# Usefulness of the Social and Communication Disorders Checklist (SCDC) for the assessment of social cognition in preschoolers

Post-print version

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**Abstract**

This study provides data on the usefulness of the Spanish version of the Social and Communication Disorders Checklist (SCDC), in terms of the validity and reliability of derived scores. Data were obtained from parents' interviews and parents' and teachers' questionnaires that measured different psychological variables from a community sample of 579 (291 boys and 288 girls), 5-year-old children. These children were tested to assess their intellectual capacity. Confirmatory factor analyses yield a one-dimensional structure invariant across sex within each informant (parents or teachers), with negligible latent mean differences between boys and girls for both informants (parents-teachers). The internal consistency was excellent (omega values ranged from .90 for parent version to .95 for teachers). SCDC scores correlated with specific scales related to developmental problems, aggressive behavior, executive functioning, and uncaring behavior towards others. SCDC scores were unrelated to intelligence quotient, whereas SCDC scores were useful for predicting the presence of behavior problems, measured with diagnostic interview. Results provide evidence on reliability and validity of SCDC scores, which is potentially a useful measure for the study of social cognition and its relationship with preschool adjustment.

**Key words**: preschool assessment, social cognition, Social and Communication Disorders Checklist, SCDC, validity

## Introduction

Social cognition is understood as the aspects of higher cognitive function that are involved in understanding social situations by attending to, interpreting, and responding to social cues, thus enabling the planning of appropriate responses (Staub & Eisenberg, 1991). It includes all the processes by which humans understand themselves and others in terms of how they feel, react, perceive or infer (Sharp, Fonagy & Gooyer, 2008). Deficits in social competence are considered a core problem in autistic spectrum disorders and a key symptom when a diagnosis is required. Diagnostic boundaries between neurodevelopmental and behavior disorders are not clear-cut and there is considerable comorbidity that suggests a certain sharing of neurocognitive deficits (Donno, Parker, Gilmour, & Skuse, 2010; Moffit, Caspi, Rutter & Silva, 2001). Gilmour, Hill, Place, and Skuse (2004) found that disruptive children often present pragmatic skill deficits similar to those present in autistic-spectrum disorders. Recent studies have described a continuous distribution of these deficits in the general population (Skuse et al., 2009) and suggested the convenience of measuring them dimensionally in order to detect subclinical problems associated with functional impairment in several areas and a large range of childhood developmental disorders (Oliver, Barker, Mandy, Skuse, & Maughan, 2011).

A strong correlation has been found between measures of conduct problems and social communication competence, using a twin design in children with normal development, and suggesting latent genetic influences in both domains (Scourfield, Martin, Eley, & McGuffin, 2004). Children with conduct problems have been shown to have impaired verbal skills and executive functioning (Moffitt, 1993), both of which are relevant to social cognition and interaction. It has been suggested that deficits in social communication can lead to antisocial and disruptive behavior (Gilmour et al., 2010).

Considering the high prevalence of conduct problems in early childhood (Angold & Egger, 2007), the increasing number of children referred to Child and Mental Health Services because of disruptive behavior (Frick & Silverthorn, 2001), and the importance of prevention at early ages (Barkley et al., 2002; Loeber & Farrington, 2000; Sonuga-Barke, Auerbach, Campbell, Daley, & Thompson, 2005), there is a great need for instruments that allow comprehensive assessment addressing all the possible factors related to conduct problems. To the best of our knowledge, no measure of social cognition for preschoolers is available in Spain, nor has any measure been validated for use with teachers.

The Social Communication Disorders Checklist (SCDC; Skuse, et al. 1997) is a one-dimensional scale designed to be answered by parents and teachers. It was originally developed to measure social-behavior deficits in individuals with Turner's syndrome and, later, was also used to measure the social and communication deficits in social reciprocity, non-verbal skills and pragmatic language usage which are characteristic of the autism spectrum (Skuse, Mandy, & Scourfield, 2005). This was done on the basis that autistic traits are widely present in the general population and that scores in the clinical range are also predictive of the presence of conduct problems in community samples (Constantino & Todd, 2003; Spiker, Lotspeich, Dimiceli, Myers, & Risch, 2002). This checklist was designed for screening purposes and is not suitable for clinical diagnosis. However, it can be used to understand the role of sub-threshold autistic trait difficulties (such as understanding the feelings, thoughts and behaviors of others) in behavioral difficulties such as ADHD and conduct disorders (Skuse et al., 2005).

The aim of the present study was to provide evidence on the usefulness and psychometric quality of the SCDC, answered by teachers and by parents in a large Spanish community sample of preschoolers aged 5. Thus, the specific objectives are three-fold: a) to test the factor structure and measurement invariance of the questionnaire across sex; b) to

study the internal consistency of the derived scores; and c) to provide evidence based on convergent and discriminant validity with other measures of aggressiveness, intelligence and executive functioning, and with DSM-IV diagnoses obtained through a diagnostic interview. We hypothesized that social cognition skill, as measured with the SCDC, would be independent of intelligence (Gilmour et al., 2004) and also that high difficulty levels would correlate with conduct problems, ADHD and emotional and relationship problems.

## Method

### Participants

The data used in this study correspond to the third year of a longitudinal research project into vulnerability to behavioral problems in preschool children. The research was conceived with a two-phase design, and an initial random sample of 2,283 children selected from all registered preschoolers (age 3) in Barcelona for the 2009-10 academic year. Children with mental retardation or pervasive developmental disorders were not included in the study.

The proportion of families that agreed to participate in the first phase was 58.7% ($N$ = 1,341 families) and no differences were found when comparing participants and refusals according to sex ($p$ = .95). However, the proportion of refusals was statistically higher for families from low socio-economic groups ($p$ < .001). The screening for including children in the second phase was carried out with the parent version of the Strengths and Difficulties Questionnaire for 3- and 4-year-olds (SDQ$^{3\text{-}4}$; Goodman, 1997). All children with a positive screening score for conduct problems, as well as a random sample including 30% of children with negative scores in the screening, were invited to continue with the longitudinal research program. The final second-phase sample included 89.4% of the families invited to continue ($N$ = 622 children), and no statistical differences were found in sex ($p$ = .820) or type of school ($p$ = .850) for participants and refusals. The mean initial age of the children was 2.97

years (*SD* = 0.16). Of the participants, 310 were boys (49.8%), and 558 were white (88.9%). The final sample for this study, obtained when children were 5, included 579 children (those with both parents' and teachers' SCDC questionnaires completed). No differences were found in sex ($p$ = .442), type of school ($p$ = .251) or socioeconomic status ($p$ = .078) between the initial sample at age 3 and children at age 5. Table 1 shows the descriptive statistics for the participants in the sample.

**Measures**

*The Social and Communication Disorders Checklist* (Skuse et al., 1997). This is a 12-item questionnaire with situations responded to on a 3-point Likert scale (0: *not true,* 1: *quite true,* and 2: *very true*). These enquire about the extent to which a child has social difficulties and was completed by parents and teachers. Higher scores indicate greater difficulties in perceiving others' feelings and moods and recognizing the consequences of their own behavior in the environment. Children with high scores have poor reciprocity skills in social relations and may show poor communication skills. In order to adapt the questionnaire, we combined back translation with a bilingual committee of experts (Hambleton, 1994). The original questionnaire was translated into Spanish by two bilingual clinical psychologists and the translated questionnaire was sent back to the author who submitted it to back translation. Differences were discussed and a consensus reached. Two independent bilingual clinical psychologists reviewed the equivalence of the content.

The *Strengths and Difficulties Questionnaire* ($SDQ^{3-4}$; Goodman, 1997) for parents and teachers of 3- to 4-year-old children was used for the study. The items have 3 response options (0: *not true*; 1: *somewhat true*; 2: *certainly true*). The $SDQ^{3-4}$ used in this study also includes the impact supplement and the two broader internalizing (sum of the items of emotional+peers subscales) and externalizing (sum of conduct+hyperactivity subscales) factors,

(Goodman, Lamping & Ploubidis, 2010). The official Spanish version of the $SDQ^{3-4}$ was used.

*Kaufman Brief Intelligence Test* (*K-BIT),* (Kaufman, 1994). This instrument is meant to be a quick measure of intelligence. Both the Matrix Abstract Reasoning and Vocabulary subtests of the Spanish version were used. Children were assessed at the age of 4.

The *Behavior Rating Inventory of Executive Function for Preschool Children* (BRIEF-P; Gioia, Isquith, Guy, Kenworthy, & Baron, 2000) measures executive functions, with 63 items and 3 response options (0: *never* to 2: *very often/always*), and was completed by teachers. For this study, we used the ISCI global index (sum of the items included in inhibitory and emotional control scales), the FI index (sum of shift and emotional control scales) and the EMI index (sum of working memory and plan-organize scales). The Spanish version of the instrument was used in this study (Ezpeleta, Granero, Penelo, de la Osa, & Doménech, in press).

The *Children's Aggression Scale* (CAS; Halperin & McKay, 2008) assesses aggressive behavior with 22 items on a 5-point Likert-type scale (0*: never* to *4: many days*). It is structured into 7 primary factors (verbal aggression, aggression against objects and animals, use of weapons, provoked physical aggression, initiated physical aggression, aggression towards peers, aggression towards adults) and a scale of global aggressive behavior. This questionnaire was answered by teachers. Verbal aggression, provoked physical aggression, initiated physical aggression, aggression towards peers and aggression towards adults scales were used in the analysis.

*Inventory of Callous-Unemotional traits* (ICU, Frick, 2004). This includes 24 items coded on a 4-point Likert-type scale (0: *not at all true* to 3: *definitely true*) and covers three dimensions: callousness (11 items), which attempts to measure the degree to which the child is unaware of other people's feelings and does not care about behaving in a socially

acceptable way, uncaring (8 items), indicating the degree to which the child worries about accomplishing duties and the acceptance of mistakes and their consequences, and unemotional (5 items), dealing with the child's difficulties in sharing emotions or openly expressing feelings. The Spanish version was used (Ezpeleta, de la Osa, Granero, Penelo & Domènech, 2013).

The *Diagnostic Interview of Children and Adolescents for Parents of Preschool Children and Young Children (DICA-PPYC)* was used to assess children's psychopathology according to the DSM-IV-TR taxonomy (American Psychiatric Association, 2000). This interview, which was answered by parents, has been adapted and validated for the Spanish preschool population, showing good psychometric properties (Ezpeleta et al., 2011). The diagnoses included in this study were Attention Deficit Hyperactivity Disorder (ADHD), Oppositional Defiant Disorder (ODD), and the Any disruptive disorders category, which included either of these two or Conduct Disorder (CD).

**Procedure**

The project was approved by the ethics review committee of the authors' institution. Head teachers of the participating schools, as well as the children's parents, received a complete description of the study. Families were recruited at the schools and gave written consent. All parents of children from P3 (aged 3) in the participating schools were invited to answer the $SDQ^{3-4}$ at home and return it to the schools. Families who agreed and met the screening criteria were contacted by telephone and interviewed yearly at the school throughout the three-year preschool period. Interviewers had previously received training and were blind to the children's screening group. After the interview, teachers answered the BRIEF-P at age 3, and the ICU and CAS questionnaires at age 5. Both parents and teachers answered the SCDC at age 5. Children were assessed with the K-BIT at age 4 by a different examiner to the one interviewing the family.

**Statistical Analysis**

Analyses were carried out with SPSS19 and MPlus7 for Windows. Because of the multi-stage nature of the sample, data were analyzed with sampling weights inversely proportional to the probability of participants' selection in the second phase of the project, and with the case weighting procedure in MPlus7.

Multi-Group Confirmatory Factor Analysis across sex was conducted using Weighted Least Squares Means and Variance (WLSMV), adjusted for the categorical data method of estimation. For each group of responses (teachers and parents), we started with a 1-factor configural invariance model, in which factor loadings and item thresholds were free to vary across sex. Next, measurement invariance was tested with the scaled difference chi-square test (Bryant & Satorra, 2012) between nested models, following the common sequence: metric invariance by constraining factor loadings and then scalar invariance by constraining item thresholds to be equal across sex. When full invariance was not achieved, we examined the fit indices of partially invariant models in which the parameters of one item were relaxed sequentially with a backward procedure (Kim & Yoon, 2011). Goodness-of-fit was assessed with the common fit indices (Jackson, Gillaspy, & Purc-Stephenson, 2009): $\chi^2$, comparative fit index (CFI), Tucker and Lewis index (TLI), and Root Mean Square Error of Approximation (RMSEA). Internal consistency of the SCDC scales was measured through omega coefficients (McDonald, 1999).

Pearson's coefficients ($r$) evaluated the convergent validity between SDCD scores and other psychopathological measures. Due to the large sample size and the high statistical power, low correlation values tended to be statistically significant. Thus, only $r$-coefficients with good effect sizes ($|r| \geq .30$) were considered relevant.

The screening accuracy of the SDCD for identifying specific DSM-IV disorders (ADHD, ODD and CD) was analyzed through odds-ratios (OR) in logistic regression models,

the area under the receiver operator curve (AUC), and sensitivity-specificity coefficients. Sensitivity and specificity were estimated for three different SDCD cut-offs: usual borderline threshold (scores corresponding to percentile 80), abnormal threshold (percentile 90), and a proposed cut-off for screening purposes based on a sensitivity not inferior to 75%.

## Results

### Multi-Group Confirmatory Factor Analysis and Internal Consistency

For teachers' responses, the goodness-of-fit indices of the unconstrained baseline 1-factor model were acceptable [$\chi^2$ (108) = 314.5; CFI = .946; TLI = .934; RMSEA = .082 (CI 90%: .072; .093)]. Partial metric invariance across sex was satisfactory [$\Delta\chi^2$ (9) = 13.6; $p$ = .139], as more than 80% (10 out of 12) of the factor loading parameters were equivalent across girls' and boys' ratings (Dimitrov, 2010): all except item 6 (higher for boys) and item 7 (higher for girls), but all ≥ .40. Full scalar invariance was achieved [$\Delta\chi^2$ (23) = 28.8; $p$ = .189], as all item thresholds were equivalent across sex. After completing the tests for metric and scalar invariance, the comparison of latent means could be conducted (Vandenberg & Lance, 2000). These were found to be similar for both sexes (0.38 standard deviation units higher for boys than for girls, which can be considered negligible). The fit statistics for this final constrained model were satisfactory [$\chi^2$ (140) = 312.2; CFI = .955; TLI = .957; RMSEA = .066 (CI 90%: .056; .076)].

For parents' responses, the goodness-of-fit indices of the unconstrained baseline 1-factor model were acceptable [$\chi^2$ (108) = 277.8; CFI = .895; TLI = .872; RMSEA = .076 (CI 90%: .0654; .087)]. Partial metric invariance across sex was achieved [$\Delta\chi^2$ (10) = 15.7 $p$ = .110], and only factor loading for item 1 was found to be higher for boys than for girls, but both ≥ .40. Full scalar invariance (equivalence of item thresholds) was achieved [$\Delta\chi^2$ (23) = 21.7; $p$ = .537]. Latent means were found to be equivalent across sex when constrained to be

zero in the boys and girls groups [$\Delta\chi^2$ (1) = 1.7; $p$ = .189]. The fit statistics for this final, fully-constrained, model were also satisfactory [$\chi^2$ (142) = 281.8; CFI = .914; TLI = .920; RMSEA = .060 (CI 90%: .050; .071)]. Table 2 presents standardized factor loadings across sex for both final models based on ratings provided by teachers (left) and parents (right). The internal consistency was excellent ($\omega \geq .90$) (Table 2, bottom).

Further analyses were based on summated rating scale scores of the respective item values. Means and standard deviations of these SCDC direct scores were 2.15 (3.25) for girls and 3.29 (4.26) for boys in the teachers' version and 3.38 (3.13) for girls and 3.60 (3.21) for boys in the parents' version. Mean and standard deviation for the total sample was 2.71 (3.82) for teacher's version and 3.50 (3.17 for the parents' one.

**Association between SDCD and other Psychological Measures**

Table 3 shows the correlation coefficients of the parent- and teacher-reported SCDC , along with other psychological measures. For the teacher version, we found high correlations with the Externalizing problems scale and the Total scale scores. No association was found between the teachers' SCDC scores and the Emotional symptom scale of the SDQ[3-4.] The rest of the SDQ scales presented moderate associations with SCDC scores. No associations were found between the children's performance in the K-BIT subtests and the SCDC scores of any of the informants. In addition, teachers' SCDC scores and executive functioning, as measured by the BRIEF-P, significantly correlated as regards children's ability to modulate actions, responses and emotions (ISCI), as well as their ability to plan, organize and self-control cognitive tasks, and the index of global executive level (GEC). Moreover, a high level of difficulty in social cognition abilities, measured through the SCDC, significantly correlated with the degree of ignorance of the feelings of others and a lack of concern about their own mistakes or acceptance of their consequences (callous unemotional children's characteristics, measured with the ICU), as reported by teachers. SCDC scores also positively correlated with

all CAS scores, measuring different forms of aggression (physical or verbal) either toward peers or adults.

Parents' SCDC scores were moderately associated with all the scales of the SDQ[3-4] questionnaire, with the strongest associations being with the Externalizing and Total score scales.

**Screening Accuracy of the SDCD to Identify ADHD, ODD, and CD**

Table 4 shows the cut-off point for children with SDCD scores over percentile 80 (borderline) and percentile 90 (abnormal), as well as the best cut-off point for guaranteeing sensitivity equal to or higher than .75. The discriminative accuracy was good for parents: AUC = .82 for all the diagnoses assessed. The discriminative power was lower for teachers, with AUC values ranging between fair (.71 for ODD and Any disruptive disorder) to good (.80 for ADHD).

Sensitivity was low for borderline and abnormal cut-off points, both for parents' and teachers' reports. The empirical cut-off point showed good sensitivity. Specificity was between good to very good for borderline and abnormal cut-off points (coefficients near or above 80.0%), but lower for empirical cut-off points (58.6% to 79.8%). Maximum sensitivity and specificity were obtained with a cut-off point that described participants scoring 5 or more for any of the disorders studied, when parents were the informants, as "probable cases".

## Discussion

The parent and teacher versions of the SCDC proved an invariant one-dimensional structure across sex. Both versions constitute a reliable and valid instrument to detect social cognition deficits in preschool ages. Consistent with the original English (Skuse et al., 2005) and German (Bolte, Westerwald, Holtmann, Freitag, & Poustka, 2011) versions the parent version showed a single factor structure in the general population, with excellent internal consistency. The teacher version followed the same pattern. Mean scores as reported by

teachers were found to be similar to those obtained in the original parent version (Skuse et al., 2005), in an assessment in a normal population with a mean age of 13, (Skuse et al., 2009), in a large sample of 8,094 children (mean age 7 years and 8 months) (Scourfield et al., 2004) and in a population-based sample of twins aged 5 to 17 (Scourfield et al., 1999), with boys obtaining significantly higher scores than girls. Still, neither these values nor the mean scores reported by parents were significantly different in terms of effect size for sex, as Cohen's *d* did not produce relevant coefficients ($d < 0.50$) in any case.

In line with the results obtained by Skuse (2009), who showed deficits in the social communication domain to be good predictors of poor behavioral adjustment at school, our results show that subclinical deficits are associated with functional impairment at school in a wide range of behavioral domains, including peer relations and attention skills, as reported by teachers in the SDQ. In addition, high scores in the SCDC are positively associated with the risk of conduct disorders and aggressive behavior. Information provided by parents follows the same pattern, but also includes a moderate association with emotional symptoms. Correlations between each of the two versions of the questionnaire and measures of psychological problems and impairment were found in the expected direction and were also in line with the results found in the literature when using the parents' version of the SCDC with older children (Skuse et al., 2009). The correlations between SCDC scores rated by teachers and difficulties as measured with SDQ are stronger than in the case of parents. Communicative abilities are context dependent (Bishop & Baird, 2001) and, therefore, deficits in communication skills at preschool age are better detected by teachers as they are more likely to meet the children in interaction with their peers than parents. This suggests that the SCDC is useful as a screening tool in school settings. As with the results obtained by (Constantino & Todd, 2003; Gilmour et al., 2004) and (Skuse et al., 2005; 2009), SCDC

scores were independent of abstract reasoning IQ, and were not associated with any measure of formal language.

Social dysfunction score, as measured by the SCDC, was significantly correlated with two different indicators of executive functioning: inhibitory self-control and metacognition, measured though the BRIEF-P. Executive functions are considered to have an important relation to the correct development of social interaction, as they seem to develop in parallel with synchronic developmental processes, even when IQ and age are controlled (Gilmour et al., 2004; Hudges, Dunn, & White, 1998).

The relationship found between callousness characteristics, measured though the ICU and SCDC scores, can be explained as evidence on convergent validity, as some items of the first questionnaire ask about difficulties understanding other people's feelings and an uncaring nature, which could be shared by both constructs. The relationship between social cognition deficits and aggressive behaviors supports the theory that erroneous attribution of meaning to other peoples' actions or words may lead to aggressive responses, as suggested by the Social Information Process (SIP) (Dodge, 1993).

Both versions of the questionnaire show a good ability to identify children with disruptive disorders, especially those with ADHD. This is probably related to the association between executive functions (which are especially impaired in children with ADHD) and social cognition mentioned above. This is particularly remarkable in the case of teacher's reports, as the information used to give a diagnosis was provided by parents, indicating that information provided by teachers with the SCDC can also be useful for identifying children with conduct difficulties.

These results are, therefore, in line with findings on the SCDC in other countries (the UK and Germany). It should be noted, however, that we studied a sample of the general population, and psychopathology is not very frequent in community samples, something

which might have affected the discriminative power. A lack of available valid instruments did not allow us to correlate our data with other measures of social cognition and we did not obtain a particular measure of pragmatic language to make comparisons, as the main object of our study was vulnerability to conduct disorders and not social cognition itself. However, we believe the psychometric properties reported can be generalized to preschool children of the general population.

Despite the aforementioned limitations, to our knowledge this is the first study to present results about the teacher's version of the SCDC and the only one to study the measurement invariance of the item scores across sex. This is also the first report of this measure in a preschool population in a large community sample to show the viability of measuring this variable at this age. The SDCD, both parent and teacher versions, has been found to be a brief, reliable and valid instrument to screen for unspecific social and communicative deficits, especially in school. The early identification of these social skills deficits could benefit many children, as they have been systematically related to conduct problems and poor school adjustment.

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Table 1.

*Sociodemographics and clinical data for the sample (N = 579).*

| | | |
|---|---|---|
| Child's age (*M*; *SD*) | | 5.0 (0.16) |
| Child's sex (*n*; %) | Male | 291 (50.3%) |
| Child's race/ethnicity (*n*; %) | Caucasian | 520 (89.8%) |
| | American Hispanic | 40 (6.9%) |
| | Other | 19 (3.3%) |
| Mother's age (*M*; *SD*) | | 36.5 (4.7) |
| Father's age (*M*; *SD*) | | 38.7 (5.8) |
| *Family socioeconomic status | High | 193 (33.3%) |
| | Mean-high | 183 (31.6%) |
| | Mean | 84 (14.5%) |
| | Mean-low | 91 (15.7%) |
| | Low | 28 (4.8%) |
| DSM-IV disorders | | *N* (weighted %) |
| Any disorder (including all interview's section) | | 231 (36.9%) |
| Any disruptive disorder | | 67 (9.6%) |
| ADHD | | 30 (4.2%) |
| Oppositional defiant disorder | | 46 (6.6%) |
| Conduct disorder | | 5 (0.5%) |
| Mood disorders | | 3 (0.3%) |
| Any anxiety disorder | | 75 (11.7%) |

*Note*: * (Hollingshead, 1975) *(n; %)*

Table 2. Confirmatory factor analysis (standardized factor loadings across sex) and internal consistency (omega) of the SCDC rated by teachers and by parents.

| | Teachers | | Parents | |
|---|---|---|---|---|
| Factor loadings (λ) | Girls | Boys | Girls | Boys |
| 1. Not aware of other people's feelings | .880 | .890 | **.601** | **.861** |
| 2. Does not realize when others are upset or angry | .846 | .856 | .847 | .808 |
| 3. Does not notice the effect of his/her behavior on family | .810 | .820 | .715 | .682 |
| 4. Behavior often disrupts family life | .823 | .833 | .641 | .611 |
| 5. Very demanding of other people's time | .720 | .728 | .643 | .612 |
| 6. Difficult to reason with when upset | **.398** | **.623** | .437 | .416 |
| 7. Does not seem to understand social skills | **.941** | **.759** | .745 | .710 |
| 8. Does not pick up on body language | .799 | .808 | .681 | .649 |
| 9. Does not appear to understand how to behave when out | .884 | .894 | .648 | .617 |
| 10. Does not realize if s/he offends people with her/his behavior | .853 | .863 | .695 | .662 |
| 11. Does not respond when told to do something | .666 | .674 | .588 | .561 |
| 12. Cannot follow a command unless it is carefully worded | .745 | .753 | .564 | .538 |
| Internal consistency (ω) | *.95* | *.95* | *.90* | *.90* |

All parameters, $p < .001$. In bold: factor loadings non-equivalent across sex; in italics: internal consistency (omega coefficient).

Table 3. Correlations between SDCD scores and other psychological measures provided by the same informant.

| | SDCD-teachers | SDCD-parents |
|---|---|---|
| SDQ: Emotional symptoms | .285 | **.347*** |
| SDQ: Conduct problems | **.643*** | **.561*** |
| SDQ: ADHD | **.639*** | **.498*** |
| SDQ: Peers | **.467*** | **.338*** |
| SDQ: Pro-social | **.511*** | **.390*** |
| SDQ: Internalizing problems | **.458*** | **.431*** |
| SDQ: Externalizing problems | **.710*** | **.618*** |
| SDQ: Total | **.735*** | **.657*** |
| SDQ: Impact | **.603*** | **.426*** |
| KBIT: Matrix | −.045 | −.112 |
| KBIT: Verbal | −.007 | −.063 |
| BRIEF: Inhibitory Self−Control Index (ISCI) | **.429*** | --- |
| BRIEF: Flexibility Index (FI) | .163 | --- |
| BRIEF: Emergent Metacognition Index (EMI) | **.311*** | --- |
| BRIEF: Global Executive Composite (GEC) | **.374*** | --- |
| ICU: Callousness | **.592*** | --- |
| ICU: Uncaring | **.543*** | --- |
| ICU: Unemotional | .114 | --- |
| CAS: Verbal aggression | **.487*** | --- |
| CAS: Physical aggression (Provoked + Initiated) | **.426*** | --- |
| CAS: Aggression toward peers | **.416*** | --- |
| CAS: Aggression toward adults | **.373*** | --- |
| CAS: Total score | **.436*** | --- |

*In bold: relevant *r*-coefficient ($|r| \geq .30$). --- Not available for parents.

Table 4. Screening predictive accuracy of SDCD scores for DSM-IV disorders.

| | | Borderline cut-off (SDCD-$P_{80}$) | | | Abnormal cut-off (SDCD -$P_{90}$) | | | Screening cut-off (Proposed) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | OR | Score | Se | Sp | Score | Se | Sp | Score | Se | Sp | AUC (95% CI) |
| SDCD-teachers | | | | | | | | | | | |
| Any disruptive disorder | 1.18* | 5 | 57.4 | 81.1 | 8 | 38.9 | 90.8 | 2 | 87.0 | 60.1 | .75 (.69; .82) |
| ADHD | 1.13* | 5 | 75.0 | 79.8 | 8 | 66.7 | 90.4 | 5 | 75.0 | 79.8 | .80 (.71; .88) |
| ODD | 1.12* | 5 | 47.2 | 79.2 | 8 | 22.2 | 88.6 | 2 | 86.1 | 58.6 | .71 (.63; .78) |
| SDCD-parents | | | | | | | | | | | |
| Any disruptive disorder | 1.39* | 6 | 69.2 | 83.2 | 8 | 47.2 | 92.4 | 5 | 76.9 | 75.7 | .82 (.77; .88) |
| ADHD | 1.32* | 6 | 73.9 | 80.5 | 8 | 47.8 | 90.2 | 5 | 82.6 | 72.8 | .82 (.74; .90) |
| ODD | 1.37* | 6 | 71.4 | 81.6 | 8 | 50.0 | 91.3 | 5 | 77.8 | 74.0 | .82 (.76; .89) |

AUC: area under ROC curve. Se: sensitivity (%). Sp: Specificity (%).

SDCD-$P_{80}$: percentile 80 for SDCD score. SDCD -$P_{90}$: percentile 90 for SDCD score.

OR and AUC values obtained through logistic regression models. *Significant OR coefficient.