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Adjustment Scales for Children and Adolescents: Factorial Validity in a Canadian Sample

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Abstract

The core syndrome factor structure of the Adjustment Scales for Children and Adolescents (ASCA) was examined with a sample of 375 randomly selected Canadian youths in a large western city. The 6 ASCA core syndrome raw scores produced an identical two-factor solution as observed in samples of American youths. Principal axis exploratory factor analysis with varimax and promax rotations produced similar factor structure coefficients. It was concluded that the ASCA measures two independent dimensions of youth psychopathology (overactivity and underactivity), similar to the conduct problems/externalizing and withdrawal/internalizing dimensions commonly found in the child psychopathology assessment literature.

Resumé

Le facteur principal de l'"Adjustment Scales for Children and Adolescents" (ASCA) a été examiné avec un échantillon d'enfants sélectionnés au hazard d'une grande ville de l'ouest. Les six facteurs principaux ont formé une solution de deux facteurs identiques des échantillons Americans. Des analyses factorielles ont été effectuées pour créer un modèle. On a determiné que l'ASCA mesure deux dimensions des comportments des jeunes («overactivity» et «underactivity»); qui sont comparables des «conduct problems/externalizing» et «withdrawal/internalizing» dimensions souvent trouvées dans la recherche psychopathologique.

Keywords

adjustment scales, Canadian Youth, validity generalization, psychopathology assessment

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Standardized assessment methods with nationally representative standardization samples (McDermott, 1994; Reynolds & Kamphaus, 1992, 2004) have greatly improved our understanding of base rates and prevalence of psychopathology in the child and adolescent populations. Given the importance of information obtained from these methods for individual educational support and program development, it is critical that the results are both reliable and valid. The Standards for Educational and Psychological Testing (American Educational Research Association, American Psychological Association, and the National Council on Measurement in Education [AERA, APA, NCME], 1999) cautions psychologists in the use of assessment instruments that have not been adequately validated with various subgroups within the overall population. Racial and ethnic subgroups within the population are frequently examined for differential reliability and validity of test scores to determine potential bias and nondiscriminatory assessment (AERA, APA, NCME, 1999). This pertains to various tests including those of cognitive abilities (Edwards & Oakland, 2006; Elliott, 1990; Fan, Willson, & Reynolds, 1995; Kaufman, Kaufman, & McLean, 1995; Keith, Quirk, Schartzer, & Elliott, 1999; Konold & Canivez, in press; Kush et al., 2001; Naglieri, Rojahn, Matto, & Aquilino, 2005; Weiss & Prifitera, 1995). Investigations of differential psychometric properties across racial and ethnic groups are also required within the domain of personality and psychopathology (e.g., Barrett & Eysenck, 1984; Cooke, Kosson, & Michie, 2001; Van de Vijver & Leung, 1997).

The Adjustment Scales for Children and Adolescents (ASCA; McDermott, Marston, & Stott, 1993), an American nationally standardized, teacher-report measure of child and adolescent psychopathology for individuals between 5 and 17 years of age, has considerable empirical support reported in the extant literature. In development, standardization, and validation of the ASCA, McDermott (1993, 1994) indicated that the 97 ASCA problem behavior items were best explained by an eight-factor model; with six factors (core syndromes) generalizing across gender, race/ethnicity, and age; and two factors (supplemental syndromes) appropriate for specific subgroups within the population. Second-order principal factor analyses of the six core syndromes produced a two-factor solution (overactivity and underactivity) which is similar to the two dimensional model (conduct problem/externalizing vs. withdrawal/internalizing) of child psychopathology frequently obtained in the developmental psychopathology assessment literature (Achenbach, 1991; Achenbach & Edelbrock, 1983; Achenbach & Rescorla, 2001; Cicchetti & Toth, 1991; Kamphaus & Frick, 2005; Merrell, 1994, 2002, 2003; Quay, 1986; Reynolds & Kamphaus, 1992, 2004). The ASCA overactivity and underactivity scales have repeatedly been shown to be independent (Canivez, 2004, 2006a, 2006b; Canivez & Bohan, 2006; Canivez & Sprouls, 2007; McDermott, 1992, 1994). Core syndrome specificity estimates were also reported to be higher than error estimates and indicated that the separate core syndromes can be meaningfully interpreted beyond the global factors they represent (McDermott, 1994). McDermott 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 within the standardization sample.

Validity of ASCA Scores

The ASCA core syndrome factor structure was replicated by Canivez (2004) with a large independent sample of 1,020 randomly selected students from preschool through Grade 12. Varimax (orthogonal), direct oblimin (oblique), and promax (oblique) rotations produced nearly identical factor structure coefficients and the factor correlation (r = .08) resulting from the promax rotation also confirmed the independence of the ASCA overactivity and underactivity scales. Similar, but slightly higher core syndrome intercorrelations and internal consistency estimates were very near those from the standardization sample data (Canivez, 2004).

Investigation of ASCA factorial validity generalization among ethnic minorities has been conducted with four samples of Native American Indians and one sample of Hispanics. Using the same methods and procedures as Canivez (2004), Canivez (2006a) replicated results from the standardization sample (McDermott, 1993, 1994) and a large independent sample (Canivez, 2004) with a sample of children and adolescents of the Ojibwe tribe in north central Minnesota. Canivez and Bohan (2006) replicated the factor structure of the ASCA with a sample of children and adolescents from the Yavapai Apache tribe in north central Arizona and coefficients of congruence indicated an excellent fit to the factor structure coefficients from both the ASCA standardization sample as well as the large independent sample (Canivez, 2004). Internal consistency estimates and subtest specificity estimates for the Ojibwe and Yavapai Apache samples were also similar and generally supportive. Factorial validity generalization of ASCA core syndromes has also been shown for two additional Native American Indian samples (Colorado River Indian Tribe and Cocopah Tribe) from Arizona (Canivez, 2006b). Canivez and Sprouls (2007) found identical results with a sample of Hispanic students in Arizona.

Despite the evidence of validity of ASCA scores in the American population, generalization of these results to Canada is limited due to demographic and cultural differences. Census data estimated that, although White is the majority in both countries, 12% of the American population is Black and 0.9% of the American population is Chinese (U.S. Census Bureau, 2001), whereas 2.5% of the Canadian population is Black and 3.9% of the Canadian population is Chinese (Statistics Canada, 2006). Studies comparing children's behaviors between Canada and the United States suggest differences as well. Harrison, Erickson, Adlaf, and Freeman (2001), for example, identified significantly higher rates of violent crime among U.S. youth compared to Canadian youth. The reverse was reported for rates of school bullying with 10% of elementary age students in the United States reporting bullying (Harachi, Catalano, & Hawkins, 1999) compared to 27% in Canada (Beran & Tutty, 2002). These studies, although limited to specific behaviors, suggest that children's behavioral experiences may be unique in Canada.

Current norms for behavioral scales frequently used in Canada are lacking. The Behavior Assessment System for Children–Second Edition (BASC-2; Reynolds & Kamphaus, 2004), for example, is often used in schools in Canada but it was standardized using an American sample. A search of the PsychINFO database and the

Psychology and Behavioral Sciences Collection yielded no results for Canadian norms on behavior rating scales. Moreover, the precursor of the ASCA, the Bristol Social Adjustment Guides (BSAG; Stott, 1966; Stott, Marston, & Neill, 1975), was normed in Britain and Canada over 30 years ago. Thus it is likely no longer in use in Canada. The ASCA might be of clinical value in assessment of psychopathology in Canadian youths; however, at present, no investigations have been conducted with the ASCA using samples of Canadian youths.

The purpose of the present study was to explore the construct validity (factor structure generalization) of the ASCA with a sample of Canadian students and examine both oblique and orthogonal solutions to determine the independence of resulting factors. In addition, ASCA core syndrome internal consistency and subtest specificity were assessed.

Method

Participants

Of the 375 students, 50.1% were male and 49.9% were female. Students ranged in grade from kindergarten through Grade 12. Similar percentages of male and female students within each grade level were obtained and were also similar to percentages within the ASCA standardization sample until Grade 10, where substantially fewer participants were obtained in the present study.[1] The mean age of the students was 9.66 years (*SD* = 3.02) with a range from 5 to 18. Student race/ethnicity was provided by the teacher raters and included the following groupings: White/Caucasian (*n* = 218, 58.1%), African/Black (*n* = 9, 2.4%), Hispanic/Latino (*n* = 3, 0.8%), Native American/First Nation (*n* = 24, 6.4%), Asian (*n* = 70, 18.7%), Other (*n* = 29, 7.7%), and not reported/missing (*n* = 29, 7.7%).

A total of 110 teachers (89 female, 20 male, 1 not specified) provided ASCA ratings on children from their classroom and ranged in age from 23 to 63 years (*M* = 36.75, *SD* = 10.27). Teachers ranged in years of teaching experience from 1 to 35 years (*M* = 9.34, *SD* = 7.98). Most (*n* = 76, 69.1%) completed ratings on 2 boys and 2 girls, with the others rating from 1 to 3 students. The mean number of ratings per teacher was 3.41 (*SD* = 0.95). Teacher race/ethnicity included the following groupings: White/Caucasian (*n* = 86, 78.2%), African/Black (*n* = 1, 0.9%), Hispanic/Latino (*n* = 1, 0.9%), Native American/First Nation (*n* = 2, 1.8%), Asian (*n* = 5, 4.5%), Other (*n* = 8, 7.3%), and not reported/missing (*n* = 7, 6.4%).

Instrument

The Adjustment Scales for Children and Adolescents (ASCA; McDermott, Marston, & Stott, 1993) is a teacher report, objective behavior rating instrument 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 students behaviors. Of the 156 items, 97 are scorable 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). As a measure of psychopathology, higher scores represent greater problem behavior endorsement across school situational contexts. Twenty-six ASCA items are positive and observed in greater than 50% of the standardization sample.

ASCA was standardized on 1,400 (700 male, 700 female) children ages 5 through 17 (Grades K-12) with standardization data collected by The Psychological Corporation and conormed with the Differential Abilities Scales (DAS; Elliot, 1990). The sample was obtained through stratified random sampling with close match to the U.S. census figures on variables of national region, race/ethnicity, parent education level, community size, family structure, disability condition, and giftedness.

Extensive evidence for ASCA score reliability and validity is presented in the ASCA manual (McDermott, 1994) and in independent studies. Internal consistency estimates (Canivez, 2004, 2006a, 2006b; Canivez & Bohan, 2006; McDermott, 1993, 1994), short-term stability estimates (Canivez, Perry, & Weller, 2001; McDermott, 1993, 1994), and interrater agreement estimates (Canivez & Watkins, 2002; Canivez, Watkins, & Schaefer, 2002; McDermott, 1993, 1994; Watkins & Canivez, 1997) have supported various types of reliability for ASCA scores.

Evidence of convergent validity (Canivez & Bordenkircher, 2002; Canivez & Rains, 2002; McDermott, 1993, 1994), divergent/discriminant validity (viz., near zero correlations between theoretically different constructs; Canivez & Bordenkircher, 2002; Canivez, Neitzel, & Martin, 2005; Canivez & Rains, 2002; McDermott, 1993, 1994, 1995), discriminative validity (Canivez & Sprouls, 2005; McDermott, 1993, 1994; McDermott et al., 1995), and factorial validity and factorial validity generalization (Canivez, 2004, 2006a, 2006b; Canivez & Bohan, 2006; McDermott, 1993, 1994) of ASCA scores have also been shown. In general, psychometric characteristics of the ASCA are acceptable and meet standards for both group and individual decision making (Canivez, 2001; Hills, 1981; Salvia & Ysseldyke, 1995).

Procedure

Classroom teachers of children and adolescents from randomly selected schools in a large city in a western Canadian province were invited to participate by voluntarily completing ASCA rating forms on students in their classroom. Teachers were requested to complete an ASCA rating form on four (two boys, two girls) randomly selected from their classroom by the researcher randomly selected. ASCA forms were distributed to these teachers, returned in a sealed envelope to the research assistants, and sent to the lead author for scoring and analysis.

Data Analyses

ASCA core syndrome, supplementary syndrome, and overall adjustment scale raw scores from the Canadian sample were compared to those from the ASCA standardization sample using multivariate and univariate analyses of variance (MANOVA and ANOVA). Statistically significant MANOVA analyses (core syndromes and overall adjustment scales) were followed by ANOVA analyses. Partial η^2 provided effect size estimates in ANOVAs and were interpreted using Cohen's (1988) criteria (.01 = *small*, .09 = *medium*, .25 = *large*). Mean differences were also examined using Cohen's d effect size estimates and benchmarks for interpretation of the absolute values of the resulting coefficients; where .20 = *small*, .50 = *medium*, and .80 = *large effects* (Cohen, 1988).

Exploratory factor analysis was considered for the 97 ASCA problem behavior items; however, ASCA items are dichotomously scored and, as is typically observed in pathology-oriented scales, many items deviated significantly from normality (skewness and kurtosis; Floyd & Widaman, 1995). As observed in previous studies of the ASCA (Canivez, 2004; Canivez, 2006a, 2006b; Canivez & Bohan, 2006; Canivez & Sprouls, 2007), several rarely endorsed items in the population had no variability in this sample (no item endorsement), which also prevented factor analysis at the item level. Some of these issues are a result of the small sample. However, the principal focus of the present study was to replicate the factor structure of the ASCA core syndromes. Also, confirmatory factor analysis (CFA) was not attempted because of the Underactivity syndrome being estimated by only two subscales, and at least three indicators per factor are recommended for identifying latent factors in CFA (Fabrigar, Wegener, MacCallum, & Strahan, 1999; Kline, 2005; Thompson, 2004).

The Pearson product-moment correlation matrix for ASCA core syndrome raw scores was subjected to principal axis exploratory factor analysis with direct oblimin and promax rotations to investigate oblique solutions and varimax rotation to investigate the orthogonal solution using SPSS 16.0.1 for Macintosh OS X. Raw scores were used because the present sample is comprised of Canadian children and adolescents and are not included in the ASCA standardization sample, which is based on the U.S. population. Conversion of raw scores from Canadian students to *T*-scores using the U.S. norms was deemed inappropriate and unnecessary. Principal axis exploratory factor analysis was used because of the nonnormal distributions of scores (Cudeck, 2000; Fabrigar, et al., 1999; Tabachnick & Fidell, 2007) and it was also the method used in previous ASCA studies (Canivez, 2004; Canivez, 2006a, 2006b; Canivez & Bohan, 2006; Canivez & Sprouls, 2007; McDermott, 1993, 1994). 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), standard error of scree (Zoski & Jurs, 1996), parallel analysis (Horn, 1965), and minimum average partial (MAP; O'Connor, 2000; Velicer, 1976). Parallel analysis and MAP were included as Thompson and Daniel (1996) indicated that they are usually more accurate and are helpful so as not to overfactor

(Frazier & Youngstrom, 2007; Velicer, Eaton, & Fava, 2000; Zwick & Velicer, 1986). The scree test was used to visually determine the optimum number of factors to retain and the standard error of scree was used as it was reported to be the most accurate objective scree method (Nasser, Benson, & Wisenbaker, 2002). Standard error of scree uses the standard error of estimate in a series of regression analyses to remove nontrivial factors until there are no unusual eigenvalues left based on the 1/v criterion where v = number of eigenvalues (Zoski & Jurs, 1996). Standard error of scree was calculated using SEscree computer program (Watkins, 2007). Parallel analysis indicated meaningful factors when 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

MANOVAs and ANOVAs of core syndrome comparisons between this Canadian sample and the ASCA standardization sample resulted in statistically significant differences (see Tables 1 and 2). All four overactivity core syndromes (ADH, SAP, SAI, OPD) showed statistically significant mean raw score differences between the Canadian sample and the ASCA standardization sample with Canadians scoring higher; however, the mean differences had small effect sizes (d = .323-.466). No significant differences were observed for the two underactivity core syndromes (DIF, AVO), which had trivial effect sizes (d = .013-.015). ANOVA for ASCA supplemental scales resulted in a statistically significant difference between the Canadian sample and the ASCA standardization sample on the DEL scale with Canadians scoring higher. The effect size was medium (d = .535). No significant differences were observed for the LEH scale (d = .065). MANOVA and ANOVA for the ASCA overall adjustment scales yielded a statistically significant difference between the Canadian sample and the ASCA standardization sample on the OVR scale with Canadians scoring higher; however, the effect size was small (d = .466). No significant differences were observed on the UNR scale (d = .004).

Pearson product-moment correlations, varimax factor structure coefficients, promax factor structure coefficients, eigenvalues, and the percentage of variance accounted for are presented in Table 3. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was .752 and Bartlett's Test of Sphericity was 753.94, $p < .0001$. Initial communality estimates ranged from .16 to .68 (Mdn = .41). Two factors were extracted through principal axis factor analysis based on results from five of six factor selection criteria (eigenvalues > 1, the scree test, standard error of scree, parallel analysis, and theoretical consideration).[2] MAP analysis indicated that only one factor should be extracted based on one factor producing the smallest average squared correlation of .055. Results of oblique rotation (promax) for the two factors extracted indicated the ADH,

Table 1. ANOVAs Between Canadian Sample and ASCA Standardization Sample (U.S.) for ASCA Core, Supplemental, and Global Adjustment Scale Syndromes

	SS	SS error	MS	MS error	*F*	*p*	η^2
Core syndrome							
ADH	488.79	19968.75	488.79	11.26	43.40	.0001	.024
SAP	116.61	3225.07	116.61	1.82	64.11	.0001	.035
SAI	13.47	772.65	13.47	0.44	30.92	.0001	.017
OPD	81.73	4401.56	81.73	2.48	32.92	.0001	.018
DIF	0.27	7333.89	0.27	4.14	0.07	.799	.000
AVO	0.11	3907.10	0.11	2.20	0.05	.821	.000
Supplemental syndrome							
DEL	32.02	727.67	32.02	0.56	56.77	.0001	.042
LEH	1.05	1304.69	1.05	1.31	0.80	.372	.001
Global adjustment scale							
OVR	2081.04	57568.30	2081.04	32.47	64.09	.0001	.035
UNR	0.03	14277.29	0.03	8.05	0.00	.949	.000

Note: η^2 = partial η^2. MANOVA for ASCA Core Syndromes: Wilks's $\Lambda = .96$, $F(6, 1768) = 12.80$, $p < .0001$, Multivariate Effect Size = .042, Power = 1.0. Univariate ANOVA *F*-tests *df* (1, 1773). MANOVA for ASCA Global Adjustment Scale Syndromes: Wilks's $\Lambda = .97$, $F(2, 1772) = 32.05$, $p < .0001$, Multivariate Effect Size = .035, Power = 1.0. Core Syndrome and Global Adjustment Scale Syndrome univariate ANOVA *F*-tests *df* (1, 1773). Delinquency Syndrome univariate ANOVA *F*-test *df* (1, 1290) and Lethargic-Hypoactive Syndrome univariate ANOVA *F*-test *df* (1, 996). On all significant effects Canadian students obtained higher ASCA raw scores than students in the ASCA standardization sample. Core Syndrome and Global Adjustment Scale Syndrome samples included all participants (Canadian Sample $N = 375$, ASCA Standardization Sample $N = 1400$); but Delinquency (Canadian Sample $N = 245$, ASCA Standardization Sample $N = 1047$) and Lethargic-Hypoactive (Canadian Sample $N = 258$, ASCA Standardization Sample $N = 740$) syndromes are not scored for certain subgroups (DEL not scored for females under 12; LEH not scored for males or females above 11). ASCA = Adjustment Scales for Children and Adolescents; ADH = Attention-Deficit Hyperactive; SAP = Solitary Aggressive (Provocative); SAI = Solitary Aggressive (Impulsive); OPD = Oppositional Defiant; DIF = Diffident; AVO = Avoidant ADH = Attention-Deficit Hyperactive; SAP = Solitary Aggressive (Provocative); SAI = Solitary Aggressive (Impulsive); OPD = Oppositional Defiant; DIF = Diffident; AVO = Avoidant; DEL = Delinquent; LEH = Lethargic-Hypoactive; OVR = overactivity; UNR = underactivity.

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). The correlation between Factor 1 (overactivity) and Factor 2 (underactivity) based on the promax rotation was .00, indicating the independence of the overactivity and underactivity dimensions and viability of an orthogonal solution. Orthogonal (varimax) rotation of the two factors also resulted in the ADH, SAP, SAI, and OPD core syndromes having strong associations with the first factor (overactivity) while the DIF and AVO core syndromes had strong associations with the second factor (underactivity).

Coefficients of congruence (Watkins, 2005) are presented in Table 4. The factorial invariance of the present factor structure results to the total ASCA standardization

Table 2. Descriptive Statistics, F, and Effect Size Estimates for Differences Between the Canadian and ASCA Standardization (U.S.) Samples

	ASCA standardization sample		Canadian sample			
	M	*SD*	*M*	*SD*	*F*	*d*
Core syndrome						
ADH	3.20	2.28	3.89	3.56	43.40*	.383
SAP	1.14	0.40	1.94	1.03	64.11*	.466
SAI	0.58	0.14	0.90	0.35	30.92*	.323
OPD	1.47	0.73	1.91	1.25	32.92*	.334
DIF	2.03	1.39	2.04	1.42	0.07	.015
AVO	1.48	0.91	1.49	0.89	0.05	.013
Supplemental syndromes						
DEL	0.63	0.20	1.14	0.60	56.77*	.535
LEH	1.19	0.52	1.00	0.60	0.80	.065
Overall adjustment scales						
OVR	5.22	3.54	7.20	6.19	64.09*	.466
UNR	2.83	2.30	2.86	2.31	0.00	.004

Note: $*p < .0001$.

sample (McDermott, 1993, 1994), a large independent American sample (Canivez, 2004), and four different Native American Indian tribal samples (Canivez, 2006a, 2006b; Canivez & Bohan, 2006) and an Hispanic/Latino sample (Canivez & Sprouls, 2007) was tested and resulted in a generally “excellent” or “good” (MacCallum, et al., 1999, p. 93) match to the factorial results of previous ASCA studies. All seven congruence coefficients for the ASCA overactivity scale were “excellent” and five congruence coefficients for the ASCA Underactivity scale were “good.” Only two congruence coefficients were in the “borderline” range and were from the ASCA Underactivity scale.

Table 5 presents the descriptive statistics for the ASCA core syndrome raw scores, internal consistency estimates, and subtest specificity estimates. Several scales appeared to deviate from normality in both skewness and kurtosis. Moderate to high internal consistency estimates of the overactivity syndrome ($r_\alpha = .92$) and the underactivity syndrome ($r_\alpha = .79$) scores were observed and internal consistency estimates for the ASCA core syndromes ranged from .66 to .86.

Discussion

The present study sought to examine the psychometric characteristics of the ASCA with a Canadian sample. Comparisons between the present Canadian sample and the

Table 3. Intercorrelations and Factor Structure Coefficients for Raw Scores on ASCA Core Syndromes

	Correlations						Varimax structure coefficient[a]		Promax structure coefficient[a]	
ASCA Core Syndrome	ADH	SAP	SAI	OPD	DIF	AVO	OVR	UNR	OVR	UNR
ADH							**0.66**	−.14	**.65**	−.17
SAP	.57						**0.93**	0.13	**.94**	.09
SAI	.50	.74					**0.77**	0.10	**.77**	.06
OPD	.47	.65	.52				**0.69**	0.04	**.70**	.01
DIF	−.23	−.10	−.06	−.10			−0.19	**0.72**	−.16	**.73**
AVO	.06	.24	.16	.15	.30		0.18	**0.46**	.20	**.45**
Eigenvalue							2.81	1.33		
Percentage of variance										
Common							46.83	22.23		
Cumulative							46.83	69.06		

Note: N = 375. ADH = Attention Deficit Hyperactive, SAP = Solitary Aggressive (Provocative), SAI = Solitary Aggressive (Impulsive), OPD = Oppositional Defiant, DIF = Diffident, AVO = Avoidant, OVR = overactivity, UNR = underactivity.

[a]Factor coefficients ≥ .40 are considered salient and are in bold type. Promax rotated Factor 1 (OVR) and Factor 2 (UNR) r = .00. Direct oblimin structure coefficients are available on request.

Table 4. Coefficients of Congruence for Varimax Structure Coefficients for Comparisons Between Canadian Sample (N = 375) and the ASCA Standardization Sample, an Independent Sample, Four Native American Indian Samples, and an Hispanic/Latino Sample.

	r_c	
Comparison group	OVR	UNR
ASCA American Standardization sample (N = 1400)[a]	.997	.961
Canivez (2004) Independent American sample (N = 1020)	.994	.967
Canivez (2006a) Ojibwe sample (N = 183)	.990	.892
Canivez and Bohan (2006) Yavapai Apache sample (N = 229)	.995	.946
Canivez (2006b) Colorado River Indian sample (N = 154)	.996	.902
Canivez (2006b) Cocopah sample (N = 108)	.992	.939
Canivez and Sprouls (2006) Hispanic sample (N = 124)	.992	.969

Note: r_c = Coefficient of Congruence; OVR = overactivity; UNR = underactivity. Guidelines for interpreting congruence coefficients: .98-1.00 = *excellent*, .92-.98 = *good*, .82-.92 = *borderline*, .68-.82 = *poor*, and below .68 = *terrible* (MacCallum, Widaman, Zhang, & Hong, 1999, p. 93).

[a]ASCA standardization data were provided by Dr. Paul A. McDermott.

Table 5. Raw Score Descriptive Statistics, Core Syndrome Internal Consistency Reliability, and Subtest Specificity Estimates

	M	*SD*	Range	Skewness	Kurtosis	r_α	Specificity[a]
ADH	3.56	3.89	0-18	1.11	0.53	.86	**.48**
SAP	1.03	1.95	0-12	2.93	10.50	.82	.14
SAI	0.35	0.90	0-6	3.48	14.15	.66	.10
OPD	1.25	1.92	0-11	1.90	3.78	.76	**.32**
DIF	1.42	2.04	0-12	2.28	6.41	.77	**.61**
AVO	0.89	1.49	0-9	2.29	6.04	.71	**.54**

Note: N = 375. 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_α = .92. Underactivity r_α = .79.

U.S. ASCA standardization sample found that Canadian children and adolescents were rated significantly higher on the ADH, SAP, SAI, and OPD core syndromes; significantly higher on the DEL supplemental syndrome; and significantly higher on the OVR adjustment scale. However, only the DEL syndrome yielded a medium effect size with the others being small. The statistically significant differences were likely the result of the large sample size of the ASCA standardization sample. Placing these results in context is difficult as there are no other studies of ASCA or other behavior rating scales with Canadian students for comparison. These results are consistent with Beran and Tutty (2002) who found greater rates of bullying in Canada. It may be that Canadian students demonstrate significantly greater problem behaviors in these areas than their American counterparts but it may also be that Canadian teachers "rate" Canadian students as demonstrating significantly greater problem behaviors in these areas than their American counterparts. There is no way to know which (or if both) are true. Regardless, the present results showed that differences were generally of small effect sizes and likely not of clinical importance.

Results of present exploratory factor analyses are consistent with and replicate those obtained with the ASCA American standardization sample (McDermott, 1993, 1994), a large independent sample of American youths (Canivez, 2004), four different Native American Indian tribal samples (Canivez, 2006a, 2006b; Canivez & Bohan, 2006), and a sample of Hispanic youths (Canivez & Sprouls, 2007). Most congruence coefficients were excellent and indicated virtually identical factor structures as those obtained in other samples. Also consistent with these studies was the observation in the present study of the factorial independence of the ASCA overactivity and underactivity syndromes. The correlation between the two obliquely rotated (promax) factors was .00. Given the very low factor and global scale *T* score (OVR-UNR) correlations and the nearly identical factor structure coefficients obtained for both varimax and promax rotations, the orthogonal solution is clearly appropriate as these factors appear to be truly independent (Tabachnick & Fidell, 2007). There were no studies comparing

Canadian and American youth on other psychopathology measures with which to compare the present results.

Overactivity and underactivity are similar to the Externalizing and Internalizing factors consistently reported in the youth psychopathology literature (Achenbach, 1991; Achenbach & Rescorla, 2001; Cicchetti & Toth, 1991; Merrell, 1994, 2002, 2003; Quay, 1986; Reynolds & Kamphaus, 1992, 2004) although these behavior-rating scales (i.e., ASEBA, BASC, BASC-2, CBCL, PKBS) often have moderately high correlations between the composite Externalizing and Internalizing scores (rs ranging from .30 to .48, Achenbach, 1991; r = .45, Achenbach & Rescorla, 2001; r = .66, Merrell, 1994; r = .66, Merrell, 2002; rs ranging from .21 to .54, Reynolds & Kamphaus, 1992; rs ranging from .39 to .51, Reynolds & Kamphaus, 2004). Moderate to high factor correlations complicate clinical interpretation of test scores and interpretation of factor analyses. Anxiety and depression are internalizing syndromes whose measurement was avoided in development of the ASCA due to their “internalized” nature. Internalized symptoms are difficult, if not impossible, for third parties to adequately observe and report. The Underactivity syndromes of the ASCA focus on specific behaviors indicating shy, timid, distant, and withdrawing characteristics, and are directly observable by teachers in school settings. These may be related to “internalizing” dimensions; however, they do not directly measure internal characteristics of anxiety or depression. This may account for why the ASCA overactivity and underactivity syndromes are consistently found to be independent.

The intercorrelations among the ASCA core syndromes in this Canadian sample are also lower than those reported in other teacher report measures of child psychopathology (ASEBA, BASC, BASC-2, PKBS, PKBS-2), suggesting greater independence and interpretability of the individual core syndromes (subscales). This was also observed in the other ASCA samples (Canivez, 2004, 2006a, 2006b; Canivez & Bohan, 2006; Canivez & Sprouls, 2007; McDermott, 1993, 1994). This is an advantage for the ASCA 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 may not be the case for instruments where several scales have substantial covariance such as the ASEBA (TRS Attention Problems-Aggression r = .74; Achenbach & Rescorla, 2001), BASC (TRS Hyperactivity-Aggression rs = .80-.84; Reynolds & Kamphaus, 1992), BASC-2 (TRS Hyperactivity-Aggression rs = .78-.83; Reynolds & Kamphaus, 2004), PKBS (Self-Centered/Explosive-Attention Problems/Overactive r = .79, Antisocial/Aggressive-Attention Problems/Overactive r = .78; Merrell, 1994), and PKBS-2 (Self-Centered/Explosive-Attention Problems/Overactive r = .80, Self-Centered/Explosive-Antisocial/Aggressive r = .80, Antisocial/Aggressive-Attention Problems/Overactive r = .78; Merrell, 2002). Correlations of this magnitude may significantly limit, or prevent entirely, individual scale interpretation and determining syndrome comorbidity.

Internal consistency estimates for the overactivity and underactivity scales seem adequate but internal consistency estimates for core syndromes are lower than those found for some subscales on the BASC, BASC-2, ASEBA, PKBS, and PKBS-2. This is likely the result of the combination of dichotomously scored ASCA items (0, 1) versus other psychopathology measures having a 3- or 4-point rating scale (which increases potential item and scale variability) and present sample variability. Perhaps a larger, more demographically representative Canadian sample would provide more scale variability. Related to this are the specificity estimates presented in Table 5, which provide estimates of variability unique to the scale. When specificity exceeds error variance there appears to be sufficient variability within that scale for interpretation beyond the global factor with which the scale is associated.

Limitations

Participants in the present study included 375 randomly selected Canadian youths in one western city, which limits the generalization of the present results. Limitations of this study are primarily based on the representativeness and sample size. Disability status, geographic location, school district size, and other factors may not adequately reflect the population of Canada, so caution must be exercised in interpreting these results beyond this sample. Another limitation is the lack of information regarding participation rates and how that may have affected the results.

Furthermore, although factorial invariance of scales is necessary, it is not a sufficient condition for complete generalizability of scales across ethnicity or other variables (Van de Vijver & Poortinga, 2005), but the latent structure of the ASCA satisfies the first condition. Future studies of ASCA generalizability across demographic groups using item response theory (IRT)-based methods such as differential item functioning (DIF) will be helpful in investigating potential bias at the item level (Zumbo, 1999). More important, other types of validity studies such as discriminant (discriminative) validity (Canivez & Sprouls, 2005) in examining the ability of the ASCA to discriminate among various child and adolescent clinical groups within Canada are needed. Also, factor analysis of core syndrome scale scores assumes unidimensionality of the core syndromes.

Conclusion

The present study supported the two-factor structure of the ASCA core syndromes and the factorial independence of the overactivity and underactivity syndromes with a Canadian sample, and findings were also observed among other samples (Canivez, 2004, 2006a, 2006b; Canivez & Bohan, 2006; Canivez & Sprouls, 2007; McDermott, 1993, 1994). To the authors' knowledge, no standardization studies have been conducted in Canada using any measures of children's adjustment or psychopathology. National standardization of ASCA in Canada would be helpful for clinical use of this scale. Like tests of intelligence, creation of Canadian norms, rather than using American, national norms may be more appropriate to use with Canadian children. Indeed, researchers attempted to develop Canadian norms in response to the concern of norm group relevance to the Canadian population (e.g., Stott, Marston, & Neill, 1975).

Given our findings that there are differences between Canadian and American children in teachers' ratings, children's behaviors, or both, it is important that norm groups relevant to the individual clients who are being assessed be developed.

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Notes

1. A table of sex by grade level distributions for the Canadian and ASCA standardization samples is available from the first author on request.
2. Figures of standard error of scree and parallel analyses are available from the first author on request.

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