

# Validation of the Turkish Versions of the Short-Form Conners' Teacher and Parent Rating Scales

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## Abstract

**Objectives:** To investigate factorial and criterion validity as well as reliability of the Turkish translations of the 28-item Conners' Teacher Rating Scale (CTRS) and 48-item Conners' Parent Rating Scale (CPRS), which both measure attention deficit, hyperactivity, and conduct problems in children, through a series of studies conducted with either normal or clinical samples.

**Method:** Normal sample data for the teacher and parent rating scales were collected at several elementary schools in Ankara through 2 different studies. The teacher rating scale sample consisted of 1539 pupils rated by their teachers, and the parent scale sample consisted of 954 pupils rated by their parents. The clinical sample consisted of 270 children diagnosed with attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ADD), and/or conduct disorder (CD), who were rated by a child psychiatrist on a DSM-IV criteria form, as well as by their parents and teachers on the respective Conners' rating scales (CRS). The patients' clinical criteria scores related to these diagnostic categories were used to evaluate, and if necessary, to modify item content of the corresponding subscales.

**Results:** Turkish versions of the CTRS and CPRS demonstrated good internal consistency as indicated by Cronbach's alpha coefficients of .95 and .90, respectively. Factor analytical data from the normal sample studies supported the construct validity of both Turkish CRS despite non-differentiation of the conduct factor from the hyperactivity factor on the teacher scale. The clinical criteria scores suggested the necessity of adapting the item content of all the subscales, except the hyperactivity subscale.

**Conclusion:** The adapted and original subscales of the CRS Turkish forms demonstrated such psychometric properties that they could be employed in assessing attention deficit and disruptive behavior disorders in Turkish children.

**Key Words:** Psychometrics, Attention deficit, Hyperactivity, Disruptive Behavior Disorder

## INTRODUCTION

Rating scales and symptom checklists provide an effective, quick, and standard approach to the measurement of problematic behaviors observed in children (Angold, 1989). The development and usage of diagnostic manuals, namely, the Diagnostic and Statistical Manual of Mental Disorders (DSM), by the American Psychiatric Association, amplified interest in rating scales, as the diagnostic criteria suggested in these manuals are, in fact, symptom lists. Rating scales have been used for subject selection and measurement of study results since the 1960s, and demand for such tools is increasing (Conners, 1998). One way of meeting this demand is to investigate the use of questionnaires in countries different

than the ones in which they were developed. According to Verhulst (1995), such an adaptation process means creating new scales that fit new conceptual structures, determining new cut-off points to use in new countries, and, related to this, creating different diagnostic criteria. Such a perspective on scale adaptation creates the opportunity to develop scales that are sensitive to cultural variations in observed behavioral and emotional symptoms. On the other hand, preservation of the content and structure of the original scale, so as to allow cross-cultural comparisons, is desirable (Bird 1996, Stanger et al. 1994).

One of the most widely used tools in the assessment of behavioral problems are the Conners' Rating Scales

(CRS), which were developed primarily for use in drug studies of children with hyperkinesias (Conners, 1969, 1970, 1973; Goyette et al., 1978). Conners developed his scales in a brief, easy-to-use, and easy-to-score format. These characteristics make CRS efficient, especially in situations where multiple scales are used and where time and finances are critical. It was shown by many studies that CRS have both internal and time reliability, and predictive and structural validity (Conners, 1990). Researchers suggested 3 main areas for the application of CRS; as a general screening tool for the detection of problematic behaviors in children, as a complimentary tool for clarifying a specific diagnosis, and as a measurement tool for the assessment of treatment results (Gianaris et al., 2001). Various forms of the scales are used in both English-speaking countries (Trietes et al., 1982; Glow et al., 1982; Thorley, 1983) and in other countries (O'Leary et al., 1985; Shen et al., 1985; Holborow and Berry, 1986; Brito, 1987; Yao et al., 1988; Luk and Leung, 1989; Rosenberg and Jani, 1995; Pal et al., 1999; Javo et al., 2000; Al Awad and Sonuga-Barke, 2002).

Over the course of time, different forms of CRS were developed by various researchers (i.e. Adelaide Conners' Parent Rating Scale, IOWA Conners' Teacher Rating Scale, and Abbot Hyperkinesias Index) (Glow et al., 1982; Loney and Milich, 1982; Cohen, 1988). Finally, CRS were revised by Conners in 1997 and a number of new items were included, and new subscales were developed (i.e. ADHD Index and DSM-IV symptoms subscale); however, it has been suggested that the relative validity of the revised CRS were understudied (Gianaris et al., 2001).

The process of translating and validating the short forms of the Turkish 28-item Conners Teacher Rating Scale (CTRS) and 48-item Conners Parent Rating Scale (CPRS) ) was started by our team in 1989 in order to use the scales in Turkey. Both CRS include items related to attention deficit, hyperactivity, and conduct problems. CPRS-48 has additional items for psychosomatic problems and anxiety. Two normal population studies and one clinical population study were conducted between 1989 and 1998. Findings of the first normal population study of the construct validity of CTRS-28 was published by Şener et al. (1995).

The findings of the second normal population study, which investigated the construct validity of CPRS-48 were presented at the 9th Turkish National Psychology Congress in 1998. A third study, which evaluated the criterion validity of CTRS-28 and CPRS-48 was con-

ducted with a clinical population and the findings were reported at the Turkish National Child Psychology Congress in 1997. In this final study, pertinent DSM-IV diagnostic criteria scores assigned to each subject by the second author on the basis of clinical interviews served as the clinical criteria against which the criterion validity of the instruments and predictive validity of the subscales were evaluated. The present article combines findings of the three studies on two Conners' scales in order to allow the reader to grasp the entire data, analyses and the procedure used for validation and adaptation of the CRS subscales in Turkish.

## METHOD

Original forms of the brief CRS (Goyette et al. 1978) were translated into Turkish by the researchers; the adequacy of each translation was assessed by both a back translation and the initiation of a pilot study with teachers and parents.

### Subjects and procedure

The normal population of the CTRS-28 study consisted of 1539 students chosen from 8 primary schools in Ankara in 1991 (51.9% male, 48.1% female; age range: 5-13 years, mean:  $8.98 \pm 1.5$  years). In this study, the students were rated on these scales by their teachers. The following year, 954 students who were chosen from various primary schools in Ankara composed the normal population of the CPRS-48 study (53.1% male, 46.9% female; age range: 6-13 years, mean:  $8.98 \pm 1.36$  years). In this study, the students were rated by their mothers or their fathers. Incomplete forms were excluded; therefore, the size of samples indicates the number of completed forms.

The clinical sample consisted of 270 children who were out-patients at Gazi University Department of Child Psychiatry and who were treated for attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and/or conduct disorder (CD) (74.8% male, 25.2% female). Mean age of the sample was 10.6 years (range: 6-16 years, SD: 3.3 years). Each participant was scored on CTRS-28 by his/her teacher, on the CPRS-48 by his/her mother or father, and on the DSM-IV (1994) criteria form, which was prepared specifically for this study, by the second author who is a child psychiatrist. The DSM-IV (1994) attention deficit conduct disorders section includes 39 diagnostic criteria in 4 criteria sets; Inattentiveness (IA), Hyperactivity/Impulsivity (H/I), Oppositional Defiant Disorder (ODD),

**Table I.** Evaluation of the Item Contents of CTRS-28 Subscales According to the Normal and Clinical Samples.

Items loaded with identical factors across age and gender groups (Normal sample data)	Correlations with DSM-IV criteria scores (Pearson r) (Clinical sample data)				Items included in the subscales	
	IA	H/I	ODD	CD	Adapted <sup>a</sup>	Original <sup>b</sup>
<b>Inattentive/Passive</b>						
7	0.59	0.53	- 0.01	- 0.31	AIP	AD/P
18	0.17	0.17	- 0.07	- 0.09	AIP	AD/P
20	0.28	0.23	- 0.09	- 0.21	AIP	AD/P
21	0.33	0.34	0.01	- 0.16	AIP	AD/P
22	0.37	0.38	- 0.04	- 0.42	AIP	AD/P
26	0.27	0.20	0.07	- 0.08	AIP	AD/P
27	- 0.11	- 0.17	0.26	0.28		CP
28	0.00	- 0.14	0.02	0.26		IP
<b>Hyperactivity</b>						
1	0.60	0.77	0.03	- 0.48	AH	H
2	0.34	0.38	0.09	- 0.31	AH	H
3	0.05	0.12	0.20	- 0.03	AH	H
4	- 0.11	- 0.04	0.25	0.15		CP
6	- 0.16	- 0.24	0.22	0.25		CP
14	0.50	0.65	- 0.03	- 0.32	AH	H
15	0.39	0.42	- 0.07	- 0.13	AH	H
16	0.24	0.25	- 0.07	- 0.24	AH	H
<b>Conduct Problem</b>						
8	0.21	0.21	0.02	0.12		H
11	0.29	0.38	0.05	- 0.12		CP
12	- 0.15	- 0.11	0.03	0.44	ACP	CP
19	- 0.04	0.01	0.05	0.16	ACP	
23	- 0.14	- 0.15	0.24	0.22	ACP	CP
24	- 0.04	- 0.01	0.18	0.22	ACP	
25	- 0.17	- 0.18	0.28	0.22	ACP	
<b>Other Items</b>						
5	0.17	0.17	0.04	0.09		CP
9	0.27	0.08	- 0.06	0.01		IP
10	- 0.29	- 0.37	0.28	0.26	ACP	CP
13	0.14	0.19	- 0.26	- 0.14		
17	0.19	0.23	0.00	- 0.11		

<sup>a</sup>Adapted subscales: AIP: Adapted inattentive-passive; ACP: Adapted conduct problem; AH: Adapted hyperactivity.

<sup>b</sup>Original Subscales: IP: Inattentive-passive CP: Conduct problem ; H: Hyperactivity;

IA: Inattentiveness; H/I: Hyperactivity/impulsivity; ODD: Oppositional defiant disorder, CD: Conduct disorder.

and Conduct Disorder (CD) criteria sets. The rating form covering all these criteria allowed the clinician to rate each criterion separately on the basis of his clinical

evaluation. As a result of this procedure, subjects received not only diagnostic criteria scores for IA, H/I, ODD and CD, but also clinical diagnoses through the application of

**Table II.** Factor Structures of CPRS-48 Subscales and Evaluation of the Item Contents According to the Normal and Clinical Samples.

Factorial structure	Factor loadings (Normal sample data)			Correlations with DSM-IV criteria scores (Pearsons' r) (Clinical sample data)				Items included in the subscales	
	Total	Boys	Girls	IA	H/I	ODD	CD	Original <sup>a</sup>	Adapted <sup>b</sup>
Conduct Problem									
2	0.62	0.60	0.64	-0.33	-0.36	0.22	0.39	CP	ACP/ AOD
8	0.67	0.67	0.65	-0.19	-0.20	0.18	0.41	CP	ACP/ AOD
14	0.54	0.59	0.54	-0.33	-0.37	0.05	0.57	CP	ACP
17	0.55	0.63	0.41	-0.17	-0.17	-0.02	0.50		ACP
19	0.53	0.53	0.56	-0.15	-0.24	0.30	0.32	CP	ACP / AOD
20	0.72	0.71	0.73	-0.28	-0.28	0.09	0.59	CP	ACP
23	0.46	0.44	0.52	0.03	0.05	0.20	0.01		AOD
27	0.65	0.71	0.51	-0.23	-0.27	0.11	0.50	CP	ACP
29	0.52	0.58	0.46	-0.36	-0.42	0.19	0.56		ACP / AOD
35	0.76	0.76	0.77	-0.24	-0.24	0.06	0.54	CP	ACP
36	0.58	0.56	0.56	-0.15	-0.27	0.06	0.43		ACP
38	0.66	0.70	0.62	-0.16	-0.14	0.11	0.39		ACP
Impulsivity/Hyperactivity									
4	0.65	0.64	0.63	0.50	0.63	-0.12	-0.41	IH	AI H
5	0.59	0.52	0.61	0.20	0.26	0.07	-0.12	IH	AI H
11	0.71	0.71	0.69	0.55	0.69	-0.01	-0.43	IH	AIH
13	0.69	0.69	0.69	0.56	0.70	0.02	0.43	IH	A IH
Learning Problem									
1	0.57	0.18	0.54	0.49	0.59	0.00	0.38		A LP
6	0.45	0.20	0.52	0.30	0.32	-0.00	-0.15		A LP
10	0.47	0.54	0.38	0.08	-0.10	-0.10	0.16	LP	
18	0.43	0.24	0.46	0.29	0.24	-0.00	-0.21		A LP
25	0.42	0.49	0.33	0.34	0.28	0.02	-0.12	LP	A LP
31	0.42	0.51	0.34	0.53	0.48	-0.07	-0.29	LP	A LP
Anxiety									
3	0.45	0.13	0.44	-0.09	-0.11	0.17	0.26		
7	0.49	0.16	0.37	0.23	0.26	0.04	0.26		
12	0.56	0.03	0.56	0.33	0.29	0.02	-0.37	AX	
16	0.51	-0.09	0.51	0.33	0.33	0.01	-0.44	AX	
21	0.41	-0.01	0.33	-0.41	-0.50	0.23	0.38		
26	0.58	0.22	0.53	0.36	0.47	0.07	-0.51		
37	0.44	0.24	0.47	0.28	0.23	0.05	-0.10	LP	
47	0.40	0.51	0.29	0.32	0.28	-0.12	-0.20	AX	
Psychosomatic									
32	0.54	0.62	0.53	0.06	-0.07	-0.02	-0.02	PS	
41	0.66	0.74	0.57	0.07	-0.01	0.04	-0.07	PS	
42	0.54	0.47	0.61	0.07	0.09	0.12	-0.07		
43	0.75	0.76	0.72	-0.01	-0.08	-0.00	0.06	PS	
44	0.68	0.64	0.69	0.19	0.17	0.06	-0.18	PS	

<sup>a</sup> CP: Conduct problem; IH: Impulsivity-hyperactivity; LP: Learning problem; A: Anxiety; PS: Psychosomatic.

<sup>b</sup>ACP: Adapted conduct problem; AOD: Adapted oppositional defiant; AIH: Adapted impulsivity-hyperactivity; ALP: Adapted learning problem; IA: Inattentiveness; H/I: Hyperactivity/impulsivity; ODD: Oppositional defiant disorder; CD: Conduct disorder.

**Table III.** Internal Consistencies of the Adapted CTRS-28 and CPRS-48 Subscales.

Subscale	Cronbach's alpha	Item-total correlations
CPRS-A LP	0.67	$\geq 0.35$
CPRS-A IH	0.82	$\geq 0.37$
CPRS-A OD	0.79	$\geq 0.37$
CPRS-A CP	0.92	$\geq 0.55$
CTRS-A IP	0.83	$\geq 0.55$
CTRS-A H	0.76	$\geq 0.25$
CTRS-A CP	0.81	$\geq 0.41$

suggested cut-offs to these scores (6 out of 8 for IA, 6 out of 9 for H/I, 4 out of 8 for ODD, and 3 out of 15 for CD). Eventually, it was established that 117 (43.3%) patients were fulfilling the IA criteria, 132 (48.9%) patients were fulfilling the H/I criteria, 95 (35.2%) patients were fulfilling the ODD criteria, and 135 (50.0%) patients were fulfilling the CD criteria. When evaluated as a whole, while 127 (47.0) of the 270 patients met only one diagnostic criteria set, 143 (53.0%) had multiple diagnoses. The percentages of diagnoses and co-morbid diagnoses are shown in Figure 1. DSM-IV IA, H/I, ODD, and CD criteria set scores were used in examining the psychometric properties of the items of CRS and the criteria validity of the subscales. The patients' clinical criteria scores related to these diagnostic categories were used to evaluate, and if necessary, to modify the item contents of the corresponding subscales.

## FINDINGS

### Factor analyses and adaptation of the subscales

CTRS-28: Factor analyses of the total sample failed to differentiate the conduct dimension from the hyperactivity dimension and these 2 behavioral dimensions were accumulated on a single factor. In order to solve this problem, the sample was divided into 4 sub-groups according to gender and age (by dividing into two as 8 or less and 9 or above) and analyses were carried out separately for each group. With this method, it was possible to make a differentiation between the conduct and hyperactivity groups; however, sliding of the 9 items to different factors in each group raised the impression that these items might be the source of non-differentiation in the general sample. Analyses conducted on the total sample and on four sub-groups showed that 3 factors composed the framework of

the scale. These factors were hyperactivity (H), Inattention/passivity (I/P), and conduct problem (CP) (Şener et al., 1995). Factor analysis and clinical data were combined in order to analyze the item structure (Table I). Only major factors were taken into account during the preparation of the table and if an item loaded on at least three of the four age/gender groups of any factor, that item was accepted as related to that factor and listed accordingly. According to the combined data of the 2 studies, 6 items out of 8 in the I/P subscale were suitable for the Turkish form of the scale. The remaining 2 items of the original I/P subscale were excluded from the Turkish form because item 27 was not related to the IA criteria score in DSM-IV, in the clinical sample, and item 9 was not loaded onto the I/P factor in the majority of the normal groups. It was observed that 6 out of the 7 items in the original H subscale qualified for the Turkish H subscale. According to the results of the normal population study, item number 8 was related to the CP factor more so than it was related to the H factor, and this led to the exclusion of the item from the H subscale of the Turkish form. On the CP subscale, only 3 of the 8 original items were included in the Turkish version. Our findings necessitated adding 3 items to the Turkish version that were not in the original scale.

CPRS-48: Principal component factor analysis applied to the normal sample resulted in 11 factors that had eigenvalues  $\geq 1.0$ . Due to the fact that in the original study 5 factors were found in the analyses and subscales were developed according to them (Goyette et al., 1978), we elected to enter only these 5 factors to the varimax rotation in order to assess the compatibility of our data with the original findings. The findings of the analyses applied to the normal sample and sub-samples composed of boys and girls (Table II) showed that factors and item contents observed in our study were similar to the original study. These factors were conduct problem (CP), impulsivity/hyperactivity (I/H), learning problem (LP), anxiety (A), and psychosomatic (PS). Despite the similarity of the factors that were observed by Goyette et al. (1978) and our study, in terms of item contents, the item contents of the factors, except for the I/H factor, were not fully compatible; therefore, we decided to adapt the CPRS-48 subscales for usage in Turkey. Items that loaded onto a specific factor at a significant level were considered to be candidates for subscales and correlations with each clinical criterion were calculated (Table II). Our strategy was to incorporate the items that were related to the same behavioral dimension in both studies into the related subscales. As can be seen in Table III, this strategy produced the 11-item adapted CP subscale, of which 7 items were

**Table IV.** Psychometric Properties of CTRS-28 and CPRS-48 Adapted Subscales with Tentative Cut-off Points.

DSM-IV DIAGNOSES	Subscale	Cut-off Score	Sensitivity %	Specificity %	Predictive value (+) %	Predictive value (-) %	Efficacy (hit rate) %
Inattentiveness	CTRS-A IP	8	72.6	69.3	64.4	76.8	70.7
		9	67.5	74.5	66.9	75.0	71.5
		10	58.1	81.0	70.1	71.7	71.2
	CPRS-A LP	5	88.0	55.6	60.2	85.9	69.7
		6	74.4	68.0	64.0	77.6	70.7
		7	58.1	77.8	66.7	70.8	69.3
Hyperactivity/ Impulsivity	CTRS-A H	7	87.9	66.7	71.6	85.2	77.1
		8	84.1	73.2	75.0	82.8	78.5
		9	72.7	80.4	78.0	75.5	76.7
	CPRS-A IH	6	88.6	64.5	70.5	85.6	76.3
		7	81.1	73.2	74.3	80.2	77.0
		8	67.4	83.3	79.5	72.8	75.6
Oppositional Defiant Disorder	CTRS-A CP	9	70.5	48.6	42.7	75.2	56.3
		10	62.1	62.3	47.2	75.2	62.3
		11	45.3	70.9	45.7	70.5	61.8
	CPRS-A OD	7	76.8	34.3	38.8	73.2	49.2
		8	73.7	43.4	41.4	75.2	54.0
		9	52.6	53.7	38.2	67.6	53.3
Conduct Disorder	CTRS-A CP	8	79.3	48.9	60.8	70.2	64.0
		9	71.9	55.6	61.8	66.4	63.7
		10	60.0	67.4	64.8	62.8	63.7
	CPRS-A CP	18	77.0	79.3	78.8	77.5	78.1
		19	75.6	85.9	84.3	77.9	80.8
		20	71.1	88.9	86.5	75.5	80.0

on the original scale. With the aim of examining the probability of the diagnosis of ODD based on CPRS -48 results, it was separated from the CP subscale and a temporary ODD subscale was formed. It was found that the original I/H subscale had perfect compatibility for utilization in the Turkish language. On the other hand, the adapted LP subscale was composed of 2 items from the original subscale and 3 items that were not in the original subscale.

#### Internal consistencies

We calculated the Cronbach's alpha coefficients as 0.95 for CTRS-28 and as 0.90 for CPRS -48. The reliability analyses results presented in Table III shows that all adapted subscales had adequate reliability, except for the LP subscale of CPRS-48.

#### Cut-off Scores

The psychometric characteristics of the subscales and

**Table V.** Prediction of the DSM-IV Criteria Scores by Conners' Rating Scales (Regression Analyses).

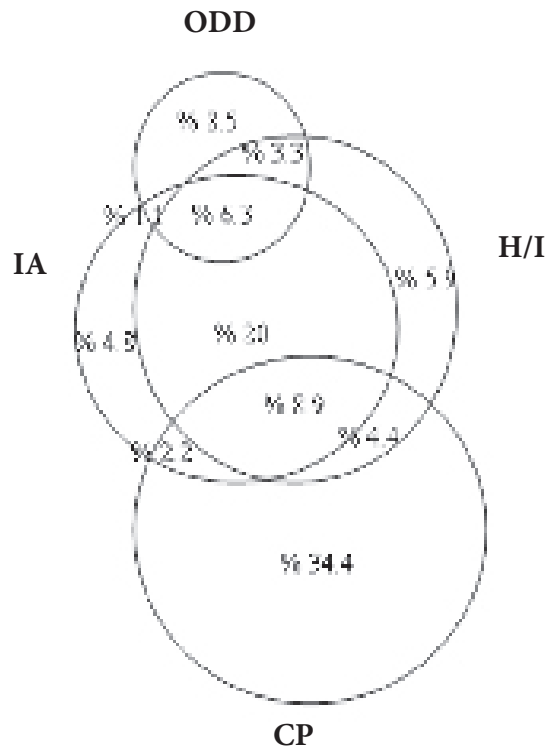
DEPENDENT VARIABLE	INDEPENDENT VARIABLE	R <sup>2</sup>	Beta	F <sup>a</sup>	T <sup>b</sup>	Significance <sup>c</sup>
DSM-IV Inattentiveness Criteria Score	CPRS Total Score	0.05	0.23	14.51	3.81	P < 0.0001
	CPRS- LP	0.21	0.45	69.72	8.35	P < 0.0001
	CPRS-A LP	0.37	0.60	154.20	12.42	P < 0.0001
	CTRS Total Score	0.12	0.35	36.75	6.06	P < 0.0001
	CTRS- IP	0.18	0.43	60.44	8.55	P < 0.0001
	CTRS-A IP	0.21	0.46	73.19	8.55	P < 0.0001
DSM-IV Hyperactivity/ Impulsivity Criteria Score	CPRS Total Score	0.04	0.18	9.41	3.07	P < 0.005
	CPRS-I	0.53	0.73	303.37	17.42	P < 0.0001
	CTRS Total Score	0.13	0.36	40.32	6.35	P < 0.0001
	CTRS H	0.40	0.64	181.72	13.48	P < 0.0001
	CTRS-A H	0.45	0.67	218.95	14.78	P < 0.0001
DSM-IV Oppositional Defiant Disorder Criteria Score	CPRS Total Score	0.03	0.16	7.18	2.68	P < 0.01
	CPRS-CP	0.04	0.19	10.20	3.19	P < 0.005
	CPRS-A CP	0.09	0.29	25.06	5.01	P < 0.0001
	CTRS Total Score	0.02	0.13	4.66	2.16	P < 0.05
	CTRS-CP	0.09	0.29	25.00	5.00	P < 0.0001
	CTRS-A CP	0.06	0.25	17.71	4.21	P < 0.0001
DSM-IV Conduct Disorder Criteria Score	CPRS Total Score	0.03	0.18	9.33	3.06	P < 0.005
	CPRS-CP	0.37	0.61	158.08	12.57	P < 0.0001
	CPRS-A CP	0.40	0.63	180.02	13.42	P < 0.0001
	CTRS Total Score	0.00	- 0.05	.65	- 0.81	N.S.
	CTRS-CP	0.11	0.34	34.90	5.91	P < 0.0001
	CTRS-A CP	0.13	0.36	39.28	6.27	P < 0.0001
DSM-IV Conduct+ Oppositional Defiant Disorder Criteria Score	CPRS Total Score	0.06	0.24	15.77	3.97	P = 0.0001
	CTRS Total Score	0.00	0.03	0.19	.43	N.S.
	CTRS-CP	0.19	0.43	61.72	7.86	P < 0.0001
	CTRS-A CP	0.18	0.43	59.27	7.70	P < 0.0001

<sup>a</sup>DF: 1, 268<sup>b</sup>DF: 268<sup>c</sup>Significant for D and F values.

potential cut-off scores are summarized in Table IV. Findings related to the adapted I/P subscale of the CTRS-28 showed that a cut-off score of 9 maximizes the efficiency of the scale in differentiating the subjects with an AD di-

agnosis from those without the diagnosis. The efficiency of the adapted H subscale of CTRS-28 was considerably higher for all potential cut-off scores for predicting dichotomized assessments (diagnosis/no diagnosis). In con-





**Figure I.** The Percentages of DSM-IV Diagnoses and Comorbidities of the 270 Children in the Clinical Sample.

trast to this, the efficiency of the adapted CP subscale of CTRS-28 in predicting the diagnosis of ODD or CD based on DSM-IV criteria was low for all cut-off scores. In CPRS-48, the percentages of correct discrimination with adapted subscales were 70% for LP, 75% for I/H, and 80% for the CP subscales. The efficiency of the ODD subscale remained very low for all cut-off scores.

### Regression Analyses

Table V shows the results of regression analyses conducted in order to examine the predictive values of both the original and the adapted versions of the CTRS-28 and CPRS-48 subscales. Generally, it can be said that the adapted CTRS-28 subscales were the best predictors of the related DSM-IV criteria scores. Among the 4 criteria sets, the highest predictions were observed for H/I score with both the CPRS-48 I/H subscale and the CTRS-28 H adapted and original subscales. DSM-IV IA and CD criteria scores were satisfactorily predicted by the related adapted CTRS-28 subscales. On the other hand, the ODD criteria score was not adequately predicted by any of the subscales. Data presented in Table V show that the adapted and original CTRS-28 subscales displayed similar characteristics in the clinical sample.

This can be explained by the exclusion of some items of the original subscales that did not load onto the appropriate factor in the normal sample. In all conditions it was found that the subscale scores were more predictive of the clinical criteria scores than the total CTRS-28 or CPRS-48 scores.

### DISCUSSION

To date, Conners' Rating Scales has been translated into a variety of languages and the reliability of these translations have been examined by numerous factor analyses. What differentiates our attempt from previous translation-validation-adaptation studies is the utilization of the criterion validity data along with the factorial validity data. This approach permitted us to examine how each item worked in different samples and to see the psychometric properties of the subscales when different cut-off points were used. On the other hand, the most important limitation of this study was that we could not follow a certain sampling strategy in the selection of the participants, which limits the generalizability of the findings.

Finding factor structures similar to the original forms (Goyette et al., 1978) supports the construct validity of the CRS Turkish versions. An adverse finding revealed by the CTRS-28 factor analysis applied on the entire sample was the undifferentiation of the hyperactivity dimension from the conduct dimension, which is a consistent problem (undifferentiation and/or high intercorrelation) observed repeatedly in various validation studies performed over the last 30 years (Hinshaw, 1987; Conners, 1998).

In the first phase of the project, dividing the sample into 4 subsamples based on age and gender, and running the factor analyses with relatively homogenous subsamples resulted in the differentiation of the hyperactivity and conduct dimensions (Şener et al., 1995). Because of the considerable variations in item content of the factors across the sub-samples, however, we felt that it would be inappropriate to construct subscales solely on the basis of factor loadings of the scale items.

Conners (1997), suggested that the lack of differentiation of the hyperactivity dimension from the conduct dimension could be attributable to the methodological problems associated with explanatory factor analysis. Accordingly, he applied explanatory analysis on one half of his sample, and confirmatory analysis on the other half while developing revised versions of his scales. He also followed the rational path in selecting the subscale items, i.e., he included a particular item into a subscale



only if the item has been loaded with the pertinent factor at least at a level of .30, and also has been loaded by the other factors at most at a level of .10. It is noteworthy that findings of two recent clinical studies utilizing both factor analytic methods suggested by Conners (1997) have not favored the superior value of the confirmatory analysis in this context (Huss et al., 2001; Kumar, and Steer, 2003).

These findings point out that the nature of the sample (clinical or normal) affects the results as much as the statistical method applied.

Despite minor discrepancies, the factor structure of the CPRS-48 Turkish version closely resembles to that of the original English version reported by Goyette et al. (1978). Remarkably, the original IH subscale proved to be entirely suitable for use in Turkish, whereas the item content of the LP and CP subscales appeared to be calling for adaptation. Some items performed variably in different contexts. For instance, item 10 (difficulty in learning) failed to correlate significantly with the DSM-IV IA criteria score in the clinical sample despite the fact that it was loaded by the LP factor at a level of 0.47 in the normal sample. Therefore, we decided not to include this item in the adapted LP subscale though it is included in the original subscale derived solely through a factor analytic study (Goyette et al., 1978). Again, we had to keep another original LP subscale item (easily frustrated in efforts) out of the adapted LP subscale in spite of its significant correlation with the IA criteria score because of its association with the anxiety factor rather than the LP factor. On the other hand, three CPRS items excluded from the original LP subscale met the requirements of inclusion in the Turkish adaptation of the LP subscale. Thus, the adapted LP subscale consisting of five items shared only two items with the original. The 11-item adapted CP subscale, however, included all seven original items in addition to four new items. On the basis of an extensive review of the literature pertaining to the long and short versions of the CPRS, Giannaris et al. (2001) concluded that either scale could be considered a reliable and valid tool in assessing general psychopathology, yet none was able to discriminate along diagnostic lines. Moreover, they found no evidence supporting the ability of any specific subscale at identifying its corresponding disorder. It seems viable, then, to construct subscales on the basis of both factor analytic and clinical studies since such a strategy allows the researchers to evaluate the discriminative performance of each item. The fact that the adapted scales we developed following this strategy performed favorably in predicting the cor-

responding clinical criteria scores provides preliminary support for the utility of such a double check. However, further studies are needed in order to see whether this strategy results in developing scales with satisfactory discriminative functions.

The fact that the Cronbach's alpha coefficients of CTRS or CPRS total scores were  $\geq 0.90$  supports both the reliability and the validity (Nunnally and Bernstein, 1994). All CRS subscales, except for one, had sufficient internal consistency. The adapted LP subscale appeared to have a consistency problem with a Cronbach's alpha coefficient  $< 0.70$ ; however, as all 5 items in the subscale correlated satisfactorily with the total score of the subscale, this problem may have been partially due to the brevity of the subscale.

The subscale scores outperformed the total CRS scores in predicting the pertinent DSM-IV criteria scores. A recent review article on the rating scales of externalizing behaviors concluded that broad-band scales offer little depth for understanding a specific behavior pattern or monitoring treatment effects when compared with narrow-band scales (Collett et al., 2003a). When used appropriately, specific rating scales have the potential to improve clinical assessment, diagnostic determination, treatment monitoring, and accountability in practice. For instance, IOWA Conners has been repeatedly proven to discriminate ADHD children from non-clinical controls in spite of its limited number of items (Collett et al., 2003b). Our findings are in accordance with the notion that behavioral dimensions associated with the Attention Deficit and Disruptive Behavior Disorders could be more accurately assessed through dimension-specific measures as compared with global measures.

Expected replications of the original factors of the CRS have not been obtained not only in our study but also in other normal population studies conducted in various countries such as Italy (O'Leary et al., 1985), India (Rosenberg & Jani, 1995), and Sudan (Awad, & Sonuga-Barke, 2002) to give a few examples from three continents. We think that this inconsistency of the CRS factor structure across the studies is mostly due to cultural differences that express themselves more noticeably in normal sample studies rather than clinical studies. Therefore, utilization of the data from clinical samples in defining item content of, and setting cut-off scores for the subscales could contribute considerably to the clinical efficiency of these scales. Conners (1998) related these inconsistencies to insufficient sample size and imperfect statistical procedures employed in the original

study (Goyette et al., 1978). Consequently, the CRS-R were developed on the basis of a much larger sample size and a kind of rational item selection procedure relying on explanatory as well as confirmatory factor analyses. A recent review on the ADHD scales reported the existence of seven studies in the literature supporting validity of the CRS-R (Collett et al., 2003b), which represent a relatively limited amount of data when compared with the vast data corpus on the original scales provided by psychometric and also trans-cultural studies published over the last 30 years (Wainright, 1996).

Therefore we recommend either adapted or original CRS subscales for use with Turkish children until the psychometric properties and trans-cultural characteristics of the CRS-R have been established universally. Though our impression is that the subscales' psychometric characteristics could be improved to some extent by certain alterations in their item content, the reader is advised not to treat our report as a finalized adaptation study given the limited size of our samples, particularly the clinical sample. The CRS need to be further tested in order to determine the best set of items to capture psychopathology with Turkish children.

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