Journal of Fundamentals of Mental Health

Mashhad University of Medical Sciences

Psychiatry and Behavioral Sciences Research Center

Original Article

Effectiveness of mindfulness-based therapy on the rate of symptoms and mindfulness in adolescents with attention-deficit hyperactivity disorder

Zeynab Abdolahzadeh[1]; Ali Mashhadi[2*]; Zahra Tabibi[2]

[1] *Ph.D. student of psychology, Ferdowsi University of Mashhad, Mashhad, Iran*
[2] *Associate professor of psychology, Faculty of Education and Psychology, Ferdowsi University of Mashhad, Mashhad, Iran*

Abstract

Introduction: Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common childhood disorders that can often continue through adolescence and adulthood. Different treatment methods have been used so far for treating this disorder. In recent years, mindfulness-based treatment approaches have attracted the attention of researchers. This research aims to investigate the effect of mindfulness-based treatment on the symptoms of ADHD and mindfulness score in adolescents suffering from ADHD.

Materials and Methods: The present research is a clinical trial research with pretest-posttest design and control group (IRCT code: IRCT2016011826079N1). The study sample included 30 female first and second grade high school students in Gonabad suffering from ADHD. The tools used in the research included clinical interview, SNAP-IV Parent Rating Scale, and Mindful Attention Awareness Scale. The experimental group received eight 90-minute sessions of mindfulness-based treatments and the control group was assigned to a waiting list. The data was analyzed through descriptive statistics and univariate analysis of covariance by SPSS version 20 software.

Results: According to our findings, the experimental group reported fewer symptoms of ADHD in posttest (P<0.001) compared to the control group. Moreover, the mindfulness of the experimental group improved in the posttest (P<0.001) compared to the control group.

Conclusion: The results of the research show that mindfulness-based treatment improved the symptoms of ADHD and mindfulness in adolescents suffering from ADHD.

Keywords: Adolescents, Attention deficit hyperactive disorder, Mindfulness

Please cite this paper as:
Abdolahzadeh Z, Mashhadi A, Tabibi Z. Effectiveness of mindfulness-based therapy on the rate of symptoms and mindfulness in adolescents with attention-deficit hyperactivity disorder. Journal of Fundamentals of Mental Health 2017 Jan-Feb; 19(1): 30-7.

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most common neuropsychological disorders in childhood that will often continue to adolescence and adulthood (1). The fifth Psychiatric Association's Diagnostic and Statistical Manual (DSM-5)[1] describes this disorder as the sustainable pattern of attention deficit and impulsivity/hyperactivity which includes coping with attention deficit (ADHD-I)[2], hyperactivity/impulsivity (ADHD-H)[3], and compound (ADHD-C)[4] (2).The prevalence of this disorder has been reported as 5% in children and 2.5% among adults (2). High prevalence of the disorder has also been reported in Iran. In a study that investigated behavioral disorders in children 7-12 years of age in Gonabad, ADHD had the highest prevalence by 9% (3). The damage in this disorder appears in three behavioral, neuropsychological, and brain levels. Damage at behavioral level includes hyperactivity, impulsivity, and attention deficit. At neuropsychological level,

***Corresponding Author:** Department of psychology, Ferdowsi University of Mashhad, Mashhad, Iran
mashhadi@um.ac.ir
Received: Mar. 10, 2016
Accepted: Aug. 09, 2016

[1]Diagnostic and Statistical Manual of Mental Disorders –Fifth Edition
[2]ADHD predominantly inattentive subtype
[3]ADHD predominantly hyperactive/impulsive
[4]ADHD Combined subtype

ADHD is followed by poor performance in tasks related to executive functions such as response inhibition, attention, and working memory (4). In terms of brain, sectors such as neural networks in the prefrontal cortex are faced with reduced size and performance (5). Various studies have shown that people with ADHD at school age will continue t o have clinical symptoms until adolescence and need treatment (6-7). ADHD signs pursue an evolution which is associated with a reduction of hyperactivity in adolescence (2, 9). The disorder in adolescents is often associated with a feeling of inner restlessness, problems associated with attention deficit, and executive functions such as poor planning, and impulsivity (10-14). Adolescents with ADHD often experience behavioral, academic and interpersonal problems and unfortunately since it is assumed that their ADHD has disappeared (as their extreme motor activity has dropped) they are identified wrongly which leads to more hidden impatience and inner restlessness (15). In addition, the risk of suicide in adolescents with ADHD is three times more than the normal ones (16). Thus, the persistence of ADHD into adolescence and adulthood has increased the need to provide new treatments in this area. Although there is a strong rationale for creating a useful treatment for adolescents unfortunately a large volume of psychological treatments have focused on children with the disorder and only a handful of results of studies involving juveniles have been published (17).

However, many different ways of treatment are applied today to reduce symptoms of ADHD. Among the most common methods are medication and cognitive-behavioral therapies which despite being effective in reducing ADHD symptoms are associated with limitations; for example, medication is effective in a short-term treatment and is associated with side effects (18, 19) and cognitive-behavioral therapy has sometimes limited long-term effects and generalization of its learned skills outside of the treatment is often at a low level (20, 2). In this regard, treatments that can more effectively focus on the etiology of the disorder will lead to more useful results. One of these methods is mindfulness-based interventions.

Mindfulness is a relatively new concept in Western psychology which is rooted in Eastern and Buddhist traditions. This feature is defined as focus on present experience and is a concept that can have a particular or conditional quality quality. When mindfulness is a particular trait, it can remain relatively constant over time and when it is a conditional quality it is developed by exercise or training (22). In a study (23) where the features of mindfulness as a trait was investigated in people with ADHD, the results showed that the overall score of mindfulness in people with ADHD was less than the score of normal people. The overlap between mindfulness and ADHD is mainly due to the role of attention (24). On the other hand, empirical evidence suggests a negative relationship between impulsivity and mindfulness (25) while impulsivity is considered as one of the main symptoms of ADHD. Two other studies also indicated the relationship between mindfulness and better performance on tasks related to the assessment of the ability to maintain attention (26, 27). Since researchers consider weakness in maintaining attention and poor performance in the relevant tasks as the main features of ADHD (28, 29) the improvement of mindfulness can contribute to the treatment of the patients.

Research carried out in Iran (30) also showed that mindfulness is relevant to sustainable attention functions (capacity of long period attention to an object). The logic behind the use of mindfulness approach in ADHD is based on different levels of the potential effects of this treatment method. Attention is enhanced during meditation exercises that make up the bulk of mindfulness-based therapy because meditation exercises such as sitting meditation involves steps in which attention has a bold role. The steps include 1.drawing attention to a significant source of attention which is usually breathing; 2.allowing distraction to pass that usually happens; 3.focusing attention again on the source of meditation. This cycle is repeated many times during the practice of meditation. The participants will be asked to pay attention during the meetings and to focus on the moment there are in during everyday activities. In these exercises various aspects of attention, meta-cognition, inhibition and working memory will be handled. Some of mindfulness meditation exercises cause attention flexibility by shifting the focus of attention from limited to wide purpose and the creation of open awareness with receptive attention (31, 32). Mindfulness also has helped as an approach to improve attention and cognitive inhibition processes and self-regulation in adolescents (44).

The answer to the question of how mindfulness training can be effective in the treatment of ADHD depends on three levels of functioning that are damaged. At the behavioral level, mindfulness focuses on increasing the ability to

control attention and to decrease automated responses (33). At the neuropsychological level, studies have shown that mindfulness-based attention enhances individuals' performance in executive functions such as working memory and attention maintenance (34, 35). There is also evidence for changes in the frontal lobe after mindfulness training (36, 37). Today, there is evidence for the increasing application of mindfulness-based interventions in children and adolescents. The two recent reviewed articles have shown an expanding trend of positive effects of mindfulness on children and adolescents although the effect of these studies has been less than those of the adult group (38, 39).

As the relationship between mindfulness and ADHD, basically highlight the role of attention, mindfulness training not only can help people as a practical tool to strengthen attention and to reduce impulsivity as one of the main features of ADHD, but also it will be followed by the improvement of mindfulness in this group. However, the few studies have addressed this issue so that no study has been carried out in Iran under this title. On the other hand, studies that have been done to improve this disorder in adolescents are very limited and most of them have focused on reducing symptoms in childhood. Accordingly, this study aims to investigate the effectiveness of mindfulness mindfulness-based therapy in improving ADHD symptoms and characteristics of mindfulness in adolescents with the disorder. In order to evaluate this issue, two hypotheses will be examined including: 1) Mindfulness-based therapy significantly reduces clinical symptoms in adolescents with ADHD in the experimental group compared to the control group 2) Mindfulness-based therapy enhances the ability of mindfulness in adolescents with ADHD in the experimental group compared to the control group.

Materials and Methods

This study is a clinical trial with which is recorded in clinical trial site of Iran with code IRCT2016011826079N1. The study was carried out with a control group and an experimental group as pre-test, post-test from September 2014 to January 2015. The study population included 12-18-year old female students of regular and public high schools in the first and second periods in Gonabad. To absorb the sample, the process began with screening so that the SNAP-IV rating scale (40) was provided for the parents of 200 students in two high schools in the center of city in the first and second periods that were selected among four high schools under the supervision of Department of Education in Gonabad. After collecting the questionnaires, students whose scores on the total scale were equal to 1.57 or their scores in the subscales of attention deficit and hyperactivity were 1.45 and 1.9 respectively, (41), were identified and a list of 115 subjects was prepared. After diagnostic interview conducted by researchers based on DSM-IV diagnostic criteria with volunteer students who had achieved the necessary score, 40 students out of 110 students received a diagnosis of ADHD. Then, the sample was selected from among the volunteer students. After sampling, the subjects were divided into control and experimental groups randomly. The inclusion criteria in this study were being 12 to 18 years of age, having ADHD, and studying in public and normal schools. Exclusion criteria included the presence of other clinical disorders, simultaneous receive of psychological treatment in patients with ADHD, and patients' having no or bad caretakers Finally, 15 patients who received mindfulness-based intervention were placed in the experimental group and 15 other people who didn't receive any treatment were placed in the control group. Since the treatment was done in a group and the group volume for this kind of treatment is specified to be 15 to 30 patients (42), the number of the members of each group was equal to 15 subjects. The experimental group received eight 90-minute sessions of treatment, but the control group received no treatment. During the meetings, the experimental group got to know the nature of the disorder and the logic of the effectiveness of mindfulness intervention in reducing symptoms, and to become aware of fundamental attitudes of mindfulness and how to strengthen it. What were emphasized in most sessions included practical exercises of mindfulness followed by home exercises. At the end of the period, the number of subjects in each experimental and control groups reduced to 13 subjects. Two groups in the pre-test and post-test were evaluated with mindfulness questionnaire completed by students and SNAP-IV rating scale completed by parents. The results of this test were evaluated using SPSS version 20 and via univariate analysis of covariance.

Research instruments

- *Clinical Interview:* Clinical interview is the base of an important multi-dimensional measurement system in the diagnosis of ADHD. In this study, structured clinical interview based on DSM-IV diagnostic criteria was performed by the researcher with students who got the necessary scores in SNAP-IV rating scale.

- *SNAP-IV Grading Scale:* This test was first made by Swanson, Nolan and Pelham in 1980 and based on the symptoms of disorder in DSM and with the revisions that were made in DSM; the modified versions of the test became available. SNAP Grading Scale SNAP has a single form contains 18 questions to be answered by parents and teachers; that is, 9 questions to identify attention deficit ADHD and 9 questions to diagnose hyperactivity. impulsivity ADHD. The score of each subject is calculated in such a way that each question is scored from 0 to 3; then the total score of each subject is divided by 18 and his score in each subtype is divided by 9. This scale has good reliability and validity. Cronbach's alpha coefficient for the whole test on was 0.97 and for the subtypes was 0.90 and 0.76 (43). Sadrossadat et al. (41) reported the reliability coefficient of this test by using test-retest, Cronbach's alpha, and split-half coefficient as 0.82, 0.90, and 0.76, respectively. This scale was also used in the present study as a diagnostic test as well as pretest and posttest to examine the reduction of symptoms.

- *Mindful Attention Awareness Scale:* This scale is a 15-item test designed by Brown and Ryan (24) in order to assess the level of awareness and attention to current events and experiences in everyday life. Test questions measure mindfulness in a six-point Likert scale (from score one for "almost always" to score six for "almost never"). This scale obtains a general score for mindfulness that ranges from 15 to 90, with higher score indicating lower mindfulness. The scale validity, due to its negative correlation with anxiety and depression assessment tools and its positive correlation with positive affect and self esteem assessment tools, has been reported to be adequate. Cronbach's alpha for Farsi version questions of this scale on a sample of 723 students has been calculated as 0.81 (30).

- *The intervention:* In this study, eight 90-minute sessions of mindfulness training were considered that according to the research done in this regard, it was mainly designed based on mindfulness-based stress reduction (MBSR) by Kabat Zinn. A short summary of the goals of the sessions will be expressed in the following.

First session: expressing group laws, explaining therapy sessions and general content of the meetings, the definition of mindfulness, its concepts and mechanisms of the effect of this treatment

Second session: discussion on practical application of basic concepts of mindfulness, explaining the concept of inertial guidance and its review in everyday life

Third session: doing practical exercise of eating with mindfulness practice, expressing members' experiences during this exercise

Fourth session: introduction to meditation, breathing exercises, practical meditation breathing exercises, expressing practical experiences of members during training

Fifth session: introduction to physical verification exercise, carrying out physical verification in action, expressing thoughts and feelings of the group at the time of exercise and correcting their views on how to practice

Sixth session: meditation breathing exercises and physical verification at the same time and expressing feelings in different parts of the body separately

Seventh session: introduction to practicing mindfulness of thoughts and sounds and doing practical exercises, expressing thoughts and feelings at the moment of exercise

Eighth session: review of past meetings, discussion and dialogue among group members about past meetings their results for them have

Results

The age of participants in the control and experimental groups ranged from 15 to 18 and the mean age of participants was 15.96 years. The mean and standard deviation of clinical symptoms of ADHD and mindfulness in the pre-test and post-test for the control and experimental groups are reported in Table 1.

Table 1. Mean and standard deviation of clinical symptoms of ADHD and mindfulness

Variable	Time	Group	Mean	SD
Clinical symptoms of ADHD	pretest	experimental	1.67	0.24
		control	1.63	0.15
	posttest	experimental	0.90	0.27
		control	1.62	0.16
Mindfulness	pretest	experimental	33.62	5.22
		control	32.62	4.21
	posttest	experimental	19.54	6.11
		control	31.62	4.78

As can be seen in Table 1, the greatest changes in the mean of clinical symptoms of ADHD are related to the mean of clinical symptoms of ADHD in pretest and posttest of the experimental group while the mean of clinical symptoms of ADHD in pretest and posttest of the control group has not changed significantly. Considering mindfulness, the greatest changes in the mean are related to the mean of mindfulness in pretest and posttest of the experimental group while the mean of mindfulness in pretest and posttest of the control group has not

changed significantly. Mindfulness lower score in the posttest of the experimental group, according to the reverse scoring of mindfulness questionnaire, actually means the increase of mindfulness.

Before performing the test, the analysis of covariance of assumptions of normal distribution, homogeneity of variances, and consistency of regression line slope in clinical symptoms of attention deficit. Hyperactivity and mindfulness were investigated. In the case of data distribution, Kolmogorov-Smirnov test showed normal distribution of data in both variables (P>0.05).

Levin test for the two variables was not significant either which indicated consistency of variances in both control and experimental groups (P>0.05). Moreover, the significance level of regression line slope was more than 0.05 (P>0.05) and thus the consistency of regression line slope in the research variables was confirmed. Since the necessary assumptions were made, covariance analysis test was used. The results of covariance analysis are reported in Table 2.

Table 2. Results of one-way analysis of covariance

Variable	Source	Sum of squares	Mean Square	F	*P*	Effect size
Clinical symptoms of ADHD	Intervention	3.382	3.382	65.62	0.001	0.74
Mindfulness	Intervention	1097.949	1097.949	72.04	0.001	0.75

As the results show in Table 2, by controlling the pretest, the main effect of the intervention variable which is the independent variable on the posttest scores of clinical symptoms of ADHD (P<0.001, $F_{1,23}$=65.62) and mindfulness (P=0.001, $F_{1,23}$=72.04) is significant. In addition, the effect size of 0.74 in clinical symptoms of ADHD and the effect size of 0.75 in mindfulness show that 74% of changes in posttest scores of ADHD and 75% of changes in posttest scores of mindfulness result from intervention.

Discussion

This study was carried out to examine the effectiveness of mindfulness-based therapy on the symptoms of ADHD and the mindfulness ability of female students with ADHD. The results indicate that mindfulness-based therapy is effective in reducing the severity of ADHD in female adolescents with ADHD. The results also suggest that mindfulness-based therapy could concentrate on strengthening the deficiencies in people with ADHD on one hand, and reducing features such as impulsivity as a main feature of this disorder, on the other hand. This is consistent with the findings of Vandrood et al. (20) who confirmed the impact of mindfulness training in reducing impulsive behavior in children with ADHD and their parents. The study conducted by Vigerbergma et al. (5) achieved similar results. In general, the obtained result is consistent with similar research findings (35, 44 - 46).

In the area of internal research, the effectiveness of this treatment in reducing the severity of ADHD has not been discussed in any research yet. The results of the study suggest that mindfulness-based treatment is focused on major damage in ADHD. At the behavioral level is mindfulness focused on increasing the ability to control attention and to decrease automated responses (39). Through engaging attention, mindfulness exercises cause changes in the attention system of individuals with ADHD that have deficiencies in the field. In this method, awareness of the moment and non-judgmental look will increase and on the contrary, automated responses that can lead to impulsivity will decrease (47). On the other hand, existing cognitive impairments in executive functions including attention, working memory and inhibition ability which are widely emphasized in people with ADHD will be followed by some problems in motivation and regulation of emotion in this group of people. However, the mindfulness practices are self-regulated and cause attention and emotion regulation in affected people. The attention and emotion regulation is done via the reduction of motivation by not being engaged with experience and allowing it to pass, training attention to the current experience with open attitude and along with acceptance and curiosity (33, 48). Therefore, the effectiveness of mindfulness-based therapy on reduction of the symptoms in adolescents with ADHD could be through the improvement of fundamental mechanisms such as attention, cognitive flexibility, inhibition ability, and or emotion regulation and the review of each mechanism in future studies can be really useful.

Another finding of this study showed the significant difference between the experimental and the control groups in mindfulness score after the intervention. That is, the mindfulness ability in adolescents with ADHD increased in the experimental group in comparison to the control group. Mindfulness-based treatment had the best

effect on the improvement of mindfulness in individuals with ADHD because the intervention is specifically trying to increase mindfulness in individuals in different groups and its application for patients with ADHD was due to low mindfulness ability in this group and in order to increase their mindfulness ability.

In relation to the effectiveness of this intervention on mindfulness particularly in patients with ADHD, only one study has been carried out; which has investigated the effect of mindfulness-based therapy on mindfulness of parents of children with ADHD. Vandrood et al. (20) reported the improvement of hyperactivity behavior in children and the significant increase of parents' mindfulness as well as the reduction of their stress. Esmali et al. (23) investigated mindfulness in adults with ADHD and compared it with the control group. They confirmed low level of mindfulness in patients with ADHD. Accordingly, it can be said that the obtained result in the present study is consistent with previous results. The result can be explained such that the common point between mindfulness and ADHD is act with full awareness; that is, people with low level of mindfulness are aware of it and concentrate on it while doing various activities, but those with ADHD haw low momentary awareness of what they are doing and have low ability to concentrate. In mindfulness-based interventions exercises are designed in such a way that they cause mindfulness experience at the deepest level of their own. Every practice which makes an individual aware of the present moment and is accompanied by accepting that moment enhances mindfulness (49). Formal exercises such as directing the attention to focus on breathing, deep listening to sounds within the environment, paying attention to one's situation at a given moment, being aware of one's own feelings and informal exercises including doing chores with mindfulness will all enhance mindfulness. Moreover, training basic attitudes of mindfulness will result in its improvement. Therefore, as the results of this study showed, mindfulness-based treatment could enhance mindfulness ability in patients with ADHD on one hand, and could influence factors such as impulsivity, inhibition ability, and cognitive flexibility on the other hand. The review of these mechanisms in the future is remarkable.

Doing this study with a small sample and gender group restricts its generalization to other groups. Therefore, it is recommended to take other age and gender groups in different areas into account for future studies. Furthermore, due to time constraints in doing the research, the results were not evaluated in the follow-up stage; thus, it is recommended to evaluate the continuity of results in the follow-up stage for the future studies. Moreover, investigating the effectiveness of mindfulness-based interventions on neuro-cognitive variables involved in ADHD such as inhibition ability, working memory, and cognitive flexibility can be very impressive in providing etiology-based treatments.

Conclusion

The findings of this study showed, that mindfulness-based therapy is impressive in reducing clinical symptoms in adolescents with ADHD and in increasing their mindfulness ability. Performing treatment guidelines during the sessions by participants and expressing their experience on how to perceive the present time are effective in their recognition and awareness of the situation they are in. This method of therapy can be useful in improving patients who are suffering from symptoms such as impulsivity, poor concentration, and distractibility through providing formal and informal exercises of mindfulness and enabling and enhancing concentration on what the individual is doing.

Acknowledgments

This research was implemented after approval by the Department of Psychology, Faculty of Education and Psychology, Ferdowsi University of Mashhad, and without the financial support of any institutions. It was recorded in clinical trial site under the code of IRCT2016011826079N1. We express our thanks to all the personnel of the Department of Education, and all the staff of Hazrat Zaynab High School who assisted us in conducting this study.

References

1. Barkley RA. Comparison of the DSM-IV combined typed of ADHD in a school-based sample of Latino Hispanic children. J Child Psychol Psychiatry 2005; 46(2): 166-79.
2. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Fifth ed. Washington, DC: American Psychiatric Association; 2013.
3. Tavakkolizadeh J, Bolhari J, Mehryar A, Dezhkam M. [Epidemiology of attention deficit and disruptive behaviour disorders in elementary school children of Gonabad town, north east Iran]. Iranian journal of psychiatry and clinical psychology 1997; 3: 40-52. (Persian)

4. Rubia K, Taylor E, Smith AB, Oksannen H, Overmeyer S, Newman S. Neuropsychological analysis of impulsiveness in childhood hyperactivity. Br J Psychiatry 2001; 179: 138-143.
5. Weijer-Bergsma E, Esther A, Bruin I, Bogels S. The effectiveness of mindfulness training on behavioral problems and attentional functioning in adolescents with ADHD. J Child Fam Study 2012; 21: 775-87.
6. Ingram S, Hechtman L, Morgenstern G. Outcome issues in ADHD: adolescent and adult long-term outcome. Ment Retard Dev Disabil Res Rev 1999; 5: 43-250.
7. Barkley RA, Fischer M, Edelbrock CS, Smallish L. The adolescent outcome of hyperactive children diagnosed by research criteria: An 8-year prospective study. J Am Acad Child Adolesc Psychiatry 1990; 29: 546-57.
8. Biederman J, Faraone S, Milberger S, Guite J, Mick E, Chen L. A prospective 4-year follow-up study of attention-deficit hyperactivity and related disorders. Arch Gen Psychiatry 1996; 53(5), 437.
9. Biederman J, Mick E, Faraone SV. Age-dependent decline of symptoms of attention deficit hyperactivity disorder: impact of remission definition and symptom type. Am J Psychiatry 2000; 157(5): 816-18.
10. Martel M, Nikolas M, Nigg JT. Executive function in adolescents with ADHD. J Am Acad Child Adolesc Psychiatry 2007; 46(11): 1437-44.
11. Miller M, Ho J, Hinshaw SP. Executive functions in girls with ADHD followed prospectively into young adulthood. Neuropsychology 2012; 26(3): 278.
12. Toplak ME, Bucciarelli SM, Jain U, Tannock R. Executive functions: performance-based measures and the behavior rating inventory of executive function (BRIEF) in adolescents with attention deficit-hyperactivity disorder (ADHD). Child Neuropsychology 2009; 15(1): 53-72.
13. Biederman J, Petty CR, Doyle AE, Spencer T, Henderson CS, Marion B, et al. Stability of executive function deficits in girls with ADHD: a prospective longitudinal follow up study into adolescence. Dev Neuropsychol 2008; 33(1): 44-61.
14. Hinshaw SP, Carte ET, Fan C, Jassy JS, Owens EB. Neuropsychological functioning of girls with Attention-Deficit Hyperactivity Disorder followed prospectively into adolescence: evidence for continuing deficits? Neuropsychology 2007; 21(2): 263.
15. Resnick RJ. Attention deficit-hyperactivity disorder in adults. In: Fisher CB, Lerner RM. (editors). Encyclopedia of applied developmental science. Thousand Oaks: Sage; 2005: 129-31.
16. James A, Lai FH, Dahl C. Attention deficit hyperactivity disorder and suicide: A review of possible associations. Acta Psychiatr Scand 2004; 110: 408-15.
17. Chronis AM, Jones HA, Raggi VL. Evidence-based psychosocial treatments for children and adolescents with attention-deficit hyperactivity disorder. Clin Psychol Rev 2006; 26(4): 486-502.
18. Van der Oord S, Pri PJM, Oosterlaan J, Emmelkamp PMG. Efficacy of methylphenidate, psychosocial treatmentsand their combination in school-aged children with ADHD: A meta-analysis. Clin Psychol Rev 2008; 28: 783-800.
19. Wolraich L, Wibbelsman J, Brown E, Steven W, Evans W, Gotlieb M, et al. Attention-Deficit Hyperactivity Disorder among aolescents: A review of the diagnosis, treatment, and clinical implications. Pediatrics 2005; 115(6): 1734-46.
20. Van der Oord S, Bögels SM, Peijnenburg D. The effectiveness of mindfulness training for children with ADHD and mindful parenting for their parents. J Child Fam Stud 2012; 21(1): 139-47.
21. Pelham WE, Fabiano GA. Evidence-based psychosocial treatments for Attention-Deficit Hyperactivity Disorder. J Clin Child Adolesc Psychol 2008; 37: 184-214.
22. Brown KW, Ryan RM, Creswell JD. Mindfulness: Theoretical foundations and evidence for its salutary effects. Psychol Inquiry 2007; 18(4): 211-37.
23. Smalley L, Loo K, Shrestha A, McGough J, Hale T. Mindfulness and attention deficit hyperactivity disorder. J Clin Psychol 2009; 65: 1087-98.
24. Brown KW, Ryan RM. The benefits of being present. Mindfulness and its role in psychological well-being. J Pers Soc Psychol 2003; 84(4): 822-48.
25. Schmertz SK, Anderson PL, Robins DL. The relation between self-report mindfulness and performance on tasks of sustained attention. J Psychopathol Behav Assess 2009; 31(1): 60-66.
26. Evans DR, Baer RA, Segerstrom SC. The effects of mindfulness and self consciousness on persistence. Pers Individ Diff 2009; 47: 379-82.
27. Barkley RA. Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. Psychol Bull 1997; 121: 65-94.
28. Chronis AM, Jones HA, Raggi VL. Evidence-based psychosocial treatments for children and adolescents with Attention-Deficit Hyperactivity Disorder. Clin Psychol Rev 2006; 26(4): 486-502.
29. Zylowska L, Ackerman DL, Yang MH, Futrell JL, Horton NL, Hale TS, et al. Mindfulness meditation training in adults and adolescents With ADHD: A feasibility study. J Attention Disord 2008; 11(6): 737-46.
30. Nejati V, Zabihzadeh A, Nikfarjam MR. The relationship between mindfulness and sustained attention, selective functions. Cognitive and behavioral science research 2012; 2(3): 31-42.

31. Jha AP, Krompinger J, Baime MJ. Mindfulness training modifies subsystems of attention. Cogn Affect Behav Neurosci 2007; 7(2): 109-19.
32. Moore A, Malinowski P. Meditation, mindfulness and cognitive flexibility. Conscious Cogn 2009; 18(1): 176-86.
33. Teasdale JD, Segal Z, Williams JM. How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? Behav Res Ther 1995; 33(1): 25-39.
34. Heeren A, Philippot P. Changes in ruminative thinking mediate the clinical benefit of mindfulness: Preliminary findings. Mindfulness 2011; 2: 8-13.
35. Semple RJ, Lee J, Rosa D, Miller LF. A randomized trial of mindfulness-based cognitive therapy for children: Promoting mindful attention to enhance social-emotional resiliency in children. J Child Fam Stud 2010; 19(2): 218-29.
36. Chiesa A, Serretti A. A systematic review of neurobiological and clinical features of mindfulness meditations. Psychol Med 2010; 40: 1239-52.
37. Kilpatrick LA, Suyenobu BY, Smith SR, Bueller JA, Goodman T, Creswell JD, et al. Impact of mindfulness-based stress reduction training on intrinsic brain connectivity. Neuro Image 2011; 56: 290-8.
38. Burke CA. Mindfulness-based approaches with children and adolescents: A preliminary review of current research in an emergent field. J Child Fam Stud 2010; 10: 1-15.
39. Black DS, Milam J, Sussman S. Sitting-meditation interventions among youth: A review of treatment efficacy. J Pediatrics 2011; 124: 532-41.
40. Friedman R, Duyal G. [Treatment of children with attention deficit-hyperactivity]. Sadralsadat J, Mohammadi MR, Sadralsadat L. (translators). Tehran: Art; 2002. (Persian)
41. Sdralsadat J, Hoshiary Z, Zamani R, Sadralsadat L. [Determination of psychometric indices of SNAP-IV rating scale in parent execution]. Journal of rehabilitation 2007; 3: 53-7. (Persian)
42. Mohamadkhani P, Khanipur H. [Mindfulness-based therapy]. Tehran: University of social welfare and rehabilitation sciences; 2012. (persion)
43. Hoseinzadehmaleki Z. [Efficacy of working memory training, parent education programs Barkley and combine the two intervention on improving executive functions and clinical symptoms in children with ADHD]. MS. Dissertation. Faculty of Education and Psychology, Ferdowsi University of Mashhad, 2012. (Persian)
44. Grosswald SJ, Stixrud WR, Travis F, Bateh MA. Use of the transcendental meditation technique to reduce symptoms of attention deficit hyperactivity disorder (ADHD) by reducing stress and anxiety: an exploratory study. Curr Issues Educ 2008; 10(2): 1-16.
45. Saltzman A, Goldin P. Mindfulness-based stress reduction for school-age children. In: Hayes SC, Greco LA. Acceptance and mindfulness interventions for children adolescents and families 2008. Oakland: New Harbinger; 2008: 139-61.
46. Bögels S, Hoogstad B, van Dun L, de Schutter S, Restifo K. Mindfulness training for adolescents with externalizing disorders and their parents. Behav Cogn Psychother 2008; 36(2): 193-209.
47. Kabat-Zinn, J. Mindfulness-Based interventions in context: Past, present and future. Clin Psychol Sci Pract 2003; 10: 144-56.
48. Sanger KL, Dorjee D. Mindfulness training with adolescents enhances metacognition and the inhibition of irrelevant stimuli: Evidence from event-related brain potentials. Trend Neurosci Educ 2016; 5(1): 1-11.
49. Germer CK. The Meaning of mindfulness. In: Germer CK, Siegel RD, Fulton PR. (editors). Handbook of mindfulness and psychotherapy. New York: Guilford; 2013: 3-28.