Psychometric Properties and Normative Information on the Child and Adolescent Behavior Inventory with Ratings for Spanish Children from Parents and Teachers

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Abstract

Background: Psychometric properties and initial normative information are provided for the sluggish cognitive tempo, attention-deficit/hyperactivity disorder-inattention, attention-deficit/hyperactivity disorder-hyperactivity/impulsivity, oppositional defiant disorder, callous-unemotional behavior (limited prosocial emotions specifier), anxiety, depression, social impairment, and academic impairment scales of the Spanish Child and Adolescent Behavior Inventory. **Method:** Mothers, fathers, and teachers of 2,142 third to sixth grade Spanish children (49.49% girls; ages 8-13) from randomly selected schools on the Balearic Islands completed the Child and Adolescent Behavior Inventory. **Results:** Scores from the scales demonstrated reliability (internal consistency and inter-rater), structural validity, and convergent/discriminant validity with attention-deficit/hyperactivity disorder and learning disorder diagnoses for boys and girls separately for each source. Normative information (T-scores) is provided for the nine scales separately for boys and girls, with test information functions supporting use of the symptom scales for screening purposes. **Conclusions:** Although more comprehensive Spanish norms are still needed, the initial normative information on the scales should be useful to inform the clinical care of individual Spanish children, with the positive psychometric properties of the scores also supporting the use of the scale for research. Copies of the Spanish Child and Adolescent Behavior Inventory and norms are available for free to clinicians and researchers.

Keywords: Assessment; Child and Adolescent Behavior Inventory; Child and Adolescent Disruptive Behavior Inventory; norms; child psychopathology.

Resumen

Información Psicométrica y Normativa del Child and Adolescent Behavior Inventory con Evaluaciones de Madres, Padres y Maestros de Niños Españoles. **Antecedentes:** en este trabajo se presenta información psicométrica y normativa inicial de la versión española del Child and Adolescent Behavior Inventory para las escalas: tempo cognitivo lento, inatención e hiperactividad/impulsividad del trastorno por déficit de atención e hiperactividad, negativismo desafiante, dureza emocional, ansiedad, depresión, afectación social y deterioro académico. **Método:** una muestra de madres, padres y maestros de 2.142 niños españoles de tercer a sexto curso de escuelas seleccionadas al azar en las Islas Baleares completaron el Child and Adolescent Behavior Inventory. **Resultados:** las puntuaciones de las escalas demostraron fiabilidad, validez estructural y validez de criterio con diagnósticos de TDAH y de trastornos del aprendizaje para niños y niñas. Se proporciona información normativa para las nueve escalas por separado para niños y niñas, mientras las funciones de información del test han respaldado el uso de las escalas de síntomas para fines de detección inicial. **Conclusiones:** aunque todavía son necesarios datos normativos más completos en niños de muestras españolas, la información normativa inicial que proporcionamos de las escalas CABI debería ser útil para los informes en el ámbito clínico, además los datos psicométricos positivos de sus puntuaciones también apoyan su uso en investigación.

Palabras clave: evaluación; Child and Adolescent Behavior Inventory; Child and Adolescent Disruptive Behavior Inventory; normas; psicopatología infantil.

The Child and Adolescent Behavior Inventory (CABI), formerly the Child and Adolescent Disruptive Behavior Inventory (CADBI), is a parent and teacher rating scale of externalizing and internalizing symptom dimensions along with impairment dimensions. The current Spanish version of the CABI measures parent and teacher perceptions of sluggish cognitive tempo,

attention-deficit/hyperactivity disorder (ADHD)-inattention (IN), ADHD-hyperactivity/impulsivity (HI), oppositional defiant disorder (ODD), callous-unemotional behavior (*DSM-5* limited prosocial emotions specifier), anxiety (symptoms specific to *DSM-5* anxiety disorders), depression (e.g., negative mood, hopelessness, worthlessness, anhedonia), social impairment, and academic impairment (e.g., see Burns et al., 2020; Sáez et al., 2019a, 2019b; and Servera et al., 2018 for the four studies with the Spanish CABI).

The CABI was designed to maximize its usefulness to clinicians and researchers. One unique aspect involves the rating anchors for the symptoms. Each symptom is rated with a six-point scale where each anchor has a specific behavioral definition for the past month

(*almost never [never or about once per month], seldom [about once per week], sometimes [several times per week], often [about once per day], very often [several times per day],* and *almost always [many times per day]*). Such behavioral definitions help to clarify the meaning of the anchors relative to typical anchors with no behavioral definitions (e.g., *never or rarely*, *sometimes*, *often*, and *very often*). A second positive aspect is that parents and teachers make the ratings for the same one-month interval, thus allowing meaningful comparisons of parent and teacher ratings. The Spanish version of the scale also includes measures of parent/teacher perception of social impairment and academic impairment in addition to symptom dimensions. Another positive feature of the CABI is its separation into different modules, thus allowing clinicians and researchers to administer the specific scale or scales most relevant to their purpose rather than the entire measure (Becker et al., 2020). In addition to the Spanish version of the CABI, there are also English (Burns & Becker, 2019) and Korean versions (Jung et al., 2020), with other translations underway. Finally, the CABI is available for free, thus making it cost-effective for clinical and research activities.

Earlier studies support the reliability (internal consistency, test-retest, and inter-rater) and validity of the CABI (CADBI) scores from the Spanish scale. For example, 24 studies used the CADBI with clinical and community samples of children from Chile and Spain and four studies the CABI with community samples from Spain (see Table S1 in the Supplemental Materials, available online at https://osf.io/6zg7n/, for a list of the 28 studies). No study, however, has presented reliability and validity information of the CABI scale scores separately for boys and girls for mother, father, and teacher ratings. And, even more important, norms have yet to be presented for the Spanish version of the CABI. Our purpose was thus to present the psychometric properties and initial normative information for the Spanish CABI with mother, father, and teacher ratings of Spanish boys and girls separately. We now note the more specific objectives.

The study first examined the structural validity of the nine scales on the CABI for mother, father, and teacher ratings of boys and girls (a separate factor analysis for each source/sex combination). The nine-factor model was expected to provide a close fit for each of the six factor analyses with the factors showing discriminant validity (correlations < .85, Brown, 2015, p. 116). Such results would provide support for the structural validity of the nine scales for boys and girls separately for each source.

For boys and girls, reliability coefficients for the CABI scale scores were expected to be excellent (alphas > .89) with the exception of the anxiety scale. Anxiety scores should show moderate internal consistency values (approximately .80) due to the six anxiety symptoms reflecting different anxiety disorders. Mother with father factor correlations for the same CABI scale were expected to be substantial (> .69). In contrast, parent (mother/father) with teacher factor correlations for the same scale were expected to moderate for sluggish cognitive tempo, ADHD-IN, ADHD-HI, and academic impairment and small for ODD, callous-unemotional behavior, anxiety, depression, and social impairment (Litson et al., 2018; Preszler et al., 2018, 2019; Seijas et al., 2019). Invariance analyses were expected to show invariance of like-item loadings and like-item thresholds for each CABI scale across mothers/fathers rating boys and mothers/fathers rating girls. It was also expected that there would be no significant factor mean differences between mothers' and fathers' ratings. We did

not expect invariance of item parameters from parents to teachers due to higher loadings for teachers. Such positive psychometric properties for boys and girls separately across the three sources would further support the usefulness of the Spanish version of the CABI to study child psychopathology.

Although the factor and invariance analyses in the above two paragraphs occur within an item response theory framework (i.e., non-linear factor analysis with items treated as categorical indictors and a probit link), the study also uses another item response theory model to evaluate further the CABI scale scores. More specifically, Samejima's graded-response model was used to determine the test information functions for each scale for boys and girls for the three sources. Given scores 1.50 standard deviations above the trait mean are often used as cut-off scores for screening purposes on child and adolescent symptom rating scales (e.g., Achenbach System of Empirically Based Assessment), CABI symptom scale scores need to have a high level of information and precision (low standard error) approximately 1.50 standard deviations above the trait mean to justify the use of the normative data for screening purposes. If CABI scale scores have this property, then such would support the use of the normative information from mothers, fathers, and teachers to inform the assessment of individual children in Spain. Also, given the Spanish version of the CABI and initial norms are available for free, the measure could be used as part of a cost-effective screening process.

Method

Participants

The participants were the mothers, fathers, and teachers of 2,142 third to sixth grade Spanish children (49.49% girls, ages 8 to 13; $M_{age} = 10.30$, $SD_{age} = 1.21$). The children were from 32 schools randomly selected from 48 schools on the Balearic Islands, Spain. The 32 schools were approximately 90% Caucasian children and 10% North African children. A total of 1,777 unique children were rated by parents (1,649 by mothers and 1,358 by fathers). For teachers, 196 completed the scale on 1,773 children. Each teacher rated an average 10.93 children ($SD = 6.05$). Approximately 85% of the children lived with both parents and approximately 13% with a single parent (approximately 2% missing). The educational level of the mothers (fathers) was as follows: 17% (25%) had completed 10 years of education, 19% (22%) had graduated from high school, 23% (21%) had technical degrees (three to five years of education after high school), and 37% (29%) had university degrees. Parents reported that 5.13% of the children had an ADHD diagnosis with 4.86% learning disorders, 3.84% medical problems (mostly asthma), 0.72% pervasive developmental disorders, 0.24% intellectual disability, 0.12% tics, and 0.06% enuresis.

Instruments

Child and Adolescent Behavior Inventory (CABI; Burns et al., 2015). The CABI measures sluggish cognitive tempo (15 symptoms), *DSM-5* ADHD-IN (nine symptoms), *DSM-5* ADHD-HI (nine symptoms), *DSM-5* ODD (eight symptoms), callous-unemotional behavior (four items, *DSM-5* limited prosocial emotions specifier), anxiety (six symptoms), depression (six symptoms), social impairment (five items on parent version and two items on teacher version), and academic impairment (five

items). A copy of the scale is available from the authors (see Table S2 and S3 in the Supplemental Materials, available online at https://osf.io/6zg7n/, for a copy of the items in English and Spanish).

Symptoms were rated with 6-point anchors for the past month (0=*almost never [never or about once per month]*, 1=*seldom [about once per week]*, 2=*sometimes [several times per week]*, 3=*often [about once per day]*, 4=*very often [several times per day]*, and 5=*almost always [many times per day]*). The four callous-unemotional symptoms were rated with slightly different 6-point anchors (0=*almost never [0 to 10% of the time]*, 1=*seldom [11 to 20% of the time]*, 2=*sometimes [21 to 49% of the time]*, 3=*often [50 to 79% of the time]*, 4=*very often [80 to 89% of the time]*, and 5=*almost always [90 to 100% of the time]*). Callous-unemotional symptoms were reverse keyed (higher scores represent more callous-unemotional behavior). Social and academic impairment items were rated with 7-point anchors (0=*severe difficulty*, 1=*moderate difficulty*, 2=*slight difficulty*, 3=*average performance [average interactions] for grade level*, 4=*slightly above average*, 5=*moderately above average*, and 6=*excellent performance [excellent interactions] for grade level*). Social and academic items were also reverse keyed with higher scores indicating more impairment.

Earlier studies support factor structure, reliability (internal consistency, test-retest, and inter-rater) and validity of Spanish CABI (CADBI) scale scores with community and clinical samples from Spain and Chile (see Table S1 in the Supplemental Materials, available online at https://osf.io/6zg7n/). Other studies with children and adolescents from Brazil, Nepal, South Korea, Thailand, and United States also provide support for the factor structure, reliability, and validity of CABI (CADBI) scale scores (e.g., Becker et al., 2020; Burns et al., 2008; Burns & Becker, 2019; Khadka et al., 2016; Jung et al., 2020). The main difference between the Spanish CABI and CADBI scales involves the inclusion of a larger number of sluggish cognitive tempo symptoms on the CABI.

Procedure

An informed consent form was given to the parents and with parental written approval a similar informed consent form was given to the teachers (mothers, fathers, and teachers provided written informed consent). After signing of the consent form, mothers, fathers, and teachers completed the CABI. Additional details on the recruitment procedures can be found in Sáez et al., (2019). The Research Ethics Committee of the University of the Balearic Islands (Protocol 07CER14) approved the study.

Data analysis

The robust weighted least squares estimator was used for the factor and invariance analyses (Mplus software, version 8.4). These analyses treated the items as categorical indicators (probit link). The graded-response item response theory model was used to generate the test information functions for each CABI scale (Stata software, version 16.0). These analyses also treated the items as categorical indicators (logit link). In addition, all analyses took into account the children were clustered within classes.

Global model fit for the factor analyses with Mplus was evaluated with comparative fit index (CFI; acceptable fit ≥ .90 and close fit ≥ .95), standardized root mean square residual (SRMR; acceptable fit ≤ .08, close fit ≤ .05), and root-mean-square error

of approximation (RMSEA; acceptable fit ≤ .08 and close fit ≤ .05). For invariance analyses across mothers/fathers rating the same sex child, the Mplus DIFFTEST was used to determine if the model with constraints on like-item loadings and like-item thresholds resulted in a significant decrement in fit relative to the model without the constraints. The invariance analyses were performed on each CABI scale separately (i.e., nine separate invariance analyses across mothers/ fathers rating boys and nine separate invariance analyses across mothers/fathers rating girls). If invariance of like-item loadings and thresholds occurred across the ratings, then it was possible to compare the factor means across mothers and fathers. Alpha level was set at *p* < .001 for all tests given the large size of the sample.

Results

Missing Data

Covariance coverage was greater than 99% for all variances and covariances within each source. Very few items were thus left blank by mothers, fathers, and teachers.

Structural Validity of Nine Factor Model for Boys and Girls

The nine-factor model provided close fit for mother, father, and teacher ratings of boys and girls (six separate factor analyses). Table 1 shows the fit indices for the six analyses. The factor correlations from each analysis showed discriminant validity (i.e., correlations < .85, see Tables S4 to S9 in the Supplemental Materials, available online at https://osf.io/6zg7n/, for the factor correlations and descriptive statistics). Item-factor loadings are reported later.

Reliability of CABI Scales for Boys and Girls

Table 2 shows the reliability coefficients (Cronbach's alpha) for the scores for the nine CABI scales. The reliability coefficients were good to excellent for boys and girls for each source for each scale.

Table 1
Fit Indices for the Nine Factor Model for Mother, Father, and Teacher Ratings of Boys and Girls

	df	χ^2	CFI	SRMR	RMSEA (90%CI)
			Mothers		
Boys	2086	4049	.97	.05	.034 (.032, .035)
Girls	2086	3701	.98	.05	.031 (.029, .032)
			Fathers		
Boys	2086	3491	.98	.05	.031 (.031, .033)
Girls	2086	3189	.98	.05	.028 (.026, .030)
			Teachers		
Boys	1894	4933	.98	.05	.042 (.041, .043)
Girls	1894	3802	.98	.05	.034 (.033, .036)

Note: Mothers: boys—*N* = 827, girls—*N* = 822; Fathers: boys—*N* = 689, girls—*N* = 669; Teachers: boys—*N* = 908; girls—*N* = 865. CFI = comparative fit index. SRMR = standardized root-mean-square residual; RMSEA = root-mean-square error of approximation

Table 2
Reliability Coefficients (Alpha) for the CABI Scales

CABI Scales	Mother Ratings		Father Ratings		Teacher Ratings	
	Boys	Girls	Boys	Girls	Boys	Girls
SCT	.93	.93	.92	.92	.97	.97
ADHD-IN	.96	.95	.96	.94	.97	.96
ADHD-HI	.94	.91	.94	.92	.96	.94
ODD	.93	.90	.92	.90	.95	.95
Callous/Unemotional	.82	.85	.85	.85	.88	.87
Anxiety	.71	.72	.76	.75	.84	.85
Depression	.87	.88	.87	.78	.92	.91
Social Impairment	.91	.92	.92	.93	.87	.87
Academic Impairment	.94	.95	.95	.95	.96	.97

Note: CABI = Child and Adolescent Behavior Inventory; SCT = sluggish cognitive tempo; ADHD = attention-deficit/hyperactivity disorder; IN = inattention; HI = hyperactive/impulsive; ODD = Oppositional defiant disorder

Item-Factor Loadings and Inter-Rater Factor Correlations for CABI Scales

A confirmatory factor analysis was applied to each scale separately across the three sources *simultaneously* (i.e., a single trait by multiple source [mother, father, teacher] factor analysis separately for each CABI scale separately for boys and girls). Tables 3 and 4 show the model fit indices from these analyses for boys and girls, respectively. Each of the analyses resulted in an acceptable to close fit (13 of the 18 analyses yielded a close fit). Table 5 shows the average factor loading for each scale for boys and girls for each source. The loadings were moderate to substantial for each source with the loadings being higher for teachers than parents.

Table 6 shows inter-rater factor correlations for the same scale for boys and girls. Factor correlations for mothers with fathers ranged from .65 (anxiety) to .88 (academic impairment) with the correlations being similar across boys and girls. Factor correlations for parents (mothers/fathers) with teachers for the same scale were small to moderate for sluggish cognitive tempo, ADHD-IN,

ADHD-HI, and depression (.35 to .56) with the factor correlations for academic impairment being stronger (.69 to .70). The factor correlations for ODD, callous-unemotional behavior, anxiety, and social impairment from home to school were small and non-significant at times (.10 to .34). There was thus strong convergent validity for mother with father ratings and weaker convergent validity for parent with teacher ratings (see Burns et al., 2014, for a more comprehensive examination of within [mothers with fathers; teachers with teachers] and across [parents with teachers] settings factor correlations for ADHD-IN, ADHD-HI, and academic impairment for Spanish first grade children).

Invariance Analyses-Mothers/Fathers Rating Boys and Mothers/Fathers Rating Girls

Given the item-factor loadings were substantially higher for teachers than mothers and fathers (Table 5), the invariance analyses were only conducted across mothers/fathers rating boys and mothers/fathers rating girls (i.e., a separate invariance analysis for each scale). For mothers and fathers rating girls, the items on each scale showed invariance of like-item loadings and like-item thresholds. For mothers and fathers rating boys, the items on each scale also showed invariance of like-item loadings and like-item thresholds with the exception of the ADHD-HI item *interrupts or intrudes on others*. Here the threshold for the transition from the 4th to 5th anchor had a significantly higher value for fathers than mothers rating boys. To summarize, with the exception of this one ADHD-HI symptom, no significant decrement in fit occurred from the model with no constraints to the model with constraints on like-item loadings and like-item thresholds. Tables S10 and S11 in Supplemental Materials show these results (available online at https://osf.io/6zg7n/).

Comparison of the factor means for each of the nine scales yielded only two significant differences. Fathers rated boys and girls significantly (*p*s < .001) higher than mothers on the callous-unemotional behavior scale (*d* = .21 and *d* = .30, respectively, thus small effect sizes). All the other factor mean differences were non-significant with *d* values close to zero. Table S12 in the Supplemental Materials shows these results (available online at https://osf.io/6zg7n/).

Table 3
Fit Indices for a One-Factor Model for Each Scale across Mother, Father, and Teacher Ratings of Boys

Scale	df	χ^2	CFI	SRMR	RMSEA (90% CI)
SCT	927	2658	.973	.067	.042 (.040, .044)
ADHD-IN	312	722	.996	.026	.035 (.032, .039)
ADHD-HI	312	1494	.981	.050	.060 (.057, .063)
ODD	241	678	.988	.036	.041 (.038, .045)
Callous/Unemotional	47	143	.990	.030	.044 (.036, .052)
Anxiety	126	212	.988	.048	.025 (.019, .031)
Depression	126	291	.991	.043	.035 (.030, .040)
Social impairment	28	80	.993	.020	.042 (.031, .053)
Academic impairment	82	490	.994	.018	.068 (.063, .075)

Note: CFI = comparative fit index. SRMR = standardized root-mean-square residual; RMSEA = root-mean-square error of approximation; SCT = sluggish cognitive tempo; SCT = sluggish cognitive tempo; ADHD = attention-deficit/hyperactivity disorder; IN = inattention; HI = hyperactivity/impulsivity; ODD = oppositional defiant disorder

Table 4
Fit Indices for a One-Factor Model for Each Scale across Mother, Father, and Teacher Ratings of Girls

Scale	df	χ^2	CFI	SRMR	RMSEA (90% CI)
SCT	927	2318	.979	.062	.038 (.036, .040)
ADHD-IN	312	570	.996	.026	.028 (.024, .032)
ADHD-HI	312	1235	.973	.064	.053 (.050, .056)
ODD	241	577	.988	.044	.037 (.033, .040)
Callous/Unemotional	47	98	.995	.026	.032 (.023, .041)
Anxiety	126	192	.992	.044	.022 (.016, .029)
Depression	126	202	.994	.043	.024 (.018, .030)
Social impairment	28	52	.997	.017	.029 (.016, .041)
Academic impairment	82	299	.997	.016	.050 (.044, .056)

Note: CFI = comparative fit index. SRMR = standardized root-mean- square residual; RMSEA = root-mean-square error of approximation; SCT = sluggish cognitive tempo; SCT = sluggish cognitive tempo; ADHD = attention-deficit/hyperactivity disorder; IN = inattention; HI = hyperactivity/impulsivity; ODD = oppositional defiant disorder

Table 5
Average Standardized Factor Loadings for the CABI Scales for Boys and Girls by Source

	Mother Ratings				Father Ratings				Teacher Ratings			
	Boys		Girls		Boys		Girls		Boys		Girls	
CABI	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
SCT	.76	.10	.77	.10	.75	.12	.77	.10	.89	.04	.90	.04
IN	.87	.05	.86	.05	.87	.05	.85	.05	.93	.03	.93	.03
HI	.85	.05	.84	.03	.86	.05	.84	.04	.92	.04	.92	.03
ODD	.84	.02	.80	.03	.83	.04	.81	.05	.92	.02	.93	.02
CU	.78	.09	.82	.06	.81	.06	.82	.06	.84	.06	.85	.06
ANX	.65	.10	.63	.10	.67	.10	.65	.12	.80	.08	.82	.07
DEP	.83	.05	.85	.05	.84	.06	.79	.06	.89	.05	.90	.03
SI	.84	.03	.84	.03	.95	.02	.86	.03	.90	.15	.90	.14
AI	.90	.04	.91	.04	.90	.03	.92	.03	.94	.03	.95	.03

Note: CABI = Child and Adolescent Behavior Inventory; SCT = sluggish cognitive tempo; IN = attention-deficit/hyperactivity disorder-inattention; HI = attention-deficit/hyperactivity disorder-hyperactivity/impulsivity; ODD = oppositional defiant disorder; CU = callous unemotional; ANX = anxiety; DEP = depression; SI = social impairment; AI = academic impairment

Table 6
Inter-Rater Factor Correlations (Standard Errors) for Child and Adolescent Behavior Disorder Scales

	Mothers with Fathers		Mothers with Teachers		Fathers with Teachers	
CABI	**Boys**	**Girls**	**Boys**	**Girls**	**Boys**	**Girls**
SCT	.79 (.02)	.83 (.02)	.46 (.03)	.41 (.04)	.43 (.04)	.41 (.04)
ADHD-IN	.84 (.01)	.81 (.02)	.56 (.03)	.51 (.04)	.54 (.03)	.49 (.04)
ADHD-HI	.79 (.02)	.78 (.02)	.40 (.04)	.35 (.05)	.42 (.04)	.39 (.05)
ODD	.77 (.02)	.72 (.03)	.32 (.04)	.23 (.05)	.34 (.05)	.19 (.06)[ns]
CU	.68 (.03)	.63 (.03)	.18 (.04)	.22 (.05)	.15 (.05)[ns]	.12 (.05)[ns]
ANX	.67 (.04)	.65 (.04)	.13 (.05)[ns]	.25 (.05)	.15 (.05)[ns]	.17 (.06)[ns]
DEP	.75 (.03)	.71 (.04)	.41 (.04)	.45 (.05)	.35 (.05)	.37 (.07)
SI	.71 (.02)	.69 (.03)	.16 (.05)	.17 (.04)	.18 (.05)[ns]	.10 (.05)[ns]
AI	.87 (.01)	.88 (.01)	.73 (.02)	.70 (.02)	.69 (.03)	.69 (.02)

Note-1: All correlations were significant at *p* < .001 unless indicated as *ns* (non-significant). The parent and teacher CABI scales contained the same items except for the social impairment scale (five items for parents and two items for teachers)

Note-2: CABI = Child and Adolescent Behavior Inventory; SCT = sluggish cognitive tempo; ADHD-IN = attention-deficit/hyperactivity disorder-inattention; ADHD-HI = attention-deficit/hyperactivity disorder-hyperactivity/impulsivity; ODD = oppositional defiant disorder; CU = callous unemotional; ANX = anxiety; DEP = depression; SI = social impairment; AI = academic impairment

Test Information Functions for CABI Scales

Each of the seven CABI symptom scales provided a high level of information and precision from approximately 0.50 standard deviations below the trait mean to 2.00 to 2.50 standard deviations above the trait mean for the three sources' ratings of boys and girls (see Figures S1 to S6 in the Supplemental Materials, available online at https://osf.io/6zg7n/). These results support the use of the normative information for screening purposes.

The test information functions for the seven symptom scales were not expected to provide a high level of information and precision below the trait mean. That is, the use of symptoms (i.e., negative behaviors) was not designed to measure the *non-occurrence* of symptoms with a high level of information and precision. More specifically, the non-occurrence of symptoms (e.g., *acts defiant and refuses to obey adults*) is not the same as the occurrence of positive behaviors (i.e., inverse of symptoms, for example, *cooperates with adult requests*).

The social impairment and academic impairment test information functions probably provide less information slightly above the trait mean (the valley in the middle of the curves) due to the nature of the middle anchor on the 7-point rating scale for these items (social impairment items middle anchor: *average interactions for grade level;* academic impairment items middle anchor: *average performance for grade level*). The middle anchor did not work as well as the anchors for low and high levels of social and academic impairment. A future version of the CABI should consider the revision of the anchors for the academic and social impairment scales to be similar to the symptom anchors. Also, with only two items on the social impairment scale for teachers, it was not possible to obtain the test information function for this scale. A future revision should include more items on the social impairment scale for teachers.

Normative Information for CABI Scales

Each CABI scale is scored by the calculation of the average score for the scale (i.e., total number of points on the CABI scale divided by the number of items on the scale). The child's average

score on the scale can then be used to obtain the corresponding *T*-score. *T*-scores higher than 65 (i.e., approximately 1.50 standard deviations above the scale mean) would indicate scores in the at-risk range and suggest a need for additional assessment. The normative information is shown for each of the nine CABI scales for boys and girls for the three sources in Tables S13 to S66 in the online Supplemental Materials (available online at https://osf.io/6zg7n/).

Effect Sizes of ADHD and Learning Disorders Diagnoses with CABI Scale Scores

Supplemental Tables S67 and S68 in the online materials show the Cohen *d* values for parent-reported ADHD and learning disorders diagnoses with CABI manifest variable scale scores for boys and girls for the three sources. The highest *d* values occurred for scales with the closest correspondence to the diagnosis. For example, the ADHD diagnosis had *d* values from .75 to 1.58 with the sluggish cognitive tempo, ADHD-IN and ADHD-HI scales with *d* values from 1.13 to 1.30 with the academic impairment scale. For the learning disorders diagnosis, the highest *d* values occurred with the sluggish cognitive tempo, ADHD-IN, and academic impairment scales (0.91 to 1.46). Convergent and discriminant validity thus occurred between the diagnoses and CABI scales. These findings, however, such be considered preliminary due to the small number of children with ADHD and learning disorder diagnoses, especially girls.

Discussion

Spanish CABI scale scores were shown to have a variety of positive psychometric properties for mother, father, and teacher ratings of Spanish boys and girls. Scores from scales showed good to excellent internal consistency for boys and girls for the three sources. In addition, factor correlations for mothers/fathers rating girls and mothers/fathers rating boys were substantial for the same scale. For the home to school associations, factor correlations for parents/teachers rating girls and parents/teachers rating boys for the same scale ranged from small (and at times non-significant) for ODD, callous-unemotional, anxiety, and social impairment to moderate for sluggish cognitive tempo, ADHD-IN, ADHD-HI, and depression to substantial for academic impairment. This pattern of inter-rater factor correlations within and across setting replicated earlier findings with Spanish first grade children (Burns et al., 2014; Litson et al., 2019; Preszler et al., 2018, 2019; Seijas et al., 2018, 2019).

Factor analyses supported the structural validity of the nine scales. Invariance analyses across mothers/fathers rating boys and mothers/fathers rating girls indicated invariance of like-item loadings and like-item thresholds for each of the nine scale with the exception of one threshold for an ADHD-HI symptom. In addition, only the callous-unemotional factor mean was significantly larger for fathers rating boys and girls (small effect size). All the other factor mean comparisons across mothers/fathers were non-significant. Item-factor loadings were also moderate to substantial for boys and girls for the three sources. These positive psychometric results suggest the usefulness of CABI scales for research on child psychopathology.

The test information functions for the symptom scale scores showed that these scales provided a high level of information and precision from approximately 0.50 standard deviations below the trait mean to 2.00/2.50 standard deviations above the trait mean. These results provide additional justification for the use of the normative information for the seven symptom scales for screening purposes. It is important to note, however, that this normative information is limited in terms of the age range of the children (third to sixth grade) as well as location (elementary schools on the Balearic Islands). *Clinicians should remain aware of this limitation in the use of the Spanish CABI with individual children*. Until nationally representative norms become available for Spain, clinicians must remain aware that these initial norms represent the first step toward the more ideal goal. In the meantime, the scale and the initial normative informative are available for free to clinicians and researchers, who can select which modules to administer based on their focus, providing a brief and cost-effective measure for practice and research. We hope researchers and clinicians find the Spanish version of the CABI useful in their work.

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