

## Affective Temperaments in Parents of Children with Attention Deficit Hyperactivity Disorder

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### ABSTRACT

**Introduction:** The objective of this study was to investigate affective temperaments of parents of children with ADHD and the relationship between ADHD and affective temperaments.

**Methods:** The children diagnosed with ADHD were evaluated with a structured interview and the Turgay DSM-IV-Based Child and Adolescent Disruptive Behavioral Disorders Screening and Rating Scale (T-DSM-IV-S) was filled by parents. Then parents were evaluated by a structured clinical interview for DSM-IV (SCID-I), and those with no diagnosis of psychiatric disorder (in the past and at the time of the study) were included to the study. The Turkish version of the Temperament Evaluation of Memphis, Pisa, Paris and San Diego Auto-questionnaire was used to evaluate affective temperaments of parents. A control group of parents who has no children with ADHD was applied the same evaluation protocol.

**Results:** The study was conducted with 123 parents (66 mothers, 57 fathers) of 66 children with ADHD and 119 control parents (65

mothers, 54 fathers) of 71 children without ADHD. Affective temperament scores of parents of children with ADHD were significantly higher than those of the control group. When the scores of mothers and fathers were compared separately, mothers had higher scores in all temperaments except hyperthymic temperament, and fathers had higher scores in all temperaments except anxious temperament in the ADHD group. Additionally, the T-DSM-IV-S attention deficit and hyperactivity/impulsivity scores of children were moderately correlated with most of the affective temperaments scores of their parents.

**Conclusion:** There is a relationship between ADHD and affective temperaments. Further studies are needed to understand the etiology, strength, and nature of this relationship.

**Keywords:** Attention deficit hyperactivity disorder, ADHD, affective, temperament, parent, bipolar disorder

### INTRODUCTION

Attention deficit hyperactivity disorder (ADHD) is a chronic developmental psychiatric disorder beginning in childhood and continuing into adulthood with symptoms of inattention, impulsivity, and hyperactivity (1). Comorbidity of bipolar disorder (BD) and other mood disorders and ADHD has been recently investigated. BD comorbidity rates in adults with ADHD have been reported to be 9.5% (2,3). Patients with both BD and ADHD have been reported to exhibit the onset of BD nearly five years earlier, have more depressive and mixed episodes, generally respond less well to treatment, and have a more severe course of illness (4). Given the high ADHD comorbidity rates in patients with BD and their relatives, a familial link between these disorders is possible (4).

A combination of genetic and environmental factors is essential for the ultimate expression of an individual's temperament (5). Furthermore, a temperament is a constitutional factor that contains the earliest biological roots of an individual's pattern of behavior: Kraepelin (6) and Kretschmer (7) hypothesized a continuum between full-blown affective pathology and premorbid temperaments, referring to them as lifelong, early-onset, attenuated, subclinical forms of manic-depressive psychosis. Akiskal (8) conceptualized affective temperaments as precursor phenotypes for the premorbid course of BPs and other mood disorders on the basis of Kraepelin's dimensional view of manic depressive insanity. Akiskal (8) suggested that both affective temperaments and mood disorders are genetically transmitted and thereby share a common pathophysiological mechanism. Furthermore, some researchers have proposed that temperamental characteristics may be related to the occurrence of mood disorders and may have a negative effect on prognosis (9,10,11). Affective temperaments reflect the core characteristics of manic-depressive illness and represent the milder manifestations of BD (12). The affective temperamental characteristics of parents of children diagnosed with ADHD have not been studied. Studies on the relationship between ADHD and temperamental characteristics are usually on ADHD in childhood (13). Prior studies on ADHD in childhood have suggested that temperamental characteristics in childhood may be correlated with anxiety and mood disorders and may increase the risk of substance abuse (14,15,16).



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This study aimed to investigate the affective temperament traits of parents of children with ADHD. We hoped to understand if these parents had different affective characteristics, which might provide a background for investigating a common etiology for risk groups and risky behaviors.

## METHODS

This study was carried out jointly by the child and adolescent psychiatry and psychiatry clinics at Kocaeli Derince Training and Research Hospital in Kocaeli, Turkey.

The study involved a study group consisting of parents of children with ADHD and a control group consisting of the parents of healthy children without ADHD diagnoses. Parents with psychiatric diagnoses were excluded as their symptoms could cause high scores in some of the subscales and alter the results (17). The study was conducted with the approval of the ethics committee of the Kocaeli University School of Medicine. All participants were asked for verbal and written consent.

### Formation of the Groups

**Study group:** The children aged 6-16 and their parents who applied in September 2013-March 2014 to our clinic were interviewed by a childhood and adolescent psychiatrist as a routine procedure. A semi-structured diagnostic interview (Schedule for Affective Disorders and Schizophrenia for School-Aged Children: Present and Lifetime Version [K-SADS-PL]) for DSM-IV was applied to the children. The parents and teachers were asked to fill in a Turgay DSM-IV-Based Child and Adolescent Disruptive Behavioral Disorders Screening and Rating Scale (T-DSM-IV-S). The parents of 100 patients who were diagnosed with ADHD for the first time ( $n=200$ ; 100 mothers, 100 fathers) were informed about the study, and those who agreed to participate in the study ( $n=170$ ; 85 mothers, 85 fathers) were evaluated by clinical interview (SCID-I) upon filling out their written consents. Among them, 136 parents (68 mothers, 68 fathers) without any active physical and psychiatric diagnoses and without any psychiatric diagnoses or treatment histories in retrospective inquiry were evaluated by the Turkish version of the Temperament Evaluation of Memphis, Pisa, Paris and San Diego Auto-questionnaire (TEMPS-A) to define their affective temperaments.

**Control group:** In order to create the control group after the formation of the study group, those who agreed to participate in the study among the hospital personnel, classmates of the children, and hospital visitors were evaluated. For the control group, parents of children whose ages and sexes matched with the patient group were admitted, while those whose children's siblings had ADHD were excluded. In these interviews, after clarification by the psychiatrist that none of the children in the family had ADHD, the parents ( $n=160$ ; 80 mothers, 80 fathers) underwent the same scaling and clinical evaluation processes. As a result, 142 parents (71 mothers, 71 fathers) were included in the study and evaluated by the TEMPS-A.

The scales of those who skipped questions or marked double options while filling in the TEMPS-A were considered invalid. Thus, the study presented the data regarding 123 parents (66 mothers, 57 fathers) of 66 children with ADHD (27 girls, 39 boys) in the study group and 119 parents (65 mothers, 54 fathers) of 71 children without ADHD (29 girls, 42 boys) in the control group.

### Materials

**Sociodemographic data form:** This data form was prepared by our team in conformity with the purpose of the study, and it contained information such as the ages, sexes, and education levels (years of education)

of the patients and their relatives and whether they had previously received psychiatric diagnoses or treatments. It was filled in by the physician based on the patient's statements during interview.

### Structured clinical interview for DSM-IV axis I disorders (SCID-I): Structured clinical interview for DSM-IV axis I disorders, clinical version (SCID-CV):

The SCID-I is a semi-structured diagnostic interview chart whose Turkish translation and validity/reliability were carried out by Çorapçıoğlu and colleagues (18). It contains DSM-IV diagnoses. The SCID-I begins with a sociodemographic data guide and covers seven diagnostic groups: mood disorders, psychotic disorders, alcohol and substance-related disorders, anxiety disorders, somatoform disorders, eating disorders, and adjustment disorders. It has a high reliability for psychiatric disorders. It is used as a standard interview to affirm the diagnosis in clinical studies (19).

### Form of temperament evaluation of Memphis, Pisa, Paris and San Diego auto-questionnaire (TEMPS-A):

The TEMPS-A was used in this study to assess the average score of the subtypes of the affective temperaments of the participants. It was originally designed by Akiskal (17) and adopted into Turkish by Vahip et al. (20). It is a self-assessment scale involving "true" or "false" indications that aim to take into account the entire life of the individual. It contains 99 questions and consists of five subdimensions that establish depressive, cyclothymic, hyperthymic, irritable, and anxious temperaments.

### Schedule for affective disorders and schizophrenia for school-aged children: Present and lifetime version (K-SADS-PL):

The K-SADS-PL is a semi-structured psychiatric interview designed to assess psychiatric disorders in children and adolescents aged 6-18 years according to DSM-IV criteria. Gökler (21) studied the reliability and validity of the Turkish version.

### Turgay DSM-IV-Based child and adolescent disruptive behavioral disorders screening and rating scale (T-DSM-IV-S):

The T-DSM-IV-S was developed by Turgay (22) and adapted and translated into Turkish by Ercan (23). The T-DSM-IV-S (parent and teacher forms) is based on the DSM-IV diagnostic criteria and assesses hyperactivity/impulsivity (9 items), inattention (9 items), opposition/defiance (8 items), and conduct disorder (15 items). A severity estimate is assigned for each symptom on a four-point Likert scale (0: not at all; 1: just a little; 2: quite a bit; and 3: very much). Subscale scores on the T-DSM-IV-S are calculated by summing the scores on the items in each subscale. The hyperactivity/impulsivity and inattention modules were used for this study.

### Statistical Analysis

In the study, comparison of continuous variables was performed with an independent samples t-test. A chi-square test was conducted for categorical variables. Correlation analysis was used to determine the relationship between the linear variables. As level of education may influence affective temperament, an additional ANCOVA model was performed including these variables as covariates and the group as the fixed factor. A linear regression analysis was used to establish the predictors of affective temperaments. Affective temperaments were established as dependent variables and probable predictors were established as independent variables in the regression model. Correlation levels were assessed as "low" for the values of 0.00-0.24, "moderate" for 0.24-0.50, "high" for 0.50-0.74, and "very high" for 0.75-1.00 (24). All analyses were carried out using Statistical Package for the Social Sciences (SPSS) 17.0 software, release 2008 (SPSS Inc., Chicago, IL, USA). The significance level for the tests was set at  $p<0.05$ .

## RESULTS

### General Definitions of the Groups

In this study, 123 parents of whom at least one child had ADHD (study group) and 119 parents of whom no children had ADHD (control group) were evaluated in terms of their affective temperament attributes. There was no significant difference in terms of age and gender between the children in the ADHD and control groups. The sociodemographic data of the parents are shown in Table 1.

There was no significant difference between ADHD children and control group in terms of age of the fathers ( $p>0.05$ ), but the education level of the fathers of ADHD children were lower than that of the control group (mean  $9.25\pm 3.29$  years for the ADHD group and  $12.77\pm 3.66$  years for the control group;  $p<0.01$ ). There was no difference between the groups in terms of the ages of the mothers, but the education levels of the mothers in the ADHD group were lower (mean  $8.41\pm 4.03$  for the ADHD group and  $11.15\pm 3.99$  for the control group;  $p<0.01$ ). Finally, there was no difference between the groups in term of age, but the parents of the ADHD group had lower education levels (mean  $8.83\pm 3.07$  for the ADHD group and  $12.10\pm 3.49$  for the control group;  $p<0.01$ ).

### Comparison of the Affective Temperament Scores of the Groups

When the groups were compared by Student's t-test in terms of temperament scores of the parents, it was found that all temperament scores (depressive, cyclothymic, hyperthymic, anxious, irritable) of the study group were higher than those of the control group ( $p<0.05$ ) (Figure 1).

**Sex:** In comparing the groups, when only mothers were evaluated, the difference between all temperament scores was still significant, except for hyperthymic temperament. On the other hand, in comparing the groups, when only fathers were evaluated, the difference between the groups in all temperament attributes was still significant, except for anxious temperament. The significance level in anxious temperament was at the borderline ( $p=0.051$ ).

**Education:** Upon evaluating the whole sample, there was a negative correlation between education levels and all affective temperament scores ( $p<0.05$ ), but there were no significant results obtained when the subjects within the groups were evaluated one by one.

**Age:** No association could be found between the participants' ages and affective temperament scores ( $p>0.05$ ).

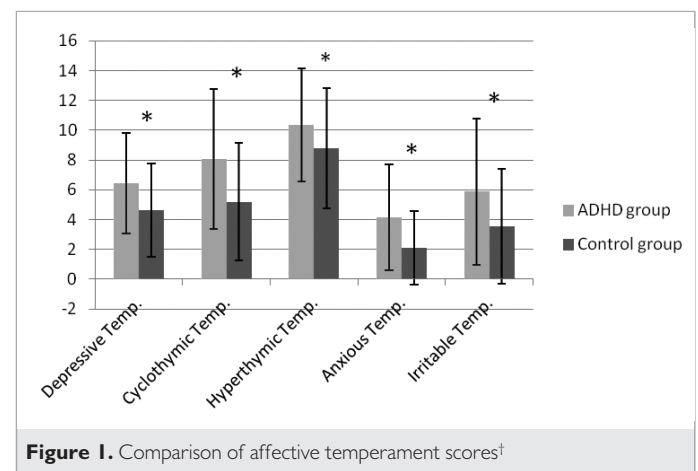
### Covariance Analysis

Upon the evaluation of the groups, a significant difference was found between the two groups in terms of education levels. Moreover, a difference was found between hyperthymic and anxious temperament in the comparison of the mother and father groups. Multivariate covariance analysis was performed to evaluate the association between the affective temperament scores of the groups and their education levels and sexes. In this model, affective temperament scores were considered the dependent variables, the groups were considered the fixed variables, and the education levels and sexes of the parents were considered covariant. In the corrected model, the difference between the two groups was still significant in all temperament scores (for depressive temperament  $F=14.25$ ,  $p<0.01$ ; for cyclothymic temperament  $F=13.17$ ,  $p<0.01$ ; for hyperthymic temperament  $F=7.84$ ;  $p<0.01$ ; for anxious temperament  $F=9.97$ ,  $p<0.01$ ; for irritable temperament  $F=15.31$ ,  $p<0.01$ ).

**Table 1.** Comparison of the groups in terms of sociodemographic data

	ADHD* group	Control group	p <sup>†</sup>
Children's ages	8.62±2.04	9.02±2.58	0.162
Children's years of education	3.13±1.91	3.59±2.43	0.119
Parents' ages	37.20±5.39	37.27±4.65	0.849
Mothers' ages	35.10±5.72	35.43±4.60	0.624
Fathers' ages	38.97±5.72	39.11±5.19	0.849
Parents' years of education	8.83±3.07	12.10±3.49	<0.01
Mothers' years of education	8.41±4.03	11.15±3.99	<0.01
Fathers years of education	9.15±3.19	12.77±3.66	<0.01

\*ADHD: attention deficit hyperactivity disorder  
†t-test



### Regression Analysis

A regression model was created to individually determine the predictors of affective temperament scores. In the model, years of education and the parent's sex, age, and group (ADHD group and control group), which had shown significant associations with affective temperament scores in the previous analyses, were considered independent variables as potential predictors (Table 2).

### The Relationship Between Parents' Affective Temperament Scores and Children's ADHD Rating Scores

A correlation analysis was made to evaluate the association between the affective temperament attributes of the parents and the ADHD scores of the children as measured by the T-DSM-IV-S. The T-DSM-IV-S hyperactivity/impulsivity subscale scores were found to be positively correlated (low correlation with hyperthymic temperament and moderate correlation with other temperaments) with all affective temperament scores ( $p<0.05$ ). Additionally, the T-DSM-IV-S attention deficit scores showed moderately significant positive correlation with depressive, cyclothymic, anxious, and irritable temperament scores, but the correlation with hyperthymic temperament was not significant (Table 3).

## DISCUSSION

In this study, the affective temperament scores of the parents of children with ADHD and the parents of children without ADHD were compared. The affective temperament scores of the parents of ADHD children were found to be higher. However, when the scores of mothers and fathers were compared separately, mothers had higher scores in all temperaments except hyperthymic temperament and fathers had

**Table 2.** Predictors for affective temperament scores (linear regression analysis)

	<b>Depressive temperament</b>	<b>Cyclothymic temperament</b>	<b>Hyperthymic temperament</b>	<b>Anxious temperament</b>	<b>Irritable temperament</b>	
Group	-0.220	-0.193	-0.142	-0.238	-0.303	beta
	-2.882	-2.514	-1.828	-3.240	-3.992	t
	0.004	0.012	0.069	0.001	0.000	p
Age	0.029	-0.42	-0.050	-0.041	-0.069	beta
	0.427	-0.605	-0.721	-0.621	-1.012	t
	0.670	0.546	0.472	0.535	0.313	p
Education	-0.117	-0.177	-0.130	-0.091	-0.80	beta
	-1.536	-2.317	-1.677	-1.238	-1.054	t
	0.126	0.022	0.095	0.217	0.293	p
Gender	-0.177	-0.182	0.215	-0.308	-0.057	beta
	-2.587	-2.643	3.070	-4.663	-0.837	t
	0.010	0.009	0.002	0.000	0.404	p
R <sup>2</sup>	0.117	0.132	0.101	0.179	0.126	

Dependent variables: depressive, cyclothymic, hyperthymic, anxious, and hyperthymic temperaments; independent variables: group (ADHD or control), age, education, and gender of the parents

**Table 3.** The correlations between parents' affective temperament scores and children's ADHD\* rating scores

	<b>T-DSM-IV-S Attention deficit scores</b>		<b>T-DSM-IV-S Hyperactivity scores</b>	
	<b>r</b>	<b>p</b>	<b>r</b>	<b>p</b>
Depressive temperament	0.267	<0.001	0.225	0.001
Cyclothymic temperament	0.304	0.000	0.333	<0.001
Hyperthymic temperament	0.069	0.296	0.168	0.010
Irritable temperament	0.263	<0.001	0.352	<0.001
Anxious temperament	0.277	<0.001	0.270	<0.001

\*ADHD: attention deficit hyperactivity disorder

higher scores in all temperaments except anxious temperament in the ADHD group. An association was shown between the individuals who previously received ADHD and bipolar affective disorder diagnoses. Studies had previously shown that affective temperaments were more common in individuals with an ADHD diagnoses, but affective temperaments had not been studied in the parents of children with ADHD diagnoses (25).

This study also showed that in the ADHD group, parents who had not received psychiatric diagnoses had higher affective temperament scores than the parents in the control group. Additionally, affective temperament scores showed a positive correlation with ADHD scores. These findings suggest several interpretations simultaneously. Primarily, high affective temperament scores in the parents of ADHD children suggest that these individuals are inclined to BDs (26). Affective temperaments are known to be precursors for bipolar affective disorders (26). There is a potential etiologic partnership between bipolar affective disorder and ADHD (27). Previous studies have reported that hyperthymic, cyclothymic, and irritable temperaments are prominent in patients with BD (28,29). Other

studies showed higher scores of depressive and anxious temperaments in BD (25). Likewise, it was shown that all temperament scores, except the score for hyperthymic temperament, were higher in the ADHD group than that of the control group (25).

All these studies suggest an etiologic and phenomenological partnership between mood disorders (particularly BD), affective temperaments, and ADHD. This would indicate that parents of children with ADHD should also be evaluated in terms of mood disorders and that necessary actions should be taken if they are on the line. Moreover, the results of this study reinforce the high comorbidity between ADHD and BD. It is suggested that patients with ADHD should also be examined for BD.

Based on our results, the parents of children with ADHD have high scores for affective temperaments despite not having psychiatric diagnoses determined with SCID-I. Having an affective temperament may be significant for parent-child interaction. In a study evaluating the effects of affective disorders on daily life, it was shown that cyclothymic and irritable temperaments, as well as depressive and anxious temperaments, had negative impacts on emotions, cognitive functions, and communication (30). Likewise, ADHD is known to lead to a loss of functionality in both the child and the family. In previous studies, adolescents who have more conflicts with their families have been shown to experience an earlier occurrence of BD (31). In this respect, the results of our study indicate that each behavioral, etiologic, and communication-related aspect of the affective temperaments should be researched in terms of both ADHD and bipolarity.

In this study, a negative correlation was found between education levels and affective temperament scores over the whole sample. This result conforms with the results of previous studies (26,32). In this study, although the ages of the parents were similar, the education levels of children with ADHD were found to be lower than that of the control group. This result is consistent with research that indicated a negative correlation between ADHD symptoms and parental education levels (33). Subclinical ADHD symptoms of parents or maladaptive effects of the high affective temperament scores may have roles on lower education levels (30). Low-

er education levels probably represent low socioeconomic status that is suggested to impact well-being of both child and family; thus, the role of education level needs to be investigated in further studies about affective temperaments and ADHD (34). In addition, based on the results of this study, confirmed in both variance analysis and regression analysis, there is an association between the ADHD diagnoses of children and the affective temperament scores of their parents independent from their education level, age, and sex.

As another invincible point, the number of excluded parents at the beginning process of the study due to psychiatric disease or invalid scales which were not filled properly was higher in ADHD group compared to control group. Previous studies showed higher rates of psychiatric disorders, especially depression and parenting stress, in parents of ADHD children (35). Also, the tendency of parents to complete the scales impatiently or carelessly may lead them to make mistakes during filling the scales. This may be related to the prevalence of common ADHD in parents of children with ADHD (36). Education levels were also lower in parents of ADHD children. This may be another interpreting factor for invalid scales. This study did not conduct further scanning in parents for ADHD and did not focus to the frequency of psychiatric disorders in parents. We can say that these results claim that future studies may highlight the relationship between depression, mood disorders, affective temperaments, and ADHD.

Drawing attention to the etiologic and phenomenological partnership between ADHD and affective temperaments, this is a scanning study using a cross-sectional method. The neurobiological and genetic mechanisms of ADHD and affective temperaments are also need to be researched. Moreover, the lack of scanning in terms of ADHD in the parents of the ADHD children is a clear indication of the limited nature of the study. On the other hand, this study has a slightly larger sample than the previous studies and is one of the first studies investigating the association between ADHD and temperaments.

There is a relationship between ADHD and affective temperaments according to results of this study. Parents of children with ADHD may have high affective temperament scores even though they do not have any clinically serious psychiatric disease diagnosis according to the scores of SCID-I. While evaluating children with ADHD, the affective temperaments that their parents may have should also be taken into consideration.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Kocaeli University School of Medicine.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Peer-review:** Externally peer-reviewed.

**Author Contributions:** Concept - E.Y., E.Y.; Design - E.Y., E.Y., A.B.Y.; Supervision - A.E.; Resource - E.Y., A.E.; Materials - E.Y., E.Y.; Data Collection and/or Processing E.Y., E.Y., Y.Y.G.; Analysis and/or Interpretation E.Y., E.Y., A.B.Y.; Literature Search - E.Y., E.Y., A.B.Y.; Writing - E.Y., E.Y.; Critical Reviews - E.Y., E.Y.

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