

The role of emotional memory in the relation between mindfulness and interpersonal problems

Mozhgan Shamseddini^{1*}, Mahnaz Shahgholiyan², Mohammad Hossein Abdollahi²

¹ Department of psychology, Faculty of psychology and behavioural sciences, Kharazmi University of Tehran, Iran. ² Faculty member of psychology and behavioural sciences, Kharazmi University of Tehran, Iran.

Correspondence: Mozhgan Shamseddini, Department of psychology, Faculty of psychology and behavioural sciences, Kharazmi University of tehran, Iran. Email: mshamseddini664@gmail.com

ABSTRACT

This study aimed to investigate the role of emotional memory in the relationship between mindfulness and interpersonal problems. 100 students of BS and MA Kharazmi University (72 women and 28 men) participated in this study. Participants were asked, the scale of interpersonal problems (IIP-60), and mindfulness Scale (MAAS) to complete and then respond to the Emotional Stroop test computer. Regression analysis (the target path analysis) was used to interpret data from the study. Results showed that, as the memory of the emotional Stroop component in the relationship between mindfulness and interpersonal problems, did not find a mediator. This does not mean that the mindfulness for influencing emotional memories associated with interpersonal problems. But also emotional memory in moderating the relationship between mindfulness and interpersonal problems, that is, as a second independent variable (not a mediator or arbitrator) is effective. This means mindfulness interact with the effect of emotional memory and not because it is associated with interpersonal problems.

Keywords: emotional memory, mindfulness, interpersonal problems

Introduction

Interpersonal problems are one of the recurrent problems in interpersonal relationships and the most important reason for seeking psychological treatment (Horowitz et al, 1993) [1]. Interpersonal problems are problems that arise in relation to others, cause anxiety and psychological helplessness, and are the product of a conflict between a person's desire for a certain behavior and fear of the consequences of that behavior (Gurtman, Mb 1995) [2]. Accurate analysis of interviews with clients has been able to identify, summarize and list a range of interpersonal problems, including problems in the areas of assertiveness, sociability, submissiveness, intimacy,

responsibility and controlling (Gurtman, 1995; quoted by Besharat, 2009) [2]. It is clear that emotion is one of the effective factors in reducing or increasing interpersonal problems. The most important source of our daily excitement is others. We experience more excitement when we interact with others than when we are alone.

On the other hand, in recent years it has been argued that cultivating mindfulness skills is beneficial for individuals suffering from a wide range of inner-personal and interpersonal problems. The application of mindfulness to mental health has been widely used since 1970 (Kabat-Zinn, 1990) [3] and has been considered in the last decade (Brown et al., 2007) [4].

"Situation-free mindfulness" is defined as the tendency to have a kind of consciousness whose characteristic is awareness of experiences without engaging in the emotional context that accompanies them, and acceptance, without judging experiences in the present moment. Mindful people perceive the inner and outer reality freely and without distortion and without engaging in the emotions that accompany them, and have a great ability to face a wide range of memories, thoughts, emotions and experiences (pleasant or unpleasant) (Ryan and Brown, 2003; [5] (Brown et al., 2007) [4].

Access this article online

Website: www.japer.in

E-ISSN: 2249-3379

How to cite this article: Moshgan Shamseddini, Mahnaz Shahgholiyan, Mohammad Hossein Abdollahi. The role of emotional memory in the relation between mindfulness and interpersonal problems. *J Adv Pharm Edu Res* 2020;10(2):106-113. Source of Support: Nil, Conflict of Interest: None declared.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

In the research background, there is a lot of empirical support for the effectiveness of mindfulness in reducing many psychological problems. For example, there were evidences for the effectiveness of mindfulness training in increasing positive emotion and mood and decreasing negative emotion in chemical injuries (Narimani et al., 2011) [6]. A research has shown that people with high levels of situation-independent mindfulness are more able to regulate their behavior and emotions and experience greater satisfaction with their lives and interpersonal relationships (Feng et al., 2013) [7]. Studies have shown the relationship between mindfulness and psychological well-being and found it as a strong predictor of psychological well-being (Ahmadvand, 2011) [8]. Hypothesis was that mindfulness as one of the cognitive-emotional processes has a role in the low well-being of neurotic individuals. In examining the role of mindfulness in emotion and mood, the results show that mindfulness predicts self-regulatory behavior and positive emotional states, and through the combination of vitality and clarity of experiences, it can make positive changes in psychological status (Ryan & Brown, 2003) [5] and reduce depression and anger (Kewit, 2008).

One study found that mindfulness weakens the relationship between neuroticism and suicidal thoughts and that there is a strong negative relationship between suicidal thoughts and extraversion at lower levels of mindfulness (Tucker, 2014). The results of studies (Barnhofer et al., 2013) [9] showed that mindfulness mediates the relationship between neuroticism and current symptoms of depression. The relationship between neuroticism and depression was significant in people with low to moderate levels of mindfulness, but not significant in those with relatively high levels of this ability (Feltman et al., 2009) [10]. In Gulak's research (2009), the mindfulness is significantly associated with five major factors of personality, especially neuroticism, negative emotion and conscientiousness.

Mindfulness is defined as non-responsive consciousness to the physical, emotional, and psychological state of the individual. It is described as the awareness of any experience in the present without judging that experience (Brown and Ryan, 2003; Samuelson et al., 2007) [4] [5]. In the last decade, mindfulness has also been described as a model of information processing. It is a memory of the mind in which attention is maintained to the complete record of observed facts (Brown et al., 2007) [4]. This complete attention is like a state of mirror in which the mind reflects and remembers only what has happened without being prejudiced by reasoning. In this case, the person becomes a neutral observer of his emotions and thoughts (Schweizer and Begley, 2002). Mindfulness, therefore, is a non-judgmental observation of a steady stream of internal and external stimuli, just as they occur (Kabat-Zinn, 2003) [11]; (Hayes and Wilson, 2003) [12]; (Ryan and Brown, 2003) [5]. These definitions are at odds with states of mind in which the mind focuses elsewhere, such as engaging in memories, worries and emotions, chewing on them, or acting automatically without the individual being

aware of his or her actions. According to Kabat-Zinn, careful attention to the experience observed in the moment, regardless of whether it is enjoyable or annoying, is an important feature (Bauer et al., 2006) [13].

The basis of mindfulness is derived from techniques that increase the capacity for attention, consistent and intelligent consciousness (which is beyond thought) as well as memory (Brown & Ryan, 2003) [4]; (Kabat-Zinn, 2003) [11]. Although the main goal of mindfulness is not relaxation, it is believed that observing negative internal events without any judgment about them or without physiological arousal causes relaxation. Mindfulness, then, means paying attention to a purposeful, specific, present-day way, free from judgment on cognitions and emotions caused by internal and external stimuli (Kabat-Zinn, 2003) [11]. In mindfulness, the goal is not to change thoughts and emotions, but to create a different relationship or attitude toward thoughts, feelings, and emotions. It includes maintaining full and moment-to-moment attention as well as acceptance without judgment and forbidding the processing of high levels of emotional information. In general, the term mindfulness refers to awareness of events, thoughts, and inner beliefs and controlling and monitoring them without engaging in their emotional context (Wells, 2009) [14].

In the last two decades, research conducted on the field of "emotion" and "memory" has increased significantly, and valuable advances have been made to assess how the two relate. A group of cognitive psychologists studied the effects of emotion on memory (Kensinger et al., 2004, 2008; Anderson and Shimamura, 2005) [15] [16] and a group the effect of memory on emotion (Shore, Scherer, & Johnston, 2001; quoted by Rio, 2009; Schmical, Volukho and Dimari, 2008) [17]. According to the results, emotion and memory, as is quite obvious in everyday life, interact with each other. Emotion can generally be studied in two ways: (1) Investigating the impact of emotional content of the information received and (2) Investigating the effect of a person's emotional state during memorization. Evidence suggests that people process, encode, and retrieve information differently based on their emotional states, such as happiness or sadness.

Schmical et al. (2008) [17] showed that people with higher memory capacity have a greater ability to suppress emotional states and a greater ability to adopt a non-emotional attitude when exposed to emotional stimuli. According to Schmeichel et al. (2013) [18], emotional memory capacity is separate from cognitive memory and with training we can improve emotional memory capacity. Laboratory studies show that in many cases individuals are more inclined to recall emotional stimuli than neutral stimuli (Kensinger and Korkin, 2003) [19]. Another group of researchers believe that emotional memories are more enduring because, first, these memories are more subjectively reviewed; second, emotional events trigger the function of the amygdala, which in turn enhances hippocampal processing (Conley, Zao, Brauer, Gabrieli, & Cahill, 2000; McGuff, 2000;

quoted by Madar, 2009). In his "Semantic Network Theory", Bauer (1981) discusses the effects of mood and emotion on cognitive processes, especially memory, such that emotions have specific affection such as pleasure, fear, joy and sorrow, a specific node or unit in memory. Any association with any of these nodes will trigger automatic reactions of facial expressions and verbal labels to the emotion.

According to Leigh and Bowen (2006) [20], mindfulness is purposeful attention, along with acceptance without judgment, which helps one to understand that negative emotions may occur, but they are not permanent. It also allows the individual to respond to events with reflection and recollection of previous events rather than involuntarily responding to them (Emanuel *et al.*, 2010) [21]. In this case, the individual is able to create a different relationship with the experience of internal feelings and external events, by creating moment-by-moment awareness and behavioral orientation based on wise responsibility instead of automatic reactivity. It effectively influences emotional responses through cortical inhibition of the limbic system and emotional processing by purposefully employing high-level behaviors (Kabat-Zinn, 2003) [11].

(Bishop *et al.* 2004) [22] and Latz *et al.* (2008) have concluded that mindfulness is composed of self-regulating attention and maintaining a particular tendency towards the present experience. Self-regulation of attention involves constant attention, attention shift, and inhibition of the detailed processing of emotional information and the recall of this information from memory. Recent efforts to transform the concept of mindfulness into a simple and understandable concept have also listed three important and major components that are dynamically and cyclically related to each other and have been identified as influential and basic mechanisms of mindfulness. They are: Awareness, Attention and Attitude (Shapiro *et al.*, 2006) [23]. Attention is one of the fundamental components of mindfulness. Cognitive psychologists have distinguished different types of cognitive abilities. Their two major forms include the ability to pay attention to an object for a long period of time (sustained attention) and the ability to inhibit the thought, excitement, or feeling process (selective attention). Despite the evident effect of mindfulness on the attention functions of the brain, no serious research has yet been done on the relationship between mindfulness and a variety of executive functions, including memory. However, the success of mindfulness-based cognitive therapies can indicate changes in the executive functions of the brain to inhibit the processing of high levels of emotional information. Researches show that mindfulness leads to inhibition of lateral system activity (Davidson *et al.*, 2003) [24].

According to what has been said and regarding the theoretical foundations of the relationship between mindfulness and emotional memory and since few empirical studies on this relationship, we have dealt, in the present study, with the role

of memory Emotion in the relationship between mindfulness and interpersonal problems.

Psychologists have long made efforts to understand cognitive processes and their impact on health. The interactions of cognition, emotion and health are quite obvious. One of the most important developments of the twentieth century is the emergence of theories that emphasize the role of some psychological structures. At first glance, it may seem that the structure of mindfulness is more in line with Eastern culture, but many scholars agree on its generality and universality. As the volume of researches show, this structure has been studied more widely in Western culture than in Eastern countries (Ghorbani *et al.*, 2009) [25]. Many cultures around the world, including Islamic, Jewish, Buddhist, Christian, and Indian cultures have used many forms of meditation. We can consider them as the origin of mindfulness. Common elements in these schools and traditions include focusing on breathing, repetition of words, and content of mindfulness. These traditions introduce mindfulness as a way to reduce the pain and suffering of each person and encourage him to expand positive traits such as awareness, insight, wisdom, compassion, restraint and sobriety (Kabat-Zinn, 2003) [11]. These traditions point out that regular practice of mindfulness meditation exercises reduces mental disorders and leads to the evolution of consciousness, wisdom, insight, calmness and mental balance.

We can change and resolve the conflicts that cause many mental health problems through mindfulness, which is the non-judgmental observation of a constant flow of internal and external stimuli, just as they occur (Horowitz *et al.*, 1993) [1]. Mindfulness is a kind of consciousness that exists in the present moment due to attention to the goal, without moment-to-moment inference. Mindfulness is a kind of non-judgmental awareness of personal experience. Without judging the experience, it unfolds moment by moment in the conscious part of the mind. In fact, mindfulness is a way to live a better life, relieve pain and enrich and make life meaningful (Siegel, 2010) [26]. considers mechanisms that explain how mindfulness skills affect the reduction of symptoms and behavioral changes. These mechanisms are: 1- Facing, 2- Cognitive change, 3- Self-management, 4- Calming, 5- Acceptance. In mindfulness, the person becomes aware of his mental way at every moment, and after being aware of the two ways of mind, one doing and the other being, he learns to move the mind from one way to another. This requires the training of specific behavioral, cognitive, and metacognitive strategies to focus the attention process (Teasdale *et al.*, 2002) [26].

It is worth noting that this psychological construct must be distinguished from self-awareness or self-attention. The similarity of these constructs is in the increased attention to mental experiences, but the main difference is in their cognitive aspect. In other words, attracting attention in self-awareness is under influence of the biases of self-centered thinking and is accompanied by self-judgment, but mindfulness is a non-biased attention and judgment about one's aspects. Mindfulness is

positively associated with mental health, while self-awareness is associated with low levels of psychological well-being (Brown, & Casser, 2005; Brown, Ryan, & Cresswell, 2007; Falconstrom, 2010) [4]. On the other hand, one of the important aspects of emotional processing of information is data processing in memory. Based on research findings, we can say that emotional processing of information is different in different disorders (Bauer, 2007) [13]. In other words, data processing is different in psychological problems. Therefore, it seems that the need to recognize these variables and the relationships between them is not only useful for the development of theoretical knowledge, but also will allow the optimal use of findings to improve health. Postwood (2009) believes that mindfulness-based stress reduction program significantly increases mindfulness and health, as well as reducing stress and its physical and psychological symptoms. So, we can consider mindfulness as a mediating factor to increase psychological performance and reduce stress symptoms resulting from meditation exercises. This treatment has a positive effect on reducing stress in people with eating disorders, especially obesity and mood swings in cancer patients (Weber, 2010) [27].

Mindfulness-based cognitive therapy is a program for the prevention of recurrence of depressive symptoms (especially unipolar depression) that combines cognitive therapy aspects with meditation (with an emphasis on mindfulness) (Segal et al., 2002) [28]. The effectiveness of this treatment has also been confirmed in patients with bipolar disorder (Weber et al., 2010) [27]. In general, mindfulness-based interventions have been effective in reducing the symptoms of depression, chronic pain and stress (Kozak, 2008; Mars and Abby, 2010) [29].

The most general and main purpose of this research is to investigate the role of emotional memory in the relationship between mindfulness and interpersonal problems. We have also conducted this research specifically with the aim of 1- examining the relationship between mindfulness and interpersonal problems, 2- examining the relationship between emotional memory and interpersonal problems, and 3- examining the relationship between mindfulness and emotional memory. The questions that this research seeks to answer are: 1- What is the relationship between emotional memory and interpersonal problems? 2- Does mindfulness affect interpersonal problems by affecting emotional memory?

In line with the issues and goals under study in this research, we tested the research hypotheses as follows: 1- Mindfulness has a negative relationship with interpersonal problems. 2- Mindfulness has a positive relationship with emotional memory.

Method

Statistical population, sample and research method

The present research is a descriptive (correlation) study. Our population is all male and female students of different fields of

Kharazmi University in MSc and BSc levels. As Lindman, Maranda and Gold (Hooman, 2001) [30] have suggested, the sample size in regression studies should be at least 100 people. Therefore, we selected 100 people from the target population using the sampling method at convenience and provided with the Mindful Attention Awareness Scale (MAAS) and Inventory of Interpersonal Problem (IIP-60). They also each performed an emotional Stroop computer test.

The method of implementation was such that the researcher, by attending the faculties of Kharazmi University, selected and tested the desired sample from among the students who were in their spare time and after explaining the objectives of the research, considering the inclusion criteria.

Age between 18 and 35 years, no clinical anxiety, no use or abuse of drugs, no other psychological disorders were the criteria for participating in the study. We assessed Inclusion criteria through completing the demographic questionnaire by the subjects and the oral report of the subjects.

We used regression method (with the aim of path analysis) to analyze the data. Analysis of the development path of regression methods and in fact the application of multivariate regression is on a larger scale. Its purpose is to obtain quantitative estimates of the relationships between a set of variables. Relationships between variables are considered as distinct paths and the analysis states which paths are significant. What this analysis does is to examine the pattern of relationships between several variables, while the possible causal relationship between them is neither confirmed nor rejected. The easiest way to perform path analysis is to use regression, provided that the assumptions of path analysis are valid (Hooman, 2001) [30].

The tools used in the research are as follows:

Inventory of Interpersonal Problem (IIP-60): The 127-item Inventory of Interpersonal Problem of short form (Horowitz et al., 1988) [1] is a 60-item test; it measures interpersonal problems in six areas: assertiveness, sociability, submissiveness, intimacy, responsibility, and controlling on a 5-grade Likert scale from 0 to 4 (very low = 0; low = 1; moderate = 2; high = 3; very high = 4). In addition to the above six subscales, the average of the subject in the field of interpersonal problems is also calculated based on his score in a total of 60 test items. In validating the Persian form of this scale for student samples (159 girls, 112 boys) and the general population (490 females, 434 males), Cronbach's alpha coefficients for each item of the subscales ranged from 0.86 to 0.89 for assertiveness, from 0.90 to 0.91 for sociability, from 0.82 to 0.84 for submissiveness, from 0.83 to 0.87 for intimacy, from 0.91 to 0.93 for responsibility, from 0.91 to 0.92 for controlling and from 0.93 to 0.95 for the total score of interpersonal problems. This is a sign of high internal consistency of the scale (Besharat, 2011).

Mindful Attention Awareness Scale (MAAS): This scale is a 15-question test that Ryan and Brown (2003) [5] designed to measure the level of awareness and attention to current events and experiences in daily life. Items are about being aware of emotional states, experiences, activities, ignoring environmental issues, doing decentralized activities, doing activities without being aware of it, and not knowing when to start and end daily activities. The test questions measure the mind-fullness construct on a six-grade Likert scale from score of one for almost always to score of six for almost never. This scale gives an overall score for mindfulness ranging from 15 to 90, and a higher score indicates greater mindfulness. Internal consistency of test questions based on Cronbach's alpha coefficient has been reported from 0.80 to 0.87 (Ryan and Brown, 2003); [5] (Ghorbani *et al.*, 2009) [25]. The validity of the scale has been reported to be sufficient due to its negative correlation with the tools for measuring depression and anxiety and the positive correlation with the tools for measuring positive emotion and self-esteem (Ryan and Brown, 2003) [5]. Cronbach's alpha of the questionnaire in this research was 0.72.

Emotional Stroop Test: The Stroop Test was first invented by Stroop (1935; quoted by Steriuss *et al.*, 2006). Steriuss *et al.* (2006) reported a Cronbach's alpha coefficient for this test by 0.91. The basis of the test is naming colors. 96 colored words are randomly shown to the subject for which in 48 words the color of the word is the same as the meaning of the word (corresponding words) and in 48 words the color of the word is different from its meaning (non-corresponding words). He is asked to specify only the color of the word regardless of its meaning. Test time for corresponding and non-corresponding stimuli (time spent responding to each of the corresponding and non-corresponding stimuli), number of error responses,

number of correct responses, number of unanswered cases, and finally the degree and interference score are some important outputs of this test. So far, several software versions of this test have been designed and used. Emotional Stroop is a computer neuropsychological test that is used to measure a person's propensity for emotional stimuli at the sub-threshold level, or to measure the executive action involved in emotional memory (subcortical emotional processing). Neutral and emotional stimuli appear in the form of four main colors and the subject must choose the color. It is clear that if the stimulus has an emotional load, the person will not be able to focus on its color, and thus the person's reaction is delayed. The computer measures the speed of reaction. In Iran, the reliability and validity of emotional Stroop have been reported as desirable by Ismaili *et al.* (2002).

Findings

In this section, we first examine the hypotheses and then the research questions. Table 1 examines the first hypothesis of the research in which: Mindfulness has a negative relationship with interpersonal problems, in the form of a correlation between the variable of mindfulness and the variable of interpersonal problems and its components. As can be seen in this table, with increasing mindfulness, the total score of interpersonal problems has decreased. This decrease is also significant in the lack of control, lack of sociability and that of assertiveness. Other components of interpersonal problems are negatively related to mindfulness but have not reached significance. We can conclude that there is a significant negative relationship between mindfulness and interpersonal problems.

Table 1- Correlation between mindfulness and components of interpersonal problems (n = 100)

Variables	Difficulty in assertiveness	Difficulty in sociability	Difficulty in submissiveness	Difficulty in intimacy	Difficulty in responsibility	Difficulty in controlling	Total score of interpersonal problems	Total score of mindfulness
Difficulty in assertiveness	1							
Difficulty in sociability	0.549**	1						
Difficulty in submissiveness	0.097	0.406**	1					
Difficulty in intimacy	0.362**	0.486**	0.416**	1				
Difficulty in responsibility	0.462**	0.373**	0.158	0.266*	1			
Difficulty in controlling	0.160	0.101	0.297**	0.273**	0.413	1		
Total score of interpersonal problems	0.618**	0.736**	0.484**	0.631**	0.470**	0.390**	1	
Total score of mindfulness	-0.242*	-0.256	-0.121	-0.200	-0.118	-0.294**	-0.268*	1

Table 2 examines the second hypothesis of the research in which: mindfulness is positively related to emotional memory, in the form of a correlation between the mindfulness variable and the components of the emotional memory variable.

Table 2- Correlation between mindfulness and components of emotional memory (n = 100)

Variable	Correct response		Error a	Error b	Time a	Time b
	a	b				
Mindfulness	1					
Correct response a	0.410*	1				
Correct response b	-0.068	0.970**	1			
Error a	-0.189	-0.166	-0.073	1		
Error b	-0.174	-0.43	-0.153	0.586**	1	
Time a	-0.32*	0.674**	0.662**	-0.122	-0.122	1
Time b	0.002	0.373**	0.387**	0.193	0.130	0.854**

*p <0/05 ** p<0/01

- a. Words with semantic load
- b. Words without semantic load

As can be seen in Table 2, no significant relationship was found between mindfulness and emotional memory components. Only with increasing mindfulness does time a decrease significantly. The correct answer a also increases.

In Table 3, we have examined the first research question in the form of a correlation table. Findings in response to the first

question: What is the relationship between emotional memory and interpersonal problems? As can be seen in Table 3, the relationship between the components of correct answers and the overall score of interpersonal problems is negative and significant. With increasing correct response (or increasing emotional memory) the overall score of interpersonal problems decreases. Both errors also had a significant positive relationship with controlling. With the increase of errors (decrease of emotional memory), the component of difficulty in controlling from interpersonal problems has increased. With the increase of type error b, the amount of interpersonal problems has also increased significantly. Of course, with the increase of type of error a, the problems have increased, but this relationship has not been significant despite its proximity to the level of significance. So in the case of question one, we can say that in fact, by increasing the correct answer and reducing the error (both indicate an increase in emotional memory), the overall score of interpersonal problems decreases.

Table 3-Correlation between components of interpersonal problems and components of emotional memory (n = 100)

Variables	Difficulty in assertiveness	Difficulty in sociability	Difficulty in submissiveness	Difficulty in intimacy	Difficulty in responsibility	Difficulty in controlling	Total score of interpersonal problems
Correct response a	0.104	-0.323**	-0.014	-0.458**	-0.053	-0.125	-0.634**
Correct response b	-0.248	-0.313**	-0.034	-0.347**	0.44	0.052	-0.396**
Error a	0.063	-0.028	-0.069	-0.014	0.008	0.303**	0.219
Error b	-0.09	-0.02	-0.007	-0.011	0.094	0.319**	0.295*
Time a	0.102	0.054	-0.022	-0.001	0.085	0.049	0.034
Time b	0.15	-0.016	-0.13	-0.06	0.112	0.041	-0.12

** p<0/01

- a. Words with semantic load
- b. Words without semantic load

In the following, we examine the second question of the research, which is about the mediating role of emotional memory between mindfulness and interpersonal problems. To investigate this mediating role, according to the correlation tables, we considered emotional memory in the form of the correct response a. Thus, we included the total score of mindfulness, the correct answer a, and the total score of interpersonal problems in regression analysis. Using regression, we investigated the answer to the second research question: Does mindfulness affect interpersonal problems by affecting emotional memory? According to this regression, the interaction of mindfulness and emotional memory component on interpersonal problems has become significant. Therefore, it is not the case that mindfulness is associated with interpersonal problems due to its effect on emotional memory. Rather, the component of emotional memory is a moderating factor in the relationship between mindfulness and interpersonal problems, that is, it acts as a

second independent variable. Table 4 summarizes the model of this regression.

Table 4- Summary of regression model

Model	R	R ²	Adjusted R ²	Estimation error
1	0.148	0.022	0.011	0.463
2	0.171	0.029	0.007	0.464

According to Table 4, mindfulness predicts 2% and correct response a (emotional memory component) also does 2% of changes in interpersonal problems.

In the following, we will examine the moderating role of the correct response a (emotional memory component) in the relationship between mindfulness and interpersonal problems. Table 5 summarizes the model of this regression.

Table 5- Summary of regression model

Model	R	R ²	Adjusted R ²	Estimation error
1	0.350	0.1220	0.091	0.464
2	0.431	0.185	0.158	0.466

According to Table 5, mindfulness and the correct answer explain 9% of the changes in interpersonal problems and the product of the multiplication of these two variables (interaction) explains 15% of the changes in interpersonal problems.

Discussion

As seen, and according to the purpose of this research, which examines the role of emotional memory in the relationship between mindfulness and interpersonal problems, the findings of this research in response to our first question (what is the relationship between emotional memory and the interpersonal problems?) showed that there is a positive relationship between emotional memory (error a) and controlling. That is, as the error rate increases, so does the controlling. The second question that arose in the present research was whether mindfulness affects interpersonal problems by affecting emotional memory. The results obtained after analyzing the data showed that with increasing mindfulness, emotional memory also increases but the amount of interpersonal problems decreases. According to the findings of regressions, we showed that in general, Stroop components as emotional memory did not play a mediating role in the relationship between mindfulness and interpersonal problems. This does not mean that mindfulness is associated with interpersonal problems because it affects emotional memory. Rather, emotional memory is an adjusting factor in the relationship between mindfulness and interpersonal problems, that is, it acts as a second independent variable (not a mediating variable). This means that mindfulness is associated with interpersonal problems in relation to emotional memory (not because of its effect on it).

We now examine the research hypotheses. The first hypothesis was that mindfulness is negatively related to interpersonal problems. The results of the analysis of the findings confirmed this hypothesis and showed that with increasing mindfulness, interpersonal problems are reduced. The findings of this research on the second hypothesis (mindfulness has a positive relationship with emotional memory) showed that the increase of mindfulness causes significantly a change only in the correct answer a, and the time a (both of which are related to words with semantic load). So increases the correct answer a, and decreases the time a.

In general, we infer from the results of the present research that the Stroop components (emotional memory) did not play a mediating role in the relationship between mindfulness and interpersonal problems. In other words, mindfulness was not associated with interpersonal problems because of its effect on emotional memory; rather, emotional memory is an adjusting factor in the relationship between mindfulness and interpersonal problems. Other findings showed that mindfulness has a positive relationship with emotional memory and a significant negative relationship with interpersonal problems. With the increase of mindfulness, among the components of emotional memory, the component of the number of correct answers (for words with semantic load) increased and the component of time (for words

with semantic load) decreased. The results also showed that with increasing emotional memory (increasing the correct response and reducing the error), the score of interpersonal problems decreases. The findings suggest that instantaneous awareness of fluid cognitive and emotional processes in the mind, along with the capacity and power of memory to process cognitive and emotional information, can lead to adaptive responses and more consistent reactions to events. Its consequence is an effective reduction in communication and interpersonal problems.

This research, like most behavioral science ones, was associated with limitations that make sense for subsequent researches and efforts to reduce or eliminate them. The first limitation of this research was that little theoretical background was available to examine the variable of emotional memory and the variable of interpersonal problems.

There was no standardized pencil test to test the emotional memory variable and we used Stroop computer software to measure it. Research has also been conducted on a small scale. This suggests that the results and findings should be cautiously generalized to larger populations. The specificity of our sample (students) is another limitation that makes it difficult to generalize the results to other populations.

References

1. Horowitz LM, Rosenberg SE, Bartholomew K. Interpersonal problems, attachment styles, and outcome in brief dynamic psychotherapy. *Journal of consulting and clinical psychology*. 1993 Aug;61(4):549.
2. MB. Personality structure and interpersonal problems: a theoretically-guided tem analysis of the inventory of interpersonal problems. *Assessment*. 1995 Dec;2(4):343-61.
3. Kabat- Zinn J. Full catastrophe Living: Using the wisdom of your mind and body to face stress, pain, and illness. New York: Delacorte. 1990.
4. Brown KW, Ryan RM, Creswell JD. Mindfulness: Theoretical foundations and evidence for its salutary effects. *Psychological inquiry*. 2007 Oct 19;18(4):211-37.
5. Ryan RM, Brown KW. Why we don't need self-esteem: On fundamental needs, contingent love, and mindfulness. *Psychological inquiry*. 2003 Jan 1;14(1):71-6.
6. Narimani M. Effectiveness of mindfulness training and emotion regulation methods on the emotion and mood of chemical warfare victims, *Scientific-Research Journal of Arak University of Medical Sciences*. 2011;Vol. 15, No. 2, 107-118.
7. Feng H, Lo YY, Tsai S, Cartledge G. The effects of theory-of-mind and social skill training on the social competence of a sixth-grade student with autism. *Journal of Positive Behavior Interventions*. 2008 Oct;10(4):228-42.
8. Ahmadvand Z. Checking the validity and reliability of the Five-faceted Mindfulness Questionnaire (FFMQ) in Iranian

- non-clinical samples. Master Thesis in Clinical Psychology, Shahed University. 2011.
9. Barnhofer T, Duggan DS, Griffith JW. Dispositional mindfulness moderates the relation between neuroticism and depressive symptoms. *Personality and individual differences*. 2011 Dec 1;51(8):958-62.
 10. Feltman R, Robinson MD, Ode S. Mindfulness as a moderator of neuroticism–outcome relations: A self-regulation perspective. *Journal of Research in Personality*. 2009 Dec 1;43(6):953-61.
 11. Kabat-Zinn J. Mindfulness-based interventions in context: past, present, and future. *Clinical psychology: Science and practice*. 2003 Jun;10(2):144-56.
 12. Hayes SC, Wilson KG. Mindfulness: Method and process. *Clinical Psychology: Science and Practice*. 2003 Jun;10(2):161-5.
 13. Bauer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using self-report assessment methods to explore facets of mindfulness. *Assessment*. 2006 Mar;13(1):27-45.
 14. Wells A. Detached mindfulness in cognitive therapy: A metacognitive analysis and ten techniques. *Journal of rational-emotive and cognitive-behavior therapy*. 2005 Dec 1;23(4):337-55.
 15. Kensinger EA, Corkin S. Effect of negative emotional content on working and long-term memory. *Emotion*, 2004; 3 (4) : 378 – 393.
 16. Anderson L, Shimamura AP. Influence of emotion on context memory while viewing film clips. *American Journal of Psychology*. 2005;118(30) : 323 -337.
 17. Schmeichel BJ, Volokhov RN, Demaree HA. Working memory capacity and the self-regulation of emotional expression and experience. *Journal of personality and social psychology*. 2008 Dec;95(6):1526.
 18. Schweizer S, Grahn J, Hampshire A, Mobbs D, Dalgleish T. Training the emotional brain: improving affective control through emotional working memory training. *Journal of Neuroscience*. 2013 Mar 20;33(12):5301-11.
 19. Kensinger EA, Corkin S. Effect of negative emotional content on working memory and long-term memory. *Emotion*. 2003 Dec;3(4):378.
 20. Leigh J, Bowen S, Marlatt GA. Spirituality, mindfulness and substance abuse. *Addictive behaviors*. 2005 Aug 1;30(7):1335-41.
 21. Emanuel AS, Updegraff JA, Kalmbach DA, Ciesla JA. The role of mindfulness facets in affective forecasting. *Personality and Individual Differences*. 2010 Nov 1;49(7):815-8.
 22. Bishop SR, Lau M, Shapiro S, Carlson L, Anderson ND, Carmody J, Segal ZV, Abbey S, Speca M, Velting D, Devins G. Mindfulness: A proposed operational definition. *Clinical psychology: Science and practice*. 2004 Sep;11(3):230-41.
 23. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. *Journal of clinical psychology*. 2006 Mar;62(3):373-86.
 24. Davidson RJ, Kabat-Zinn J, Schumacher J, Rosenkranz M, Muller D, Santorelli SF, Urbanowski F, Harrington A, Bonus K, Sheridan JF. Alterations in brain and immune function produced by mindfulness meditation. *Psychosomatic medicine*. 2003 Jul 1;65(4):564-70.
 25. Ghorbani N, Watson PJ, Weathington BL. Mindfulness in Iran and the United States: Cross-cultural structural complexity and parallel relationships with psychological adjustment. *Current Psychology*. 2009 Dec 1;28(4):211.
 26. Teasdale JD, Segal ZV, Williams JM, Ridgeway VA, Soulsby JM, Lau MA. Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of consulting and clinical psychology*. 2000 Aug;68(4):615.
 27. Weber B, Jermann F, Gex-Fabry M, Nallet A, Bondolfi G, Aubry JM. Mindfulness-based cognitive therapy for bipolar disorder: A feasibility trial. *European Psychiatry*. 2010 Oct 1;25(6):334-7.
 28. Segal ZV, Williams J M G, Teasdale JD Mindfulness-based cognitive therapy for depression. New York: Guilford. 2002.
 29. Kozak A. Mindfulness in the management of chronic pain: conceptual and clinical considerations. *Techniques in Regional Anesthesia and Pain Management*. 2008 Apr 1;12(2):115-8.
 30. Hooman HA. Multivariate data analysis in behavioral research. Tehran: Parsa Pub. 2001.