Brief Communication

Symptoms Defined by Parents' and Teachers' Ratings in Attention-Deficit Hyperactivity Disorder: Changes With Age

Bedriye Öncü, MD[1], Özgür Öner, MD[2], Pınar Öner, MD[3], Neşe Erol, PhD[4], Ayla Aysev, MD[4], Saynur Canat, MD[5]

Objective: To determine whether Child Behavior Checklist/4-18 (CBCL) and Teacher Report Form (TRF) scores of children and adolescents with a first-time diagnosis of attention-deficit hyperactivity disorder (ADHD) are different and whether there is a similar difference in normal control subjects.

Method: We analyzed the CBCL and TRF scores of 146 patients (124 boys and 22 girls, aged 6 to 18 years; mean age 11.0 years, SD 3.6). We analyzed the same scores for 274 age and sex-matched control subjects recruited from a nationally representative sample.

Results: Subjects with ADHD had significantly higher CBCL and TRF scores than control subjects. Age was significantly correlated with scores on the CBCL and TRF subscales Social Withdrawal, Somatic Complaints, and Internalization Problems; with scores on the CBCL subscale Attention Problems; and with scores on the TRF subscale Anxiety–Depression. In the group with ADHD, age was negatively correlated with scores on the CBCL and TRF subscale Externalizing Problems and with scores on the TRF subscale Aggressive Behavior. In the control group, the only significant correlation was between age and the CBCL subscale Somatic Complaints score.

Conclusions: These results indicate that underdiagnosis of ADHD in childhood may cause the emergence of greater internalization problems in adolescence.

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Information on author affiliations appears at th end of the article.

Clinical Implications

- Symptom profiles of first-time diagnosed subjects with attention-deficit hyperactivity disorder (ADHD) change with age.
- Untreated adolescents with ADHD have more internalization problems than untreated children with ADHD.
- Higher somatization problems in Turkish adolescents with ADHD may reflect cultural differences, suggesting that untreated patients may have different symptoms in different cultures.

Limitations

- Children and adolescents were screened cross-sectionally.
- The control group was not screened for psychiatric disorders.
- The study had a limited number of female subjects.

Key Words: *attention-deficit hyperactivity disorder, adolescent, child, Child Behavior Checklist, Teacher Report Form*

Attention-deficit hyperactivity disorder (ADHD) is one of the most frequent neurodevelopmental disorders of childhood. Studies that followed children with ADHD to adolescence reveal that 70% to 85% of the children may continue to have the disorder during adolescence (1–3). ADHD also continues to cause significant social and academic problems in adolescents and is usually comorbid with other psychiatric disorders (4–6). However, despite these significant findings, ADHD literature mostly relies on childhood cases (7,8).

As Biederman and colleagues indicated, treatment of children in the follow-up process makes it harder to generalize the findings in the follow-up literature to all ADHD cases (7).

Therefore, cross-sectional studies of first-time diagnosed ADHD patients may be important in determining the presentations of ADHD in different age groups, which will help to control the confounding effects of treatment on the natural course of the disorder.

In this article, we report Child Behavior Checklist/4-18 (CBCL) and Teacher Report Form (TRF) scores of children and adolescents diagnosed with ADHD for the first time and compare this with scores of age- and sex-matched control subjects selected from a nationally representative epidemiologic sample. The goal of this study is to determine whether CBCL and TRF scores of first-time diagnosed ADHD patients change with age and whether there is a similar change in normal control subjects.

Materials and Method

Subjects

We included 146 patients with ADHD in the study: 124 boys (84.9%) and 22 girls (15.1%), aged 6 to 18 years (mean age 11.04 years, SD 3.56); we also included 274 age- and sex-matched control subjects. Patients with ADHD were recruited from consecutive admissions to the general child and adolescent psychiatry outpatient clinics at Ankara University's Faculty of Medicine Child Psychiatry Department and Faculty of Medicine Adolescent Psychiatry Unit. All subjects were white. Children and adolescents from all over Turkey are referred to these 2 clinics. Diagnosis based on DSM-IV criteria was established by consensus of at least 2 psychiatrists. All subjects with ADHD had normal medical histories and were clinically screened for psychosis, eating disorders, substance use disorders, pervasive developmental disorders, and mental retardation. Most ADHD diagnoses were the combined subtype, but they also included the predominantly inattentive subtype. All patients were diagnosed for the first time and had never been previously evaluated for psychiatric disorders; none had previously received psychopharmacological treatment. CBCL and TRF scores were obtained prior to the evalution. Only 96 patients had TRF scores, owing to summer holidays.

Control subjects were recruited from a nationally representative epidemiologic sample. The sample was selected by a self-weighted, multistage, random, stratified, and clustered sampling plan. Another study details the selection of the epidemiologic sample (9). Subjects living in urban areas were selected for this study to obtain a group more resembling our clinical population. Two control subjects for each ADHD subject were selected randomly from the age- and sex-matched children and adolescents.

Materials

Child Behavior Checklist /4-18. We used the CBCL to obtain standardized parental reports of children's problem behaviours and competencies. The CBCL includes 118 problem items (10). There are 8 syndrome scales based on the problem items: Social Withdrawal, Somatic Complaints, Anxiety–Depression, Thought Problems, Attention Problems, Social Problems, Aggressive Behavior, and Delinquency. The total scores obtained from the Social Withdrawal, Somatic Complaints, and Anxiety–Depression subscales give a broadband syndrome Internalization Problems score. The sum of the Aggressive Behavior and Delinquency subscale scores give a broadband Externalization Problems syndrome score. Back translation, bilingual retest method, and pretest field study were done for the CBCL (11). The test–retest reliability of the Turkish form was 0.84 for Total Problems. Internal consistency of the Turkish form was adequate (Cronbach's alpha = 0. 88) (9,11).

Teacher Report Form. The TRF also includes 118 items (12). The syndrome scales and broadband syndromes are identical with those of the CBCL. The same translation methods were used for the TRF. The test–retest reliability of the Turkish form was 0.88 for Total Problems. Internal consistency of the Turkish form was adequate (Cronbach's alpha = 0. 87) (9,11).

Data Analysis

We used analysis of variance (ANOVA) to compare the CBCL and TRF syndrome scale scores and broadband syndrome groupings (Internalizing and Externalizing) of the patients with ADHD and the control group. We used Spearman's rank correlation test to calculate correlations of syndrome scale scores with age. Two-tailed significance tests ($P < 0.05$) are reported throughout. SPSS 10.0 statistical package was used for the analysis (12).

Results

Group Differences

Tables 1 and 2 summarize means and standard deviations of the syndrome scale and broadband syndrome scores obtained from the CBCL and the TRF. ADHD cases have significantly higher scores in all the CBCL scales than do control subjects. When the TRF is taken into account, subjects with ADHD have higher scores in Attention Problems, Thought Problems, Social Problems, Delinquency, Aggressive Behavior, Externalizing Problems, and Total Problems.

Correlations With Age

In the ADHD group, CBCL scores for Social Withdrawal ($r = 0.242$, $P = 0.004$), Somatic Complaints ($r = 0.302$, $P < 0.001$), Attention Problems ($r = 0.202$, $P = 0.018$), and Internalizing Problems ($r = 0.200$, $P = 0.019$) were significantly correlated with age. CBCL scores for Social Problems ($r = –0.168$, $P =$

Table 1 Comparison of Child Behavior Checklist (CBCL) scores for patients with attention-deficit hyperactivity disorder (ADHD) and control subjects

	Control subjects			ADHD patients			
CBCL scale	Mean	SD	95%CI	Mean	SD	95%CI	$F_{1,411}$
Social Withdrawal	2.69	2.64	2.37–3.00	4.04	3.81	3.51–4.57	20.99***
Somatic Complaints	1.03	1.60	0.84–1.22	1.91	2.01	1.58–2.25	23.48***
Anxiety—Depression	4.77	3.70	4.33–5.21	7.72	5.26	6.83–8.60	43.46***
Social Problems	1.79	1.83	1.57–2.01	4.12	2.68	3.66–4.57	107.41***
Thought Problems	.63	1.01	0.51–0.75	2.31	1.96	1.98–2.64	132.43***
Attention Problems	4.04	2.79	3.70–4.37	9.80	4.28	9.08–10.52	269.70***
Delinquency	1.38	1.84	1.16–1.60	4.77	3.74	4.14– 5.40	151.73***
Aggressive Behavior	6.44	5.73	5.76–7.12	15.72	8.96	14.21–17.23	162.38***
Internalizing Problems	7.82	7.12	6.97–8.67	20.78	11.75	18.80–22.75	45.33***
Externalizing Problems	6.98	6.09	6.13–7.84	22.02	14.32	19.65–24.40	192.83***
Total Problems	25.93	16.77	23.94–27.93	56.49	38.50	52.19–60.79	211.48***

***$P \leq 0.001$; CI = Confidence interval; SD = Standard deviation

Table 2 Comparison of Teacher Report Form (TRF) scores for patients with attention-deficit hyperactivity disorder (ADHD) and control subjects

	Control subjects			ADHD patients			
TRF	Mean	SD	95%CI	Mean	SD	95%CI	$F_{1,369}$
Social Withdrawal	3.64	3.72	3.20-4.08	3.73	3.80	2.96–4.50	0.04
Somatic Complaints	0.79	1.78	0.58–1.00	0.99	1.70	0.65–1.33	0.93
Anxiety—Depression	7.38	5.31	6.74–8.01	7.95	5.09	6.92–8.98	0.84
Social Problems	2.51	3.38	2.11–2.91	4.94	3.9	4.14–5.72	34.08***
Thought Problems	0.94	1.58	0.75–1.13	2.05	2.12	1.62–2.48	29.19***
Attention Problems	8.85	8.33	7.86–9.84	17.80	8.17	16.15–19.46	82.93***
Delinquency	1.48	2.30	1.20–1.75	2.90	2.67	2.35–3.44	24.70***
Aggressive Behavior	6.50	8.83	5.54–7.47	16.38	11.39	14.07–18.68	83.80***
Internalizing Problems	11.46	8.47	10.41–12.51	12.20	8.17	10.54–13.85	0.51
Externalizing Problems	7.98	10.02	6.79–9.17	19.22	13.36	16.51–21.92	74.52***
Total Problems	32.61	27.07	29.39–35.82	57.43	26.86	51.98–62.87	60.03***

***$P \leq 0.001$; the remaining values are nonsignificant.

0.049) and Externalization Problems ($r = –0.191$, $P = 0.025$) were negatively correlated with age. TRF scores for Social Withdrawal ($r = 0.359$, $P = 0.006$), Somatic Complaints ($r = 0.302$, $P = 0.022$), Anxiety–Depression ($r = 0.242$, $P = 0.018$), and Internalizing Problems ($r = 0.287$, $P = 0.005$) were also significantly correlated with age. TRF scores for Aggressive Behavior ($r = –0.291$, $P = 0.004$) and Externalizing Problems were negatively correlated with age ($r = –0.263$, $P = 0.010$).

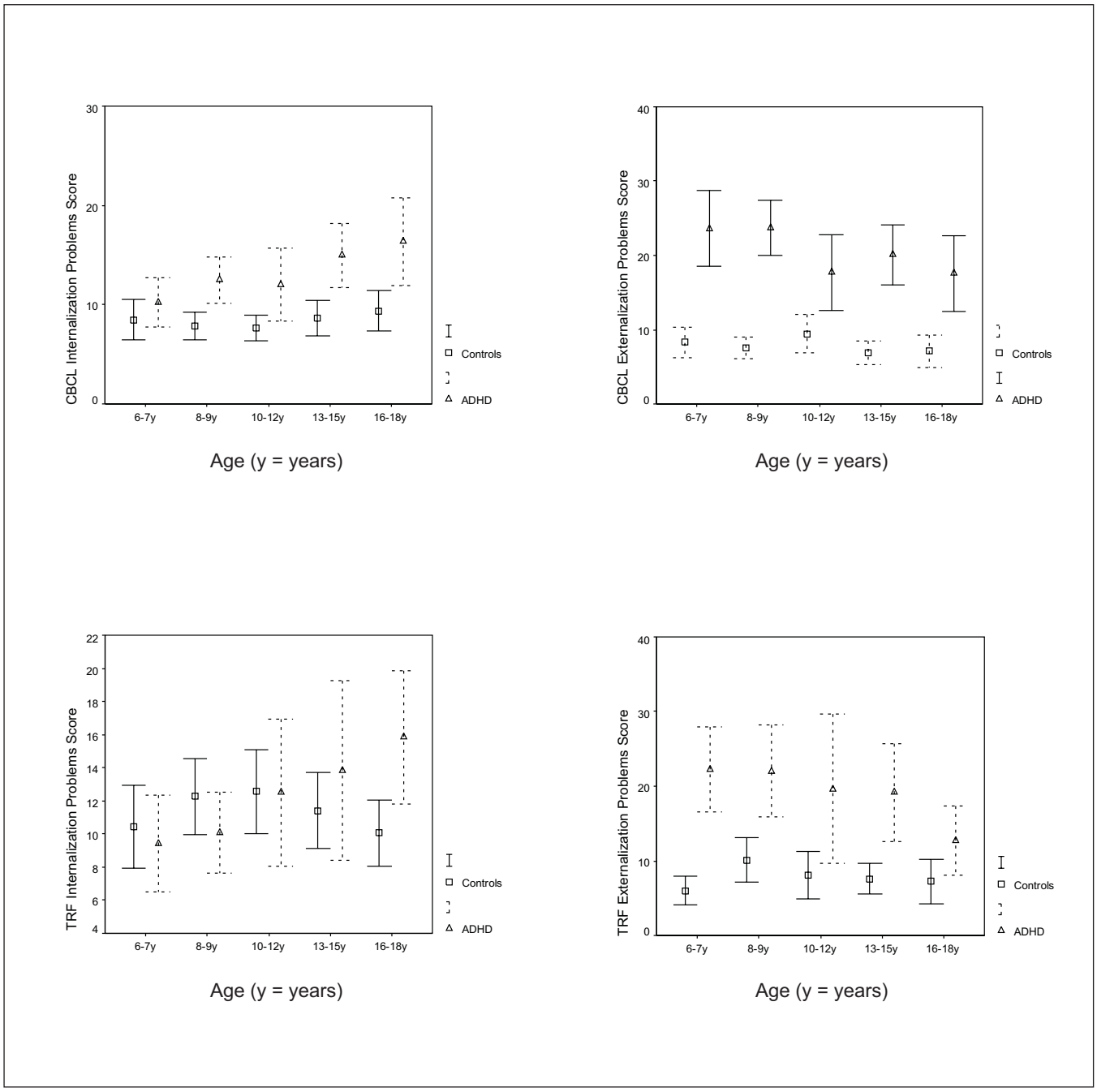
In the control group, only CBCL scores for Somatic Complaints ($r = 0.178$, $P = 0.003$) were significantly correlated with age. Figure 1 summarizes changes in CBCL and TRF Internalizing and Externalizing Problems with age.

Discussion

Consistent with previous studies, subjects with ADHD had higher CBCL scores for Social Problems, Attention Problems, and Internalizing and Externalizing Problems, as well as higher TRF scores for Social Problems, Attention Problems, and Externalizing Problems, than did control subjects (3,13,14).

There was a significant correlation between age and scores for Social Withdrawal, Attention Problems, and Internalizing Problems in the group with ADHD. Since this was not the case for the control group, the correlation does not seem to indicate merely a more pronounced relation between age and CBCL–TRF scores. Conversely, Biederman and others' study indicated that child and adolescent subjects had similar CBCL profiles (7). In that study, however, the sample was followed for 4 years and was probably treated. Treatment in this period may prevent the emergence of higher internalization problems in adolescence. Previous studies indicate that effective

Figure 1 Change of Child Behavior Checklist (CBCL) and Teacher Report Forum (TRF) scores of attention-deficit hyperactivity disorder patients and control subjects with age (95%CI)



treatment may be important to prevent future internalization problems (15).

The more prominent Internalizing Problems in the adolescent group with ADHD may be a result of social problems and negative societal feedback. Again, previous studies indicate that social problems are prominent in most cases of ADHD (16,17). Indeed, interpersonal and social problems may be one of the most disabling aspects of ADHD (18) and may be related to outcome (19). Children and adolescents with ADHD are less popular than their classroom peers (20). Further, peer rejection and social-skills deficits in childhood may increase risk of later delinquency, academic failure, and psychopathology (21).

Higher somatization problems in older subjects with ADHD and in control subjects may be a correlate of other internalization disorders. However, this may also reflect a cultural difference. Earlier studies conducted with Turkish patients indicated that somatization is frequent in the Turkish

population and may be a prominent part of depressive symptomatology (22,23).

These results suggest that underdiagnosis of ADHD in childhood may cause higher internalization problems in adolescence. Further, presentation of internalization problems may differ from culture to culture.

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[1]Attending Psychiatrist, Adolescent Psychiatry Unit, Psychiatry Department, Ankara University Faculty of Medicine, Ankara, Turkey.
[2]Resident and Research Fellow, Child Psychiatry Department, Ankara University Faculty of Medicine, Ankara, Turkey.
[3]Child Psychiatrist, private practice, Ankara, Turkey.
[4]Professor, Child Psychiatry Department, Ankara University Faculty of Medicine, Ankara, Turkey.
[5]Professor, Adolescent Psychiatry Unit, Psychiatry Department, Ankara University Faculty of Medicine, Ankara, Turkey.
Address for correspondence: Dr B Öncü, Ankara Universitesi Tip Fakultesi Psikiyatri Anabilim Dali, Cebeci, Ankara, Turkey
e-mail: oncu@medicine.ankara.edu.tr or bedriyeoncu@superonline.com

Résumé :Symptômes définis par les cotations des parents et des enseignants dans le trouble d'hyperactivité avec déficit de l'attention : changements avec l'âge

Objectif : Déterminer si les scores à la Liste de comportement pour les enfants/4-18 (CBCL) et au formulaire de rapport des enseignants (TRF) d'enfants et d'adolescents ayant un premier diagnostic de trouble d'hyperactivité avec déficit de l'attention (THADA) sont différents, et s'il y a une différence semblable chez des sujets témoins normaux.

Méthode : Nous avons analysé les scores à la CBCL et au TRF de 146 patients (124 garçons et 22 filles; de 6 à 18 ans; âge moyen 11,0 ans, ET 3,6). Nous avons analysé les même scores chez 274 sujet témoins assortis selon l'âge et le sexe, recrutés dans un échantillon représentatif à l'échelle nationale.

Résultats : Les sujets souffrant du THADA avaient des scores significativement plus élevés à la CBCL et au TRF que les sujets témoins. L'âge était significativement corrélé avec les scores aux sous-échelles du Retrait social, des Plaintes somatiques et des Problèmes d'internalisation de la CBCL et du TRF, avec les scores à la sous-échelle des Problèmes d'attention de la CBCL, et avec les scores à la sous-échelle Anxiété-dépression du TRF. Dans le groupe ayant le THADA, l'âge était négativement corrélé avec les scores à la sous-échelle des Problèmes d'externalisation de la CBCL et du TRF, et avec les scores à la sous-échelle du Comportement agressif du TRF. Dans le groupe témoin, la seule corrélation significative était entre l'âge et le score à la sous-échelle des Plaintes somatiques de la CBCL.

Conclusions : Ces résultats indiquent que le sous-diagnostic du THADA dans l'enfance peut causer l'apparition de problèmes d'internalisation plus importants à l'adolescence.