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# Psychometric Validity of the Strengths and Difficulties Questionnaire-Dysregulation Profile

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**Key Words**
Strengths and Difficulties Questionnaire · Receiver operating characteristic · Child Behavior Checklist · Depression · Anxiety · Attention problems · Aggression · Children · Bipolar

**Abstract**
***Background:*** In many severely mentally disordered children, the clinical presentation is complicated by comorbid affective and behavioral dysregulation. Recently, a highly heritable behavioral phenotype of simultaneous deviance on the anxious/depressed, attention problems, and aggressive behavior syndrome scales has been identified on the Child Behavior Checklist Dysregulation Profile (CBCL-DP). The aim of the present pilot study was to determine an equivalent to the CBCL-DP using the Strengths and Difficulties Questionnaire (SDQ). ***Sampling and Methods:*** We applied stepwise linear discriminant analyses and receiver operating characteristic (ROC) analysis to data from 543 consecutively referred children and adolescents, aged 5–17 years. The CBCL and the SDQ were completed by parents as part of the diagnostic routine. ICD-10 discharge diagnoses were established in consensus conferences. ***Results:*** A combination of five SDQ items (SDQ-Dysregulation Profile, SDQ-DP) yielded the best discrimination of children with and without CBCL-DP and classified 81.0% of the subjects correctly leading to an area under the curve of 0.93. The content of the five SDQ-DP items mirrors well the mixed behavioral phenotype of anxious-depressive, aggressive and attention problems captured by the CBCL-DP. SDQ-DP status was highly correlated with CBCL-DP status and was best defined by a SDQ-DP score ≥5. ***Conclusions:*** The psychometric properties of the SDQ-DP have been robustly tested and validated. Based on these results, clinicians may use the SDQ-DP as a useful and economical screening measure to improve the assessment, prevention, and treatment of severe dysregulation in childhood and adolescence. Future investigations should study the longitudinal stability, heritability, and genetic associations of this behavioral phenotype.


## Introduction

Many severely mentally disordered children are afflicted by severe affective and behavioral dysregulation, including 'affective storms', behavioral dyscontrol, rest-

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lessness, agitation and aggression that pose substantial diagnostic and therapeutic challenges to the practicing community. Still, severe dysregulation is currently not well characterized in the DSM-IV and ICD-10.

Severe dysregulation in youth is captured by a recently identified behavioral phenotype on the Child Behavior Checklist (CBCL) [1], one of the best-studied empirically derived parent checklists to measure general child and adolescent psychopathology (CBCL dysregulation profile; CBCL-DP). The CBCL-DP is characterized by deviance on the anxious/depressed, attention problems, and aggressive behavior syndrome scales, and has shown strong associations with suicidal behavior [2–7].

About 1–2% in epidemiological samples, 6–7% in child psychiatric clinical samples and 13–20% of children with attention-deficit/hyperactivity disorder meet the criteria for this phenotype [5–8]. The profile is well ensured by replication studies and meta-analysis [9], and has been confirmed to be stable across ages [7, 10]. There is a growing body of evidence showing a familial aggregation of CBCL-DP due to additive genetic and shared environmental factors [3, 7, 8, 11].

One issue that has received considerable attention in the child psychiatry literature is whether severe dysregulation should be considered a developmental presentation of bipolar disorder (BD) [5, 6, 12]. Some authors have suggested considering such chronic, non-episodic affective and behavioral dysregulation as a broad phenotype of BD; as opposed to the classical narrow bipolar phenotype with clearly demarcated affective episodes.

Two longitudinal studies suggest that the majority of children with CBCL-DP are severely impaired in adulthood, and about one third of them show a transition to BD in young adulthood [10, 13]. While the CBCL-DP is commonly seen in children with BD [4], the specificity of the association between CBCL-DP and BD has come into question [2, 5, 8, 14], and recent evidence indicates that CBCL-DP is not useful as a proxy for ICD-10 or DSM-IV diagnoses of BD [6, 15].

Recent studies have examined the neurobiology underlying the behavioral phenotype captured by the CBCL-DP and presented evidence of genetic [7, 11, 16], neurometabolic [17] and endocrinologic [18] characteristics of CBCL-DP.

There is increasing consensus that CBCL-DP appears to be an indicator of a disorder of self-regulation, overall psychopathology, symptom severity, and functional impairment, rather than being indicative of any particular diagnosis proposed by the current classificatory systems [2, 13].

In addition to the CBCL, a shorter behavioral screening questionnaire of very similar psychometric properties has been established. The Strengths and Difficulties Questionnaire (SDQ) [19, 20] has 25 items on 5 scales relating to emotional symptoms, conduct problems, hyperactivity, peer problems and prosocial behavior. Due to the brevity of the SDQ and its low cost in administration as well as evaluation, the SDQ has been chosen as screening measure in various clinical and research settings. It has, for example, been used in several large epidemiological studies as well as for screening children at risk [e.g. 21, 22].

Previous studies have shown that the SDQ and the CBCL are highly correlated and generally perform similarly, though the SDQ seemed superior as a measure of inattention/hyperactivity and at least as good at detecting internalizing and externalizing problems [23–25].

So far, the SDQ has not been used to assess the mixed behavioral phenotype of anxious-depressive, aggressive and attention problems captured by the CBCL-DP. Since the SDQ is widely used in research and clinical practice, the delineation of a new SDQ subscale assessing severe dysregulation is of high clinical and scientific relevance.

Therefore, the aim of the present study was to determine a SDQ equivalent to the CBCL-DP. Firstly, we used stepwise linear discriminant analyses to assess which combination of SDQ items provides the best prediction of CBCL-DP cases. Secondly, we computed point-serial correlations (after Pearson) between the CBCL-DP status and the SDQ dysregulation profile (SDQ-DP), and correlations between the CBCL-DP score (i.e. the composite T-score of the three CBCL subscales attention problems, aggressive behavior, and anxious/depressed) and the SDQ-DP score (i.e. the sum of the SDQ-DP items identified in the discriminant analyses). Thirdly, we explored how well the SDQ-SP is able to distinguish between children with and without CBCL-DP. Receiver operating characteristics (ROC) were plotted in order to show the rate of true-positives against the false-positives; in addition, the sensitivity and specificity of the SDQ-DP against the CBCL-DP status was calculated. Lastly, we investigated the frequency of the SDQ-DP in a clinical sample of children and adolescents and studied which diagnoses are met by individuals with SDQ-DP, to compare them to previously reported diagnoses from CBCL-DP samples [6, 8].

## Methods

*Sample*

The sample comprised all outpatients and inpatients (age 5–17 years) referred to the University Clinic of Child and Adolescent Psychiatry in Göttingen, Germany, between August 1998 and July 2000. Parent reports of the German SDQ as well as the corresponding CBCL version were collected from all patients. A few records were discarded due to the large number of missing answers: 13 SDQs had more than 2 missing items on at least 1 of the 5 SDQ subscales and could not be used for the recommended prorating of scale scores based on valid items, while 9 CBCLs had to be discarded because over 20 item answers were missing (for details, see Becker et al. [25]). The analysis sample consisted of 543 children and adolescents (80% outpatients, 20% inpatients), including 147 girls with an average age of 10.8 ± 3.1 years, and 396 boys with an average age of 9.9 ± 2.8 years.

All children were clinically assessed and best-estimate ICD-10 diagnoses were established by senior board-certified child psychiatrists in consensus conferences according to the diagnostic guidelines of the German society for child and adolescent psychiatry [26]. In these meetings, all materials obtained throughout the diagnostic and therapeutic process via semi-structured parent and child interviews [27], various clinical rating scales (parents, teachers, experts; e.g. Conners Rating Scale) [28], psychological assessment, and behavior observation were reviewed. Diagnoses were considered positive only when the consensus committee determined that diagnostic criteria according to the ICD-10 were unequivocally met. However, no κ-coefficients were computed between interviews and consensus diagnoses.

After thorough clinical examination by child and adolescent psychiatrists, 380 (90 girls and 290 boys) of the 543 children and adolescents received a child psychiatric diagnosis on axis I (any diagnosis of psychiatric disorders, apart from categories F70–F79, F80–F83.99, F85–F89, and F98). Most of the remaining 163 patients who were not considered to be psychopathologically disturbed presented with dyslexia or other specific learning disabilities.

To allow comparisons with other SDQ studies, patients' diagnoses were assigned to 3 diagnostic subcategories, following the same procedure as in previous reports:

(1) emotional disorders (F30–F43.23, F43.25, F92.0–F93.2, F93.8, F93.9);

(2) oppositional/conduct disorders (F43.24, F43.25, F90.1, F91–F92.99);

(3) hyperactivity/attention-deficit disorders (F90–F90.99, excluding F90.1).

Four of the 90 girls who were diagnosed with 'any diagnosis on axis I' did not meet the criteria for 1 of these 3 diagnostic subcategories. A total of 58 of the 290 boys met criteria for >1 axis I diagnosis [for details, see 25].

The ICD-10 subcategories as well as age and gender distribution of the clinical sample are given in table 1.

*Child Behavior Checklist*

For all subjects, parents completed the German version of the CBCL [29]. The CBCL queries about the child's behavior in the past 6 months. Besides a total problems score, the CBCL has 2 broadband scales (externalizing problems and internalizing problems) and 8 narrow-band syndrome scales: withdrawn, somatic complaints, anxious/depressed, social problems, thought problems, attention problems, delinquent behavior, and aggressive behavior. A total of 118 items (plus two optional questions) is rated by the parents or primary caregivers; 33 questions are not related to one of the syndrome scales. A T-score of 50 indicates average functioning in reference to other children of the same age and gender and every 10 points represents 1 SD. Syndrome scale T-scores of 67–70 (percentile 95–98) represent a borderline clinical range, T-scores >70 the clinical range [1]. Reliability, factorial validity and discriminant validity of German adaptation of the CBCL have been confirmed [30, 31].

**Table 1.** Distribution of diagnostic categories and mean age (n = 543)

| Diagnostic categories | Boys (n = 396) | Girls (n = 147) | Total (n = 543) |
|---|---|---|---|
| Any axis I diagnosis | 290 (73.2)[1] | 90 (61.2)[2] | 380 (70.0) |
| Mean age (± SD), years | 9.9 ± 2.8 | 10.8 ± 3.1 | 10.2 ± 2.9 |
| Range | 5.0 – 17.10 | 5.1 – 17.11 | 5.0 – 17.11 |
| Emotional disorders | 90 (22.7) | 42 (28.6) | 132 (24.3) |
| Conduct disorders | 108 (27.3) | 21 (14.3) | 129 (23.8) |
| Hyperactivity/attention-deficit disorders | 150 (37.9) | 23 (15.6) | 173 (31.9) |

Where indicated, data presented as n (%).
[1] 58 met criteria for >1 axis I diagnosis.
[2] 4 did not meet criteria for 1 of the 3 diagnostic subcategories.

*Strengths and Difficulties Questionnaire*

The SDQ is a short behavioral screening questionnaire which can be completed in about 5 min by the parents [19]. The SDQ asks about 25 attributes, some negative, some positive. The items are divided between 5 subscales of 5 items each, generating scores for emotional symptoms, conduct problems, hyperactivity, peer problems and prosocial behavior. Items of the first 4 subscales are summed to generate a total difficulties score.

The instrument was translated into German in 1997, and several evaluative studies have since been completed. In a normative study on a field sample of 930 children, the distributions of raw scores in the German parent SDQ closely resembled those found in the English version; a factor analysis of the German data yielded a pattern of loadings which convincingly replicated the original scale structure [24]. The SDQ was shown to be able to distinguish between a community and a clinical sample, and between subgroups with and without specified categories of disorders within a clinical sample [32].

*Statistics*

According to previous studies, a profile of clinical scores (T-score ≥70) on the anxious/depressed, attention problems, and aggressive behavior syndrome scales of the CBCL was regarded as the CBCL-DP [4, 33]. We used this profile for the categorical dis-

**Table 2.** SDQ items with highest discriminative power in discriminant analysis

| Item | SDQ scale | F value | Wilks' lambda | Correlation |
|---|---|---|---|---|
| 13: often unhappy, down-hearted or tearful | emotional problems | 11.7 | 0.82 | 0.64 |
| 12: often fights with other children or bullies them | conduct disorders | 18.0 | 0.83 | 0.59 |
| 22: steals from home, school or elsewhere | conduct disorders | 10.4 | 0.82 | 0.57 |
| 8: many worries, often seems worried | emotional problems | 7.9 | 0.81 | 0.52 |
| 2: restless, overactive, cannot stay still for long | hyperactivity | 7.5 | 0.81 | 0.41 |

Pooled within-groups correlations between discriminating variables and canonical discriminant functions; variables ordered by size of correlation within function.

crimination between children with and without affective and behavioral dysregulation. In addition, we computed the CBCL-DP score, i.e. the sum of the 3 syndrome scales T-scores, following Hudziak et al. [7].

*Stepwise Linear Discriminant Analysis*

The statistical procedure 'discriminant analysis' uses weighted combinations of predictors to better precalculate criterion groups. We used stepwise linear discriminant analysis on all 25 SDQ items to assess which combination of them provides the best prediction of CBCL-DP status. Criterion to include a predictor in the analysis was a significant reduction in Wilks' lambda. Point-serial correlations (after Pearson) were computed between the CBCL-DP status and the SDQ-DP score and correlations were computed between the CBCL-DP score (the sum of the 3 CBCL-PBD syndrome scales) [7] and the SDQ-DP score (the sum of the SDQ-DP items identified as predictors).

*ROC and Area under the Curve*

The ability of the SDQ-DP score to distinguish between children and adolescents with and without CBCL-DP status was examined using a ROC analysis, employing the area under the curve (AUC) as the index of discriminant ability. As a guide to interpretation, the higher the graph extends towards the upper left corner of the graph, the higher the discriminatory power of the test. The closer the curve comes to the ROC 45-degree diagonal, the less accurate is the prediction. Respectively, the AUC is a measure of overall fit of CBCL-DP status classification by the SDQ-DP score: the AUC would be 1.0 for a measure that discriminated perfectly between individuals with and without CBCL-DP status, and 0.5 for a measure that discriminated with no better than chance accuracy [24, 31].

*Sensitivity and Specificity of the SDQ-DP Score against the CBCL-DP Status*

To explore how well the SDQ-DP is able to distinguish retrospectively between children with and without CBCL-DP and to identify the best cut-off point at which sensitivity and specificity for identifying CBCL-DP status are in optimal relation to each other, the ROC curve was used. Sensitivity is defined as the percentage of CBCL-DP subjects who are correctly classified as 'true-positives', whereas specificity means the percentage of subjects who are correctly classified by CBCL-DP as 'true-negatives'.

The significance level accepted was 5% (two-tailed). All p values resulting from statistical tests were interpreted in the exploratory sense, no $\alpha$ adjustment for multiple comparisons was performed. Data were analyzed with SPSS 15.0.

## Results

*Stepwise Linear Discriminant Analyses*

Discriminant analysis on all 25 SDQ items successfully discriminated between the 2 predicted clinical groups (CBCL-DP status yes/no; Wilks' lambda = 0.787; $\chi^2 = 126.80$; d.f. = 25; $p < 0.001$). All 25 SDQ items together explained 21.3% of the variance between the 2 groups (canonical correlation = 0.462).

A combination of the 5 items on the SDQ with the highest positive standardized canonical discriminant coefficients yielded the best discrimination of children with and without the CBCL-DP status (item 13: often unhappy (0.267); item 12: often fights with other children (0.321); item 22: steals from home (0.195); item 8: many worries (0.306), and item 2: restless, overactive (0.253; table 2).

The internal consistency (Cronbach's $\alpha$) obtained for the parent-rated SDQ-DP scale in this clinical sample is $\alpha = 0.52$.

Furthermore, there was a strong correlation of the SDQ-DP score with the CBCL-DP status ($r = 0.45$, $p < 0.001$). Likewise, the correlation between the CBCL-DP score (the sum of the 3 CBCL-PBD syndrome scales; Hudziak et al. [7]) and the SDQ-DP score (the sum of the 5 SDQ-DP items) was high ($r = 0.75$, $p < 0.001$).

*ROC and AUC*

The ability of the SDQ-DP score to distinguish between children and adolescents with and without CBCL-DP status was examined using a ROC analysis, employing the AUC as the index of discriminant ability. The

ROC curve for the SDQ-DP score and for the CBCL-DP status is shown in figure 1. The ROC curve follows the left-hand and then the top border, and thus shows a high accuracy for the SDQ-DP score. The AUC of the SDQ-DP rating indicates a high degree of correspondence between the SDQ-DP construct and the CBCL-DP status. AUC is 0.93 (standard error 0.01) which allowed an excellent prediction of the CBCL-DP status by SDQ-DP score.

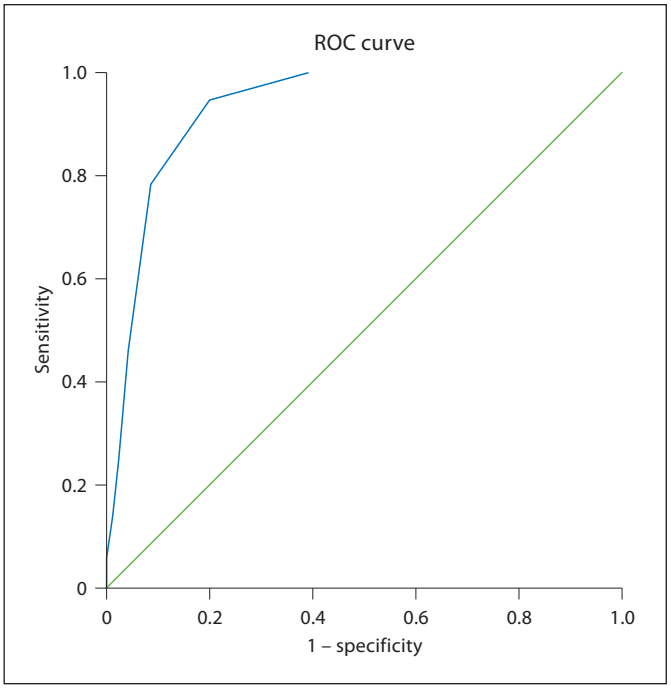
*Sensitivity and Specificity of the SDQ-DP Score against the CBCL-DP Status*

To reduce the potential for misclassification of children using the SDQ-DP approach, the ROC curve was used to identify the best cut-off point for identifying CBCL-DP. The major coordinates of this curve (table 3) confirm the results above.

The findings show CBCL-DP status was best defined by a SDQ-DP score ≥5 because this fits best with both a high sensitivity and a high specificity. Applying this cut-off score, the SDQ-DP correctly classified the CBCL-DP status in 81.0% of all cases: out of 37 cases meeting criteria for CBCL-DP, 35 were correctly identified (sensitivity 94.6%), while the specificity was 80%, identifying correctly 405 out of 506 cases without CBCL-DP.

A total of 25.0% (n = 136; out of them 24.3% female) of the sample had a higher SDQ-DP score than the cut-off score of 5. Out of them, 122 children (89.7%) met criteria for any diagnosis on axis I. Emotional disorders were diagnosed in 48 (35.3%), oppositional/conduct disorders in 62 (45.6%) and hyperactivity/attention-deficit disorders in (41.9%). More than half of the children (n = 73) met criteria for 2 disorders (combined conduct and emotional disorder: n = 28; combined hyperactive and conduct disorder: n = 31).

Using the same cutoff, an exploratory evaluation of a German epidemiological sample of children and adolescents (n = 930) [for details, see 32] detected a prevalence of the SDQ-DP of 2.6%.




Color version available online

**Fig. 1.** The ROC curve for SDQ-DP score and CBCL-DP status.

**Table 3.** Sensitivity and specificity of the SDQ-DP score in the total sample

| | CBCL-DP status | | Total |
|---|---|---|---|
| | no | yes | |
| SDQ-DP score <5, n (%) | 405 (80) | 2 (5.4) | 407 (75) |
| SDQ-DP score ≥5, n (%) | 101 (20) | 35 (94.6) | 136 (25) |
| Total, n (%) | 506 (100) | 37 (100) | 543 (100) |

## Discussion

In the present pilot study, we determined a SDQ equivalent to the CBCL-dysregulation profile. Using stepwise linear discriminant analyses, a combination of 5 SDQ items (SDQ-DP) yielded the best discrimination of children with and without CBCL-DP and classified 81.0% of the subjects correctly. Two of these items are part of the SDQ emotional symptoms subscale (13: often unhappy, down-hearted or tearful; 8: many worries, often seems worried), 2 are included in the conduct problems subscale (12: often fights with other children or bullies them; 22: steals from home, school or elsewhere), and 1 in the hyperactivity subscale (2: restless, overactive, cannot stay still for long). Thus, the content of the 5 SDQ-DP items mirrors well the mixed behavioral phenotype of anxious-depressive, aggressive and attention problems captured by the CBCL-DP. An unweighted sum of these 5 items represents the SDQ-DP score. Point-serial correlations indicated a high correlation between the SDQ-DP score and the CBCL-DP score (r = 0.75), and a moderate correlation between the SDQ-DP score and the CBCL-DP status (r = 0.45).

ROC were applied to explore how well the SDQ-DP is able to distinguish between children with and without CBCL-DP. An AUC of 0.93 indicated a high ability of the SDQ-DP score to predict the CBCL-DP status. Analysis of the ROC curve's major co-ordinates proves an optimal balance between sensitivity (94.6%) and specificity (80%) at a cut-off point of 5. Thus, different analyses confirmed that the SDQ-DP construct is a sensitive and specific measure for differentiating between individuals with and without dysregulation as captured by CBCL-DP.

The prevalence of the CBCL-DP was 6.9% and almost exactly matched that reported from another large clinical German sample (6.6%) [5]. Using the cut-off point of 5, 25% of the children in our sample of clinically referred patients and 2.6% of an epidemiological sample met criteria for SDQ-DP. The cut-off point can easily be adjusted to a higher or lower SDQ-DP score if the demands of a study require a different relation between sensitivity and specificity.

The SDQ-DP subscale complements the traditional 5 SDQ subscales. Similar to these established subscales, the DP scale consists of 5 items; like the emotional symptoms, conduct problems and peer problems scales, a cut-off score $\geq 5$ identifies children exhibiting problems in the clinical range.

Given the internal consistency obtained in our clinical sample (Cronbach's $\alpha = 0.52$), the parent-rated SDQ-DP scale can be considered to be moderately reliable.

Shorter scales are normally less reliable than longer scales, thereby attenuating validity [34]. As the newly derived SDQ-DP subscale comprises only 5 items compared with the CBCL's 44 items included into the CBCL-DP, one has to address the question of whether the SDQ's brevity was achieved at the cost of reduced validity. However, due to the lack of an external criterion, the present data set does not permit us to answer this question. Therefore, the findings of our pilot study need replication from studies using external diagnostic criteria. Previous studies comparing both questionnaires suggest that the brevity of the SDQ did not reduce its criterion validity compared to the CBCL, as judged against standardized interviews [23].

To approach this problem, we investigated which clinical diagnoses were met by individuals with SDQ-DP, to compare them to previously reported diagnoses from CBCL-DP samples [6, 8]. More than 80% of SDQ-DP children were diagnosed with disruptive behavior disorders, such as attention-deficit/hyperactivity disorder, oppositional defiant disorder, and conduct disorder. There is a striking similarity between this finding and the results of previous studies in which children meeting the CBCL-DP were very likely to have ADHD, ODD, and CD [6, 8]. The conceptualization of severe dysregulation as an indicator of symptom severity [35] is underscored by the fact that more than half of the SDQ-DP children met criteria for at least 2 disorders.

## Conclusion

Summarizing our findings, we present initial evidence for the psychometric validity of the SDQ-DP. Based on these results, the SDQ-DP may be regarded as a useful and economical screening measure for severe behavioral and emotional dysregulation. Clinicians may use the SDQ-DP to improve the assessment, prevention, and treatment of severe dysregulation in childhood and adolescence. Since the SDQ is widely used, researchers could reanalyze their previously collected data to examine questions related to behavioral and affective dysregulation. In addition, future studies should try to replicate the clinical correlates, longitudinal stability, heritability, and neurobiological characteristics that have been shown for the corresponding CBCL profile.

## References


1 Achenbach TM: Manual for the Child Behavior Checklist/4–18 and 1991 Profile. Burlington, University of Vermont, 1991.

2 Ayer L, Althoff R, Ivanova M, Rettew D, Waxler E, Sulman J, Hudziak J: Child Behavior Checklist Juvenile Bipolar Disorder (CBCL-JBD) and CBCL Posttraumatic Stress Problems (CBCL-PTSP) scales are measures of a single dysregulatory syndrome. J Child Psychol Psychiatry 2009;50:1291–1300.

3 Althoff RR, Rettew DC, Faraone SV, Boomsma DI, Hudziak JJ: Latent class analysis shows strong heritability of the child behavior checklist-juvenile bipolar phenotype. Biol Psychiatry 2006;60:903–911.

4 Biederman J, Wozniak J, Kiely K, Ablon S, Faraone S, Mick E, Mundy E, Kraus I: CBCL clinical scales discriminate prepubertal children with structured interview-derived diagnosis of mania from those with ADHD. J Am Acad Child Adolesc Psychiatry 1995;34:464–471.

5 Holtmann M, Bölte S, Goth K, Poustka F: CBCL-pediatric bipolar disorder phenotype: severe ADHD or bipolar disorder? J Neural Transm 2008;115:155–161.

6 Holtmann M, Duketis E, Goth K, Poustka L, Bölte S: Severe affective and behavioral dysregulation in youth is associated with increased serum TSH. J Affect Disord 2010; 121:184–188.

7 Hudziak JJ, Althoff RR, Derks EM, Faraone SV, Boomsma D: Prevalence and genetic architecture of Child Behavior Checklist-juvenile bipolar disorder. Biol Psychiatry 2005; 58:562–568.
8 Volk HE, Todd RD: Does the Child Behavior Checklist juvenile bipolar disorder phenotype identify bipolar disorder? Biol Psychiatry 2007;62:115–120.
9 Mick E, Biederman J, Pandina G, Faraone SV: A preliminary meta-analysis of the Child Behavior Checklist in pediatric bipolar disorder. Biol Psychiatry 2003;53:1021–1027.
10 Biederman J, Petty CR, Monuteaux MC, Evans M, Parcell T, Faraone SV, Wozniak J: The child behavior checklist-pediatric bipolar disorder profile predicts a subsequent diagnosis of bipolar disorder and associated impairments in ADHD youth growing up: a longitudinal analysis. J Clin Psychiatry 2009; 70:732–740.
11 Boomsma DI, Rebollo I, Derks EM, van Beijsterveldt TC, Althoff RR, Rettew DC, Hudziak JJ: Longitudinal stability of the CBCL-juvenile bipolar disorder phenotype: a study in Dutch twins. Biol Psychiatry 2006; 60:912–920.
12 Holtmann M, Duketis E, Poustka L, Zepf FD, Poustka F, Bölte S: Bipolar disorder in children and adolescents in Germany: national trends in the rates of inpatients, 2000–2007. Bipolar Dis 2010;12:155–163.
13 Meyer SE, Carlson GA, Youngstrom E, Ronsaville DS, Martinez PE, Gold PW, Hakak R, Radke-Yarrow M: Long-term outcomes of youth who manifested the CBCL-Pediatric Bipolar Disorder phenotype during childhood and/or adolescence. J Affect Disord 2009;113:227–235.
14 Althoff RR, Rettew DC, Ayer LA, Sulman JR, Hudziak JJ: Requiem to the CBCL-Mania Proxy. Poster, 6th Ann NIMH Pediatr Bipolar Dis Conf, Boston, 2008.
15 Diler RS, Birmaher B, Axelson D, Goldstein B, Gill M, Strober M, Kolko DJ, Goldstein TR, Hunt J, Yang M, Ryan ND, Iyengar S, Dahl RE, Dorn LD, Keller MB: The Child Behavior Checklist (CBCL) and the CBCL-bipolar phenotype are not useful in diagnosing pediatric bipolar disorder. J Child Adolesc Psychopharmacol 2009;19:23–30.
16 McGough JJ, Loo SK, McCracken JT, Dang J, Clark S, Nelson SF, Smalley SL: CBCL pediatric bipolar disorder profile and ADHD: comorbidity and quantitative trait loci analysis. J Am Acad Child Adolesc Psychiatry 2008;47:1151–1157.
17 Zepf FD, Wöckel L, Poustka F, Holtmann M: Diminished 5-HT functioning in CBCL pediatric bipolar disorder profiled ADHD patients vs. normal ADHD: susceptibility to rapid tryptophan depletion influences reaction time performance. Hum Psychopharmacol 2008;23:291–299.
18 Holtmann M, Bölte S, Goth K, Döpfner M, Plück J, Huss M, Fegert JM, Lehmkuhl G, Schmeck K, Poustka F: Prevalence of the CBCL-pediatric bipolar disorder phenotype in a German general population sample. Bipolar Dis 2007;9:895–900.
19 Goodman R: The strengths and difficulties questionnaire: a research note. J Child Psychol Psychiatry 1997;38:581–586.
20 Woerner W, Becker A, Rothenberger A: Normative data and scale properties of the German parent SDQ. Eur Child Adolesc Psychiatry 2004;13:3–11.
21 Brookes K, Xu X, Chen W, et al: The analysis of 51 genes in DSM-IV combined type attention deficit hyperactivity disorder: association signals in DRD4, DAT1 and 16 other genes. MolPsychiatry 2006;11:934–953.
22 Achenbach TM, Becker A, Döpfner M, Heiervang E, Roessner V, Steinhausen HC, Rothenberger A: Multicultural assessment of child and adolescent psychopathology with ASEBA and SDQ instruments: research findings, applications, and future directions. J Child Psychol Psychiatry 2008;49:251–275.
23 Goodman R, Scott S: Comparing the strengths and difficulties questionnaire and the Child Behavior Checklist: is small beautiful? J Abnorm Child Psychol 1999;27:17–24.
24 Klasen H, Woerner W, Wolke D, Meyer R, Overmeyer S, Kaschnitz W, Rothenberger A, Goodman R: Comparing the German versions of the strengths and difficulties questionnaire (SDQ-Deu) and the Child Behavior Checklist. Eur Child Adolesc Psychiatry 2000;9:271–276.
25 Becker A, Woerner W, Hasselhorn M, Banaschewski T, Rothenberger A: Validation of the parent and teacher SDQ in a clinical sample. Eur J Child Adolesc Psychiatry 2004;13: 11–16.
26 DGKJP (Deutsche Gesellschaft für Kinder- und Jugendpsychiatrie und Psychotherapie): Guidelines for diagnostics and therapy of psychiatric disorders in infancy, childhood and adolescence (in German; Hyperkinetic disorders chapter F90). ed 3. Koeln, Deutscher Aerzteverlag, 2007.
27 Englert E, Jungmann J, Rotthaus W, Wienand F, Lam L, Poustka F: Glossar zur Basisdokumentation Kinder- und Jugendpsychiatrie. Forum der Kinder- und Jugendpsychiatrie und Psychotherapie 1996;III:38–51.
28 Goyette CH, Conners CK, Ulrich RF: Normative data on revised Conners Parent and Teacher Rating Scales. J Abnorm Child Psychol 1978;6:221–236.
29 Arbeitsgruppe Deutsche CBCL: CBCL/4–18: Parent questionnaire on the behavior of children and adolescents, ed 2 (in German). Koeln, Arbeitsgruppe Kinder-, Jugend- und Familiendiagnostik, 1998.
30 Döpfner M, Schmeck K, Berner W, Lehmkuhl G, Poustka F: Reliability and factorial validity of the Child Behavior Checklist – an analysis of a clinical and field sample (in German). Z Kinder Jugendpsychiatr 1994; 22:189–205.
31 Schmeck K, Poustka F, Döpfner M, Plück J, Berner W, Lehmkuhl G, Fegert JM, Lenz K, Huss M, Lehmkuhl U: Discriminant validity of the Child Behaviour Checklist CBCL-4/18 in German samples. Eur Child Adolesc Psychiatry 2001;10:240–247.
32 Woerner W, Becker A, Friedrich C, Klasen H, Goodman R, Rothenberger A: Normal values and evaluation of the German parents' version of Strengths and Difficulties Questionnaire (SDQ): results of a representative field study (in German). Z Kinder Jugendpsychiatr 2002;30:105–112.
33 Faraone SV, Althoff RR, Hudziak JJ, Monuteaux M, Biederman J: The CBCL predicts DSM bipolar disorder in children: a receiver operating characteristic curve analysis. Bipolar Dis 2005;7:518–524.
34 Streiner DL, Norman GR: Health Measurement Scales. Oxford, Oxford University Press, 1989.
35 Holtmann M: Early-onset bipolar disorders: underdiagnosed or overestimated? (in German). Z Kinder Jugendpsychiatr Psychother 2009;37:159–161.