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REPLICATION OF THE ADJUSTMENT SCALES FOR CHILDREN AND ADOLESCENTS CORE SYNDROME FACTOR STRUCTURE

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Independent examination and replication of the core syndrome factor structure of the Adjustment Scales for Children and Adolescents (ASCA; McDermott, Marston, & Stott, 1993) is reported. A sample of 1,020 children were randomly selected from their classroom and rated on the ASCA by their teacher. The six ASCA core syndromes produced a two-factor solution through principle axis analysis using multiple criteria for the number of factors to extract and retain. Varimax, direct oblimin, and promax rotations produced identical results and nearly identical factor structure coefficients. It was concluded that the ASCA indeed measures two independent dimensions of psychopathology (Overactivity and Underactivity) that are similar to the conduct problems/externalizing and withdrawal/internalizing dimensions commonly found in the child psychopathology assessment literature (Cicchetti & Toth, 1991; Quay, 1986). © 2004 Wiley Periodicals, Inc.

The Adjustment Scales for Children and Adolescents (ASCA; McDermott, Marston, & Stott, 1993) is a teacher report behavior rating scale designed to assess psychopathology for individuals 5 to 17 years of age. Teachers are considered to be among the most accurate and reliable reporters of children's behaviors (Kamphaus & Frick, 1996; Martin, Hooper, & Snow, 1986) and their observation of children in varied situations and normative perspective due to observing many children over time is valuable (Piacentini, 1993). Further, as McDermott (1994) has pointed out, evidence suggests that parent reports of child problem behavior are problematic and may indicate as much parental pathology as child pathology and youth self-reports are typically lacking in reliability and there are difficulties with child literacy, deception, and cognitive immaturity. In the development and final version of the ASCA, healthy/positive behaviors were included so teachers are able to report more than problem behaviors. Behavior rating scales preceding the ASCA frequently presented only problem behaviors or symptom checklists.

A nationally representative standardization sample of 1400 youths (700 males and 700 females) from preschool/kindergarten through grade 12 was obtained through stratified random sampling according to "national region, community size, race/ethnicity, parent education level, family structure, and youth handicapping condition" (McDermott, 1994, p. 11). Representation was also achieved for handicapping condition (disability) and giftedness. The ASCA was standardized and co-normed with the Differential Abilities Scale (DAS; Elliott, 1990) for 1200 youths by The Psychological Corporation.

Of the 156 items, 97 are scorable for dimensions of psychopathology and 26 reflect positive/healthy behaviors. Factor analyses by McDermott (1993; 1994) identified the presence of eight dimensions, six of which were replicated and reliable across race/ethnicity, age, and gender and specified as core syndromes. The six core syndromes are Attention Deficit/Hyperactive (ADH), Solitary Aggressive-Provocative (SAP), Solitary Aggressive-Impulsive (SAI), Oppositional-Defiant (OPD), Diffident (DIF), and Avoidant (AVO). These six core syndromes combine to form two composite (second-order) or overall adjustment indexes: Overactivity (ADH, SAP, SAI, and

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OPD syndromes) and Underactivity (DIF and AVO syndromes) that are similar to the externalizing and internalizing dimensions frequently identified in the child psychopathology assessment literature (Achenbach, 1991; Achenbach & Edelbrock, 1983; Cicchetti & Toth, 1991; Merrell, 1994; Quay, 1986; Reynolds & Kamphaus, 1992). Delinquency (DEL) and Lethargic-Hypoactive (LEH) comprise the two supplementary syndromes that are reliable for certain subgroups in the population. The DEL syndrome is scored and interpreted for all youths except females under 12 while the LEH syndrome is scored and interpreted for all youths under 12 (McDermott, 1994). Core syndromes, supplementary syndromes, and overall adjustment scales are reported as normalized *T* scores ($M = 50$, $SD = 10$) and percentiles.

Extensive evidence for ASCA score reliability and validity is presented in the ASCA manual (McDermott, 1994) and subsequent independent studies. Internal consistency estimates for the total standardization sample ranged from .68 to .86 for the six core syndromes and two supplementary syndromes. Alpha coefficients equaled .92 for the Overactivity scale and .82 for the Underactivity scale. Test–retest reliabilities ($N = 40$) over a 30-school-day interval ranged from .66 to .91 for the six core syndromes and from .75 to .79 for the Overactivity and Underactivity scales and no significant differences were observed in *T* scores across the retest interval. Statistically significant stability coefficients for the ASCA were also obtained by Canivez, Perry, and Weller (2001) for the overall adjustment scales, core syndromes, and supplemental syndromes over a 60-day retest interval. Stability coefficients ranged from .49 to .68 for the core syndromes, supplementary syndromes, and overall adjustment scales *T* scores and mean changes were less than .8 raw score points, replicating the findings of McDermott (1994). Canivez et al. (2001) also found significant stability for the ASCA syndromic profiles and discriminant classifications, two additional methods of score interpretation.

McDermott (1994) and Watkins and Canivez (1997) have also reported significant inter-rater agreement for ASCA syndrome *T* scores. Statistically significant correlations were found for the core syndromes and global adjustment scales and no statistically or clinically significant mean differences were found between raters. Canivez and Watkins (2002) reported significant inter-rater agreement for ASCA Syndromic Profile classifications while Canivez, Watkins, and Schaefer (2002) reported significant inter-rater agreement for ASCA Discriminant Classifications.

Convergent and divergent validity studies with the ASCA have also yielded positive results. McDermott (1993; 1994) found convergent validity coefficients ranging from .65 to .91 when comparing the ASCA and the Revised Conners Teacher Rating Scale (CTRS; Trites, Blouin, & Laprade, 1982). All four of the ASCA overactive core syndromes were highly correlated with the CTRS Hyperactivity and Conduct Problem factors. The low to near zero correlations between the Overactive and Underactive core syndromes of the ASCA supported the divergent validity for these two dimensions (McDermott, 1993; 1994). Correlations between the ASCA and Child Behavior Checklist (CBCL; Achenbach & Edelbrock, 1983) were statistically significant among similar psychological dimensions or constructs (McDermott, 1993; 1994). Canivez and Bordenkircher (2002) and Canivez and Rains (2002) reported convergent and divergent validity support in comparing the ASCA and the Preschool and Kindergarten Behavior Scales (PKBS; Merrell, 1994) for randomly selected preschool, kindergarten, and first grade children. Specifically, the ASCA Overactivity global adjustment syndrome and core syndrome scores were significantly and moderately to highly correlated with the PKBS Externalizing composite and subscale scores. Divergent validity was observed with low to near zero correlations between the ASCA Overactivity global adjustment syndrome and core syndrome scores and the PKBS Internalizing composite and subscale scores.

Additional evidence of construct validity for the ASCA has also been reported. McDermott (1995) reported low negative correlations (except one comparison) between the ASCA and the

Differential Abilities Scale (DAS; Elliott, 1990) further supporting divergent validity of ASCA scores. Correlations between the ASCA and DAS ranged from −.24 (ASCA ADH and DAS Spelling) to .10 (ASCA OPD and DAS Nonverbal Reasoning Ability), indicating that psychological adjustment as measured by the ASCA accounted for no more than 6% of the variability in ability or achievement as measured by the DAS. McDermott (1994) and McDermott et al. (1995) showed the ASCA core syndromes demonstrated good diagnostic accuracy (approximately 80% correct classification) in differentiating students with emotional disturbance from age, gender, race, and grade level matched normals, as well as separate groups of learning disabled, speech/language disabled, and gifted students. Positive predictive power estimates (a more important index than overall classification accuracy) also exceeded a recommended standard (.75) for diagnostic tests (Milich, Widiger, & Landau, 1987).

Principal components exploratory analyses and confirmatory analyses reported by McDermott (1993; 1994) have indicated the ASCA items are best explained by an eight-factor model with six factors (core syndromes) generalizing across gender, race/ethnicity, and age while two factors (deemed supplemental syndromes) were appropriate for specific subgroups in the population. Second-order principal factors factor analyses of the six core syndromes produced a two-factor solution (Overactivity and Underactivity) which appears similar to the two dimensional model (conduct problem/externalizing vs. withdrawal/internalizing) of child psychopathology frequently obtained in the assessment literature (Achenbach, 1991; Achenbach & Edelbrock, 1983; Cicchetti & Toth, 1991; Merrell, 1994; Quay, 1986; Reynolds & Kamphaus, 1992). Core syndrome specificity estimates were also reported to be higher than error estimates and indicated that the separate core syndromes can be meaningfully interpreted (McDermott, 1994). McDermott (1994) also showed that the core syndrome and overall adjustment scales were invariant across child and adolescent, male and female, and White and non-White groups.

To date there have been no independent investigations of the factor structure of the ASCA core syndromes. The purpose of the present study was to explore the factor structure of the ASCA core syndromes in a large independent sample and examine both orthogonal and oblique solutions to determine the dependence or independence of the resulting factors. The present study also investigated the internal consistency of ASCA syndromes and their subtest specificity. Due to the small sample size of adolescent participants it was not feasible to explore the factor invariance across development.

Method

Participants

Demographic characteristics of the present sample are presented in Table 1. The majority of students were from rural and suburban cities in the Midwest ($n = 918$); however, some students were from the Southwest ($n = 102$) region of the United States. Of the 1020, 51.8% were male and 48.2% were female. Students ranged in grade from preschool through grade 12. In a large number of cases ($n = 349$, 34.2%), teachers failed to report the race/ethnicity of the child being rated. Given the geographic location of these samples it is likely that the majority of these students were Caucasian. Race/ethnicity percentages included 57.5% Caucasian, 2.7% Black/African American, 4.0% Hispanic/Latino, 0.4% Asian American, 1.0% Native American, and 0.5% biracial. Most children were not disabled (82.3%), however, the sample included students with various disabilities or exceptionalities highlighted in Table 1. Multidisciplinary evaluation teams using their respective state and federal special education guidelines independently classified students with disabilities. The mean age of the students was 8.09 years ($SD = 2.74$) with a range from 5 to 19.

Table 1
*Sample Demographic Characteristics (*N = *1020)*

Variable	*n*	%
Sex		
Male	528	51.8
Female	492	48.2
Race/Ethnicity		
Caucasian	587	57.5
Black/African American	28	2.7
Hispanic/Latino	41	4.0
Asian American	4	0.4
Native American	10	1.0
Biracial	1	0.5
Missing data	349	34.2
Grade		
Pre-K	18	1.8
K	253	24.8
1	210	20.6
2	90	8.8
3	104	10.2
4	94	9.2
5	84	8.2
6	69	6.8
7	3	0.3
8	3	0.3
9	20	2.0
10	33	3.2
11	4	0.4
12	6	0.6
Missing data	29	2.8
Disability/exceptionality		
Not disabled	839	82.3
Learning disabled	80	7.8
Seriously emotionally disabled	34	3.3
Mentally retarded	9	0.9
Speech/language disabled	20	2.0
Attention deficit disorder	7	0.7
Autism	6	0.6
Other health impaired	4	0.4
Hearing Impaired	2	0.2
At-risk preschool	4	0.4
Gifted	9	0.9
Referred for evaluation	6	0.6

Instrument

The Adjustment Scales for Children and Adolescents (ASCA; McDermott, Marston, & Stott, 1993) is an objective behavior rating instrument completed by a student's classroom teacher and designed for use with all noninstitutionalized youths ages 5 through 17 (grades K through 12). The

ASCA consists of 156 behavioral descriptions within 29 specific school situations where teachers may observe student's behaviors. Of the 156 items, 97 are scoreable for psychopathology and based on factor analyses of standardization data, singularly assigned to one of six core syndromes [Attention-Deficit/Hyperactive (ADH), Solitary Aggressive-Provocative (SAP), Solitary Aggressive-Impulsive (SAI), Oppositional Defiant (OPD), Diffident (DIF), and Avoidant (AVO)] or two supplementary syndromes [Delinquent (DEL) and Lethargic/Hypoactive (LEH)]. The core syndromes are combined to form two composite indexes: Overactivity (ADH, SAP, SAI, and OPD syndromes) and Underactivity (DIF and AVO syndromes). In general, psychometric characteristics of the ASCA are acceptable and meet standards for both group and individual decision-making (Canivez, 2001; Salvia & Ysseldyke, 1995).

Procedure

Classroom teachers were instructed on how to randomly select boys and girls from their class rosters and then completed the appropriate ASCA rating form. ASCA forms were scored according to the manual and core syndrome scores were reported and analyzed in their *T* score units.

Data Analysis.

Exploratory factor analysis was considered for the 97 ASCA problem behavior items, however; ASCA items are dichotomously scored and thus considered problematic, many items deviated significantly from normality (skewness and kurtosis) as is typically observed in pathology oriented scales (Floyd & Widaman, 1995), and several items had no variability, thereby preventing analysis at the item level. The ASCA core syndrome *T* score Pearson product-moment correlation matrix was thus subjected to principal axis exploratory factor analysis with varimax rotation to investigate the orthogonal solution and direct oblimin and promax rotations to investigate oblique solutions using SPSS for Macintosh 10.0.7a. Principle axis exploratory factor analysis was used due to the nonnormal distributions of scores and principle axis factor analysis was not based on normal distribution assumptions (Cudeck, 2000; Fabrigar, Wegener, MacCallum, & Strahan, 1999; Tabachnick & Fidel, 2001). Multiple criteria as recommended by Gorsuch (1983) were used to determine the number of factors to retain and included eigenvalues greater than 1 (Guttman, 1954), the scree test (Cattell, 1966) and parallel analysis (Horn, 1965). Parallel analysis was included as Thompson and Daniel (1996) indicated that it is usually more accurate. The scree test was used to visually determine the optimum number of factors to retain while parallel analysis indicated factors considered meaningful when the eigenvalues from the sample data were larger than those produced by random data containing the same number of participants and factors (Lautenschlager, 1989). Random data and resulting eigenvalues for parallel analyses were produced using the Monte Carlo PCA for Parallel Analysis computer program (Watkins, 2000) with 100 replications to provide stable eigenvalue estimates.

Results and Discussion

Pearson product-moment correlations, varimax factor structure coefficients, promax factor structure coefficients, eigenvalues, and the percent of variance accounted for are presented in Table 2. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .76 and Bartlett's Test of Sphericity was 1673.45, $p < .0001$. Communality estimates ranged from .42 to .66 ($Mdn = .50$). Promax and direct oblimin rotations produced almost identical structure coefficients so only Promax coefficients are presented. Core syndrome intercorrelations in the present study are similar to those reported by McDermott (1993; 1994) for the standardization sample ($N = 1400$) although somewhat higher. Two factors were extracted through principal axis factor analysis based on results from all three factor selection criteria (eigenvalues > 1, the scree test, and parallel analysis)

Table 2
Intercorrelations and Factor Structure Coefficients for ASCA Core Syndromes T Scores

	Correlations						Varimax structure coefficient[a]		Promax structure coefficient[a]	
ASCA core syndrome	ADH	SAP	SAI	OPD	DIF	AVO	OVR	UNR	OVR	UNR
ADH							**.73**	−.02	**.73**	.00
SAP	.60						**.81**	.05	**.81**	.02
SAI	.50	.56					**.69**	.04	**.69**	.06
OPD	.49	.56	.50				**.69**	.14	**.70**	.16
DIF	−.10	−.08	−.04	.03			−.10	**.70**	−.07	**.70**
AVO	.13	.13	.14	.20	.42		.17	**.62**	.20	**.63**
Eigenvalue							2.66	1.42		
% Variance:										
Common							44.34	23.66		
Cumulative							44.34	68.00		

Note. $N = 1020$. ADH = Attention Deficit Hyperactive, SAP = Solitary Aggressive (Provocative), SAI = Solitary Aggressive (Impulsive), OPD = Oppositional Defiant, DIF = Diffident, AVO = Avoidant.

[a]Factor coefficients ≥ .40 are considered salient and are in bold type. Promax rotated Factor 1 and Factor 2 $r = .08$. Direct oblimin structure coefficients are available upon request.

(see Figure 1) and rotated using the varimax procedure to achieve an orthogonal solution. The ADH, SAP, SAI, and OPD core syndromes were strongly associated with the first factor (Overactivity) while the DIF and AVO core syndromes were strongly associated with the second factor (Underactivity). These results are consistent with and replicate those obtained with the ASCA standardization sample (McDermott, 1993; 1994). Principal axis factor analysis with promax rotation was used to produce an oblique solution for comparison. Two factors were extracted and again, the ADH, SAP, SAI, and OPD core syndromes were strongly associated with the first factor

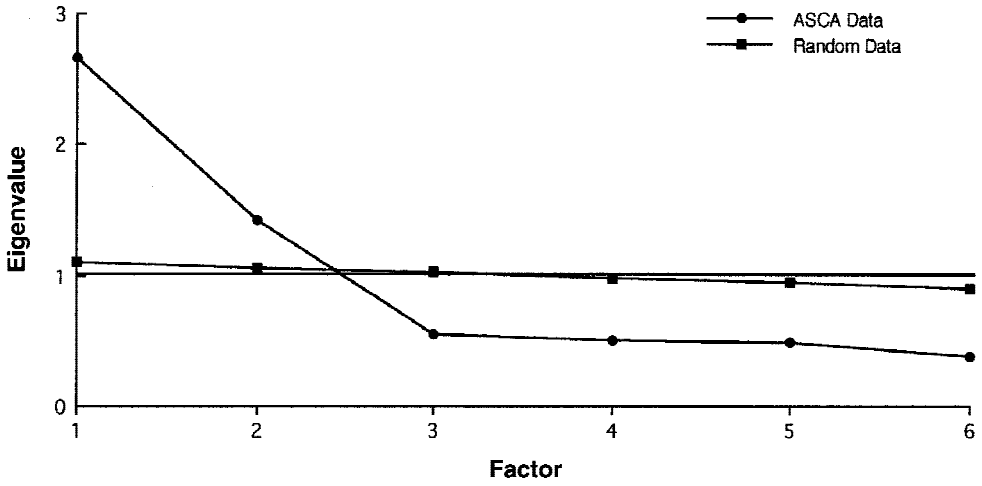

FIGURE 1. Scree plots for ASCA parallel analysis.

(Overactivity) while the DIF and AVO core syndromes were strongly associated with the second factor (Underactivity). Factor structure coefficients for the varimax, oblimin, and promax rotations were almost identical and the correlation between Factor 1 (Overactivity) and Factor 2 (Underactivity) based on the promax rotation was .08, strongly suggesting the independence of the Overactivity and Underactivity dimensions. The correlation of the Overactivity and Underactivity global syndromes *T* scores was .04, also indicating global scale independence. Given the very low factor and scale (OVR-UNR) correlations and the very similar factor structure coefficients, the varimax rotated (orthogonal) solution appears the most viable and is easier to interpret (Tabachnick & Fidell, 2001).

The descriptive statistics for the ASCA core syndrome *T* scores, internal consistency estimates, and subtest specificity estimates are presented in Table 3. Several scales appeared to deviate from normality (skewed and/or platykurtic or leptokurtic). Internal consistency estimates of the Overactivity syndrome ($r_\alpha = .93$) and the Underactivity syndrome ($r_\alpha = .83$) scores were almost identical to those observed in the ASCA standardization sample (McDermott, 1994). Internal consistency estimates for the ASCA core syndromes ranged from .66 to .88 and also were almost identical to those observed in the ASCA standardization sample. These internal consistency estimates are somewhat lower than those found in other teacher report behavior rating scales (Achenbach, 1991; Achenbach & Edelbrock, 1983; Merrell, 1994; Reynolds & Kamphaus, 1992) but likely due to the dichotomous nature of ASCA items that limits item and total raw score variability. Other teacher report rating scales typically have items rated on a three- or four-point continuum. Four of the six ASCA core syndromes achieved subtest specificity estimates exceeding error variance (see Table 3) indicating syndrome interpretability beyond the global factor based score. These estimates are generally lower than those found in the ASCA standardization sample and a result of the somewhat higher core syndrome intercorrelations observed in these data, which resulted in greater communality estimates especially among the SAP and SAI syndromes.

An important finding in the present study is the factorial independence of the Overactivity and Underactivity factors ($r = .08$). The Overactivity and Underactivity factors are similar to the Externalizing and Internalizing factors frequently reported in the youth psychopathology literature (Achenbach, 1991; Cicchetti & Toth, 1991; Merrell, 1994; Quay, 1986; Reynolds & Kamphaus, 1992) but these behavior rating scales (i.e., CBCL, PKBS, and BASC) often have moderately high correlations between the composite Externalizing and Internalizing scores [*r*s ranging from .30–.48 (Achenbach, 1991); $r = .66$ (Merrell, 1994); *r*s ranging from .21–.54 (Reynolds & Kamphaus,

Table 3
T Score Descriptive Statistics, Core Syndrome Internal Consistency Reliability, and Subtest Specificity Estimates

	M	*SD*	Range	Skewness	Kurtosis	r_α	Specificity[a]
ADH	52.95	11.62	39–99	.35	−.07	.88	**.34**
SAP	52.63	11.29	45–81	.86	−1.13	.79	.13
SAI	51.68	9.73	47–99	1.69	1.23	.66	.25
OPD	51.90	12.03	43–99	1.36	2.17	.82	**.32**
DIF	50.43	10.74	40–99	.52	−.62	.82	**.32**
AVO	50.07	10.23	42–99	.80	−.46	.72	**.30**

Note. $N = 1020$. ADH = Attention Deficit Hyperactive, SAP = Solitary Aggressive (Provocative), SAI = Solitary Aggressive (Impulsive), OPD = Oppositional Defiant, DIF = Diffident, AVO = Avoidant.

[a]Specificity = r_α—Communality. Specificity estimates exceeding error variance are considered significant and are in bold type. Overactivity $r_\alpha = .93$. Underactivity $r_\alpha = .83$.

1992)] which complicates interpretation and factor analyses. In the construction of the ASCA, syndromes like anxiety and depression were avoided due to their "internalized" nature, which are difficult or impossible for third parties to observe and report. The ASCA Underactivity syndromes focus on specific behaviors indicating shy, timid, distant, and withdrawing characteristics, which are observable and related to "internalizing" dimensions but do not directly measure such internal characteristics such as anxiety or depression. This difference may account for the independence observed among the Overactivity and Underactivity syndromes because many of the observable behaviors are, in fact, mutually exclusive.

Further, the intercorrelations among the ASCA core syndromes in this study as well as in the ASCA standardization sample (McDermott, 1994) are also lower than what is frequently seen in teacher report measures of child psychopathology suggesting greater independence and interpretability of the individual scales (syndromes). This is a distinct advantage in that psychologists may interpret the separate ASCA core and supplementary syndromes as they measure unique variability beyond the common factor and error variance. This is not the case for instruments where scales have substantial covariance such as the BASC [i.e., TRS Hyperactivity-Aggression *r*s = .80–.84 (Reynolds & Kamphaus, 1992)] and PKBS [Self-Centered/Explosive-Attention Problems/Overactive $r = .79$, Antisocial/Aggressive-Attention Problems/Overactive $r = .78$ (Merrell, 1994)], which prevents the individual scale interpretation.

Although students in the present study were randomly selected and various disability groups were represented, there are still limitations based on the representativeness of the sample. Specifically, disability, geographic location, and race/ethnicity did not match the overall population, so caution should be exercised in interpreting these results. Caucasian students were overrepresented while all other racial/ethnic groups were underrepresented compared to the ASCA standardization sample and the U.S. population. Thus, generalization beyond Caucasians is not recommended. This may have influenced the overall core syndrome intercorrelations which were observed to be somewhat higher than those observed in the ASCA standardization sample. McDermott and Spencer (1997) found racial, gender, and socioeconomic differences in base rates of psychopathology in the ASCA standardization sample. Although the sample included individuals from two states in different geographic regions of the United States (Southwest and Midwest) it is not representative of the overall population. Future studies with better geographic, racial/ethnic, and disability diversity and representation will greatly aid in improving generalizability beyond the Caucasian group. Overall, the present study strongly supports the two-factor structure of the ASCA core syndromes and the factorial independence of the Overactivity and Underactivity syndromes.

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