Psychometric Properties of the Young Mania Rating Scale for the Identification of Mania Symptoms in Spanish Children and Adolescents with Attention Deficit/Hyperactivity Disorder

Eduardo Serrano, Lourdes Ezpeleta, José A. Alda, José L. Matalí, Luis San

Abstract

Background: Diagnosing mania in children is difficult, due to the high comorbidity and symptom overlap with attention deficit/hyperactivity disorder (ADHD). The detection of manic symptoms in ADHD has important implications for prognosis and choice of treatment. Our objective was to study the utility of the Young Mania Rating Scale (YMRS) for discriminating mania in Spanish children with ADHD. Method: One hundred children and adolescents with ADHD between 8 and 17 years of age were evaluated with a structured diagnostic interview (Diagnostic Interview for Children and Adolescents-IV), the YMRS, the Parent-Young Mania Rating Scale (P-YMRS), the Child Mania Rating Scale-Parent Version (CMRS-P) and the Children’s Global Assessment Scale. Results: The YMRS showed a 1-dimensional structure with good internal consistency and test-retest reliability. The YMRS was associated with the P-YMRS and the CMRS-P. The scores obtained with the YMRS differentiated between ADHD with and without mania. The receiver operating characteristic curve analysis showed good diagnostic efficiency in differentiating mania in ADHD (area under the curve of 0.90). Conclusions: The Spanish version of the YMRS is a valid and reliable instrument for detecting and quantifying the symptoms of mania in children and adolescents with ADHD. The results provide further knowledge about the frequent association between ADHD and manic symptoms in children.

Introduction

In recent decades, it has been recognized that bipolar disorder (BPD) could have onset at young ages [1–3]. There is a consensus among researchers and clinicians about the difficulty of diagnosing pediatric mania. This difficulty is primarily due to 3 factors: (1) the clinical presentation of mania in children, (2) the overlapping of symptoms of mania with attention deficit/hyperactivity disorder (ADHD) and (3) its high comorbidity with ADHD.

The clinical presentation of BPD in prepubertal children and in early adolescence is a matter of debate and...
shows differences with respect to classic manic-depressive symptoms in adults. The symptoms of euphoria and inflated self-esteem, and the episodic course are rare in children [4, 5]. Affective phenomenology is often mixed, and dysphoria with ‘affective storms’ and severe outbursts of anger are much more frequent than euphoria. The course is often chronic, discontinuous and erratic [6–8]. The National Institute for Mental Health research roundtable on prepubertal BPD [9] reached an agreement that pediatric BPD can present as ‘narrow’ (fitting the classic definition of BPD-I or BPD-II described in DSM-IV [10]) or ‘broad’ (basically BPD not otherwise specified that includes children who do not meet DSM criteria but who are still severely impaired by symptoms of mood instability). Other authors have suggested a phenotypic system of juvenile mania consisting of a narrow phenotype, 2 intermediate phenotypes and a broad phenotype, according to the presence of distinct episodes and hallmark symptoms [11].

Comorbidity studies show the frequent co-occurrence of ADHD and BPD. In a sample of young people with ADHD, Biederman et al. [12] found that 23% had BPD, which is similar to the 22% reported by Butler et al. [13] and the 20% found by Wozniak et al. [8]. In Europe, Dil ler et al. [14] found in an outpatient sample (7–13 years of age) with ADHD that 8.2% also had BPD.

There is a considerable debate about the difference in pediatric BPD prevalence between the USA and Europe. Epidemiologic studies in clinical samples in Europe reported a prevalence of mania ranging from 0% in the UK [15] to 4% in Spain [16]. In US outpatient samples it ranges from 5.9 to 19.6% [17–20]. These differences may be explained by the variations in methodology (range of age considered, rating scale used, person interviewed), ICD-10 and DSM-IV differences in diagnostic criteria for BPD (ICD-10 requires at least 2 episodes of significantly disturbed mood and activity), clinician bias against BPD (preference to classify such clinical presentations as severe ADHD, conduct, depressive and personality disorders instead of BPD), an overdiagnosis of the disorder in the USA and/or a true higher prevalence of pediatric BPD in the USA [16].

Another aspect that makes diagnosis difficult is the frequent overlap of BPD and ADHD symptoms (distractibility, high levels of motor activity, racing thoughts, rapid or accelerated speech, impulsivity, aggression and irritability) [12]. Despite considerable symptom overlap, mania can be distinguished from ADHD by the presence of core symptoms of mania such as euphoria and grandiosity [17]. Nonetheless, the structure of mania may be multidimensional and more complex than the classic euphoric-dysphoric dichotomy [21].

The difficulty in discriminating between BPD and ADHD leads to the diagnosis of false negatives (not recognizing BPD if there is ADHD) or false positives (diagnosing BPD when only ADHD is present). The importance of differentiating symptoms of mania in children and adolescents with ADHD and making a proper diagnosis is not only a nosological matter, but has significant implications for prognosis and choice of treatment [22–24].

Therefore, it is essential to have specific instruments with strong psychometric properties to assess pediatric mania and enable the clinician to quantify the presence and severity of manic symptoms. We currently have few instruments that specifically assess juvenile mania. The most widely studied in BPD, and developed to be used on adults, is the Young Mania Rating Scale (YMRS) [25]. The YMRS is an 11-item scale designed to be completed by the clinician. The scale assesses the intensity of manic symptoms based on a clinical interview with the patient and takes into account the subjective comments of the interviewee and the clinician’s own observation. The instrument has shown adequate psychometric properties in adult inpatients [25]. Subsequently, studies have been conducted to validate its use with children and adolescents, which have also shown satisfactory psychometric properties [26–28]. The scale used on prepubertal children (6–12 years old) differentiated BPD from ADHD, while the scores from hyperactivity-specific instruments (for parents and teachers) did not differ between groups [26]. In a later study also conducted on prepubertal children, the YMRS showed adequate internal consistency (α = 0.80) and convergent validity with another measure of mania (r = 0.83; p < 0.0001) [27]. Youngstrom et al. [28] reported a single-factor structure and good internal consistency (α = 0.91) in children and adolescents (5–17 years of age).

Studies for validating the YMRS in children have focused on the scale’s effectiveness in discriminating BPD from ADHD or another disorder. Until now, no study has assessed the utility of the YMRS in discriminating mania in children with ADHD. We do not currently have any validated scale for the Spanish population that specifically assesses pediatric mania. The objective of this study is to analyze the reliability and validity of the Spanish version of the YMRS for children and adolescents with ADHD and thus evaluate the utility of the scale to detect and quantify symptoms of mania in ADHD.
Methods

Subjects

A total of 100 children and adolescents between 8 and 17 years old (mean = 11.03; SD = 2.61) consecutively referred to an outpatient child and adolescent psychiatry and psychology unit of 3 hospitals (2 of public health network and 1 private) in Barcelona (Spain) participated in the study.

To be part of the study, the children had to have received a principal diagnosis of ADHD according to DSM-IV criteria [10] assessed with the Diagnostic Interview for Children and Adolescents-IV (DICA-IV) [29]. Table 1 shows the demographic and clinical characteristics of the sample. The distribution of socioeconomic level was: 30% of the parents had a high professional level (professionals and executives), 35% had an average professional level (skilled workers), 32% had a low professional level (unskilled workers and manual laborers) and 3% were unemployed.

Seventy-five subjects (75%) had combined type ADHD, 16 (16%) had predominately inattentive-type ADHD, and 9 (9%) had hyperactive-impulsive-type ADHD. Seventy-one (71%) of the children and adolescents with ADHD met the criteria for oppositional defiant disorder and 15 (15%) for conduct disorder. Eight cases (8%) fulfilled DSM-IV criteria for BPD (DSM), 6 (6%) for bipolar disorder not otherwise specified (BPD-NOS) (see definition below) and 14 (14%) for bipolar spectrum disorder (BPSD) (BPD + BPD-NOS) (table 1). Of the 8 cases with BPD (DSM), 7 (87.5%) had ADHD combined type and 1 case (12.5%) had inattentive type. With regard to BPD-NOS, 5 cases (83.3%) had combined type and 1 case (16.7%) had hyperactivity-impulsive type. Therefore, in BPSD we found 12 cases (85.8%) with ADHD combined type, 1 case (7.1%) with ADHD hyperactivity-impulsive type and 1 case (7.1%) with ADHD inattentive type, respectively.

The study excluded the subjects with a diagnosis of mental retardation, pervasive developmental disorder, schizophrenia or severe neurological disorders.

Materials or Instruments

Diagnostic Interview for Children and Adolescents-IV

Children and adolescents were diagnosed using the DICA-IV [29], a semistructured diagnostic interview that assesses a wide range of psychological disorders in children and adolescents based on diagnostic criteria from the DSM-IV [10]. The Spanish version of the DICA-IV has been adapted and validated for the Spanish population with satisfactory psychometric properties [30, 31]. The following sections were used: ADHD, oppositional defiant disorder, conduct disorder and mania. The diagnoses were established by child and adolescent clinical psychologists combining the information provided by parents and children/adolescents for each symptom assessed. The symptom was considered present if the parents or child/adolescent referred it in the interview. For this study, the same clinician administered the DICA-IV to the parents and to the child/adolescent, taking into account the information provided by both sources.

Table 1. Sample description and comparison of scores on mania and functioning scales

<table>
<thead>
<tr>
<th></th>
<th>Total (n = 100)</th>
<th>ADHD with mania (n = 14)</th>
<th>ADHD without mania (n = 86)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>BPD (DSM) (n = 8)</td>
<td>BPD-NOS (n = 6)</td>
</tr>
<tr>
<td>Median age, years</td>
<td>11 (range = 8–17)</td>
<td>13.50 (range = 8–17)</td>
<td>12 (range = 8–17)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td>Boys (84)</td>
<td>Girls (16)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 (87.5)</td>
<td>1 (12.5)</td>
</tr>
<tr>
<td>ADHD type</td>
<td></td>
<td>Combined (75)</td>
<td>Hyperactivity (9)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7 (87.5)</td>
<td>0</td>
</tr>
<tr>
<td>Comorbidity</td>
<td></td>
<td>Defiant disorder (71)</td>
<td>Conduct disorder (15)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8 (100)</td>
<td>4 (50)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6 (100)</td>
<td>5 (83.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 (100)</td>
<td>9 (64.3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>57 (63.3)</td>
<td>6 (7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CMRS-P</td>
<td></td>
<td>15 [0–53]</td>
<td>18 [5–62]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14 [0–43]</td>
<td>11 [0–32]</td>
</tr>
<tr>
<td>P-YMRS</td>
<td></td>
<td>12 [0–52]</td>
<td>15 [3–53]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>18 [6–52]</td>
<td>11 [0–32]</td>
</tr>
<tr>
<td>YMRS</td>
<td></td>
<td>3 [0–33]</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15 [3–33]</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6.50 [5–27]</td>
<td>5 [0–10]</td>
</tr>
<tr>
<td>CGAS</td>
<td></td>
<td>55 [21–70]</td>
<td>40 [21–50]</td>
</tr>
</tbody>
</table>

Figures are numbers of cases with percentages in parentheses or medians with ranges in square brackets unless otherwise indicated. BPD (DSM) = Bipolar disorder (DSM); BPD-NOS = bipolar disorder not otherwise specified; BPSD = bipolar spectrum disorder; ADHD = attention deficit/hyperactivity disorder; CGAS = Children Global Assessment Scale; CMRS-P = Child Mania Rating Scale-Parent Version; P-YMRS = Parent-Young Mania Rating Scale; YMRS = Young Mania Rating Scale. p value: significance of Mann-Whitney test for the comparison of ADHD without mania and BPSD. * χ2 test (Fisher’s exact test).
consideration independently the information provided by each one.

In addition to the DSM diagnosis of BPD, BPD-NOS was also defined according to the criteria set out by Birmaher et al. [32], such as the presence of relevant BPD symptoms that did not fulfill the DSM-IV criteria for BPD. Specifically, subjects needed to have (1) (a) elevated mood and 2 associated DSM-IV symptoms or (b) irritable mood and 3 associated DSM-IV symptoms; (2) a change in the level of functioning; (3) duration of a minimum of 4 h within a 24-hour period, and (4) at least 4 cumulative lifetime days meeting the criteria.

Young Mania Rating Scale
This is an instrument developed by Young et al. [25] to be completed by the clinician while conducting the interview on the patient (15–30 min). It is an 11-item scale (see table 2 for item contents). The clinician rates the severity of the symptoms from 0 (no symptoms/normal behavior) to 4 (extreme deviation) based on the subjective information provided by the patient about the last 24-hour period, and the clinical observation of behavior during the interview. According to the developer of the questionnaire, items 5, 6, 8 and 9 have a double weight for calculating the total score [25].

Validation studies with pediatric outpatients obtained internal consistency (Cronbach’s η) between 0.80 and 0.91, and convergent validity with another measure of mania of r = 0.83 (p < 0.0001) [26–28]. The YMRS has become the most widely used measure in the research of BPD in adults and children.

The Spanish version, adapted for adults by Colom et al. [33], was used to validate the YMRS in children and adolescents with ADHD.

Parent-Young Mania Rating Scale
Developed by Gracious et al. [34], this is the parent version of the YMRS. It consists of 11 questions in which parents report on possible changes that they have observed in the behavior of their son/daughter, in his/her mood or in his/her thoughts. Each question has 5 possible answers, from 0 (no symptoms/normal behavior) to 4 (extreme deviation). As in the YMRS, questions 5, 6, 8 and 9 have a double weight for calculating the total score. Each one of the 11 questions on the P-YMRS occurs in the same order and assesses the same symptom as the items described in the YMRS. The aim of the P-YMRS is to have a standardized scale for parents used to assess the presence and severity of manic symptoms in children and adolescents aged 5–17 years. The original version of the P-YMRS showed acceptable internal consistency (Cronbach’s η of 0.72) and good discriminant validity between BPD and unipolar disorder, disruptive behavior disorder and any other diagnosis [34]. The P-YMRS has not been validated in Spain. To conduct the study, the P-YMRS was translated from English to Catalan and from Catalan to English with permission of the authors. Each translation was done by an official translator in his/her native language in conjunction with consultation to 3 clinical experts. The decision to translate one of the scales into Catalan was based on the interest of the authors to have standardized mania assessment instruments in a language that is the mother tongue of a significant part of the studied population. The Catalan version of the P-YMRS showed adequate internal consistency (Cronbach’s η of 0.71) in this sample.

Child Mania Rating Scale-Parent Version
This is a questionnaire for parents developed by Pavuluri et al. [35] to screen for child mania. It contains 21 items and is based on DSM-IV symptoms for manic episode. Each question has 4 possible answers on a Likert scale of 0 to 3, where 0 is never/rarely, 1 is sometimes, 2 is often and 3 is very often. The original version of the Child Mania Rating Scale-Parent Version (CMRS-P) showed good psychometric properties (Cronbach’s η of 0.96) and convergent validity with the YMRS (r = 0.78, p < 0.001), and differentiated between children with mania and children with ADHD [35]. The scale is designed to be answered by parents and it takes about

### Table 2. Comparison of means by diagnostic group, standard deviation (SD) and factor loading of the YMRS

<table>
<thead>
<tr>
<th>YMRS items</th>
<th>Total (n = 100)</th>
<th>ADHD without mania (n = 86)</th>
<th>ADHD with mania (n = 14)</th>
<th>ADHD without mania vs. BPSD</th>
<th>Factor loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elevated mood</td>
<td>0.24 ± 0.63</td>
<td>0.08 ± 0.31</td>
<td>1.38 ± 1.06</td>
<td>1 ± 1.26</td>
<td>0.001</td>
</tr>
<tr>
<td>2. Increased motor activity/energy</td>
<td>0.94 ± 1.07</td>
<td>0.80 ± 0.99</td>
<td>1.87 ± 1.24</td>
<td>1.67 ± 1.21</td>
<td>0.001</td>
</tr>
<tr>
<td>3. Sexual interest</td>
<td>0.17 ± 0.57</td>
<td>0.06 ± 0.23</td>
<td>1.25 ± 1.38</td>
<td>0.33 ± 0.81</td>
<td>0.001</td>
</tr>
<tr>
<td>4. Sleep</td>
<td>0.38 ± 0.83</td>
<td>0.24 ± 0.59</td>
<td>2.25 ± 1.28</td>
<td>2 ± 2.19</td>
<td>0.001</td>
</tr>
<tr>
<td>5. Irritability</td>
<td>0.70 ± 1.21</td>
<td>0.47 ± 0.95</td>
<td>2.25 ± 2.25</td>
<td>1 ± 1.67</td>
<td>0.001</td>
</tr>
<tr>
<td>6. Speech (rate and amount)</td>
<td>0.98 ± 1.34</td>
<td>0.86 ± 1.17</td>
<td>1.75 ± 1.98</td>
<td>0.67 ± 1.03</td>
<td>0.001</td>
</tr>
<tr>
<td>7. Language/thought disorder</td>
<td>0.27 ± 0.60</td>
<td>0.21 ± 0.51</td>
<td>0.88 ± 1.12</td>
<td>0.33 ± 0.51</td>
<td>0.001</td>
</tr>
<tr>
<td>8. Thought content</td>
<td>0.24 ± 0.81</td>
<td>0.07 ± 0.36</td>
<td>0.25 ± 0.70</td>
<td>0.33 ± 0.81</td>
<td>0.001</td>
</tr>
<tr>
<td>9. Disruptive/aggressive behavior</td>
<td>0.10 ± 0.52</td>
<td>0.07 ± 0.48</td>
<td>0.00 ± 0.00</td>
<td>0.50 ± 1.22</td>
<td>0.001</td>
</tr>
<tr>
<td>10. Appearance</td>
<td>0.07 ± 0.38</td>
<td>0.05 ± 0.26</td>
<td>2.63 ± 1.59</td>
<td>2 ± 1.78</td>
<td>0.001</td>
</tr>
<tr>
<td>11. Insight</td>
<td>0.82 ± 1.29</td>
<td>0.57 ± 1.04</td>
<td>16 ± 9.78</td>
<td>11 ± 8.87</td>
<td>0.001</td>
</tr>
<tr>
<td>Total score</td>
<td>4.95 ± 5.85</td>
<td>3.50 ± 3.35</td>
<td>13.86 ± 9.40</td>
<td>3.50 ± 3.35</td>
<td>–</td>
</tr>
</tbody>
</table>

Significant differences are indicated in italics.
Psychometric Properties of the YMRS in Spanish Children with ADHD

10–15 min. There is currently no version of the scale adapted for the Spanish population. For this study, the scale was translated into Spanish with permission of the authors. The Spanish version was then backtranslated into English. The translations were done by official translators and it was reviewed by 3 clinical experts. In this sample, the CMRS-P obtained good internal consistency (Cronbach’s α of 0.91).

Children's Global Assessment Scale
This scale, developed by Shaffer et al. [36], was used to assess the degree of functional impairment of the child at the time of the examination. Children’s Global Assessment Scale (CGAS) scores range from 1 (maximum impairment) to 100 (normal functioning). Scores ≥70 reflect normal functioning. The psychometric properties of the scale adapted for the Spanish population have been studied with satisfactory results in terms of reliability (test-retest and inter-interviewers) and validity (since it differentiated groups of children with and without pathology and subjects with a different number of disorders) [37].

Procedure
Once written consent to participate in the study had been obtained from parents and children (>12 years old) and verbal consent had been obtained from children (<12 years old), parents and children and adolescents were interviewed separately with the DICA-IV. After the interview the parents answered the P-YMRS and the CMRS-P and the clinicians completed the YMRS and the CGAS. The YMRS was completed again after 1 week in 32 patients to evaluate the test-retest reliability.

Statistical Analysis
The data were analyzed with SPSS 17.0. The factor structure was analyzed through confirmatory factor analysis with AMOS 17. The unweighted least squares method of estimation was used, regarding nonnormality and sample size, but this method of estimation does not provide significant tests. In order to make adjustment possible items 5, 6, 8 and 9 were recoded into a 5-point Likert-type scale [38]. Internal consistency was calculated using Cronbach’s α and test-retest reliability was analyzed by Pearson correlation. External validity was studied by relating the total YMRS score with the total scores of the mania scales (P-YMRS and CMRS-P) and the clinicians completed the YMRS and the CGAS. The YMRS was completed again after 1 week in 32 patients to evaluate the test-retest reliability.

Results

Factorial Structure
The confirmatory factor analysis showed that the scale is 1-dimensional (SRMR = 0.117; GFI = 0.966; eigenvalue = 4.206); a single factor explained 38.24% of the variance. Table 2 shows the standardized factor loadings, which indicate a significant contribution of each item in the factor. All factor loadings were ≥0.30.

Reliability
Internal Consistency. Cronbach’s α coefficient for the total scale was 0.83 for the entire sample.

Test-Retest Reliability. The 1-week test-retest reliability in 32 patients was 0.95 (p < 0.001).

Convergent Validity
Convergent validity was studied by correlating the scale with the P-YMRS and the CMRS-P, which are 2 scales that aim to measure the same construct (manic symptoms). The YMRS was significantly related to the P-YMRS (B = 0.66; 95% CI = 0.37–0.95) and to the CMRS-P (B = 0.64; 95% CI = 0.27–1.01). The association of the YMRS with a functional impairment measure, the CGAS, was also studied through linear regression, controlling for sex and age. The results showed a significant association between both scales (B = −1.07; 95% CI = −1.34 to −0.80). For every point of increase on the YMRS, the functioning decreased 1.07 points.

Predictive Validity
Logistic regression analysis, controlling for sex and age, indicated that the score on the scale is significantly associated with the diagnosis of ADHD + BPD (DSM) (OR = 1.24; 95% CI = 1.09–1.4); the likelihood of diagnosing ADHD + BPD (DSM) versus ADHD without mania was multiplied by 1.24. The same analysis showed a significant association between the YMRS score and the diagnosis of ADHD + BPDS (OR = 1.45; 95% CI = 1.17–1.8); for each point of increase on the scale, the likelihood of diagnosing ADHD + BPDS versus ADHD without mania was multiplied by 1.45.

Discriminative Validity
The means of the items of the YMRS and the total score for the ADHD + BPDS group were significantly greater than those of the ADHD without mania group in all of the items except speech (rate and amount), disruptive/aggressive behavior and appearance (table 2).

The ROC curve analysis showed areas under the curve between 0.90 and 0.88 to differentiate ADHD + BPD (DSM) and ADHD + BPDS from ADHD without mania, respectively. A cutoff point between 6 and 7 achieved a specificity of 0.78 and a sensitivity of 0.87 for ADHD + BPD (DSM). A cutoff point between 5 and 6 achieved a specificity of 0.76 and a sensitivity of 0.78 to discriminate ADHD + BPDS (fig. 1 and 2).
Discussion

The results obtained from validating the YMRS suggest that the Spanish version of the YMRS is a valid and reliable instrument for detecting and quantifying the symptoms of mania in children and adolescents with ADHD. The YMRS used on children and adolescents with ADHD shows satisfactory psychometric properties and differentiates between ADHD patients with and without mania.

The factor analysis of the scale indicates that it is 1-dimensional; a single factor explains the largest percentage of the variance, which indicates that it assesses a single construct (mania).

In addition to good reliability (internal consistency and test-retest reliability), the validity of the Spanish version of the YMRS for children with ADHD is shown by (1) the significant association with other measures of mania in children and adolescents with ADHD, the P-YMRS and the CMRS-P, (2) the significant association between the YMRS and functional impairment measured with the CGAS, (3) the diagnostic effectiveness shown in the ROC curve analysis, and (4) the significant association between the total score on the scale and the diagnosis of ADHD + BPD.

The manic symptoms of the YMRS that best differentiated BPD in children with ADHD were elevated mood, increased motor activity/energy, sexual interest, sleep, irritability, language/thought disorder, thought content and insight. Geller et al. [6] found that grandiosity, elated mood, hypersexuality, flight of ideas and decreased need for sleep differentiated children with BPD from ADHD. It is worth noting that children with BPD were included in the study if they had grandiosity and/or elation.

On the other hand, speech (rate and amount), disruptive/aggressive behavior and appearance were not discriminatory. The appearance of children, unlike that of adults, is not directly related to psychopathology because the way children dress greatly depends on their parents. This item also had the lowest factor loading in the factor analysis. Speech (rate and amount) and disruptive/aggressive behavior were the manic symptoms that neither discriminated between ADHD and ADHD + BPSD. Disruptive/aggressive behavior also occurs in ADHD when it is associated with oppositional defiant and conduct disorder. However, the association between conduct problems and BPD in adolescents should be noted. In our sample, we found 64% of conduct disorder in children and adolescents with ADHD + BPSD. These results are similar to 69% of lifetime comorbidity of BPD with conduct disorder found for Kovacs and Pollok [39]. Endrass et al. [40] found that children and adolescents showing behavior such as repeated running away from home and physical
fighting were 2.6–3.5 times more likely to experience a bipolar II disorder than those without any indication of conduct problems. Longitudinal studies have confirmed impaired social functioning as a predictor for mood disorders and BPD in particular [41–42].

Finally, the item speech (rate and amount) also overlaps with the rapid or accelerated speech in children with ADHD [12].

Psychometric properties obtained in the Spanish version of the YMRS for children and adolescents with ADHD are similar in factorial structure, internal consistency, test-retest reliability and validity data to the validation results for the American population of the original version of the YMRS for child and adolescent outpatients [26–28].

The validity of the diagnosis of mania (and BPD-NOS) in children and adolescents has been under debate, especially in Europe. Youngstrom et al. [43] reviewed the classic diagnostic validators applied to pediatric BPD. They noted that studies of phenomenology could inform diagnostic progress in children with BPD. In this way, elated mood is highly specific to BPD (45–87%) [32, 44–47] and irritability (present in >80%) [32, 44, 46] appears to be the complement of elated mood. The genetic component of diagnostic validation appears important as the presence of bipolar illness in the parents of such children is an important diagnostic marker. The course of illness tends to involve mixed episodes with rapidly fluctuating mood states, and such an early onset of bipolar illness may predict worse prognosis into adulthood. With respect to treatment response, children with BPD treated with antidepressants and/or amphetamines may lead to mania or mixed states. There is an emerging consensus about morphological and functional changes associated with pediatric BPD.

With regard to BPD-NOS, Birmaher et al. [32] found that 25% of the youths initially meeting criteria for BPD-NOS progress to meet full criteria for BPD-I or BPD-II within 2 years. These results provide preliminary validation for the definition of BPD-NOS.

Other authors are skeptical of the new phenotypes defined by US researchers and affirm that pediatric BPD phenotypes remain hypothetical [48].

In any case, the results of this study provide further knowledge about the association between ADHD and manic symptoms in children and adolescents in a non-Anglo-Saxon sample. Given the high prevalence of ADHD, which is between 3 and 5% in school-age children [10], a co-occurrence of 14% of BPSD represents a considerable number of comorbid cases. Keeping in mind the worse prognosis of ADHD associated with mania [22–24], proper detection of comorbid cases with BPD (aided by specific scales for assessing pediatric mania) will determine the choice of treatment, on both a pharmacological and psychosocial level.

Limitations

The study poses some limitations arising mainly from the limited number of participants with comorbidity with BPSD. The sample size of the ADHD with mania group should be increased in subsequent studies. Another limitation was the fact that the same clinician completed DICA-IV interviews with parents and children for the diagnosis, which could have biases the assessment. However, in other interviews, as the Schedule for Affective Disorders and Schizophrenia for School-Age Children, the assessment of parents and children is made by the same interviewer.

Acknowledgements

We want to thank Dr. E. Penelo for her advice on confirmatory factor analysis. This study was supported, in part, by grant PSI2009-07542 of the Ministry of Science and Innovation (Spain).

References


