ABSTRACT

Despite efforts to encourage use of behavior checklists as a part of clinical evaluations of Attention-Deficit/Hyperactivity Disorder (ADHD), the use of these checklists in busy clinical settings is inconsistent. In this study, we sought to develop a brief, easy to use behavioral checklist for ADHD and related symptoms. Five mental health care providers identified items for the CHAOS (Conduct-Hyperactive-Attention Problem-Oppositional Symptom) checklist based on DSM-IV diagnostic categories. The items, which reflect the 5 DSM-IV diagnostic categories (Table 1), were subjected to a principal components analysis (PCA) with Promax rotation (other factor analytic and rotation methods were also applied, with similar results). Four components had eigenvalues >1. Based on PCA loadings (Figure 1), items fell into groups of 5, which were consistent with the original DSM-IV diagnostic categories. Subscales based on these loadings were named Attention Problems, Hyperactivity-Impulsivity, Oppositional Behavior, and Conduct Problems. Internal Consistency

In order to encourage more widespread use of ADHD behavior checklists in busy clinical practices and primary care settings, we developed a very brief, user-friendly measure with strong psychometric properties. The CHAOS scale is short and very easy to score and interpret, with four 5-item subscales corresponding to the DSM-IV diagnostic categories of most concern in the treatment of ADHD: ADHD-Inattentive (Attention Problems subscale), ADHD-Hyperactive/Impulsive (Hyperactivity-Impulsivity subscale), Oppositional-Defiant Disorder (Oppositional Behavior subscale), and Conduct Disorder (Conduct Problems subscale). Subscale items are grouped on the CHAOS scale, making them easy to identify, add, and (in the case of the subscales) compare to cutoff raw scores of approximately 10. The CHAOS scale is easy to reproduce (free, one side of a page) and use in clinical practice. Results of psychometric analyses demonstrated a strong factor structure as well as excellent internal consistency and test-retest reliability. Inter-rater reliability was comparable to that of other behavior checklists, and correlations with office-based measures of executive functioning were statistically significant only for CHAOS subscales reflecting ADHD symptoms. Relationships with other behavior checklists were strong and specific to the constructs measured by the CHAOS subscales. Study results showed that the CHAOS is a short, useful, and practical tool for the medical and mental health fields.

METHOD

Content Development of the CHAOS Scale

Five mental health care providers (2 psychiatrists, 2 social workers, and 1 psychologist) independently selected the 5 “best” symptoms from each of four DSM-IV diagnostic categories: ADHD-Inattentive, ADHD-Hyperactive/Impulsive, Oppositional-Defiant Disorder, and Conduct Disorder. CHAOS scales were then administered to mothers of 205 clinically-referred children. Principal components analyses resulted in 4 5-item subscales: Attention Problems, Hyperactivity-Impulsivity, Oppositional Behavior, and Conduct Problems. Reliability and validity of the subscales were examined in a separate sample of 139 clinically-referred children. The CHAOS demonstrated moderate to high test-retest and inter-rater reliability. CHAOS subscale scores correlated significantly with subscales from other checklists, as well as with office-based tests of executive functioning. The results of this study demonstrate that the CHAOS has good to excellent reliability and validity in the assessment of ADHD. Because of its brevity, ease of scoring, breadth of coverage, and low cost (free), it is well-suited for use in systematically evaluating and monitoring ADHD symptoms in busy clinical settings.

RESULTS

In order to encourage more widespread use of ADHD behavior checklists in busy clinical practices and primary care settings, we developed a very brief, user-friendly measure with strong psychometric properties. The CHAOS scale is short and very easy to score and interpret, with four 5-item subscales corresponding to the DSM-IV diagnostic categories of most concern in the treatment of ADHD: ADHD-Inattentive (Attention Problems subscale), ADHD-Hyperactive/Impulsive (Hyperactivity-Impulsivity subscale), Oppositional-Defiant Disorder (Oppositional Behavior subscale), and Conduct Disorder (Conduct Problems subscale). Subscale items are grouped on the CHAOS scale, making them easy to identify, add, and (in the case of the subscales) compare to cutoff raw scores of approximately 10. The CHAOS scale is easy to reproduce (free, one side of a page) and use in clinical practice. Results of psychometric analyses demonstrated a strong factor structure as well as excellent internal consistency and test-retest reliability. Inter-rater reliability was comparable to that of other behavior checklists, and correlations with office-based measures of executive functioning were statistically significant only for CHAOS subscales reflecting ADHD symptoms. Relationships with other behavior checklists were strong and specific to the constructs measured by the CHAOS subscales. Study results showed that the CHAOS is a short, useful, and practical tool for the medical and mental health fields.

DISCUSSION

Behavior checklists are a valuable part of the assessment of ADHD, and use of checklists is recommended in ADHD evaluation and treatment guidelines (AACAP, 1997; AAP, 2000). However, in spite of the large number of available checklists, about 25-40% of primary care physicians do not use behavior checklists routinely for ADHD evaluation (Chan et al., 2005; Rushton et al., 2004). Furthermore, many physicians report that use of behavior checklists is not feasible in their practice (Power et al., 2008). The use of ADHD behavior checklists longitudinally to monitor change and to guide treatment decision-making is even less common, despite the potential value of this approach for maximizing treatment efficacy (MTA Cooperative Group, 1999). The underuse of behavior checklists in primary care settings is a result of several shortcomings, including length, cost, insufficient symptom coverage, and inconvenience of scoring and interpretation. In this study, we sought to develop a scale that addressed these shortcomings and that would be especially appropriate for busy clinical and primary care settings.

Figure 1: PCA Loadings for CHAOS Items

Figure 2: Inter-rater Reliability

Figure 3: Test-Retest Reliability

Figure 4: Parent-Report Correlations

Table 1: Sensitivity and Specificity of CHAOS Scores in Predicting Parent- and Teacher-Report Diagnostic Elevations on the SI-4

<table>
<thead>
<tr>
<th>CHAOS Subscale</th>
<th>Respondent</th>
<th>Cutoff</th>
<th>Sensitivity</th>
<th>Specificity</th>
<th>AUC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attn Hpr Attn Tchr</td>
<td>ADHD</td>
<td>1.00</td>
<td>0.82</td>
<td>0.94</td>
<td>0.92</td>
</tr>
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<td>ADHD</td>
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