

## **The Child Bipolar Questionnaire – Scoring, Reliability, and Validity**

The Child Bipolar Questionnaire (CBQ) was designed to assist clinicians in the early detection of pediatric bipolar disorder (PBD) and to rapidly identify potential cases for research studies. It was constructed based on the model proposed by Depue et al. (1981), who developed the General Behavior Inventory, a dimensional approach to the identification of bipolar disorder in adults. With 65 items rated on a Likert scale (“1 - never”, “2 - sometimes”, “3 - often”, or “4 - very often or almost constantly”), the CBQ provides three measures in one rating scale. The CBQ total score assesses severity of illness. The CBQ Core Index aids in differential diagnosis. The CBQ-based diagnostic algorithms screen for children meeting symptom criteria for DSM-IV mania, several alternate disease phenotypes, and ADHD. The algorithms also aid in screening for comorbid PBD and ADHD. The CBQ has an estimated reading level of grade 8 and has been translated into Spanish, French, Polish, and Portuguese. It may be self-administered by a parent/parent substitute or administered by a clinician. Via a secure, internet-based data acquisition system established and maintained by the Juvenile Bipolar Research Foundation (JBRF), parents have contributed demographic and clinical data, including CBQ data, on over 4000 children and adolescents aged-5-17. JBRF maintains email contact with these parents, making it possible to assemble the reliability and validity data summarized in this report.

### **Scoring Rules**

**CBQ Total Score** = the sum of all 65 items rated “3” or “4”; median score for children with PBD in the JBRF sample (N=2795) was 45, median score for children with ADHD (N=21) was 16 (range 7-33), median score for children with no diagnosis (N=38) was 1 (range 0-5).

**CBQ Core Index** = the sum of 22 items rated “3” or “4”: q1, q2, q3, q6, q8, q10, q23, q26, q27, q31, q32, q33, q36, q39, q40, q42, q52, q53, q55, q62, q63, q64; a CBQ Core Index score of 4 or higher indicates PBD, a score of 2 or 3 indicates ADHD, and a score of 0 or 1 indicates no diagnosis.

### **CBQ Diagnostic Algorithms:**

**PBD** - Must be rated  $\geq 3$  on one or more of qs 31, 32, and 33; Must be rated  $\geq 3$  on four or more of the following: a) q4, q5, q6 (occurrence of one or more rated  $\geq 3$  counts as one); b) q24, q25 (occurrence of one or more rated  $\geq 3$  counts as one); c) q26; d) q27, q28 (occurrence of one or more rated  $\geq 3$  counts as one); e) q29; f) q36.

**ADHD** - Must be rated  $\geq 3$  on three or more of qs 11-19; Must not be rated 3 or 4 on more than three of the following: a) q4, q5, q6 (occurrence of one or more rated  $\geq 3$  counts as one); b) q24, q25 (occurrence of one or more rated  $\geq 3$  counts as one); c) q26; d) q27, q28 (occurrence of one or more rated  $\geq 3$  counts as one); e) q29; f) q36.

**Comorbid PBD and ADHD** - If both q11 and q14 are rated 3 or higher, PBD+ADHD is indicated; if at most one of q11 and q14 is rated 3 or higher, PBD-ADHD is indicated.

### **Reliability**

Test-retest reliability of the CBQ total score and the CBQ Core Index score was assessed using a Pearson’s correlation between the first and second rating for each subject. The correlations between the test and retest values of the CBQ total score and the CBQ Core Index were 0.819 and 0.86 respectively. Both are considered excellent agreement (Fleiss, 1981). Reliability of the CBQ diagnostic algorithm was assessed by comparing the diagnosis indicated by the first rating for each subject to that indicated by the second rating, using a kappa coefficient. Within diagnostic group, the test-retest concordance estimates were 0.81 for PBD, 0.74 for ADHD, and 0.76 for neither diagnosis, all considered excellent agreement.

### **Construct validity**

Construct validity was assessed by comparing diagnostic classifications derived from CBQ-based algorithms with K-SADS-based DSM-IV diagnoses in a sample of 135 children. Using the K-SADS, 76 subjects were diagnosed with PBD (DSM-IV phenotype), 21 with ADHD (no mood disorder), and 38 with no psychiatric diagnosis. The CBQ bipolar algorithm correctly classified 58 of 76 subjects who had PBD (sensitivity = 76%) and 57 of 59 subjects who did not have PBD (specificity = 97%). The CBQ diagnostic algorithms correctly classified 76% of the PBD subjects, 67% of the ADHD subjects, and 97% of the subjects with no diagnosis, with an overall rate of agreement of 81%. Using the K-SADS, 51 of the 76 subjects diagnosed with PBD had comorbid ADHD (PBD+ADHD) and 25 did not (PBD-ADHD). The CBQ diagnostic algorithm correctly identified 77% of the PBD+ADHD subjects and 68% of the 25 PBD-ADHD subjects. The CBQ Core Index score was assessed for its ability to predict K-SADS P/L diagnoses for bipolar disorder (inclusive of types I, II, and NOS), ADHD without mood disorder, and no psychiatric diagnosis. The kappa coefficient for agreement between CBQ Core Index score and K-SADS diagnosis was 0.84, indicating excellent agreement. When the analysis consisted of PBD vs. no PBD (inclusive of ADHD and no diagnosis), the CBQ Core Index score with a cut-off point of 4 has 100% sensitivity, 86% specificity, 100% negative predictive power and 90% positive predictive power.

### **Concurrent validity**

Additional history data were obtained via the JBRF website from parents of a subsample of 497 children. CBQ total score was significantly higher among subjects with a parent-reported primary diagnosis of bipolar disorder compared to all other diagnoses. Similarly, children/adolescents reported to have had prior psychiatric hospitalizations had significantly higher CBQ scores, on average, than subjects who were reported not to have been hospitalized. Children with an early onset of psychiatric illness, dichotomized as onset  $\leq$  age 3 years vs. onset  $>$  3 years, had significantly higher CBQ scores. Among subjects reported by parents to have been held back at school at least one year, CBQ total scores were significantly higher than the scores of all other subjects in the subsample. Similarly, subjects reported by parents to have had at least one incident involving the juvenile justice system had significantly higher CBQ scores than other subjects.

### **Summary**

With, as yet, no consensus on diagnostic criteria for bipolar disorder in children, it is a great challenge to develop a brief diagnostic instrument for youth that preserves primary DSM-IV criteria for mania, adequately assesses several proposed phenotypes for PBD, and helps to distinguish the condition from comorbid conditions such as ADHD. Such an instrument is crucial to the further study of phenomenological features of pediatric bipolar disorder and to efforts to delineate the boundaries between bipolar disorder and other more commonly diagnosed childhood psychiatric disorders. The Child Bipolar Questionnaire may prove a very useful tool in both clinical and research efforts toward these aims.