



# Temperament in Adulthood Attention Deficit-Hyperactivity Disorder without Bipolar Disorder

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**Objective** We examined whether some temperamental traits would be associated with persistence of attention deficit-hyperactivity disorder (ADHD) in adulthood independent from bipolar disorder (BD).

**Methods** Eighty-one ADHD patients without a comorbid diagnosis of BD were divided into two groups, those with childhood ADHD (n=46), and those with Adulthood ADHD (n=35). The severity of childhood and adulthood ADHD were assessed by using the Wender Utah Rating Scale (WURS-25) and Turgay's Adult ADD/ADHD Diagnosis and Evaluation Scale (DES). Subjects' temperamental characteristics were examined using the Temperament Evaluation of Memphis, Pisa, Paris and San Diego-auto questionnaire (TEMPS-A).

**Results** The mean scores of WURS-25 were higher in adult ADHD group than in childhood ADHD group ( $p<0.001$ ). Adult ADHD group had significantly higher scores on cyclothymic ( $p=0.002$ ), irritable ( $p<0.0001$ ), and anxious ( $p=0.042$ ) subscales of TEMPS-A. The scores of WURS-25 in adulthood ADHD group were positively correlated with cyclothymia scores ( $r=0.366$ ,  $p=0.033$ ). Total scores of Turgay's Adult ADD/ADHD DES were positively correlated with cyclothymic ( $r=0.354$ ,  $p=0.040$ ), hyperthymic ( $r=0.380$ ,  $p=0.026$ ), and irritable ( $r=0.380$ ,  $p=0.026$ ) subscale scores. Cyclothymic and irritable temperaments were significantly associated with the severity of adulthood symptoms of ADHD.

**Conclusion** We might suggest that cyclothymic and irritable temperaments would predict the diagnosis of adulthood ADHD independent from BD.

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**Key Words** ADHD, Temperament, Adulthood, Childhood.

## INTRODUCTION

Attention deficit-hyperactivity disorder (ADHD) is a developmental childhood-onset psychiatric disorder which is known to continue into adulthood with symptoms of inattention, impulsivity and hyperactivity.<sup>1,2</sup> While childhood prevalence of ADHD varies between 3 and 12%, its 1-7.3% rates at adulthood reveals that childhood ADHD persists into young adulthood in 60-70% of the cases.<sup>3,4</sup>

The observations demonstrate that ADHD subjects who continue to have their symptoms in adulthood represent a

different group from those that do not manifest the disorder. The presentation of core childhood symptoms of ADHD can change from adolescence to adulthood with less hyperactivity, but with more impulsivity, attentional problems, mood fluctuations, and irritability.<sup>5-10</sup> In adults, a childhood history of ADHD symptoms is considered important to distinguishing ADHD from other clinical syndromes that can cause similar symptoms, such as mood disorders, substance abuse, and some personality disorders.<sup>11-13</sup> Number or severity of childhood ADHD symptoms, hyperactivity/impulsivity symptoms, or combined type of ADHD, comorbidity with oppositional defiant disorder (ODD) and conduct disorder (CD), female gender, medication treatment might increase the risk of ADHD persistence, while higher IQ might be a protective factor.<sup>7,14-19</sup>

ADHD is supposed to be rooted in early development through temperament.<sup>20</sup> The relationship between the temperament traits and ADHD has been examined in several studies. The children with ADHD showed higher scores on Novelty Seeking<sup>21-23</sup> and lower scores on Self-Directedness,<sup>23-25</sup> Cooperativeness, Persistence,<sup>24,25</sup> and Reward Dependence<sup>25</sup> compared

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with controls. In adults with ADHD, high Novelty Seeking, Harm Avoidance<sup>26-31</sup> and low Self-Directedness<sup>26</sup> have been described. According to previous studies comparing with other temperament and character variables, high Novelty Seeking seems to play a central role in predicting lifetime diagnosis of ADHD<sup>22,32</sup> and in mediating the relationship between ADHD and personality disorders, such as borderline personality disorders (BPD).<sup>33</sup>

A high rate of bipolar disorder (BD) comorbidity<sup>34,35</sup> and bipolar symptoms have been found in adults diagnosed with ADHD.<sup>36,37</sup> Hence, affective symptoms are considered among essential features of ADHD.<sup>38</sup> On the other hand, cyclothymic temperament are strongly related to bipolar spectrum disorder,<sup>39</sup> and also were found to be more prevalent in adult ADHD patients than in controls and the general population.<sup>39,40</sup> Although temperament are related to both BD and ADHD, the relationship of temperament with pure BD or ADHD is uncertain yet. In the present study, we hypothesized that some temperamental traits would be predictive for the continuation of ADHD symptoms into adulthood without a comorbid diagnosis of BD. For this aim, we first compared patients whose ADHD symptoms continued (A-ADHD) or disappeared after 18 years old (C-ADHD) in terms of clinical and temperamental properties, and then examined which variables were more likely to be associated with A-ADHD.

## METHODS

### Assessments

Eighty-one subjects (48 women and 33 men) aged between 18 and 65 years with lifetime diagnosis of ADHD were recruited consecutively at the psychiatry out-patient clinics of the Adnan Menderes University Hospital. The subjects were not receiving any stimulant drugs for at least 1 month prior to interviews. Our exclusion criteria were diagnoses of schizophrenia, bipolar disorder, autism spectrum disorders or organic mental syndromes. All patients gave informed consent to participate in the study after the study protocols had been fully explained. The study was approved by the local ethics committee of the Medical Faculty of Adnan Menderes University (Approval number 2014/455).

Lifetime diagnosis of ADHD in total sample was assessed through Structured Clinical Interviews for DSM-IV Axis I Disorders (SCID-I).<sup>41,42</sup> The patients who reported six symptoms of either inattention or hyperactivity-impulsivity during a 6 months period (DSM-IV criterion A); symptoms of either inattention or hyperactivity-impulsivity before age 7 (criterion B); some impairment in at least two or more settings (like at school or at home) (criterion C); and clinically significant impairment in social, academic or occupational functioning (cri-

terion D) were considered to have a diagnosis of ADHD (n=81). Thirty-five patients who reported that their ADHD symptoms continued after 18 years old were diagnosed as A-ADHD. Since the remaining 46 patients did not meet the criteria of ADHD after 18 years old, they were considered as having C-ADHD. We retrospectively assessed the severity of childhood ADHD symptoms in total sample by using the Turkish version<sup>43</sup> of Wender Utah Rating Scale (WURS-25)<sup>44</sup> that is a 25-item self-report questionnaire with a 5-point Likert scale based. In order to measure the severity of ADHD in patients with childhood and adulthood ADHD, we used the Turkish version<sup>45</sup> of Turgay's Adult ADD/ADHD Diagnosis and Evaluation Scale.<sup>46</sup>

Affective temperamental traits were assessed by Turkish version<sup>47</sup> of Temperament Evaluation of Memphis, Pisa, Paris and San Diego auto-questionnaire (TEMPS-A), which was developed by Akiskal and coworkers.<sup>48</sup> This questionnaire contains subscales of items for the depressive, hyperthymic, cyclothymic, irritable and anxious temperaments to identify dominant affective temperament and to assess the mean scores of affective temperament subtypes.<sup>49</sup> The original scale consists of 109 items for males and 110 items for females. The Turkish version inquires about lifelong behavior patterns and consists of 99 items to define 5 temperament subtypes: depressive, hyperthymic, irritable, cyclothymic and anxious.

### Statistical analysis

Group differences in demographic variables were computed through chi-square test. The continuous independent data were compared using Student's t-test. To test the inter correlations between the scores of ADHD, and temperament scales, Pearson's correlation analyses were used. Based on the significant correlations obtained, two multiple linear regression analyses were undertaken to examine variance in the scores of WURS-25 and Turgay's Adult ADD/ADHD Scale for 81 participants, using the Stepwise Method. All statistical tests were two-tailed at  $p=0.05$ . We used SPSS 15.0 statistical software (SPSS Inc., Chicago, IL, USA) to perform our analyses.

## RESULTS

As indicated in Table 1, there were no significant differences between C-ADHD (n=46) and A-ADHD groups (n=35) in terms of gender, age, marital status, and educational level. The mean scores of WURS-25 were higher in the A-ADHD group compared to C-ADHD group ( $p<0.0001$ ). Our results revealed that A-ADHD group had significantly higher scores on cyclothymic ( $p=0.002$ ), irritability ( $p<0.0001$ ), and anxious ( $p=0.042$ ) subscales of TEMPS-A.

Correlational analyses revealed that the scores of WURS-

**Table 1.** Comparison of ADHD groups with regard to some demographic, clinical and temperamental variables

	C-ADHD (N=46)		A-ADHD (N=35)		Statistical analyses		
	N	%	N	%	$\chi^2$	df	p
Gender					0.114	1	0.73
Female	28	60.9	20	57.1			
Male	18	39.1	15	42.9			
Marital status					1.331	1	0.24
Single	23	50.0	22	62.9			
Married	23	50.0	13	37.1			
	Mean	SD	Mean	SD	t	df	p
Age	33.47	13.01	31.22	10.04	0.84	79	0.39
Educational level (years)	10.21	3.93	10.34	3.74	-0.14	79	0.88
WURS-25	46.45	8.40	56.11	11.23	-4.25	61	<0.0001
Turgay's adult ADD/ADHD DES							
Total	17.23	6.49	31.82	7.12	-9.6	79	<0.0001
Inattention	8.80	4.12	17.54	5.27	-8.36	79	<0.0001
Hyperactivity	5.34	3.65	9.02	4.95	-3.694	60	<0.0001
Impulsivity	3.10	1.81	5.17	2.62	-3.976	57	<0.0001
Hyperactivity/impulsivity	8.45	4.57	14.28	6.87	-4.33	56	<0.0001
TEMPS-A							
Depressive	9.82	3.83	11.44	3.26	-1.97	77	0.052
Cyclothymic	12.13	3.47	14.47	2.68	-3.25	77	0.002
Hyperthymic	8.64	4.68	8.00	4.30	0.62	77	0.53
Irritability	7.48	3.66	10.67	3.24	-4.01	77	<0.0001
Anxious	13.46	5.74	15.73	4.00	-2.06	77	0.042

WURS-25: Wender-Utah Rating Scale, TEMPS-A: Temperament Evaluation of the Memphis, Pisa, Paris, and San Diego Autoquestionnaire, Turgay's Adult ADD/ADHD DES: Turgay's Adult Attention Deficit Disorder/Attention Deficit-Hyperactivity Disorder Diagnosis and Evaluation Scale, C-ADHD: childhood-attention deficit-hyperactivity disorder, A-ADHD: adulthood-attention deficit-hyperactivity disorder

**Table 2.** Correlations of TEMPS-A with severity of childhood and adulthood ADHD symptoms in A-ADHD group

TEMPS-A	A-ADHD (N=35)			
	WURS-25		Turgay's adult ADD/ADHD DES	
	r	p	r	p
Depressive	-0.084	0.637	-0.354*	0.040
Cyclothymic	0.366*	0.033	0.354*	0.040
Hyperthymic	0.069	0.700	0.392*	0.022
Irritability	0.263	0.132	0.380*	0.026
Anxious	0.101	0.571	-0.032	0.858

\*p>0.05. WURS-25: Wender-Utah Rating Scale, TEMPS-A: Temperament Evaluation of the Memphis, Pisa, Paris, and San Diego Autoquestionnaire, Turgay's Adult ADD/ADHD DES: Turgay's Adult Attention Deficit Disorder/Attention Deficit-Hyperactivity Disorder Diagnosis and Evaluation Scale, A-ADHD: adulthood-attention deficit-hyperactivity disorder

25 in C-ADHD group were positively correlated with cyclothymia (r=0.366, p=0.033) subscale scores of TEMPS-A. Total scores of Turgay's Adult ADD/ADHD DES were positively correlated with cyclothymic (r=0.354, p=0.040), hyperthymic (r=0.380, p=0.026), and irritable (r=0.380, p=0.026) subscale scores of TEMPS-A, and negatively correlated with depressive

subscale scores of TEMPS-A (r=-0.354, p=0.040) (Table 2).

Based on expected relationship between the severity of adulthood symptoms of ADHD and temperament, a stepwise linear regression analyses including all significantly correlating variables were conducted with Turgay's Adult ADD/ADHD DES as dependent variables. For Turgay's Adult ADD/ADHD DES scores, a significant model [F(4, 78)=8.927, p<0.001] predicted 32.5% of the sample outcome variance (Adj. R<sup>2</sup>=0.289). Four predictors were entered into the model; cyclothymic ( $\beta$ =1.139, t=3.50, p=0.001) irritable ( $\beta$ =0.913, t=3.282, p=0.002) were significantly associated with higher scores of Turgay's Adult ADD/ADHD DES. Two other predictor variables (depressive and hypertymic temperament) did not significantly contribute to variance with a large effect size (d=0.406) (Table 3).

## DISCUSSION

In the present study, we hypothesized that some temperament traits would be associated with the persistence of ADHD in adulthood even when BD patients were excluded. There are several limitations of this study. First, the sample sizes of

**Table 3.** Multiple linear regression analyses of Turgay's adult ADD/ADHD scale and WURS-25 scores (N=81)

Predictor variable	R <sup>2</sup>	Adj. R <sup>2</sup>	F	p	Constant	Gradient (β)	t	p
Turgay's adult ADD/ADHD diagnosis and evaluation scale								
Model	0.325	0.289	8.927	<0.001	10.790			
TEMPS-A cyclothymic						1.139	3.550	0.001
TEMPS-A irritability						0.913	3.282	0.002
TEMPS-A depressive						-0.600	-1.890	0.063
TEMPS-A hyperthymic						-0.472	-1.887	0.063

WURS-25: Wender-Utah Rating Scale, TEMPS-A: Temperament Evaluation of the Memphis, Pisa, Paris, and San Diego Autoquestionnaire, Turgay's Adult ADD/ADHD DES: Turgay's Adult Attention Deficit Disorder/Attention Deficit-Hyperactivity Disorder Diagnosis and Evaluation Scale

the groups were small to generalize the results. Second, we did not measure the baseline levels of anxiety and depression, which can affect the performance of the patients on the self-rating scales of TEMPS, WURS-25, and Turgay's Adult ADD/ADHD DES. Current levels of mood and anxiety of the participants are particularly important when interpreting the relationship between anxiety/mood disorders and temperament. For instance, anxiety and mood disorders have shown to correlate to some extent with high scores on harm avoidance.<sup>50-52</sup> Additionally, we did not assess the subtypes of childhood and adulthood ADHD, and the diagnoses of Axis II disorders since small sample sizes would make it difficult to perform further statistical analysis. In our sample, all subjects (n=81) were assessed for a current diagnosis of ADHD. Among all variables, only the severity of childhood symptoms of ADHD were retrospectively evaluated. Therefore, recall bias might have affected adults' reports of their childhood ADHD symptoms. Despite these limitations, this study indicates that some temperament characteristics of patients would be more likely to be prominent in A-ADHD independent from BD.

One of the main findings of this study was that A-ADHD patients reported more childhood ADHD symptoms on the WURS-25 scale, in accordance with some of the previous studies.<sup>16,18,53</sup> This result may demonstrate that a more severe course of ADHD during childhood may precede the persistence of ADHD in adulthood.

Cyclothymic temperament is strongly related with increased psychiatric comorbidity, including BD.<sup>39</sup> Among patients with BD, especially BD II, the cyclothymic temperament has been reported to be the most common temperament trait, and it has been observed that it often precedes the disorder.<sup>54,55</sup> It is controversial whether persistence of ADHD into adulthood are related to temperament, or overlapping conditions such as mood and anxiety disorders. An association between temperament and ADHD would help understanding of outcomes of C-ADHD in adulthood. A recent study demonstrated that among A-ADHD patients, cyclothymic temperament was associated with more childhood and adult ADHD symptoms.<sup>39</sup> In our study, we have found that some temperamental traits

might be related to the occurrence of ADHD symptoms in adulthood. Cyclothymic, irritable, and anxious temperament scores were significantly higher in A-ADHD subjects than those in C-ADHD. Cyclothymic, depressive, hyperthymic, and irritable temperament showed a significant positive correlation with the Turgay's Adult ADD/ADHD DES scores in adults. Stepwise linear regression analysis demonstrated that cyclothymic and irritable traits strongly predicted adulthood scores of ADHD. These results might demonstrate that some temperament traits such as cyclothymia and irritability would not be seen as specific for BD comorbidity in A-ADHD subjects, and would be among the core features of A-ADHD independent from BD. Since the mean age of our sample seemed to be late for the emergence of BD, we suppose that our results might be representative for pure ADHD. Given the prior studies which demonstrated that depressive, irritable and anxious temperaments were more likely to be related to BPD compared to BD or healthy controls,<sup>40,56,57</sup> further studies are required to test the relationship between the temperamental traits and personality disorders in adult ADHD subjects. Since we did not assess the Axis II diagnoses, we were not able to examine the relationship between personality disorders and temperament. Regarding high levels of anxious temperament in BPD and ADHD, it is obvious that particularly BPD should be evaluated among A-ADHD in the absence of BD.

In conclusion, this study might demonstrate that particularly cyclothymic and irritable temperament would be associated with A-ADHD patients without comorbid diagnosis of BD. Further studies are required to replicate this finding in larger samples including patients with personality disorders.

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