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ORIGINAL ARTICLE

Behavioural Problems in a Nationally Representative Sample of Uruguay. Characterisation of Latent Profiles by Socioeconomic Status, Maternal Depression and Family Violence

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Abstract
CBCL 1½–5 is one of the most widely used behavioural problem screening instruments internationally. However, few studies have explored its psychometric properties in national representative samples. Additionally, there is limited evidence on the existence of latent profiles of behavioural problems in preschool samples. This study aimed to analyse the psychometric properties of the Spanish version of the CBCL in a representative sample of children from Uruguay (n = 4210), identify latent profiles and characterise profiles according to sociodemographic and family environment variables (maternal depression and violence practices). Our results suggest that the CBCL 1½–5 is reliable. We replicate the seven-correlated-factor solution, which is invariant by sex and age. Three large profiles of behavioural problems were identified (high, medium and low risk) where membership in groups of higher risk was explained by the socioeconomic context, child's sex, maternal depression and, to a lesser extent, violent parental practices.

Keywords Preschool · CBLC · Externalising · Internalising · Latent profile analysis · Maternal depression · Violence

Introduction

Emotional and behavioural problems are present in children from an early age. However, the lack of reliable and valid instruments for screening has obstructed assessment and detection in early childhood. Adaptation of the Child Behaviour Checklist (CBCL) for children 1.5 to 5 years old (CBCL 1½–5) allows this difficulty to be overcome. The CBCL 1½–5 is a screening instrument that explores internalised and externalised behavioural problems in preschoolers [1]. The development of the CBCL 1½–5 and its popularisation at an international level have allowed the advancement of epidemiological and comparative studies on behavioural problems in early childhood [2]. The objective of this work is to explore its psychometric properties and characterise the latent profiles of behavioural problems in a representative sample of Uruguayan children.

Psychometric Properties of CBCL 1½–5

The CBCL 1½–5 is a screening instrument designed to assess the behavioural, emotional and social problems of children aged from one and a half to five years old. It is composed of seven subscales or domains: (I) emotionally reactive, (II) anxious/depressed, (III) somatic complaints, (IV) withdrawn, (V) sleep problems, (VI) attention problems and (VII) aggressive behaviours. This structure of seven correlated factors was determined in the original study by exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and reliability analysis in a sample from the United States. In the original study, a second-order model was also evaluated, grouping the syndromes into two broadband factors: internalising and externalising. Internalising, refers to problems linked to the self and is composed of syndromes I, II, III and VI. Externalising refers to conflicts with other people and with the expectations of the child and

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is composed of syndromes VI and VII. In this model, sleep problems is excluded due to suboptimal factor loads [1].

Multiple studies have explored the factor structure of CBCL 1½–5 on several continents, including some Spanish-speaking countries [2–7]. In general, the seven-correlated-factor solution was replicated by CFA, as most of the studies report adequate fit indices [2, 4–7], as well as the second-order factor solution [4, 6, 8]. Regarding internal consistency, previous studies report that broadband scales have very good alpha coefficients, ranging between 0.82 to 0.91 [3, 5–7, 9]. In contrast, in the subscales associated with symptoms (narrowband) the results are mixed, as alphas below 0.70 and even 0.60 are frequently reported [5–7, 9], especially in subscales associated with internalised problems (e.g. withdrawal and attention problems). In sum, adequate fit indices are observed for both models tested; internal consistency is generally adequate, although suboptimal values are observed in some narrowband subscales.

The measurement invariance of the seven-factor solution of the CBCL 1½–5 has been evaluated extensively for school age [10–12]. However, there are a few publications that report the invariance of the preschool version [2, 13, 14]. Taken together, these studies show acceptable levels of measurement invariance reached across gender, parent race and countries, with some exceptions (these studies are summarized in Supplementary Material 1). We are not aware of studies analysing measurement invariance of the CBCL 1½–5 by sex and age in Spanish or with national representative samples.

Determining Profiles with the CBCL: Dysregulation and Latent Profiles

A key aspect in the identification of children at high risk of behavioural problems is the combination of high scores in two or more CBCL subscales. In these cases, the existence of behavioural problems profiles, such as the Dysregulation Profile (CBCL-DP) [15, 16], was proposed. CBCL-DP was proposed by Ayer et al. [16] when questioning and evaluating the specificity of the Child Behaviour Checklist-Juvenile Bipolar Disorder Profile (CBCL-JPB) and the Posttraumatic Stress Problems Scale (CBCL-PTSP). Originally, CBCL-JPB and CBCL-PTSP were considered two different disorders obtained through different diagnoses. However, Ayer et al. [16] presented evidence that the CBCL-JPB and CBCL-PTSP are indicators of similar clinical aspects and that both identify a global syndrome which they call CBCL-DP. The CBCL-DP is determined when scores in aggressive behaviour, anxiety/depression and attention problems are higher than the proposed threshold-based *t* scores [17].

Other methods that use empirical models may allow for identification profiles such as Latent Profile Analysis (LPA) or Latent Class Analysis (LCA). LPA or LCA are procedures within the structural equations modelling used to identify hidden groups or subtypes of a population using multivariate data. In this way, LCA or LPA try to determine the presence of profiles (in our case, pathologies or diseases) by creating patterns of association among the underlying symptoms [18]. If the dysregulation profile exists empirically, the LPA/LCA models should suggest classes that are coincident in terms of scoring.

Very few studies have performed this comparison. One study evaluated the LCA of CBCL with 2031 American children between 6 and 18 years old; they also evaluated the agreement between informants (parents, teachers and self-report) for the CBCL-DP [15]. The model with the best fit indexes was the 7-class model (out of 10 tested). The CBCL-DP was identified in all versions of informants. According to the parents' report, approximately 10% of the boys and 6% of the girls were identified in this class.

We only found two studies that evaluated LPA or LCA with CBCL 1½–5 scores. First, LPA was tested in a sample of 6131 children between 5 and 7 years old in the Netherlands [19], which partially exceeds the age range of the instrument. Four profiles were found: (I) *highly problematic* (composed of 1.8% of the total sample) was composed of children with high scores in all subscales; (II) *internalising* (5.3%; children with high scores in the four subscales of internalising behaviour; (III) *externalising/emotionally reactive* (7.3%; children with high scores in emotionally reactive behaviour and aggressive behaviours, moderately high scores in somatic complaints, withdrawn and attention problems, but low scores in anxiety/depression, and (IV) *no problems* (85.6%; children with low scores in all subscales. The authors question whether the first class is equivalent to CBCL-DP because it has high scores in emotionally reactive, somatic complaints and withdrawal [19]. They suggest that the CBCL-DP could not be identified by LPA possibly due to the change in the age and language and the use of all subscale scores, and not only the scores of anxious/depressed, attention problems and aggressive behaviours, as was estimated previously [15, 19].

In the second study, an LCA was performed with a sample of 731 American children between 2 and 4 years old, as subscale scores were dichotomised according to whether they were in the normative (t scores < 60) or borderline or clinical range ($t \geq 60$), comparing solutions from 1 to 6 classes separately according to the children's age (2, 3 and 4 years). In general, better indices were found for the four-class solution (except for the 4-year-old age group). The four classes were: (I) *normative*—children who are unlikely to be in the borderline/clinical range; (II) *externalising*—children with a high probability of presenting problems in the two externalising subscales, together with withdrawn, (III) *internalising*—high probability of being in the clinical

range in the four domains of internalising behaviour, and (IV) *comorbid*—high probability of presenting high scores in the six subscales of the CBCL. The size of each class varied according to age: the comorbid decreases with age, while the normative increased [20].

This Study

The aims of this study are: (a) to analyse the psychometric properties of CBCL 1½–5 in a representative national sample, (b) to determine latent profiles in early childhood behavioural problems and their relationship with the risk profiles suggested by CBCL 1½–5, and (c) characterise these profiles according to demographic variables and the family context of the child.

To achieve these objectives, we use a sample obtained from the 2015 and 2018 editions of the Survey of Nutrition, Child Development and Health of Uruguay (ENDIS). ENDIS is a panel survey designed to measure well-being and developmental indicators in a national and representative sample of Uruguayan children from 0 to 3 years old. In this context, ENDIS data allow us first to evaluate the psychometric properties of CBCL 1½–5 and to explore latent profiles in a representative sample at the national level, with a high statistical power and an equitable distribution of participants across the entire age range of application of the instrument. Furthermore, ENDIS data allow the identified latent profiles obtained to be characterised in different domains. First, in socioeconomic terms, ENDIS revealed information related to the income and sociodemographic composition of households. There is an extensive range of literature that associates different sociodemographic variables, such as parental education or the level of household income, with higher rates of behavioural problems and child psychopathology, with lower socioeconomic status being more disadvantaged [21–23]. It is also a frequent finding that boys have a higher level of externalising problems than girls [8, 24].

On the other hand, ENDIS also collected data on maternal depression and anxiety. Mother's depression has been associated, in various cultural contexts, with reduced maternal supervision [25], increased risk of childhood injuries [26] problematic sleep patterns in children [27] and higher levels of internalising and externalising problems and general psychopathology [28]. Therefore, we expected that higher rates of maternal depression will be related to children with higher risk profiles.

Violence against children has been associated with a greater development of various health and behavioural problems [29, 30], such as an increased risk of developing posttraumatic stress disorder, internalising symptoms or externalising symptoms [31, 32]. Children's exposure to domestic violence is associated with higher levels of externalising and internalising problems [33]. ENDIS collected parental violence data, both reported by the parents and by the home visitor. Therefore, ENDIS data allow an analysis of the method (informant) effect in the relationship between family violence towards children and behavioural problems in early childhood. This question is of particular importance for family violence assessment procedures [34].

In sum, previous studies have shown that depression of caregivers, as well as violent parenting practices, is associated with an increased risk of developmental problems. However, there are no studies that have evaluated simultaneously how sociodemographic variables, parental depression and violent practices each relate to preschool aged children's behavioural problems in a national representative population.

Method

Participants and Procedure

We merged ENDIS data collected in the second wave of the first cohort (carried out in 2015) with the first wave of the second cohort (2018). By doing this, we reached an equitable representativeness of all ages in months covered by the CBCL 1½–5, since the distribution by age in both cohorts was slightly different. The samples collected are representative of the Uruguayan early childhood population. Technical data about survey sampling procedures can be found on the National Institute of Statistics (INE) website [35].

In total, 4210 primary caregivers (95.3% are mothers, 3.1% fathers, 1.3% grandparents and 0.3% others) reported the behavioural problems of their children. Of the total, 2571 correspond to wave 2 of the first cohort and 1,639 to the second cohort of ENDIS. Participants provided sociodemographic and children's development information. The age range of the children was 18 to 71 months (M = 46.0; SD = 12.9; 51.7% boys). With respect to residence, 41.7% of children are from Montevideo (capital and main city of Uruguay); 66.6% live in nuclear homes, 11.9% in single-parent families, 20.3% in extended households, and the remaining 1.2% are in non-family households.

The research was approved by the institutional review board of the Faculty of Medicine of the University of the Republic of Uruguay. All referring adults gave their informed consent. The questionnaire was administered by university students strictly trained for this research. Items were asked orally at the respondents' home and entered using a tablet.

Instruments

Child Behaviour Checklist (CBCL)

The 1½–5-year-old version adapted and translated into Spanish, as authorised by the authors, was used. It is composed of 99 items with three response options (0 = not true—as you know; 1 = in some ways, sometimes; 2 = very true or often true). The original authors report adequate fit indices for both the seven-correlated-factor model (syndromes) and for the second-order model. Narrowband syndromes showed adequate reliabilities with $\alpha > 0.70$, except anxiety/depression ($\alpha = 0.60$) and attention problems ($\alpha = 0.68$). Very good internal consistency values were reported for the internalising ($\alpha = 0.89$), externalising ($\alpha = 0.92$) and total problems ($\alpha = 0.95$) scales [1].

We computed raw scores and standardised scores (*t* scores) according to the technical manual guidelines. Total problems were calculated by adding up the 99 items. The scores were classified as normal, borderline and clinical [1]. Finally, the CBCL-DP was calculated from the sum of the *t* scores of attention problems, anxious/depressed and aggressive behaviours. In the CBCL-DP, cut-off points ≥ 180 were considered for non-clinical samples and ≥ 210 for clinical samples [17].

Sociodemographic Variables

The sex and date of birth of each child was relieved. The participating adults indicated their age and years of education.

Self-reporting Questionnaire (SRQ20 [36])

The SRQ-20 is a screening instrument to assess depression, anxiety or emotional distress. It is composed of 20 items with dichotomous answers (Yes/No). In our sample, internal consistency was very good ($\alpha = 0.87$ and $\omega = 0.84$).

Punishment Subscale of the Home Observation of the Environment (HOME)

We worked with the HOME punishment subscale [37]. It is completed by the interviewer and consists of five items that evaluate aggressive behaviours of the caregiver towards the child during the interview (for example, "Did the mother or father shout at any of the children?"). All items have a binary assessment (yes/no). Higher scores indicate a more punitive or severe parenting style. Internal consistency values in a previous study ($\alpha = 0.78$) [38] and in our sample ($\omega = 0.77$) were good.

Parent–Child Conflict Tactics Scale (CTSPC)

The UNICEF version was used in the Multiple Indicator Cluster Surveys (MICS) studies [39]. It is composed of two items of psychological aggression (for example, "I scream") and six items of physical punishment ("It shook him"), all with a binary response (yes/no). In this study a score composed of the sum of all the items was calculated with the exception of the punishment item, "He beat him up, that is, he hit him again and again as hard as he could", for not presenting variability in its answers. We found no previous studies reporting reliabilities of this scale. In this sample, the internal consistency was good ($\omega = 0.76$).

Data Processing and Analysis Plan

In total, 44 participants were excluded: 32 participants older than the upper age limit of the scale (71 months of age); 10 participants who presented more than eight missing values in the CBCL 1½–5 (as recommended in the technical guidelines) [1], and two cases for which the first five items were not recorded. No multivariate outliers were identified. Item 65 has the highest frequency of missing values (2.5%).

SPSS, MPlus 8.1 and R software were used. The first programme was used to compute descriptive statistics and correlation coefficients (missing values were imputed through the expectation maximisation procedure). With MPlus we performed the CFA with the WLSMV estimator and the LPA of the CBCL subscale scores. Missing values were estimated using the FIML procedure. R was used to estimate measurement invariance and the multinomial logistic regression model; cases with missing values were excluded from this analysis.

For CFA, we considered adequate values to be CFI > 0.90, TLI > 0.95, RMSEA ≤ 0.06 and SRMR ≤ 0.08 [40]. We followed the suggestions to perform measurement invariance with order categorical data [41, 42]. First, we tested for configural invariance, followed by threshold invariance, threshold, loading invariance and finally the threshold and loading and intercept invariance, both for sex (boys vs. girls) and age (1–3 years vs. 4–5 years old) of children. Delta in CFI and in RMSEA was calculated to assess whether the restrictions imposed on the models worsened model fit. The most restrictive model should not reduce CFI more than 0.002 [43] or at least 0.005 [44], and RMSEA more than 0.015.

In the LPA we explored solutions between 2 to 7 profiles. Better adjustment indices were considered by: (I) lower scores in Akaike information criteria (AIC), Bayesian information criteria (BIC) and sample-size adjusted version of the BIC (Adj BIC); (II) a higher score in entropy; (III) *p* value less than 0.05 in the Vuong–Lo–Mendell–Rubin likelihood ratio test (VLMR), the Lo-Mendell-Rubin test (LMR) and bootstrapped log-likelihood ratio tests (BLRT). We also

considered the theoretical relevance of each latent profile [45, 46]. After selecting the best-fitting profile solution, we assigned participants to each profile based on the most likely membership. Each profile is described qualitatively and in terms of standardised *t* scores, followed by a characterisation in terms of the sociodemographic characteristics of the mother and the child's home.

Finally, two multivariate multinomial logistic regression models were adjusted in order to jointly analyse the characteristics associated with latent profiles. Explanatory variables were included sequentially, controlling by child's sex and age (in months). In the first model, we included in step 1 the mother's age and education, and in step 2 we included maternal depression and the HOME punishment subscale scores. The second model had three steps. First, age and education were included; secondly, maternal depression, and in the third step, violent parenting practices measured via observation (HOME punishment scale) and self-report (CTSPC scale) were included in order to compare informant effects in the measurement of violent practices. For the last model, we worked with ENDIS data from the second cohort since CTSPC was only administered there.

Results

Descriptive Statistics

Table 1 shows the descriptive statistics, percentage of children in the clinical and borderline range, reliability coefficients and Spearman's correlations of CBCL 1½–5. All omegas are greater than 0.70 with the exception of attention problems. The correlations between CBCL 1½–5 syndromes are positive (> 0.30) and statistically significant. In total, the percentage of children with a deregulated profile was estimated at 9.7% and with a clinical profile at 0.9%.

Confirmatory Factor Analysis and Measurement Invariance

Both the seven correlated and second-order factor solutions present adequate fit indices (see Table 2). The standardised factor loadings of the two models evaluated in the CFA are higher than 0.50 and statistically significant, excepting item 46 ($\beta = 0.41$, $p < 0.001$ in both models, emotionally reactive subscale), and item 7 ($\beta = 0.48$, $p < 0.001$ in the model of seven correlated factors; $\beta = 0.49$, $p < 0.001$ in the second-order model, somatic complaints subscale). Item loadings are presented in Supplementary Material 2.

We performed measurement invariance with the seven-correlated-factor model as it shows better fit indices. Results

Table 1 Descriptive statistics, internal consistency and intercorrelations of CBCL 1½–5 scores

	M (SD)	% B	% C	Ω	Correlations								
					2	3	4	5	6	7	8	9	10
1. ER	1.42 (2.18)	4.7	1.6	0.78	.57**	.38**	.46**	.38**	.43**	.61**	.76**	.61**	.70**
2. A/D	2.72 (2.74)	6.5	4	0.76		.41**	.50**	.43**	.50**	.64**	.88**	.65**	.80**
3. SC	1.16 (1.80)	3.5	1.9	0.82			.32**	.33**	.31**	.38**	.64**	.39**	.52**
4. W	1.03 (1.76)	1.8	3.5	0.79				.33**	.39**	.48**	.67**	.49**	.61**
5. AP	1.82 (2.11)	1.2	1.2	0.74					.37**	.49**	.48**	.49**	.60**
6. AB	2.15 (1.85)	4	1.5	0.66						.64**	.55**	.77**	.71**
7. AB	7.82 (6.84)	3.9	2.2	0.89							.71**	.98**	.91**
8. I	6.33 (6.69)	6	7.3	0.94								.72**	.89**
9. E	9.97 (8.15)	5.4	6.5	0.91									.92**
10. T	24.96 (20.35)	5.1	6.4	0.97									

ER Emotionally reactive, *A/D* anxious/depressed, *SC* somatic complaints, *W* withdrawn, *SP* sleep problems, *AP* attention problems, *AB* aggressive behaviour, *I* internalising, *E* externalising; *% B* = percentage of borderline, *% C* = percentage of clinical, *T* = total, *M (SD)* = mean (standard deviation); ω = McDonald's Omega; *$p < .05$; ** $p < .01$

Table 2 Fit indices of the confirmatory factor analysis of CBCL 1½–5

Model	$\chi 2$	Df	CFI	TLI	RMSEA (IC 90%)	WRMR
1. Seven correlated factors	8750.495*	2123	0.936	0.934	0.027 (0.027–0.028)	2.153
2. Second order	7962.141*	1703	0.936	0.933	0.030 (0.029–0.030)	2.262

are consistent both by sex and age, as we added more restrictions to the model fit indices remain acceptable (see Table ESM 3.1 in Supplementary Material 3). Descriptive statistics by sex and age, item loadings, thresholds and subscale intercorrelations by group in the measurement invariance analyses can be found in Supplementary Material 3.

Latent Profile Analysis

Table 3 shows the fit indices of the models evaluated in the LPA. The 2-profile model has better entropy than the 3-profile solution, but it only discriminates between children with problems (78%) and without problems. The 4-, 5- and 7-profile solutions have non-significant values for VLMR and aLMR. We continue to analyse the characteristics of the 3-profile and 6-profile model because they have the most appropriate fit indices. For the 3-profile solution, the correct classification percentage exceeds 92% in all classes. In the 6-profile solution, 92% of correct classification for five profiles is exceeded and in the sixth profile 87.3% is reached (9.6% are assigned to the second profile).

Table 4 and Fig. 1 present the *t*-score's average and groups sizes of the 3-profile model. The first profile shows low scores in all subscales of CBCL 1½–5, with *t* scores ranging from 50.5 (in emotionally reactive) to 51.3 (in sleep problems and somatic complaints); for this reason, we call it "normative". The second profile has *t* scores between 54 and 58; for that reason, it was called "moderate". The last group reports *t* values ≥ 0.60 in all CBCL 1½–5 syndromes; for that reason, we labelled it "problematic".

Figure 2 presents the average t-scores for the six-profile solution. The means, group size, a description of each of the six profiles, and a note on interim 4- and 5-profile solutions are presented as Supplementary Material 4.

We compared the percentage of children classified with CBCL-DP in the non-clinical (DP; $t \geq 180$) and clinical sample (CDP; $t \geq 210$) according to the 3- and 6-profile solutions. We also identified the percentage of children in the normal, borderline and clinical range for both models. In the 3-profile model there is a progressive increase in the percentage of children identified as borderline or clinical. In the *normative* group, all participants were classified as normal, while in the *moderate,* there is an increase in children classified as borderline. In the *problematic* group, most children are classified as "clinical".

In the 6-profile model, a similar pattern is observed but with a decrease in the gradient of change between profiles, with the exception of the third and fourth. On the one hand, in the third profile there is a higher percentage of children classified as borderline and clinical in internalising and externalising than in the fourth profile. On the other hand, the fourth profile shows a higher percentage of children identified as borderline and clinical in

Table 3 Fit indices of latent profile analysis

Model	AIC	BIC	aBIC	VLMR p	aLMR *p*	BLRT*p*	Entropy	NFP
2-Profiles	126,972.9	127,112.4	127,042.5	0.000	0.000	0.000	0.918	22
3-Profiles	**123,937.7**	**124,128.1**	**124,032.7**	**0.000**	**0.000**	**0.000**	**0.895**	**30**
4-Profiles	122,850.2	123,091.3	122,970.6	0.2733	0.277	0.000	0.862	38
5-Profiles	121,794.0	122,085.9	121,939.7	0.1197	0.1221	0.000	0.894	46
6-Profiles	121,089.6	121,432.3	121,260.7	0.0148	0.0159	0.000	0.860	54
7-Profiles	120,611.5	121,004.9	120,807.9	0.2107	0.2175	0.000	0.863	62

AIC Akaike information criteria, *BIC* Bayesian information criteria, *a* adjusted, *VLMR* Vuong–Lo–Mendell–Rubin likelihood ratio test, *LMR* Lo–Mendell–Rubin test, *BLRT* bootstrapped log-likelihood ratio tests, *NFP* number of free parameters; the fit indices of the selected model are marked in bold

Table 4 Average of *t* scores for the 3-profile model

	Normative (65%) M (SD)	Moderate (28%) M (SD)	Problematic (7%) M (SD)
Emotionally reactive	50.5 (1.75)	55.4 (4.71)	68.0 (5.42)
Anxious/depressed	50.8 (1.92)	56.7 (5.24)	65.9 (7.97)
Somatic complaints	51.3 (3.18)	54.8 (6.04)	60.3 (8.10)
Withdrawn	50.7 (2.46)	54.7 (6.12)	62.9 (10.10)
Sleep problems	51.3 (3.16)	55.3 (6.47)	61.2 (10.10)
Attention problems	51.0 (2.46)	55.8 (5.48)	59.6 (6.88)
Aggressive behaviour	50.8 (1.89)	57.8 (5.61)	66.1 (8.91)

The percentage of children by category is shown in parentheses; *M (SD)* Mean (standard deviation)

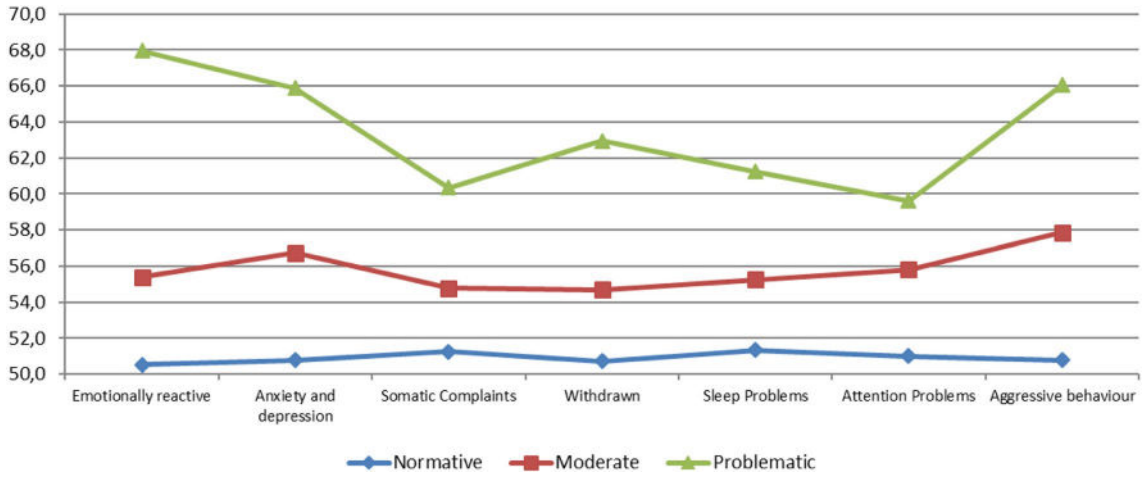

Fig. 1 Average of the *t* scores of the 3-profile solution

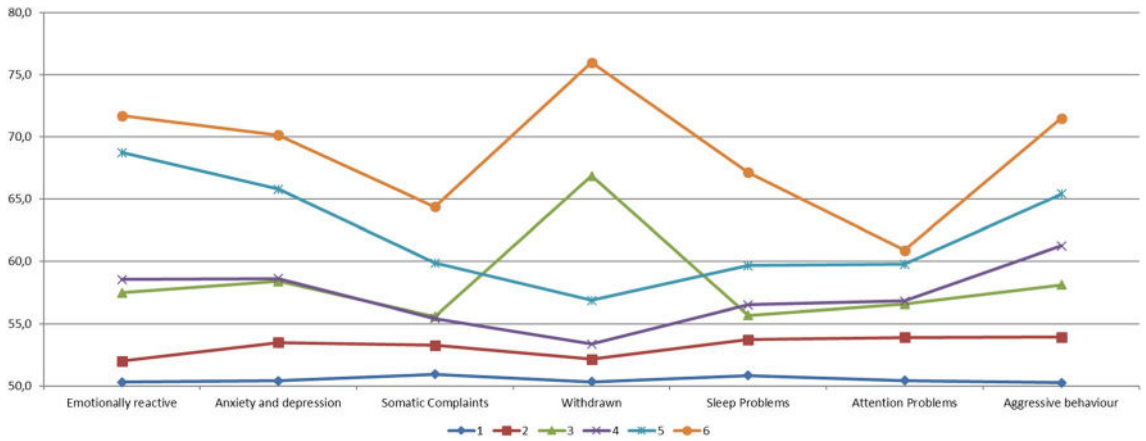

Fig. 2 Average of the *t* scores of the 6-profile solution

externalising. The percentage of profile classification of the two solutions (3 and 6 profiles) is presented in Supplementary Material 5.

As noted, there is no single model to be selected based merely on fit indices. Although the 3-profile model has some of the best indicators; the 6-profile model also shows good fit indices, with syndromes grouped according to what is expected theoretically. The 6-profile model offers some groups with less than 5% of the participants (even less than 1%) and with reduced differentiation between them. We believe that this model can be useful to consider if researchers intend to characterise or investigate children with markedly clinical characteristics. As the classification is better in the solution of 3 profiles, and profiles are more parsimonious, we will continue with the characterisation of the 3-profile model.

Characterisation of Latent Profiles

Table 5 shows the mean and distribution of the characteristics of the child and his household according to the 3-profile solution. Statistically significant differences are observed in the age of months, $F(2, 4207) = 11.06$, $p < 0.05$, between the normative ($M = 46.7$; $SD = 13.0$) and the moderate profile ($M = 44.6$; $SD = 12.8$), without observing significant differences by sex of the child. In relation to household characteristics, statistically significant differences are observed in all the variables evaluated. Regarding the mother's age ($F(2, 4180) = 68.4$, $p < 0.05$) significant differences are observed between the normative profile ($M = 32.98$; $SD = 7.32$) and both the moderate ($M = 30.59$; $SD = 7.56$) and the problematic profile ($M = 28.92$; $SD = 7.70$). Regarding mother's education, a main effect was observed ($F(2, 4177) = 142.69$,

Table 5 Descriptive statistics for latent profiles according to child and household characteristics

Group	Child		Child's home				
	Female (%)	Age (months)	Mother's characteristics			Violent practices	
			Age (years)	Education (years)	Depression (%)	Observed	Declared
Normative	49.30%	**46.77 (12.97)**	**32.98 (7.32)**	**11.34 (3.94)**	**9.76%**	**0.43 (0.84)**	**1.12 (1.16)**
Moderate	46.80%	**44.57 (12.79)**	**30.59 (7.57)**	**9.66 (3.50)**	**26.03%**	**0.79 (1.15)**	**1.47 (1.32)**
Problematic	44.40%	**46.20 (12.10)**	**28.92 (7.71)**	**8.29 (2.56)**	**47.29%**	**0.96 (1.30)**	**1.58 (1.38)**
Total	48.30%	46.05 (12.89)	32.04 (7.54)	10.67 (3.87)	16.80%	0.57 (0.99)	1.27 (1.24)

Bold values are marked with statistically significant differences ($p < .05$)

$p < 0.05$) between the three profiles (normative: M = 11.34; SD = 3.94; moderate: M = 9.66; SD = 3.50; problematic: M = 8.29; SD = 2.56). In observed violent parenting practices, a main effect was found, F (2, 4,188) = 105.65, $p < 0.05$, as significant differences were found between profiles (normative: M = 1.79; SD = 1.73; moderate: M = 2.52, SD = 2.07; problematic: M = 3.07; SD = 2.09). Finally, we also found a main effect in declared violent parenting practices between profiles, F (2, 1,561) = 16.9, $p < 0.05$), normative: M = 1.12; SD = 1.16; moderates: M = 1.46; SD = 1.31; and problematic: M = 1.58; SD = 1.38.

In summary, children in the normative group are characterised by residing in homes with more favourable conditions in terms of the mother's higher educational level and a lower level for maternal depression. Furthermore, this group shows a lower incidence of violent parenting practices, both observed and reported, with mothers being of a higher average age. In contrast, children in the problematic profile are characterised by residing in less favourable environments, characterised by a lower maternal educational level and a higher incidence of maternal depression, exposure to violent parenting practices, both observed and reported, and a lower mother's age. Children of the moderate profile are located in between the normative and the problem profile in these variables.

Table 6 Summary of the linear regression analysis of the first model and second model evaluated

Model/predictors	First model (N = 4210)		Second model (N = 1639)	
	Moderate	Problematic	Moderate	Problematic
	OR 95% (CI)	OR 95% (CI)	OR 95% (CI)	OR 95% (CI)
Step 1				
Mat. age	0.97*** [0.96;0.98]	0.95*** [0.93;0.97]	0.96*** [0.95;0.98]	0.94*** [0.91;0.97]
Mat. education	0.90*** [0.88;0.91]	0.79*** [0.76;0.82]	0.91*** [0.88;0.94]	0.80*** [0.75;0.85]
Step 2				
Mat. age	0.97*** [0.96;0.98]	0.94*** [0.93;0.96]	0.96*** [0.95;0.98]	0.93*** [0.90;0.96]
Mat. education	0.91*** [0.89;0.93]	0.83*** [0.79;0.87]	0.91*** [0.88;0.95]	0.83*** [0.78;0.89]
Mat. depression	2.62*** [2.15;3.2]	5.78*** [4.32;7.73]	2.66*** [1.93;3.65]	4.68*** [2.97;7.37]
VP observed	1.35*** [1.25;1.45]	1.40*** [1.25;1.57]		
Step 3				
Mat. age	n.a	n.a	0.96*** [0.94;0.98]	0.93*** [0.90;0.96]
Mat. education	n.a	n.a	0.91*** [0.88;0.95]	0.83*** [0.77;0.89]
Mat. depression	n.a	n.a	2.37*** [1.71;3.28]	3.97*** [2.49;6.34]
VP—Self reported	n.a	n.a	1.18*** [1.07;1.3]	1.15 [0.98;1.36]
VP—observed	n.a	n.a	1.42*** [1.24;1.62]	1.55*** [1.28;1.88]

Reference category: normative profile; all regressions are controlled by sex and age (months) of the child; *n.a.* not applicable; ***$p < .001$ **$p < .01$ *$p < .05$; information of model 1: N of step 1 = 4180, N of step 2 = 3829; R^2 (CoxSnell): step 1 = .09; step 2 = .11; R^2 (Nagelkerke): step 1 = .15; step 2 = .19; information of model 2: N of step 1 = 1616, N of step 2 = 1438, N of step 3 = 1424; R^2 (CoxSnell): step 1 = .09, step 2 = .14, step 3 = .17; R^2 (Nagelkerke): step 1 = .11; step 2 = .17, step 3 = .20; Mat. = maternal; VP = Violent practices

Multinomial Regression Model

A summary of the first and second multinomial regression model evaluated is presented in Table 6. In the first model, age and education of the mother were included in step 1, and maternal depression and violent parenting practices observed at the time of the survey were included in step 2.

The mother's age and education are statistically significant in explaining the probability that the child is of the moderate or problematic profile with respect to the normative. The older the mother and the higher the mother's education level, the lower the probability of the child being in the profiles with behavioural problems. Maternal depression is the risk factor with largest effect size, i.e., the estimated effect almost quintuples the probability that the child belongs to the problem profile and almost doubles the probability of being in the moderate profile (both compared to the normative). Violence in parenting practices increases the probability of the child belonging to profiles with behavioural problems (moderate and problematic) by around 40% compared to the normative.

In the second regression analysis model, maternal depression enters a step earlier than the variables of violent parenting practices. In step 3, the method effect of the informant of violent practices is studied, entering simultaneously CTSPC scores and HOME violent practices subscale scores. When comparing models 1 and 2, a similar pattern is identified among the variables entered (with the same valence, strength and statistical significance) with similar coefficients for both models tested. Regarding violence in parenting practices, the CTSPC scores do not contribute significantly to the model. However, HOME scores are a significant predictor of CBCL total scores.

Discussion

Using CBCL 1½–5 data administered in a nationally representative population survey, this study aimed to: (a) estimate the psychometric properties of a Spanish version of CBCL 1½–5, (b) determine the latent profiles of behavioural problems and their relationship with the suggested risk profiles, and (c) characterise these profiles according to sociodemographic variables and the child's family context.

This version of CBCL 1½–5 showed very good psychometric properties, better than in most other Latin American samples. Regarding internal consistency, all indicators are higher than 0.70, with the exception of attention problems which are somewhat below that threshold. This result is consistent with the findings of other studies in Latin America [3, 4, 7, 9] and in the original study with the US population [1]. Therefore, we suggest that researchers should analyse the convenience of using this subscale score in their studies.

Our results also confirm the factor structure of the correlated seven-factor model and the second-order model, proposed by the original authors [1] and widely cross-culturally replicated. We have also confirmed adequate levels of invariance, so this version of the CBCL can be used for comparative purposes among children of different ages and sexes. In line with this, our study adds to previous studies of factor invariance of CBCL between groups according to different sociodemographic criteria [2, 13, 14].

As a second objective, we set out to determine the existence of latent empirically based profiles and to analyse concordance with profiles determined by cut-off scores. We found that both a three-profile model and a latent six-profile model are reasonable models to consider. For the characterisation of population-wide behavioural problems in Uruguay, we selected the three-profile model, which is more parsimonious and avoids marginal profiles in terms of size. This solution groups children into three levels of risk, without observing inverse combinations in subscales of externalised or internalised problems. Profiles are characterised by similar levels in all subscales. This may be due to the high correlation observed between subscales of internalised and externalised problems in our sample ($r = 0.71$). The first profile presents a total absence of risk of behavioural problems; the second presents a very low probability of clinical risk and a low probability of borderline risk, and the third presents high risks of severe clinical problems (i.e. generally, with t scores greater than 60), including the deregulated profile. In conclusion, our empirical results based on the analysis of latent profiles support more the categorisation of total problems (normal, borderline and clinical), than that based on deregulated profiles, in the preschool population. The reasons why the CBCL-DP was not found in our LPA may be aligned with those raised by Basten et al. [19] that the CBCL-DP may emerge at a later age, coinciding with the age range of the next version of the CBCL.

The 6-profile model, although similar to the 3-profile model and while the profiles can be grouped according to the total number of all problems (rather than by internal combinations of the subscales), presents some peculiarities that may be of interest for researchers who want to better characterise subgroups with very high behavioural problems. The 6-profile solution finds a profile with very high behavioural problems and low n but which is one that can be of great relevance for targeting prevention campaigns in early childhood. Also, there are two intermediate profiles, distinguishable by either high withdrawal or high aggressive behaviour. In comparison to other studies, we found partial support for other latent profile solutions reported in the literature. For example, we could not find the specific internalising or externalising profiles found by Connell et al. [20] and by Basten et al. [19], although we did replicate the findings of extreme profiles of very low problems and those

that were highly problematic or comorbid (we labelled these as problematic).

Finally, we aimed to characterise the profiles by sociodemographic information and home composition and to explore the contribution of maternal depression and domestic violence. As in previous studies [47], we found that the group with the greatest behavioural problems was the most disadvantaged in socioeconomic terms, and had slightly younger mothers. Likewise, the profile of those with major problems was mostly male, thus replicating previous studies [8, 24]. Our results of the multinomial regression model indicate that maternal depression is the variable that best explains belonging to a profile with behavioural problems, with effects being shown that are far superior to other variables (including observed and self-reported violence). The effects, assessed as odds ratios, are similar in magnitude to those reported for other developing countries [48] in terms of lags in the emotional development of children, thereby increasing the risk between four to six times. The effect of violent practices contributes to a lesser extent to explain membership in a behavioural problem profile, despite reaching statistical significance. In any case, the violence reported by the observer through the HOME scale scores better predicts the behavioural problems profiles than the self-reported violence score, thus contributing to the idea that this method may be subject to measurement error [34].

Although this study worked with a national representative sample of Uruguayan children and had a high statistical power design, it has some limitations. First, the instruments were administered in the context of an interview, when they were originally designed to be self-administered. Second, when working with a sample of general population, the instrument can show problems of variability or discrimination estimating behavioral problems (i.e. floor effect). Finally, only one source of data was available for child psychopathology (parents' report). Future research would benefit from using a multi-informant approach, including, for example, clinical records on child psychopathology. Another promising line of research is to use ENDIS panel data to perform a latent transition analysis with the successive waves of the survey in order to explain change or continuity in profiles across child development.

Summary

This study proved, in a nationally representative sample, that the Spanish version of the CBCL has very good psychometric properties for its use in early childhood. Also, we could identify three latent profiles based on low, intermediate and problematic levels of both internalising and externalizing behaviour. Membership to profiles with higher behavioural problems was associated with child sex, socioeconomic status, maternal depression and parental violent practices.

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Compliance with Ethical Standards

Conflict of interest Fanny Rudnitzky works in the Ministry of Social Development, which runs the governmental survey. The other three authors declare that they have no conflict of interest.

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