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Validity and reability of the CBCL/6-18. Includes DSM scales

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Introduction. The Child Behavior Checklist (CBCL/6-18) is the most commonly used parent-completed instrument that assesses child and adolescent psychopathology. It has been used in epidemiology and clinical studies. The last version contains DSM-oriented subscales.

Objective. Investigate the psychometric properties of the CBCL/6-18 and develops a valid and reliable Mexican version.

Method. Psychologists and child psychiatrists adapted the Spanish version of CBCL/6-18, and a back translation was done by a native English speaker. Discrepancies in the adaptation were solved by consensus. The checklist was applied to children in the community and to outpatients from a psychiatric children hospital. Reliability was evaluated by estimating internal consistency (Cronbach's alpha) on all scales: retest at one week was evaluated with intraclass correlation coefficients (ICC). A ROC curve was performed to estimate a cut-off which correctly identified children from the clinically referred patients and children recruited in the community (non-referred). Mean differences for the groups were calculated with the Student's *t* test.

Results. The Mexican version of the CBCL/6-18 showed that the Cronbach's alpha coefficient was 0.90 for internalizing problems, 0.94 for externalizing problems and 0.97 for the total problem scale. The ICC was 0.97 for the total problem scale. Significant differences were found between the mean score in broad band, narrow and the new DSM/oriented scales.

Conclusions. The Mexican version of CBCL/6-18 is a reliable and valid screening instrument for clinical and epidemiologic use.

Key words:
Validity. Reliability. CBCL clinometrics. Child psychopathology.

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Validez y fiabilidad del CBCL/6-18. Incluye las escalas del DSM

Introducción. La lista de síntomas del niño CBCL/6-18 *(Child Behavior Checklist)* es el instrumento para evaluar psicopatología en niños y adolescentes más comúnmente utilizado en estudios clínicos y en numerosos estudios epidemiológicos. La última versión contiene subescalas orientadas al DSM.

Objetivo. Determinar las propiedades psicométricas del CBCL/6-18 y desarrollar una versión mexicana fiable y válida.

Método. Paidopsiquiatras y psicólogos adaptaron la versión en español del CBCL/6-18; una retraducción fue realizada por una persona bilingüe. Las discrepancias en la adaptación se resolvieron por consenso. El CBCL/6-18 se aplicó a niños de la población general y a pacientes de la consulta externa de un hospital psiquiátrico. La consistencia interna se evaluó con el coeficiente alfa de Cronbach, el test-retest a una semana se calculó por medio del coeficiente de correlación intraclase (CCI). Se realizó una curva *receiver operating characteristic* (ROC) para estimar un punto de corte que discriminara a los niños de la comunidad de referidos clínicamente. Las diferencias en los puntajes de la escala se estimaron con la prueba *t* de Student.

Resultados. La versión mexicana del CBCL/6-18 mostró coeficientes de alpha de Cronbach: problemas internalizadores, 0,90; externalizadores, 0,94, y el total de problemas, 0,97. El CCI para el test-retest de la escala total fue de 0,97. Las puntuaciones de los niños de ambos grupos mostraron diferencias estadísticamente significativas.

Conclusiones. Con estos resultados se puede concluir que la versión mexicana del CBCL/6-18 es un instrumento válido y confiable para usarse como instrumento de cribado.

Palabras clave:
Validez. Fiabilidad. Clinimetría del CBCL. Psicopatología infantil.

INTRODUCTION

Psychopathology in children is more frequent than previously thought. Studies in the United States show that the prevalence at 3 months for at least one psychiatric disorder is 15% and that this increases up to 36 % if the period is prolongued to one year[1]. Data from Latin American countries report higher values of psychopathology compared to European countries when the same methodology is used[2]. In our country, the national studies show a 16 % prevalence using the Report Questionnaire for Children of 3 to 12 years (RQC)[3]. Based on the answers of the parents with this instrument, it was found that the most common symptoms were restlessness, 19 %; irritability, 17 %; nervousness, 16%; attention deficit, 14 %; disobedience, 13 %; explosive character, 11 %, and dependent behavior, 9 %[4]. Comorbidity is very common. The different studies report values between 25.5 % to 50 % according to the methodology used[5-8]. Different authors have warned that many children with emotional and behavioral problems do not receive attention[9-10].

In Mexico, Caraveo (1995) found that only 13 % of the «possible cases» came to request professional help and that this was provided by a psychiatrist in only 2 % of the cases. Latency time to receive the attention is very long. A national study found that 2 % of the adults who have reported depression beginning in childhood retrospectively had a 10 year delay in receiving treatment[11]. Detection of the psychopathology is very important since 41% of the problems detected in childhood continue up to adult age[12]. Early onset disorders have a worse prognosis and greater relapses than those that begin in the adult life[13,14]. Some studies have shown that up to 72 % of behavior disorders the first symptoms occur before 10 years of age, as has been reported by several authors[15]. This makes it seem that many of the disorders diagnosed in childhood are really forms of early onset[16]. Their early detection is a valuable opportunity for treatment and the establishment of preventive measures.

Many diagnostic and screening instruments oriented towards children and adolescents have been developed in the last two decades. These instruments, as those for adults, are based on the DSM and ICD category diagnostic criteria, whose principal representatives are structured interviews. They are very useful to establish precise diagnoses but also have the disadvantage that much time (3 hours) is needed to apply them and that they are very expensive since the staff that applies them must be trained. The Child Behavior Checklist (CBCL) is among the instruments that best represent the dimensional diagnosis. This was developed by Thomas M. Achenbach and Craig Edelbrook and was initially designed to evaluate the most common pyschopathology in children from 4 to 18 years of age. It is one of the instruments used most internationally. According to the authors, it needs a mental age of at least 10 years and reading level of the 5th grade of primary education to fill out the questionnaire[17]. The questionnaire has two sections. The first one evaluates the competence of the child in the social, academic, family and use of free time areas. The second section evaluates the behavioral and emotional problems of children based on 118 items that go from 0 (almost never) to 2 (almost always). The scores are organized into factors called «anxious-depressed problems», «withdrawal-depressed», «somatic complaints», «social problems», «thought problems», «attention problems», «rule breaking behavior» and «aggressive behavior». It also contains the scales of «internalizing problems» and «externalizing problems». The sum of all the items form the «total problem» scale. The latter is a global index that makes it possible to compare the psychopathology in the different countries where the epidemiologic studies have been performed. This scale is the one used most with the purposes of collecting data for clinical, epidemiological and research use in child psychopathology. It has served to validate other instruments and scales. This scale has been formally standardized and translated into more than 70 languages. Many epidemiological studies have been conducted in different countries that have been able to establish comparisons and document their transcultural viability[18]. In the most recent version (CBCL/6-18)[19], short band DSM oriented scalds were introduced. They consist in the same items of the test described as very consistent with the diagnostic categories of the DSM by expert psychologists and psychiatrists of different cultures, deriving in subscales of: affective, anxiety, somatic complaints, attention deficit/hyperactivity, oppositionism and behavior problems[20]. These subscales have not been tested. Furthermore, the symptoms list was oriented towards children of 6 to 18 years of age and guidelines were published for this group. Some changes were made, such as the introduction of six items that substituted others that were reported little. In addition, item 105 of the CBCL/4-18 investigated the use of alcohol and drugs with non-medical purposes were divided and in CBCL/6-18 the use of alcohol was examined in the item (no. 2). The period evaluated by the test was extended to 6 months instead of 2 months. The fact that very few changes have been introduced into the CBCL/6-18 will make it possible to compare the results obtained from previous versions. Important contributions have been made since the introduction of the CBCL in the clinical aspect, epidemiology and psychopathology of the development. There are studies and translations to Spanish done in countries such as Puerto Rico, Spain and Colombia[21,22]. However, up to now, no Mexican version of this instrument has existed.

This study aims to determine the psychometric characteristics of the scale in the problem section. To do so, internal consistency, test-retest reliability, and validity of the translation and adaptation to colloquial language of Mexico of the CBCL/6-18 (child behavior checklist) list of Achenbach symptoms were evaluated.

MATERIAL AND METHODS

All those children between 6 and 18 years of age whose parents consented to their participation in the study were

included in the study. Two groups were evaluated: *a)* children who came to the emergency department of the Child Psychiatry Hospital Dr. Juan N. Navarro to request a first consultation, who were not receiving any medication, and *b)* children from three official schools whose principals and parents authorized their participation in the study.

PROCEDURE

Child psychiatrists and psychologists who were experts in child psychopathology adapted the instrument based on the Spanish version of CBCL available in ASEBA: http://www.aseba.org/index.html to the Mexican Spanish colloquial language. The adapted version was retranslated by a bilingual school psychologist, independently of the study and who did not know the instrument. Questionnaires were given to all the patients who came to the emergency department of the Hospital Dr. Juan N. Navarro for the first time. The parents of the children from the official schools filled out the list of symptoms in a meeting. Only 6 persons could not complete the questionnaire due to visual problems or analphabetism. For the retest, the parents of both groups took the questionnaire with the instruction to fill it out one week later and then hand it in to the school or hospital.

STATISTICAL ANALYSIS

Descriptive statistics was used to analyze frequencies, percentages and averages, and the Student's *t* test was used for the analysis of demographic and clinical characteristics of the sample. The SPSS version 11 program was used. All the subscales of the classical profile and the DSM oriented profile and the global scales of internalizing, externalizing problems and that of total problems (sum of all the items) were graded.

Internal consistency

Internal consistency of the scale was examined with Cronbach's alpha[23].

Reliability

Test-retest reliability was estimated by calculating the Pearson correlation coefficients and intraclass correlation coefficients[24] for all the subscales and for the Total problems.

Validity

The validity of the list as a screening instrument was determined by comparing the score on the total problem scale of the children from the hospital and community. To determine the validity of the list as a screening instrument of psychopathology, a ROC curve was made. This is a chart designed to evaluate the radio signals and its use for the evaluation of the instruments in psychiatric tests was established by Murphy in 1987[25].

The criterion used was the condition of being a clinically referred or non-clinically referred patient, with the total problems. The differences between the means of the two groups were measured with the Student's *t* test for independent samples.

RESULTS

Table 1 shows the demographic data for the total sample and the subgroups and the score of the means and standard deviation of all the CBCL/6-18 subscales.

The boys in the adolescent (11 to 18 years) and the children (6-11 years) groups had higher scores (x = 59.5) than the girls (x = 47.82), this difference being significant by means of

Table 1 Groups by age and gender

	Community	Hospital	Total	Test of differences
N	409	202	611	
Male gender	52.8 %	69.8 %	58.42 %	NS
Age (mean ± SD)	10.1 (2.8)	10.3 (2.9)	10.3 (3.3)	NS
CBCL score/6-18				
DSM scales (mean ± SD)				
Affective	3.6 (3.6)	8.3 (4.4)	5.2 (4.4)	*
Anxiety	2.8 (2.4)	4.8 (2.6)	3.5 (2.7)	*
Somatic complaints	1.9 (2.1)	2.9 (2.7)	2.2 (2.4)	*
ADD	4.9 (3.5)	8.9 (3.4)	6.2 (3.9)	*
Oppositionism	3.8 (2.6)	3.8 (2.6)	4.7 (3.0)	*
Behavior	1.9 (2.3)	4.9 (4.4)	2.9 (3.3)	*
Classical profile				*
Anxious-depressed	5.1 (4.3)	9.7 (5.3)	5.6 (5.1)	*
Somatic complaints	3.2 (3.1)	5.6 (4.4)	4.0 (3.8)	*
Social problems	4.5 (3.8)	8.6 (4.5)	5.9 (4.5)	*
Thought problems	2.5 (3.0)	6.0 (4.2)	3.6 (3.8)	*
Attention problems	5.4 (2.2)	11.0 (4.3)	7.3 (5.0)	*
Rule breaking behavior	3.6 (3.6)	9.3 (5.9)	5.5 (5.2)	*
Aggressive behavior	9.1 (7.2)	18.3 (8.9)	12.1 (8.9)	*
Internalizers	8.3 (6.6)	15.9 (8.2)	10.8 (8.0)	*
Externalizers	12.8 (10.4)	27.7 (13.8)	17.1 (13.6)	*
Total problems	41.2 (29.5)	82.0 (35.2)	54.7 (36.9)	*

* $p < 0.001$. ADD: attention deficit disorder.

the Student's *t* test, which was 0.001 gl (570.30). The adolescent group of both genders had higher scores than those of the child group from 6 to 11 years, these differences only being significant for the female gender as shown in table 2.

Internal consistency

The internal consistency of CBCL was studied by Cronbach's alpha coefficient that showed elevated consistency for the internalizing problem scale, this being 0.90, externalizing problem scale, 0.94, and total problems scale, 0.97. All the subscales except that of anxiety (0.69) had alpha values of 0.75 (thought problems) to 0.86 and 0.93 (attention problems and aggressive behavior), respectively, as can be observed in table 4 that shows the comparison with the coefficients reported by Achenbach.

Reliability

Test-retest reliability was obtained through the estimation of Pearson's correlation coefficients in 206 questionnaires of the parents to answer for the second time. The correlation for the total of the scale was 0.84 vs 0.94 reported by Achenbach at one week of the retest (table 3). Except for the scale of somatic complaints DSM (0.69), the remaining Pearson correlation coefficients were 0.72 (thought problems) to 0.86 (externalizing problems). When the clinical group and community groups were analyzed, it was found that all the correlation coefficients were higher for the community group. The intraclass correlation coefficient (ICC) of the total problems scale was 0.97 (table 4).

Validity

One way of establishing the validity of the instrument is to determine a cutoff for the identification of the clinically referred subjects (patients) and non-clinically referred subjects (community). Using a ROC curve, it was determined that the score of 61 on the Total problems scale minimized the number of false positives and negatives (fig. 1).

Table 2 T test-results of the means of the groups

Groups	CBCL/6-18 Mean of total score	p
Community vs clinical	41.2 vs 82.0	***
Boys vs adolescents	57.0 vs 64.2	NS
Girls vs adolescents	43.1 vs 53.6	*
Girls (6/18) vs boys (6/18)	47.8 vs 59.5	***

* $p < 0.05$. ** $p < 0.01$. *** $p < 0.001$.

Table 3 Cronbach's alpha of the CBCL/6-18 scales

DSM scales	Hospital (N = 202)	Community (N = 409)	Total (N = 61)	Achenbach (N = 3.210)
Affective (13 items)	0.75	0.78	0.82	0.82
Anxiety (6 items)	0.63	0.69	0.69	0.72
Somatic complaints (8 items)	0.72	0.69	0.71	0.75
ADHD (7 items)	0.78	0.81	0.84	0.84
Oppositionism (5 items)	0.80	0.81	0.84	0.86
Behavior (17 items)	0.89	0.85	0.90	0.91
Classical profile				
Anxious-depressed (13 items)	0.80	0.80	0.83	0.84
Withdrawal-depressed (8 items)	0.76	0.74	0.79	0.80
Somatic complaints (11 items)	0.79	0.73	0.78	0.78
Social P. (11 items)	0.74	0.77	0.80	0.82
Thought P. (15 items)	0.73	0.68	0.75	0.78
Attention P. (10 items)	0.79	0.83	0.86	0.86
Rule breaking behavior (17 items)	0.80	0.79	0.84	0.85
Aggressive behavior (18 items)	0.91	0.91	0.93	0.94
Internalizers (32 items)	0.89	0.88	0.90	0.90
Externalizers (35 items)	0.92	0.92	0.94	0.94
Total (113 items)	0.97	0.95	0.96	0.97

ADHD: attention-deficit hyperactivity disorder; H: hospital; C: community.

The clinical group had higher scores for all the CBCL subscales of the classical profile and the DSM compared with the community group, this difference being statistically significant (table 1).

DISCUSSION

The CBCL was designed as a self-report questionnaire. However, in many validation studies, including the original (Achenbach), the questionnaire was administered by interviewers. This study aimed to investigate the viability of the scale as self report and its capacity to discriminate between the clinical referred and non-clinically referred population.

Internal consistency

The Mexican version of the CBCL had an excellent internal consistency for the total problems scale (0.97), a value similar to that obtained by Achenbach. The wide band scales

Table 4 Intraclass correlation coefficients and Pearson's Coefficient for the CBCL/6-18 test-retest

CBCL/6-18 DSM Scales	Test retest		
	Mexico (n = 202)	CCI	USA (n = 20)
	r		r
Affective	0.76	0.87	0.84
Anxiety 0.73	0.81	0.80	
Somatic complaints	0.69	0.80	0.90
ADHD	0.82	0.91	0.93
Oppositionism	0.79	0.89	0.85
Behavior	0.83	0.93	0.93
Classical profile			
Anxious- depressed	0.74	0.89	0.82
Withdrawal-depressed	0.75	0.87	0.89
Somatic complaints	0.73	0.85	0.92
Social P.	0.79	0.88	0.90
Thought P.	0.72	0.88	0.86
Attention P.	0.85	0.89	0.92
Rule breaking behavior	0.83	0.87	0.91
Aggressive P.	0.85	0.94	0.90
Internalizers	0.76	0.94	0.91
Externalizers	0.86	0.95	0.92
Total	0.84	0.97	0.94

All the correlations were significant at $p < 0.01$.

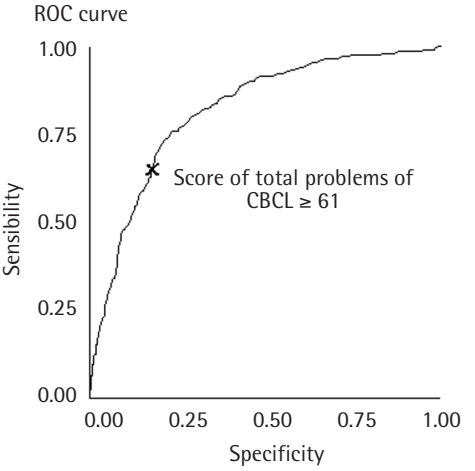

Figure 1 *ROC curve between clinically referred and non-clinically referred criteria and total problems of the CBCL/6-18*

of: externalizing problems (0.90), internalizing problems (0.94), narrow band of classical profile (0.75 to 0.93) and those DSM oriented ones (0.69 to 0.90) were good to excellent. The lower number of items on the DSM subscales led to a slight decrease in internal consistency coefficients. The scales with the lowest alpha coefficients were those of anxiety (DSM) (0.69), somatic complaints (DSM) (0.71) and thought problems (0.75). The last two scales systematically appear with low internal consistency coefficients in other studies[26-31]. Similar results were reported by Achenbach (1991) for the CBCL/4-18 and also for the new CBCL/6-18 version[19].

The anxiety scale belongs to the new DSM oriented scales. In the classical profile, anxiety was evaluated together with depression to make up the anxious/depressed scale. This grouped scale has a high consistency (alpha of 0.83) that reflects the coexistence and continuity of both factors, a situation that has been recognized in many studies[32,33]. When the depression and anxiety constructs are separated, consistency in the latter dropped from good (0.83 in the classical profile) to moderate (0.69) in the DSM one. Some authors question the independence of anxiety and depression when it is measured through questionnaires[34,35] Using structured interviews, anxiety appears as a factor independent of depression, mainly in girls[36], and also in adolescence due to the influence of development[37]. Although it seems convenient to have a scale that measures an anxious-depressed dimension congruent with the coexistence of both disorders, there are reasons that justify the need to evaluate anxiety as an independent construct of depression. Its identification is very important as it is a predisposing factor for other disorders such as the use and abuse of substances and as a precursor of depression. Its existence in childhood is associated with a chronic and persistence course in adult[38]. Anxiety determines poor response to treatment of depression and worse prognosis with greater relapses[39-41]. However, it is not easy to recognize and measure it. Even instruments specifically aimed at measuring anxiety in its different forms (separation anxiety, generalized anxiety, specific phobia, social phobia) report moderate alphas: 0.64[42]. According to the above, it is not surprising that this subscale is the lowest one of all of them.

Test-retest reliability

The CBCL test-retest reliability was generally good (0.84). Pearson's correlations for the subscales were good but lower than those reported by Achenbach. This may be due to the differences in the methodology used. The original scale was administered as an interview while the scales in this study were filled out by the parents in the schools or in the hospital. As in the other studies, the thought problem scale (r = –72) and the DSM scale of somatic complaints (r = 0.061) which is very similar to that of the classical profile had lower Pearson correlations[22]. The anxiety subscale [DSM] (r = 0.73) also showed a low correlation. This is very likely due to the variability of the construct over time (table 3).

When the clinical and community groups were analyzed, it was found that all the Pearson's coefficients were higher for the community group than for the clinical group. This result contrasts with the results reported in other studies[43,44] where the retest was greater in the clinical groups with structured interviews made by the clinicians. This leads us to think that the test-retest reliability may be improved if a clinician administers the Symptoms list, using his/her criterion. The intraclass correlation coefficient (ICC) of the Total problems scale was 0.97.

Validity

The ability to distinguish between the general and clinical population is a desirable attribute of the instruments. As in other studies, all the scales can effectively discriminate between the clinical and community groups. This can be seen in Table 1. The criterion validity was established with the ROC curve, the criterion used was that of being clinically referred or being from the general population.

Limitations

The study has some limitations. Participation of the parents was very high, 98 %, because the instrument was applied in a school meeting. Unfortunately this fact excluded children and adolescents who did not attend the school. According to the statistics of the last census published by the National Institute of Statistics, Geography and Data Processing (INEGI)[45], this means up to 22.3 % of the children between 6 and 15 years of age and 58.6 % of the youth between 15 % and 19 % in Mexico who do not attend school.

CONCLUSIONS

With these results, we can state that the CBCL/6-18 is a valid and reliable instrument to be used in the Mexican population with clinical and epidemiological purposes. Its capacity to discriminate between children of the general and clinically referred population which has been described in many articles has been confirmed. The validation procedure is long and complex. Other studies should be conducted to investigate the qualities of the subscales to discriminate between patients with different disorders and compare the different subscales (classical versus DSM oriented profile).

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