelihood that individuals will make depressive inferences regarding their current circumstances (12).

Mindfulness is an effective factor for mind wandering. Based on these researches, mindfulness decreases mind wandering (13-15). The concept of mindfulness originates from Buddhism and is based on the fact that attention and awareness evolve actively. Mindfulness is defined as a way of non-judgmental, non-responsive awareness of current events, including emotions, cognitions, physical feelings, and external stimuli including seeing, hearing, and tasting (16). Mindfulness helps people relieve from unintentional thought and unhealthy behaviors and regulate their behaviors¹⁷. Past researches also have shown that mindfulness decreases anxiety and depression (10,18,19). Holzel et al. (20) outline attention regulation as a mechanism that relates mindfulness to its effects. Past research, for example, Wang et al. (10) confirmed the important role of mind-wandering in the relation between mindfulness and negative mood. This study investigates the relationship of mindfulness with anxiety and depression by mediating the role of unintentional mind wandering as failure in attention control. So, the present study aimed to indicate that the unintentional mind wandering is a mechanism mediating the relationship of mindfulness with anxiety and depression.

Materials and Methods

The present study had a descriptive-correlational plan. The model analysis method was Structural Equation Modeling (SEM) using AMOS software. The statistical population of this study included all undergraduate female students of Shahid Chamran University of Ahvaz city- Iran. The inclusion criteria included not taking memory-enhancing drugs, for example, Ritalin. In order to estimate the appropriate sample size, it is suggested that in the structural equations modeling, the sample size ratio for each free parameter is estimated to be at least 5, the ratio of 10 to 1 is appropriate, and the ratio of 20 to 1 is desirable (21). Here, according to this method, the total number of paths, the variance of the exogenous variable, the number of covariances, and the number of error variances are calculated as the number of

parameters of the model. In this study, this number includes 5 paths + 1 variance of exogenous variables + 0 covariance + 13 error variances = 19. Therefore, the minimum sample size for the current study is $19 \times 5 = 95$, and the appropriate sample size is $19 \times 10 = 190$ (21). Therefore, in the current study, the sample size of 300 subjects was appropriate for testing hypotheses. In the first sampling stage, five faculties (psychology and educational sciences, technical and engineering, literature and human sciences, basic sciences, and social sciences) from 12 faculties were selected randomly. Then, based on the number of fields and population ratio of girls in each faculty, 300 students were selected from 23 different fields of study, (7% technical and engineering, 20% psychology and educational sciences, 41.5% social sciences, 18.43% basic sciences, and 23% literature and humanities).

Research instrument

A) Mindful Attention Awareness Scale: This scale was devised by Brown and Ryan (22). This scale has 15 items (for example, I find myself preoccupied with the future or the past). The participants in the study were asked to report on their experience of each sentence frequency based on Likert's 6-point scale, 1 for "Almost always" to 6 for "Almost never". To measure the reliability of this scale, Kotze and Nel (23) used the method of internal consistency, and to determine its validity, they used methods of confirmatory factorial analysis and criteria validity. Their findings showed that Cronbach's alpha coefficient for this subscale was 0.90. Also, the relationship between Freiburg Mindfulness Inventory and the Mindful Attention Awareness Scale was significant (0.56). The results of the confirmatory factorial analysis also showed suitable indices for the factorial structure (for example, RMSEA = 0.07, CFI = 0.94, SRMR = 0.06), and the factorial loads were enough (over 0.3). In the present study, the reliability of this subscale was obtained by Cronbach's alpha coefficient (0.80), and its factorial structure was confirmed by confirmatory factorial analysis. In analyzing factorial loads of the items in this scale, 7 items were excluded because their loads were below 0.30 for the analysis stage.

B) The Intentional/Unintentional Mind Wandering Scale: This scale was compiled and validated by Carriere, Seli and Smilek (24). Carriere et al. have divided mind wandering

into two general groups: intentional distraction or aim-oriented and unintentional or aimless distraction. This scale consists of two subscales of intentional mind wandering (4 items, for example, 'I enjoy my mind wandering') and unintentional mind wandering (4 items, 'It seems, I have no control over my mind wandering'). In the present study, only unintentional mind wandering was used. To determine the psychological features of this subscale, the 7-point scale (1 for never and 7 for always) was used. First, they calculated the alpha coefficient (0.86) for mind wandering. Then, they used confirmatory factorial analysis to measure the validity of this scale. Their analysis showed that the items of five scales had suitable and sufficient factorial loads (0.62 to 0.86). In the present research, the reliability of this scale was studied using Cronbach's alpha coefficient, and its validity was confirmed by confirmatory factorial analysis. Cronbach's alpha coefficient for unintentional mental distraction was 0.80, and its factorial loads in the confirmatory factorial analysis were enough (over 0.30).

C) The Short Form of the Spielberger State-Trait Anxiety Inventory: This scale has six items (for example, I am anxious). The scoring of this scale is based on a five-degree scale from 1 for 'never' to 5 for 'very much'. Marteau and Bekker's (25) research shows that this scale has sufficient reliability ($\alpha = 0.77$). The authors confirmed the validity of the scale through checking the correlation of the six-item form with the fourteen remaining items ($r = 0.90$) and the 20-item general form ($r = 0.96$). The present study measured its reliability and validity by Cronbach's alpha method and confirmatory factorial analysis. The reliability of the scale was 0.76, and factorial loads for all items were over 0.30.

D) The Depression Anxiety Stress Scale (DASS-21): It has 21 items and three subscales (stress, anxiety, and depression). In the present study, only the depression subscale has seven items (for example: 'I feel down and heart-broken'). In this scale, the subjects were asked to deal with the degree of a case they had experienced in the past week using a 4-point tension/frequency scale. The score of each subscale was obtained by adding the scores of related items. In order to test the psychological features of the scale, Lovibond and Lovibond executed it in a large non-clinical sample ($n = 2914$) and showed that the reliability of the

scale calculated by Cronbach's alpha was acceptable for all the three subscales (for depression, the alpha was 0.84). They analyzed the main parameters in a sample of 717 students and showed that the three parameters accounted for a high proportion of variance. Later, using the method of confirmatory factorial analysis, they showed that the 3-parameter (anxiety, depression, stress) structure was superior to the 2-parameter (anxiety and depression) structure (26). Sahebi et al. validated this scale to 1070 Iranian individuals. Cronbach's alpha coefficient for the depression subscale was 0.77 (27). In the present study, Cronbach's alpha coefficient analyzed the reliability of this subscale, and its reliability was analyzed by the confirmatory factorial analysis method. Cronbach's alpha coefficient for depression subscale was 0.80, and its factorial loads in the confirmatory factorial

analysis were enough (over 0.30). Data analyzed through AMOS and SPSS software.

Results

In demographic variables, the participants were aged 21.49 ± 2.96 years. The minimum, and maximum, ages were 18 and 47 years, respectively. The descriptive results contain the correlation matrix, mean, standard deviation, kurtosis, and skewness scores of the subjects for the variables in this study are presented in Table 1.

The normal distribution of data was analyzed using numerical detection methods. Kurtosis and skewness of the variables are all in the range of -2 to 2, confirming the normality of the variables. As seen in Table 1, all the correlations among the variables were significant.

Table 1. Descriptive findings and correlation matrix of the research variables

Variables	1	2	3	4	M	SD	Kurtosis	Skewness
1. Mindfulness	-	-	-	-	47.83	8.37	-0.09	-0.48
2.Unintentional MW	-0.44**	-	-	-	9.95	4.24	-0.37	0.53
3. Anxiety	-0.37**	0.29**	-	-	12.11	3.19	-0.46	0.01
4. Depression	-0.34**	0.35**	0.40**	-	10.99	3.11	1.82	1.00

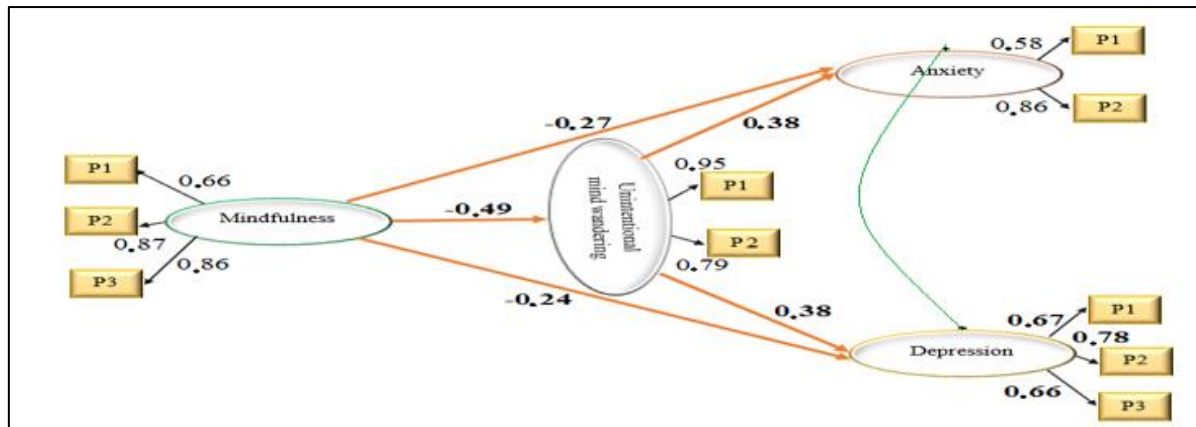
MW= Mind Wandering, ** $P < 0.01$

In order to validate the proposed model fitness, the Structural Equation Method (SEM) was used, and all analyses were performed using SPSS and AMOS. In addition, a combination of fitness indices was used to determine the fitness adequacy of the proposed model with the combined data. Investigation of the indices showed that the model required improvement. For this, item parcels for all variables were formed to control inflated measurement errors caused by multiple items for the latent factor.

This method was used in this study for two reasons: First, the scales were not dimensional. Parceling involves summing or averaging item scores from two or more items and using these parcel scores in place of the item scores in an SEM analysis. Second, using this method helps improve the fitting of the model (28). These parcels were created using assigning the highest and lowest loading items across parcels. The values of accepted fitness indices for primitive and modified models have been reported in Table 2.

Table 2. Fitness indices of the model

Indices	χ^2/df	GFI	AGFI	CFI	IFI	RMSEA
Acceptable fitness values	< 5	>0.90	>0.90	>0.90	>0.90	<0.08
Fitness of primitive model	3/01	0.94	0.89	0.81	0.82	0.08
Fitness of modified model	2.56	0.95	0.91	0.86	0.87	0.07



Factor loadings are standardized. P1-P3= Parcels of variables, All direct paths are significant at 0.001.

Figure 1. The structural equation modeling for the corrected model of the relationship of mindfulness with anxiety and depression with mediating role of unintentional mind wandering

The bootstrap method was used to determine the significance of mediation relationships. Table 3 shows the results of using the bootstrap method concerning indirect mediator paths. In

order to analyze the indirect paths, the total score of the variables was. Certainty level for these certainty distances is 95, and bootstrap's repeated samplings are 1000.

Table 3. The results of bootstrap for the indirect paths of the model

Indirect paths	Data	Boot	Bias	SE	Confidence interval
1. Mindfulness→ MW→ Anxiety	-0.03	-0.03	0.00	0.01	-0.05 -0.004
3. Mindfulness →MW→ Depression	-0.04	-0.04	0.00	0.01	-0.07 -0.02

MW= Mind Wandering

As seen in Table 3, the certainty distances reveal the exclusion of zero in these distances and the significance of indirect paths. The certainty levels which do not include zero indicate that the desired indirect effect is significant. As seen in Table 3, all of the indirect paths are significant. According to the above model, in general, parenting styles, extroversion, and Introversion could predict ($R^2 = 0.27$) the anxiety variable, which could be explained by 27% of the endogenous variable 73% other non-research variables.

Discussion

Results of structural equation modeling analysis showed a significant negative relationship between mindfulness and unintentional mind wandering. The more people possess higher mindfulness, the less probable they are affected by mind wandering. These findings are in line with the findings of some studies (13-15). Furthermore, Hoogland (29) referring to some previous studies, stated that mindfulness mediators are better able to

sustain their attention than non-mediators. These studies stated that the ability to focus one's attention better for expected stimuli and unexpected events requires a switch in attention. As such, mindfulness mediators demonstrated lower expectancy effects than concentrative mediators because they were better able to distribute their attention, did not get as caught up with particular stimuli, increased meditation experience might increase one's ability to sustain attention. When people become attentive and aware that they are not focused on the task, they try to focus again on it without positive or negative judging their distractions (30).

The results of the study confirmed that mindfulness had negative direct relations with anxiety and depression, as in previous studies (31-33). Attention is focused on the future, and physical stress is one of the hallmarks of anxiety. Due to the effect of anxiety on the mind and body, many studies have focused on the role of mindfulness. Anxiety is a psychological problem that originates from cognitive

evaluations and is rooted in future-oriented thoughts, which leads to a mood that focuses on coping with the potential negative consequences of the future rather than consciousness in the present moment (34). Based on cognitive theories, evaluation plays an important role in anxiety. Beck and Emery (35) believe that incompatible anxiety takes root from the disturbance of the evaluation process. People who suffer from chronic anxiety regard hazardous situations as threatening. Mindfulness helps to reduce anxiety by keeping attention on the moment. Desrosiers et al. (36) have explained this relationship with the model of the conditional process. According to this model, the lack of reaction reduces symptoms by providing interruptions in automated maladaptive responses to stimulus-induced anxiety. By providing a pause, the lack of reaction facilitates to inhibit effective emotion regulation strategies. Instead of auto-responding to worry-based thinking, the lack of response will lead to an alternative response cognitive re-evaluation.

This model is consistent with the observed relationship between the lack of reaction from mindfulness and the reduction in worry and anxiety. Mindfulness through adaptation to the present moment, increasing self-awareness, self-regulation, and self-observation helps to reduce anxiety (37).

Also, in the context of the relationship between mindfulness and depression, it should be noted. Beck (35) finds the cause of depression a tendency to interpret everyday events negatively. However, the person who is in mindfulness mode is capable of acute access to self-evaluating processes and can adopt more adaptive coping strategies that promote the adoption of any experience, including self-evaluating thoughts (I can be aware of my anxiety). It has been proven that mindfulness meditation requires the person not to be completely, but impartially, aware of everything that occurs at the moment, without judgment, hatred, or investment (38).

Hence, mindfulness provides the context in which individuals perceive thoughts and events and refrain from their critical judgment (39). The lack of judgment of internal experiences is a mechanism for creating an uncritical tendency to emotions (36). When a depressed person looks at his/her thought as one of the thousands of thoughts that come and go during a day, not

in the sense of it, it interferes with the immediate self-evaluating negative thoughts and stops the depressing cycle (40).

The present study showed that unintentional mind wandering has a direct relationship with anxiety and depression. It should be noted that researchers found that mind wandering can be related to negative mood (8). Also, a study has indicated that wandering minds tend to think about unpleasant things (3). Poerio, Totterdell, and Miles found that negative mood triggers personal goals or problems that then occur during mind wandering. This suggests that mind wandering is an attempt to solve a problem beyond the present moment. Furthermore, they found that mind wandering is associated with everyday concerns and further discomfort for maintaining negative mood (7). Marchetti, Putte and Koster provide evidence on the relationship of daydreaming with depressive symptoms through self-focus and rumination. Mind wandering, depending on the tragic content of the thoughts, could lead to increasing depression. This means that the less the mind wandering is reduced the more symptoms of depression subsequently diminish (41). Finally, the study found that mindfulness can predict anxiety and depression through unintentional mind wandering. Hence, the indirect assumptions of the present study are also confirmed. Mindfulness significantly relates to mood, and mind wandering is correlated with mindfulness and mood. Individuals with high mindfulness levels have less mind wandering, which could help them experience a better mood state (10). Poerio et al., (7) and Ruby et al. (42) found that the emotional content of self-generated thoughts can potently predict subsequent mood. Killingsworth and Gilbert (3) also proposed that mental retreat, especially of its retrospective nature, could be linked to creating a lower mood. Mentally motivated individuals have difficulty in controlling executive functions or allocating attention. Through the distribution of resources between the present task and unrelated thoughts, mindfulness regulates the negative mood (43).

Limitations of the present study in generalizing the findings relate to the tools were used in a self-report form. For future researches, we suggest that also behavioral measurements be used. Regarding the better generalization of the findings, it is advised that this model get analyzed in other researches.

Conclusion

Unintentional mind wandering is a factor in facilitating anxiety and depression, and mindfulness can affect anxiety and depression by reducing unintentional mind wandering. Therefore, the results of this study show that consciousness to daily practices and practices

can prevent the occurrence and severity of anxiety and depression.

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