

Examining the factors that are correlated with mindfulness with a focus on attention deficit hyperactivity symptoms

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Abstract

Purpose: We hypothesized that attention deficit hyperactivity symptoms would negatively correlate with the level of mindfulness.

Design and Method: Seventy-six subjects referred to the outpatient psychiatry unit and 32 healthy control subjects filled out the Mindful Attention Awareness Scale (MAAS), the Depression Anxiety Stress Scale (DASS), the Adult ADHD Self-Report Scale (ASRS), and the Wender Utah Rating Scale (WURS).

Findings: Patients scored higher on ADH symptoms compared to controls ($p \leq .001$). Higher scores on the ASRS and WURS revealed lower mindfulness in the study group ($p \leq .001$). WURS, DASS depression, ASRS attention subscale-based scores ($p < .05$) were significant predictors on MAAS scores.

Practice Implications: Besides emotional symptoms ADH symptoms had a significant predictive value on mindfulness.

KEYWORDS

anxiety, attention deficit hyperactivity symptoms, depression, mindfulness, stress

1 | INTRODUCTION

There is growing evidence that point out the association between awareness and well-being.¹ Mindfulness that has a history of almost 2500 years in Eastern traditions² is a relatively recent practice in Western psychology compared to Eastern culture. In the literature mindfulness, which has its roots in Buddhist philosophy, is described as a practice with two components. The first component is orienting one's attention purposefully to the present moment and the second one is adoption of open curious, accepting awareness of experiences in the present moment.³ Mindfulness involves self-regulation of attention to the experience of the present moment and decentered, nonjudgmental awareness, referring to openness to one's internal and external experiences.⁴ The ability to control reactions to stress and attentional control may lead to increased self-regulation, which leads to psychological well-being.⁵ Mindfulness can be improved by training and meditation.^{4,6} It is suggested that mindfulness has a major impact on the release of individuals from their thoughts, habits, and unhealthy behaviors⁷ due to nonjudgmental and nonreactive acceptance of emotions.⁸ Hence mindfulness has been inversely associated with depressive symptoms, worry, impulsivity, and stress.^{9,10}

The significant effects of mindfulness-based interventions such as mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR) in various mental health conditions such as depression, anxiety disorders, substance use disorder, and eating disorders have been confirmed in several studies.¹¹⁻¹⁵ Moreover, recent research demonstrated that mindfulness training may improve attentional networks,¹⁶ alter dopamine levels,¹⁷ and increase cortical thickness.¹⁸ Neuroimaging studies suggest that mindfulness mediation causes neuroplastic changes in brain areas associated with attentional functioning.¹⁹ Studies of mindfulness in samples without attention deficit hyperactivity disorder (ADHD) support its application to patients with ADHD,¹⁹ based on the fact that mindfulness practice is a self-regulatory training that appears to improve attention regulation and emotion regulation.²⁰ The emphasis of mindfulness practice on the present moment enhances the capacity for sustained attention and the capacity to shift the focus of their attention between various stimuli. These skills amplify one's potential for self-regulation²¹ and allows attention to be redirected from depressive or anxious rumination back to present moment.²⁰ Pre- and posttreatment results regarding the efficacy of 8 week group mindfulness practice in adult ADHD samples revealed improvements in self-reported inattentive,

hyperactivity-impulsive, depressive, anxious symptoms, executive functioning, and emotion dysregulation.^{22,23}

ADHD is a common neurodevelopmental disorder that is characterized by deficits of attention, hyperactivity, and impulsivity.²⁴ Almost in 60% of patients, symptoms persist in adult life.²⁵ This lifelong condition causes significant impairment in multiple domains, such as academic, occupational, and relational areas.^{26,27} Deficits in executive functioning including attention, working memory, difficulties in arousal, motivation, and emotional regulation have been noted in patients with ADHD.^{28,29} As Barkley pointed out that ADHD can be categorized under self-regulation impairments.³⁰

There are also studies demonstrating the overlapping brain regions such as anterior cingulate cortex and dorsolateral prefrontal cortex involved in ADHD and mindfulness.³¹ The association between ADHD and mindfulness is important because ADHD is a disorder that co-occurs with other psychiatric disorders including mood disorders, anxiety disorders. Studies reported that 9–16% of individuals with depression had comorbid ADHD.³² A recent study showed that 28% of the patients referred to a clinic for mood and anxiety disorders had undetected ADHD.³³ Comorbid conditions are associated with poor lack of improvement of symptoms.³⁴ Therefore, understanding the relation of mindfulness between emotional and attention problems is crucial because mindfulness-based interventions yield significant efficacy in treatment of both emotional dysregulation and attention problems. The purpose of this study is to investigate the association between mindfulness and emotional symptoms and attention deficit hyperactivity symptoms in patients suffering from mood and anxiety disorders. We hypothesized that, besides depression, anxiety and stress levels, attention deficit hyperactivity symptoms will also be negatively correlated with mindfulness due to the role of attention regulation in each. A better understanding of what factors are associated with mindfulness would be useful in exploring the efficacy of mindfulness-based therapies in various mental health conditions.

2 | METHOD

2.1 | Study design and participants

The present investigation has a cross-sectional design. Seventy-six consecutive subjects with primary complaints of depressive symptoms, anxiety, and somatic symptoms who applied to the outpatient unit of Acibadem Maslak Hospital, Psychiatry Department, Istanbul, Turkey for the first time, participated in the study. The mean age of the subjects was 29.61 ± 7.56 years (range = 17–45). The community sample consisted of 32 healthy gender and age matched participants without psychiatric problems. The participants were recruited between January 2016 and August 2016. Exclusion criteria included dementia, traumatic brain injury, cognitive impairment, mental retardation, psychosis, being illiterate. All participants provided written informed consent. This study was approved by the Ethics Committee of Acibadem University Faculty of Medicine.

TABLE 1 Range of scores of DASS subscales

	Normal	Mild	Moderate	Severe	Very Severe
Depression	0–9	10–13	14–20	21–27	≥28
Anxiety	0–7	8–9	10–14	15–19	≥20
Stress	0–14	15–18	19–25	26–33	≥34

2.2 | Measures

Sociodemographic Data Form: The sociodemographic form was developed by the investigators to evaluate sociodemographic characteristics such as age, sex, education status, marital status, occupational status, and clinical characteristics.

Mindful Attention Awareness Scale: Mindful Attention Awareness Scale (MAAS) which consists of 15 items was used to measure mindfulness levels. The MAAS uses a Likert type scale ranging from 1 (almost always) to 6 (almost never) resulting in a possible range of scores from 15 to 90.⁹ Higher scores on the MAAS reflect more mindfulness. The Turkish validity and reliability of MAAS was performed by Ozyesil et al. (2011).³⁵

The Depression Anxiety Stress Scale: The Depression Anxiety Stress Scale (DASS) was used in the present study to assess the negative emotional symptoms among participants. It is a 42 item self-report inventory designed by Lovibond and Lovibond.³⁶ It provides scores on three subscales: depression (14 items), anxiety (14 items), and stress (14 items). Each item is rated on a 4-point Likert scale, ranging from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time), showing the severity of the participants' experiences over the last week. Range of possible scores for each scale is 0–42. Scores considered in the normal range are 0–9 for depression, 0–7 for anxiety, and 0–14 for stress. Table 1 shows the range of scores of DASS subscales. This scale was validated to Turkish by Akin and Cetin.³⁷

Adult ADHD Self-Report Scale (ASRS v1.1): ADHD symptoms were measured by using ASRS v1.1, an 18 item scale designed to evaluate current manifestation of ADHD symptoms in people aged 18 years or older. The scale is based on Diagnostic and Statistical Manual of Mental Disorders: Fourth Edition (DSM-IV-TR) criteria.³⁸ Respondents are required to use a 5-point Likert scale ranging from 0 (never) to 4 (very often). Severity level of symptoms are assessed by summing up the scores. Inattentive subscale scores range from 0 to 36. Hyperactivity/impulsive subscale scores range from 0 to 36. Subscale scores of 0–16 reveal no ADHD, 17–23; probable ADHD, scores of 24 or higher reveal clinical range.³⁹ The Turkish version of ASRS has demonstrated good reliability and validity in university students.⁴⁰ Reliability analysis showed that the Turkish version of ASRS has a high level of internal consistency (Cronbach's alpha = 0.88).

The Wender Utah Rating Scale: The Wender Utah Rating Scale (WURS-25) is a 25-item self-report questionnaire for the retrospective assessment of childhood ADHD symptoms in adults for ADHD. The WURS-25 is a 5-point Likert scale, ranging from 0 (not at all or very slightly) to 4 (very much), based on the Utah criteria which were developed by Ward et al. (1993).⁴¹ Total scores of WURS-25 range from 0 to 100. The Turkish validity and reliability of WURS-25 were established by Oncu et al. and the cut-off score point was 36.⁴² The Turkish version

of WURS-25 demonstrated excellent internal consistency (Cronbach's alpha = 0.93).

2.3 | Data analysis

All statistical analyses were performed using the SPSS v. 13.0 software for Windows package for personal computers (SPSS, Inc., Chicago, IL, USA). For all analyses, according to the power analysis minimum 22 individuals for each group were needed to have 90% power with 5% type I error. Frequencies and descriptive statistics were calculated for all study variables. Variables were checked for normality variance. Independent *t* test was used to compare the mean scores between groups. We applied Bonferroni correction to reduce the chance of a type I error. Benferroni correction results in a level of $p < .05$. Effect sizes of the differences between groups are calculated. Categorical data was analyzed by chi-square analysis. In order to explore whether ADHD symptoms, depression, anxiety, stress, age, and sex were related to mindfulness levels, linear regression analyses were used with MAAS as the dependent. Multicollinearity was tested when performing regression analysis. Bivariate correlations were computed to examine the relationship between the variables. Bivariate correlations and the regression analysis were performed in patient group. A probability level of $p < .05$ was used to indicate statistical significance.

3 | RESULTS

There were no significant differences between the groups in terms of sociodemographic characteristics (Table 2). 59.2% of the participants were female and 40.8% were male. The mean age of the participants was 29.61 ± 7.56 years. About half of the clinical sample ($n = 40$, 52.6%) met a diagnosis of current depressive episode. 7.9% of the clinical sample was diagnosed as having ADHD according to their primary complaints. Table 2 shows the present primary diagnoses of the clinical sample.

DASS depression, anxiety, and stress scores were significantly higher in the study group compared to the control group (16.45 ± 9.11 vs. 3.97 ± 4.40 , $p < .001$; 13.55 ± 7.81 vs. 3.59 ± 3.26 , $p < .001$; 20.41 ± 8.27 vs. 8.06 ± 4.73 , $p < .001$, respectively).

MAAS total scores were significantly lower in the study group compared to the control group (52.29 ± 13.25 vs. 68.81 ± 11.94 , $p < .001$).

ASRS attention subscores, hyperactivity subscores, and total scores were significantly higher in the study group compared to the control group (17.63 ± 6.71 vs. 8.28 ± 4.72 , $p < .001$; 16.26 ± 5.96 vs. 9.09 ± 4.62 , $p < .001$; 33.89 ± 11.24 vs. 17.38 ± 8.11 , $p < .001$, respectively). WURS scores were significantly higher in the study group compared to the control group (31.33 ± 17.68 vs. 13.29 ± 7.6 , $p < .001$).

Table 3 shows the comparisons between study and control group in terms of DASS, MAAS, WURS, and ASRS scores. The effect sizes of the differences between the groups in terms of DASS, MASS, WURS, and ASRS scores were large.

Correlation analysis yielded negatively significant bivariate associations between MAAS scores and DASS, WURS, and ASRS scores. Higher depression, anxiety, and stress levels were significantly

associated with lower mindfulness ($r = -.288$, $p = .012$; $r = -.324$, $p = .004$; $r = -.317$, $p = .005$, respectively). The strength of the correlation between MAAS and DASS scores was weak. In addition, higher scores on the ASRS attention subscale, hyperactivity/impulsivity subscale, ASRS total scores revealed lower mindfulness in the study group ($r = -.543$, $p < .001$; $r = -.387$, $p = .001$; $r = -.516$, $p < .001$, respectively). The strength of the correlation between MAAS and ASRS attention, hyperactivity/impulsivity subscale scores, and ASRS total scores was moderate. There was also a moderate negative correlation between MAAS scores and WURS scores, which was statistically significant ($r = -.560$, $p < .001$). Table 4 shows the results of correlation analysis.

In the linear regression model, WURS ($p < .001$), DASS depression subscale ($p = .004$), ASRS attention subscale scores ($p = .01$) were significant predictors when MAAS score was a dependent variable. The adjusted explained variance of the linear regression model was 0.48. There were no effects of age and sex. The analyses showed no multicollinearity (Table 5).

4 | DISCUSSION

The primary goal of this study is to better understand the factors that affect the mindfulness. Specifically, we focused on the relationship between mindfulness and attention deficit hyperactivity symptoms besides depression, anxiety, and stress. Attention has a primary role in mindfulness and attentional dysfunction is a core symptom cluster of ADHD. Thus, their overlap is a question of interest and there is still a need for understanding their relationship.

Mindfulness is conceptualized as a set of skills such as being nonjudgmental toward one's experiences, observing, and acting with awareness.⁴³ Acting with awareness and accepting without judgment mindfulness skills have been found to be related to lower levels of emotional dysregulation.^{44,45} Similar to the previous research,^{9,10} our findings demonstrated that there were negative significant correlations between emotional symptoms such as depression, anxiety, stress, and mindfulness. Moreover, in the present study, another factor that was found to play a role in low mindfulness was attention deficit hyperactivity symptoms. Consistent with the previous research,⁴⁶ our findings support the hypothesis that individuals with attention deficit hyperactivity disorder symptoms have lower mindfulness. Our results also showed that childhood ADHD symptoms and depression levels predicted lower mindfulness.

Mindfulness-based interventions can enhance well-being and reduce psychological and physical problems.⁴⁷ Previous findings suggest that mindfulness is related to better emotional state by reducing negative affectivity⁸ and increasing experiences of positive emotional state.⁹

Mindfulness training is shown to activate and strengthen skills such as observing and acting with awareness in individuals with ADHD.³¹ Studies of mindfulness support its application to individuals with ADHD based on the rationale that mindfulness training has an impact on attention regulation, executive functioning, and emotion regulation which are dysfunctional in ADHD.³¹ The emphasis of

TABLE 2 Sociodemographic characteristics of the participants

Characteristics	Clinical Sample (n = 76)	Community Sample (n = 32)	p
	n (%) mean ± SD	n (%) mean ± SD	
Age	29.61 ± 7.56	29.66 ± 9.39	.98
Sex			
Male	31 (40.8)	11 (34.4)	.53
Female	45 (59.2)	21 (65.6)	
Marital status			
Married	27 (35.5)	16 (50)	.16
Single	49 (64.5)	16 (50)	
Level of education			
High school	20 (26.3)	9 (28.1)	.85
University	56 (73.7)	23 (71.9)	
Work status			
Employed	57 (75)	28 (87.5)	.13
Student	18 (23.7)	3 (9.4)	
Housewife	1 (1.3)	1 (3.1)	
Previous psychiatric history			
None	61 (80.3)	28 (87.5)	.46
Mood disorder	12 (15.3)	4 (12.5)	
Anxiety disorder	3 (3.9)	-	
Other	-	-	
Present primary diagnosis			.000
Current depressive disorder	40 (52.6)	-	
Anxiety disorder	20 (26.3)	-	
Adjustment disorder	6 (7.9)	-	
ADHD	6 (7.9)	-	
Somatic symptom disorder	4 (5.3)	-	

mindfulness practice on the present moment enhances the capacity for sustained attention and the capacity to shift the focus of their attention between various stimuli. These skills amplify one's potential for self-regulation²¹ and allows attention to be redirected from depressive or anxious rumination back to present moment.²⁰ Neuroimaging studies also show that mindfulness meditation engenders neuroplastic changes in brain areas associated with attentional functioning typically impaired in ADHD.³¹ Studies show that individuals with ADHD have abnormal neuronal activity in dorsofrontostriatal, orbitofrontostriatal, and frontocerebellar circuits.⁴⁸ Hölzel et al. demonstrated the role of anterior cingulate cortex which is involved in executive functioning and attentional process.⁴⁹

A number of limitations of the present study should be taken into consideration. First of all ADHD symptoms were evaluated by self-report tests. Small sample size and correlational character of the study are additional limitations. Small sample size of the study could limit the generalizability of the findings.

Overall this study focuses on a relevant subject regarding the relationship between mindfulness and emotional symptoms and attention deficit hyperactivity symptoms. To our knowledge, this is the first study that examines the association between ADHD symptoms

and mindfulness in a group of adult patients with mood and anxiety disorders that applied to the outpatient psychiatry clinic in Istanbul, Turkey.

The management of ADHD across lifespan is a topic of discussion centering on optimal multimodal treatment.⁵⁰ As shown in numerous clinical trials stimulant medications are the first line treatment for ADHD.⁵¹ However there is a growing interest in novel nonpharmacological interventions in patients with ADHD who respond partially to medications, experience intolerable side effects, have contraindications such as pregnancy, and who desire to minimize the use of medications and seek alternative approaches to alleviate symptoms.^{22,30,48} Recently, mindfulness practice is also considered as a tool for regulating attention and emotions. Besides yielding improvements in depression and anxiety disorders, mindfulness practice could help patients with ADHD symptoms to regulate their attention and emotions and thereby ameliorate their symptoms.⁴⁸ Thus, improving mindfulness through practice offers a novel approach in the multimodal treatment of ADHD. Future research with larger samples in order to draw firm conclusions about the relationship between ADHD and mindfulness are needed. There is also a need for randomized controlled trials with large sample size to evaluate the impact of mindfulness training on long

TABLE 3 Comparisons of DASS, MAAS, WURS, ASRS scores between groups

Scales	Clinical Sample	Community Sample	t	p	Cohen's d
	Mean ± SD n = 76	Mean ± SD n = 32			
DASS					
Depression	16.45 ± 9.11	3.97 ± 4.40	-9.59	.000	1.74
Anxiety	13.55 ± 7.81	3.59 ± 3.26	-9.34	.000	1.66
Stress	20.41 ± 8.27	8.06 ± 4.73	-9.76	.000	1.49
MAAS	52.29 ± 13.25	68.84 ± 11.94	6.09	.000	1.31
ASRS					
Attention	17.63 ± 6.71	8.28 ± 4.72	-7.16	.000	1.61
Hyperactivity/impulsivity	16.26 ± 5.96	9.09 ± 4.62	-6.07	.000	1.34
Total	33.89 ± 11.24	17.38 ± 8.11	-8.57	.000	1.68
WURS	31.33 ± 17.68	13.29 ± 7.6	-7.26	.000	1.33

ASRS, Adult ADHD Self-Rating Scale; DASS, Depression Anxiety Stress Scale; MAAS, Mindful Attention Awareness Scale; WURS: Wender Utah Rating Scale.

TABLE 4 Pearson's correlations of the MAAS, DASS, ASRS and WURS scores in the clinical sample

		DASS Depression	DASS Anxiety	DASS Stress	ASRS Attention	ASRS hyp/imp	ASRS Total	WURS
MAAS	Correlation	-.288	-.324	-.317	-.543	-.387	-.516	-.560
	p	.012	.004	.005	.000	.001	.000	.000

ASRS, Adult ADHD Self-Rating Scale; ASRS hyp/imp, Adult ADHD Self-Rating Scale hyperactivity/impulsivity; DASS, Depression Anxiety Stress Scale; MAAS, Mindful Attention Awareness Scale; WURS, Wender Utah Rating Scale.

TABLE 5 Summary of linear regression analysis model when MAAS was taken as a dependent variable in the clinical sample

Predictors	B	β	t	p	Collinearity Statistics VIF
Age	-.267	-.153	-1.705	.093	1.09
WURS	-.349	-.466	-4.491	.000	1.47
ASRS attention	-.549	-.278	-2.638	.01	1.51
DASS depression	-.388	-.266	-2.962	.004	1.1

ASRS, Adult ADHD Self Rating Scale; DASS: Depression Anxiety Stress Scale; MAAS, Mindful Attention Awareness Scale; WURS, Wender Utah Rating Scale.

Dependent variable: MAAS.

R²: 0.48; Adjusted R²: 0.45.

term outcomes, so that the role of these interventions in relapse prevention can be evaluated.

CONFLICT OF INTEREST

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