ASSESSING DIMENSIONS OF DISRUPTIVE CHILD BEHAVIOR WITH THE EYBERG CHILD BEHAVIOR INVENTORY

By

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The Eyberg Child Behavior Inventory (ECBI) is a well-validated parent rating scale that assesses behavior problems in both children and adolescents. While originally conceptualized as a one-dimensional measure of disruptive behavior, there are discrepancies in the literature regarding its factor structure, with some studies finding a single factor and others finding support for a multidimensional structure. While previous research samples have been diverse, additional research is needed on other clinical samples. The primary goal of our study was to further assess the factor structure of this measure using data obtained from a clinical sample displaying a wide range of disruptive behaviors such as children referred for evaluation of Attention Deficit Hyperactivity Disorder (ADHD) and associated conditions.

Data from parents of 181 children referred to an ADHD Program were used for the analyses. Upon initial assessment in the ADHD clinic, parents completed a number of assessment measures that included the ECBI as well as measures used in validity analyses. A factor analysis using principal axis factoring and promax rotation was performed on the individual item data of the ECBI. Analysis of eigenvalues greater than one, item distribution breakdown, and inspection of the scree plot revealed that the ECBI was best accounted for by a three-factor structure with factors representing oppositional defiant behavior, attention problems,

and conduct problems. Convergent and discriminant validity analyses using measures of relevant constructs from psychometrically sound measures demonstrated good validity for all three factors. Current research continues to demonstrate that the ECBI is a valid tool with a multidimensional structure, which could increase the measure's utility in both clinical and research contexts.

CHAPTER 1
INTRODUCTION

ADHD and the Disruptive Behavior Disorders

Attention Deficit Hyperactivity Disorder (ADHD) is one of the most commonly diagnosed childhood behavioral disorders occurring in approximately 3 to 5% of the general child population (American Psychiatric Association (APA), 1994). Barkley (1998) suggests that children with this disorder also comprise approximately 40% of referrals to outpatient clinics. The guidelines defined in the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) are generally used to make diagnostic decisions regarding the presence or absence of ADHD. Current criteria include clinically significant levels of symptoms in the domains of attention, hyperactivity and impulsivity; symptom onset before 7 years of age; symptoms that are present across situations; that cause impairment in social, academic, or occupational functioning; and symptoms that have occurred apart from other mental disorders. Subtypes of the disorder are based on these dimensions and include the predominantly inattentive type, the predominantly hyperactive/impulsive type, and the combined type.

ADHD also has high rates of comorbidity with Oppositional Defiant Disorder (ODD) and Conduct Disorder (CD). ODD is defined as a pattern of hostile, defiant, and negativistic behavior towards adults (APA, 1994). Symptoms include arguing with adults, actively defying rules or requests, as well as often being angry and vindictive. To meet diagnostic criteria for ODD, a child must have exhibited the pattern of defiant behavior for at least 6 months, must show evidence of impairment, and the symptoms must not be due to another mental disorder. Conduct Disorder is characterized by a pattern of behavior that violates the basic rights of others or age-appropriate societal rules (APA). Symptoms are grouped into the categories of aggression towards people or animals, destruction of property, deceitfulness or theft, and serious violations

of rules such as running away. Subtypes for conduct Disorder are based on age of onset and include childhood-onset type and adolescent-onset type. All three of the described disorders are viewed as disruptive behavior or externalizing disorders and are highly comorbid with one another (APA). Indeed, the high degree of comorbidity between ODD and CD has prompted some researchers to suggest that they are not, in fact, separate disorders, although a variety of studies clearly support distinctions between these two conditions (Loeber, Lahey, & Thomas, 1991).

While several measures exist that assess for symptoms of each of these disorders (e.g. structured interviews, Child Behavior Checklist, Diagnostic Interview Schedule for Children), no widely used brief questionnaire or screener assesses all of these domains. A short measure that accomplishes such a task has the potential for great clinical and research utility.

The Eyberg Child Behavior Inventory (ECBI)

The Eyberg Child Behavior Inventory (ECBI) is a parent rating scale which assesses disruptive behavior problems in both children and adolescents (Eyberg & Robinson, 1983). The ECBI was designed to differentiate normal children and adolescents from those with conduct problems and as a follow-up instrument for assessing treatment effects for a broad age range (Eyberg & Ross, 1978). While demonstrating good psychometric characteristics in previous research (Boggs, Eyberg, & Reynolds, 1990; Funderburk, Eyberg, Rich & Behar, 2003; Robinson, Eyberg, & Ross, 1980), there are discrepancies regarding the factor structure of the ECBI. Eyberg designed the ECBI as a one-dimensional assessment scale of general conduct problems and studies have found support for such a structure (Colvin, Eyberg, & Adams, 1999; Eyberg, 1992). Other researchers, however, have found evidence of a multidimensional structure of the ECBI. In an examination of the cross-cultural validity of the ECBI in a sample of Australian preschoolers, Werba (2003) found evidence for a two-factor structure of the ECBI.

The author found similar results when repeating the exploratory factor analysis on a sample of parents of preschoolers in the United States. Results from both analyses, while not identical, indicated the factors represented the constructs of ODD and ADHD.

Taking a closer look at individual items from the ECBI, they seem representative of three specific categories and similar to specific DSM-IV (APA, 1994) criteria for ODD, ADHD, and CD. For example, the ECBI item "Has short attention span" is similar to the DSM-IV criterion "Often has difficulty sustaining attention in tasks or play activities." Similarly, the ECBI item "Acts defiant when told to do something" is similar to the DSM-IV ODD criterion "Often actively defies or refuses to comply with adult's requests or rules." Another ECBI item, "Teases or provokes other children," appears at face-value to be similar to the DSM-IV CD criterion "Often bullies, threatens, or intimidates others." When continuing to compare the ECBI item by item to DSM-IV criteria for the three disorders, many other examples are revealed. As ODD, CD, and ADHD comprise the primary childhood disruptive behavior disorders, it is not surprising that a measure such as the ECBI may have a factor structure representing aspects of these three areas.

Some researchers have, in fact, found evidence for a three-factor structure of the ECBI. Burns and Patterson (1991) collected data from parents of 1,526 children in outpatient clinics in Montana, Washington, Idaho, and Oregon. In their exploratory factor analysis they utilized principal components analysis with varimax rotation on the frequency scores of the ECBI. Results indicated a three-factor structure with factors representing oppositional-defiant behavior, attentional difficulties, and violations of others' rights via aggression.

Burns and Patterson (1991) attempted to replicate their three-factor findings of the ECBI using a random sample of children from an urban school district in Washington. Again using

principal components analysis and varimax rotation, Burns and Patterson performed an exploratory factor analysis, though limiting the resulting model to three factors as they had an a priori hypothesis based on results from their first study. Findings supported a three-factor solution representing the categories they had identified in previous work. Burns and Patterson (2000) later combined their urban and original sample and divided them into two subsequent random samples in order to further evaluate the factor structure of the ECBI. Using exploratory factor analysis with maximum likelihood extraction and oblique rotation, they examined two- to seven-factor solutions as results indicated seven eigenvalues greater than one. Here, Burns and Patterson found a four-factor solution to be most relevant. The first three factors again represented symptomatology of ODD, attention problems, and CD, but the fourth factor did not represent a discernible dimension. The researchers explained this fourth factor as a possible response bias effect which resulted in a meaningless factor as can happen when items with low but significant loadings on the first factor separate and form their own separate factor. Burns and Patterson chose the four-factor solution because it resulted in the three primary factors becoming more conceptually clear.

Burns and Patterson (2000) next took their second random sample and performed a confirmatory factor analysis on the ECBI using the first three factors of the four-factor model (the fourth factor was not used as it was judged conceptually meaningless). Burns and Patterson also compared the three-factor solution to a one-factor solution and a two-factor solution (which combined the ODD and CD factors). Results from the initial three-factor confirmatory analysis indicated adequate to good fit, and a significantly better fit compared to the one- and two-factor models. Burns and Patterson also identified 90th percentile cutoff scores from their community

sample to identify children with significant levels of oppositional behavior, attention difficulties, and conduct problems.

Still, other researchers continue to find support for a one-factor structure of the ECBI (Colvin et al., 1999). Using data collected for the restandardization of the ECBI, researchers found, via four different methods of factor analysis, that the ECBI was best accounted for using a one-factor model. These researchers utilized principal components analysis with both varimax and oblimin rotations, and principal axis factoring with varimax and oblimin rotations. A conceptually meaningful one-factor model was found with all four methods of analysis.

In 2005, Weis, Lovejoy, & Lundahl performed a confirmatory factor analysis using individual ECBI item data to compare the previously described Burns and Patterson (2000) three-factor model to a one- and two-factor model using a large general clinical sample of young children. In this analysis, the researchers used data from different studies of stress, affect, and parenting which included ECBIs completed by a predominantly Caucasian sample of parents of children ages two to six. The study demonstrated that Burns and Patterson's three-factor model was an adequate fit to the combined data set. A one-factor model demonstrated a poor fit to the data. The two-factor model (collapsing the ODD and CD categories) did demonstrate adequate fit. It can be noted, however, that the three-factor model was a significantly better fit to the data than either the one- or two-factor model.

In addition to their confirmatory factor analysis, Weis et al., (2005) completed a second study assessing the discriminative validity of the three-factor model of the ECBI. In this investigation, the researchers recruited caregivers of 115 children referred to an outpatient psychology clinic. In order to assess the discriminative validity of the Burns and Patterson cutoff scores described earlier, Weis et al. had caregivers complete an ECBI. The primary aim of this

study was to assess the ability of cutoff scores to categorize children with and without significant disruptive behavior problems. The second aim of the study was to discriminate between children who do or do not display symptoms of ADHD, ODD and CD as determined by the Disruptive Behavior Disorder Rating Scale (DBDRS; Barkley, 1997). Results demonstrated that the three factors had adequate negative predictive power and poor positive predictive power. Sensitivity for the three factors was poor (.63 to .77) but results demonstrated good specificity (.91 to .94). Results of a MANOVA using the factor scores of the ECBI as the multivariate dependent variable and the symptom groups from the DBDRS as the independent variables suggested that the Attention Difficulties factor did not appear to discriminate children with attention problems from children with ODD or CD; the same was true of the oppositional factor. The Conduct Problems factor did appear to adequately differentiate children with aggressive behaviors from those with attention problems or ODD. While these researchers did extend the work of Burns and Patterson, the limited age range and nonspecific general clinical sample may limit results. The second sample used in the study was also not large and individual diagnostic groups were not well represented. Thus, while the study adds to the literature, further research is needed.

In these previous studies, samples have included participants recruited through pediatric clinics and schools, general outpatient psychology clinics, childcare centers, family service agencies, and newspaper advertisements. While researchers have previously attempted to assess the fit of a three-factor model on a general clinical sample (Weis et al., 2005), additional research is needed on other clinical samples. In addition, it is important to assess the validity of factors resulting from such research and, perhaps later, the value of cutoff scores for well validated factors. Research along these lines might provide the basis for using the ECBI as a brief, preliminary screener for specific problem areas, rather than just as an overall index of disruptive

behavior. Additionally, it can be noted that the ECBI was also designed to assess change in conduct problem behavior over the course of treatment (Eyberg & Ross, 1978). Here, the utility of the ECBI could potentially be increased threefold in terms of providing change data in multiple areas that may or may not be directly targeted by treatment (e.g., ODD, CD, and ADHD related symptoms). This, in turn, might decrease time spent in the assessment process by reducing the need for multiple pre-screeners and follow-up assessments. Clinicians, researchers, and patients will save time if such a measure is available. While the ECBI has already been validated as a brief screening instrument for both children and adolescents with conduct problems, it may be able to provide even more information.

The current study aimed to add to the literature by further assessing the factor structure of the ECBI and conducting validity analyses on the factors of the model. While previous investigations have studied diverse samples, more research is needed on clinically relevant samples. One such sample would be one that could be expected to display symptomatology for all three of the disorders purported to be assessed by the ECBI. As ADHD is highly comorbid with both ODD and CD, a sample of children referred to an ADHD clinic would likely display the symptomatology of all three disorders. Specifically, it was expected that multiple factors of the ECBI would be identified using such a sample and that these factors would be representative of symptomatology of attention problems, oppositional behavior, and conduct disorder. As previous factor analyses found that several items did not load on any of the factors, it was hoped that this relevant clinical sample would be able to utilize all of the ECBI items, some of which may not have appeared as salient in the more general samples in previous research. Secondarily, we expected that factors found via factor analysis would demonstrate good convergent and

discriminant validity when assessed in relation to psychometrically established measures designed to measure similar constructs.

CHAPTER 2
METHODS

Data Collection

Data for this study was collected from children (and their parents) who were involved with the interdisciplinary ADHD program at the University of Florida. This program is staffed by professionals from various disciplines (e.g. psychology, pediatrics, child psychiatry, medicine, nursing, speech pathology) from several departments at the University of Florida and Shands Teaching Hospital. Children are referred to the program for assessment and follow-up by parents, teachers and physicians from the local community and from throughout North Central Florida. Some children referred to the program have not received a complete assessment and have no official diagnosis at the time of referral. Others with a diagnosis have not undergone a detailed assessment such as that available at the University of Florida. When a child is referred to the program, the child and caregiver(s) participate in an all-day assessment. This includes parent- and teacher-report (and sometimes child-report depending on age) measures to assess for ADHD symptoms and possible comorbid features, a clinical interview, intellectual and achievement testing, as well as other measures, as necessary. The data from the psychological assessment are presented at an ADHD Program meeting, along with data obtained by the pediatrician associated with the ADHD program. This information is used by the ADHD interdisciplinary team to determine whether additional assessment by other professionals is needed and to determine recommendations and the appropriate diagnosis.

An application for exempt status was submitted to the University of Florida Institutional Review Board as data was collected without identifiers. Once exempt status was obtained, data were collected from the files and entered into a database for analyses. Demographic data collected included age, gender, ethnicity, education level, and diagnoses of the child.

Information on the age, gender, education level, and family income of the caregiver who completed the forms was also recorded. Individual item data from the ECBI as well as scores from several other measures used for validity analyses were also entered into the database.

Measures

The ECBI

The ECBI is a 36-item parent-report measure designed to assess conduct problems in both children and adolescents (Eyberg & Ross, 1978). The ECBI has two scales: a problem scale and a frequency scale. Caregivers are asked to indicate how often a particular behavior or problem occurs on a 7-point likert-type scale. The scale ranges from anchors “never” to “always.” The problem scale asks caregivers to indicate in a yes or no format whether they consider the particular behavior to be a problem regardless of the frequency. The ECBI has demonstrated good internal consistency, test-retest reliability, and sensitivity to treatment effects (Colvin et al., 1999; Eyberg & Robinson, 1983; Robinson et al., 1980).

The CPRS and BASC

As part of the child’s assessment, caregivers complete the Conners Parent Rating Scale (CPRS; Conners, 1997) and the Behavioral Assessment System for Children (BASC; Reynolds & Kamphaus, 2004). The CPRS and BASC are broadband measures that have undergone psychometric validation in previous research. The CPRS is an 80-item questionnaire that assesses ADHD symptoms and associated features and provides measures used to assess the validity of factors found in the present factor analysis. The BASC is a slightly longer broadband measure, completed by a parent or caregiver, which assesses symptoms related to various types of child psychopathology and child difficulties that were also useful in assessing validity of derived factors in the present study. Caregivers may have completed either the first or second

edition of the BASC as the measure underwent revision and was republished in 2004. However, both versions contain the subscales used in analyses for the current study.

Participants

Data were collected from 181 caregivers of children referred to the ADHD clinic at the University of Florida. The average age of the child referred to the clinic was 8.75 years old (*SD*=2.93) and 75% (*N*=135) were male. Consistent with Alachua County census data, 75% (*N*=136) of the sample identified as Caucasian, 18% (*N*=32) identified as African-American, 2% (*N*=3) identified as Hispanic, and the remaining 5% (*N*=10) of the sample identified as another ethnicity, multiracial, or did not specify. The average level of education of the child was the third grade. Of the children on whom ECBIs were completed, 92% (*N*=166) were given a diagnosis of ADHD. Of those diagnosed with ADHD, 79% (*N*=131) were combined type, 17% (*N*=28) were predominantly inattentive type, 2% (*N*=4) were predominantly hyperactive/impulsive type, and 2% (*N*=3) were categorized as ADHD NOS. A total of 22% (*N*=40) of the children met diagnostic criteria for ODD and 3% (*N*=5) met diagnostic criteria for CD.

Statistical Analyses

Factor Analyses

In order to accomplish the aim of further exploring the factor structure of the ECBI, an exploratory factor analysis (EFA) was conducted on the individual item data of the ECBI frequency scale. EFA, as opposed to confirmatory factor analysis (CFA), was chosen for several reasons. First, while several studies have found multidimensional structures, these studies are few in number and were conducted on limited samples. While Burns and Patterson (1991, 2000) used large samples in their analyses, these participants represented community samples rather than samples drawn from a clinical population. The same is true of the study with Australian

preschoolers (Werba, 2003). Even though Weis et al. (2005) performed a CFA, their sample was also not a specific clinical sample; perhaps a different model would have fit the data better had a more relevant sample been used. Here it can also be noted that Weis et al. performed their CFA on the three-factor model from Burns and Patterson which excluded nine of the ECBI items. It was hoped that use of a relevant clinical sample would utilize all 36 of the ECBI items. Hence, it was reasonable to conduct an EFA on the current clinical sample in order to explore the factor structure that would be most robust in a sample likely to display symptomatology of all three disorders. Secondly, while multivariate normality is generally helpful in providing a clear factor structure, the assumption is much more pertinent to CFA than EFA (Floyd & Widaman, 1995). As the current study sample is not a large sample, multivariate normality is harder to achieve and the techniques employed in an EFA are not as sensitive to non-normally distributed data. Thus, the validity of the resulting factor structure is somewhat increased by the use of EFA as opposed to CFA. A minimum sample size of 180 was chosen based on the generally accepted rule of needing five cases per item in order to conduct a valid analysis (Floyd & Widaman).

Specifically, the study extracted factors via principal axis factoring, a technique which is not thought to be as constrained by assumptions of multivariate normality (Floyd & Widaman, 1995). Two kinds of rotation were employed in the current study. First, all models were rotated via oblique rotation. As ADHD is highly comorbid with both ODD and CD it is logical to expect that factors representing symptoms of the three disorders would be correlated. All analyses were rerun using orthogonal rotation to see if use of the independent rotation strategy resulted in a clearer factor structure. An initial EFA was run without specifying the number of factors. After investigation of the scree plot and eigenvalues, subsequent EFAs were run forcing specific-numbered solutions.

Validity Analyses

Pearson correlations were used to assess convergent and discriminant validity of factors found in factor analyses. Here, the ECBI factors were correlated with scores on various subscales of the CPRS and BASC. Specifically, the CPRS contains an ADHD Index and a DSM-IV Inattentive subscale which were expected to correlate highly with the proposed Attention Difficulties factor of the ECBI. The CPRS also contains an Oppositional Behavior subscale which was expected be highly correlated with the Oppositional Defiant Behavior factor of the ECBI. The BASC has an Attention Problems subscale which was expected to be highly correlated with the Attention Difficulties factor of the ECBI. The BASC also has both a Conduct Problems and an Aggression subscale, which were hypothesized to be highly correlated with the Conduct Problems factor of the ECBI. The BASC and CPRS both contain some form of an anxiety subscale and these were hypothesized to not be correlated with any of the three proposed factors of the ECBI.

CHAPTER 3
RESULTS

Factor Analytic Findings

Results of the initial factor analyses revealed nine factors with eigenvalues greater than one. Inspection of the scree plot (See Figure 3-1) demonstrated two points of leveling-off, one point at three factors and one point at six factors. Thus, four more factor analyses were run forcing three-, four-, five-, and six-factor solutions. This was completed using oblique rotation initially and then again with orthogonal rotation. Conceptually, results were best accounted for by the three-factor oblique rotation with factors representing oppositional defiant behavior, attention problems, and conduct problems. Results of this model are presented in Table 3-1. Items were considered to load on a factor if they had a loading of .4 or higher, a generally accepted level (Floyd & Widaman, 1995). This three-factor solution involved a total of 25 of the 36 ECBI items.

Here it can be seen that factor 1, labeled Oppositional Defiant Behavior, consisted of 12 items which seemed to reflect the pattern of defiant and negativistic behavior towards adults associated with ODD. The second factor, labeled Attention Difficulties, consisted of seven items that, at face value, appeared representative of the attention problems often experienced by children diagnosed with ADHD. Lastly, the third factor, labeled Conduct Problems, was comprised of six items which appeared to represent aggression and violation of the rights of others and societal norms, a symptom pattern that is associated with Conduct Disorder.

Correlations among factors are presented in Table 3-2. The EFA resulted in 11 items not loading on a factor at .4 or higher (See Table 3-3). Only two items cross-loaded on another factor at a factor loading of .2 or higher. These items were “Whines” and “Interrupts.”

Factor scores were computed as the sum of the frequency ratings for the items loading at .4 or higher on the three factors. Summation was used as it is considered an adequate method of computing factor scores (Floyd & Widaman, 1995; Tabachnick & Fidell, 2007) and it is consistent with the computation of factor scores employed in prior studies (Burns & Patterson, 2000; Weis et al., 2005). The 11 items that did not show significant loadings on any factor were not included in the computation of factor scores. In this sample, the Oppositional Defiant Behavior factor had a mean score of 53.96 (*SD*=12.42), the Attention Difficulties factor had a mean score of 36. 98 (*SD*=8.19), and the Conduct Problems factor had a mean score of 17.5 (*SD*=7.95). Cronbach's alpha for the Oppositional Defiant Behavior, Attention Difficulties, and Conduct Problems factors were .92, .85, and .80 respectively, suggesting adequate to very good internal consistency of the factors (Henson, 2001).

Validity Analyses

Factor scores were correlated with various subscales of the BASC and CPRS (See Table 3-4). Examination of the correlation matrix, as predicted, revealed that the ECBI factors correlated most highly with their conceptual counterpart subscales of the BASC and CPRS. None of the ECBI factors correlated significantly with the anxiety subscales of the BASC and CPRS

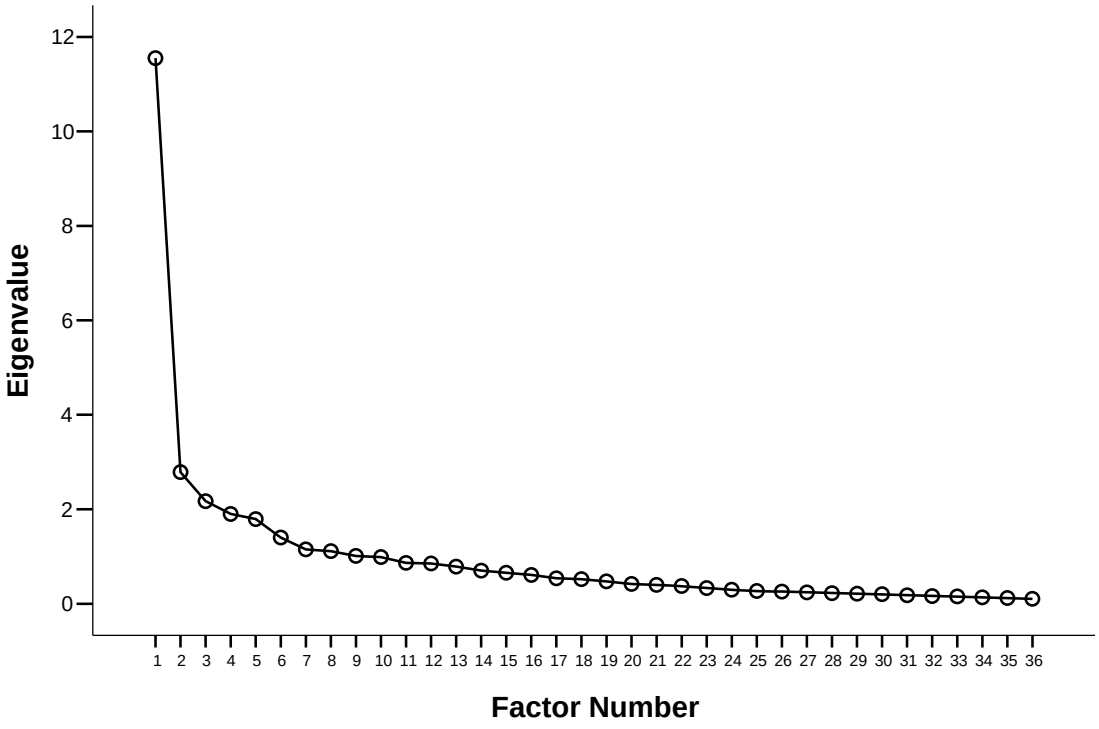

Figure 3-1. Scree plot of the ECBI individual frequency item data.

Table 3-1. Factor loadings for principal axis factoring via oblique rotation three-factor analysis of the ECBI

Items	Factor loading 1	2	3
Factor 1 (Oppositional Defiant Behavior)			
13. Has tempter tantrums	**.915**	-.125	-.137
10. Acts defiant when told to do something	**.913**	-.106	-.061
12. Gets angry when doesn't get own way	**.889**	-.048	-.066
14. Sasses adults	**.776**	-.067	.093
9. Refuses to obey until threatened with punishment	**.770**	.084	-.027
11. Argues with parents about rules	**.735**	-.032	.040
8. Does not obey house rules on own	**.724**	.069	.013
17. Yells or screams	**.668**	.021	.113
15. Whines	**.539**	.219	-.098
5. Refuses to do chores when asked	**.529**	.067	-.004
7. Refuses to go to bed on time	**.465**	.189	-.091
4. Refuses to eat food presented	**.407**	.065	.009
Factor 2 (Attention Difficulties)			
30. Is easily distracted	-.258	**.867**	.029
32. Fails to finish tasks or projects	-.060	**.850**	-.113
31. Has short attention span	.006	**.794**	-.130
34. Has difficulty concentrating on one thing	.007	**.700**	-.046
29. Interrupts	.263	**.524**	.055
1. Dawdles or lingers at mealtime	-.031	**.466**	.192
2. Dawdles in getting dressed	.055	**.437**	.004
Factor 3 (Conduct Problems)			
23. Teases or provokes other children	-.113	.016	**.842**
27. Physically fights with sisters and brothers	-.078	-.032	**.654**
26. Physically fights with friends own age	.097	-.192	**.644**
24. Verbally fights with friends own age	.067	-.034	**.637**
25. Verbally fights with sisters and brothers	-.190	.060	**.611**
21. Steals	.193	-.084	**.447**

Table 3-2. ECBI factor correlations

	Factor 1	Factor 2	Factor 3
Factor 1	--	--	--
Factor 2	.52*	--	--
Factor 3	.46*	.24*	--

*p<.01

Table 3-3. Items not loading at .4 or higher in the three-factor oblique rotation factor analysis of the ECBI

	Factor loading		
Items	1	2	3
35. Is overactive or restless	.399	.207	.103
18. Hits parents	.288	.038	.219
36. Wets the bed	.234	-.143	.116
34. Has difficulty entertaining self alone	.039	.355	.081
6. Slow in getting ready for bed	.253	.336	-.075
16. Cries easily	.213	.327	-.086
28. Constantly seeks attention	.186	.326	.122
19. Destroys toys or other objects	.357	.058	.379
20. Is careless with toys and other objects	.134	.202	.328
22. Lies	.235	.237	.325
3. Has poor table manners	.125	.217	.292

Table 3-4. Pearson correlations between ECBI factors and CPRS and BASC subscales

Subscale	Oppositional Defiant Behavior factor	Attention Difficulties factor	Conduct Problems factor
CPRS ADHD Index	.14	.42**	.12
CPRS Oppositional Behavior subscale	.70**	.37**	.55**
CPRS DSM-IV Inattention subscale	.10	.46**	.11
BASC Attention Problems subscale	.20*	.57**	.17
BASC Conduct Problems subscale	.57**	.47**	.63**
BASC Aggression subscale	.63**	.37**	.74**
CPRS Anxious/Shy subscale	.14	.10	.03
BASC Anxiety subscale	.06	.09	-.01

*p<.05, **p<.01

CHAPTER 4
SUMMARY AND CONCLUSIONS

Consistent with hypotheses, results of the factor analysis strongly suggest that, when used with a clinical population including children with disruptive behavior disorders, the ECBI is a multidimensional measure. Results demonstrate that item variance is best accounted for by a three-factor solution, resulting in factors labeled Oppositional Defiant Behavior, Attention Difficulties, and Conduct Problems.

Here it can be noted that considering the unrotated factors with eigenvalues greater than 1.0 (Kaiser, 1960) initially suggested a total of nine factors, although that criterion is generally considered to significantly overestimate the number of factors (Zwick & Velicer, 1986). Subsequent inspection of the scree plot (Cattell, 1966) suggested between three and six discernable factors; thus, additional analyses were run forcing three-, four-, five- and six-factor solutions. The three-factor model clearly appeared to be the most conceptually meaningful, irrespective of whether oblique or orthogonal rotation strategies were employed. As a result, this solution was chosen for validity analyses.

Factor analytic findings are mostly consistent with previous research. While it was predicted that use of a disruptive behavior disorder clinical sample would result in most ECBI items loading on at least one derived factor, a total of 11 items did not. Of the 11 items that did not load on any factor in the current study, four of the items were included in Burns and Patterson's (2000) fourth "junk" factor. Thus it appears that even in this specific clinical sample, there are ECBI items that do not group together in a conceptually meaningful manner. In contrast to the previous research, use of a four-factor model did not produce more conceptually "meaningful" factors (Burns & Patterson).

While previous work by Burns and Patterson (2000) and Weis et al. (2005) found evidence for a multidimensional structure of the ECBI in community and general clinical samples, the current study aimed to determine the degree to which a multidimensional structure could be delineated in a more specific clinical population using stricter factor loading criteria than that employed in prior studies. Here it can be noted that Burns and Patterson utilized a factor loading criterion of .3 or higher while the current investigation considered loadings of .4 or higher to indicate a significant item loading on a factor. Results demonstrated that a basic three-factor model maintains even when using more stringent criteria. Thus, the present EFA supports a similar factor structure to that found by previous investigators even when using more rigorous criteria (Burns & Patterson; Weis et al.), continuing to demonstrate sound evidence of a multidimensional model of the ECBI.

Results of validity analyses were also consistent with hypotheses. The three factors of the ECBI demonstrated adequate to very good internal consistency. Strong evidence was also found for the convergent validity of factors. Here, as predicted, the Oppositional Defiant Behavior factor was found to correlate most highly with the CPRS Oppositional Behavior subscale. This factor also correlated significantly with the BASC Conduct Problems and Aggression subscales, although these correlations were smaller. There was also a significant correlation with the BASC Attention Problems subscale but, again, this correlation was smaller. The Attention Difficulties factor correlated most highly with the BASC Attention Problems subscale. This correlation was followed closely by significant correlations with the CPRS ADHD Index and CPRS Inattention subscale. Somewhat surprisingly, the Attention Difficulties factor was also significantly correlated with the BASC Conduct Problems, Aggression, and Oppositional Behavior subscales. Lastly, the Conduct Problems factor was most highly correlated with the

BASC Aggression subscale and also had a significant correlation with the BASC Conduct Problems subscale, as predicted. This factor also correlated significantly with the CPRS Oppositional Behavior subscale but not with any of the other BASC or CPRS subscales. Evidence for discriminant validity was also found as none of the three factors correlated significantly with either the BASC or CPRS anxiety subscales.

As previous studies have only investigated specificity, sensitivity and other aspects of diagnostic and categorizing abilities of a three-factor model of the ECBI, our study is the first to assess the convergent and discriminant validity of derived factors. Overall, results provide strong support for the multidimensional structure of the EBCI. While multiple factor analytic studies now provide support for some variation on a three-factor solution, the present investigation moves the field further ahead by not simply relying on the face validity of factor label designations. These validity analyses give empirical support that allows for more confident use of the Oppositional Defiant Behavior, Attention Difficulties, and Conduct Problems labels applied to the three factors of the ECBI in our study and in previous research.

While our investigation adds to the literature and provides updated support for the three-factor structure of the ECBI, it is not without limitations. The present study used a sample size of 181, which meets minimum criteria of five cases per item for a factor analysis (Floyd & Widaman, 1995). While meeting minimum requirements, larger samples are generally considered better and some argue that a minimum of 200 or 10 cases per item is required (Floyd & Widaman). Again sample size can also affect normality, which in turn can affect the clarity of the model, possibly explaining why the current structure did not perfectly match with previous findings. While EFA is more robust to such violations of normality than CFA, this aspect of the data cannot be ignored.

Another limitation involves the presence of cross-loading items. In our study, two items cross-loaded on another factor. These items were "Whines," which loaded primarily on the Oppositional Defiant Behavior factor and secondarily on the Attention Problems factor, and "Interrupts," which loaded primarily on the Attention Problems factor and secondarily on the Oppositional Defiant Behavior factor. There are several reasons that may account for such cross-loadings. First, the "Whines" item may not necessarily be associated with any of the constructs assessed by the three factors; it is not representative of any of the specific DSM-IV criteria for the behavioral disorders (APA, 1994). As the ECBI was designed before the DSM included criteria for the disruptive behavior disorders, it does contain some items which, based on current DSM-IV criteria and diagnostic categories, may not clearly associate with one symptom category versus another. It was surprising that the "Interrupts" item cross-loaded as this is a diagnostic criterion for ADHD, though it is grouped in the impulsivity category within the DSM division of symptoms. This item though, cross-loaded on the oppositional behavior factor. While interrupting may not be a specific symptom of ODD, it is an avenue through which to annoy authority figures and purposely annoying adults is a specific symptom of ODD. Again, sample size may have affected the clarity of results and use of a larger sample might eradicate the presence of cross-loadings.

While the validity findings overall suggested that the three factors found in factor analysis demonstrate good convergent and discriminant validity when compared to psychometrically established measures of similar constructs, they were not perfectly in line with predictions. Both the Oppositional Defiant Behavior and Conduct Problems factors, while correlating most highly with their conceptual counterparts, also correlated significantly with the CPRS and BASC subscales that related to CD and ODD, respectively. This limitation of the validity results could

be explained by the nature of the constructs the two factors represent. As stated previously, prior discussions in the literature have focused on whether to consider the two disorders on a continuum or view them as separate and distinct constructs (Loeber et al., 1991). The DSM-IV itself notes that there is overlap between the two disorders (e.g. disobedience) even while viewing them as two separate constructs (APA, 1994). Hence, it is not surprising that two factors representing oppositional defiant behavior and conduct problems would correlate with measures of both categories, due to high levels of comorbidity between the two disorders. Still, the highest correlations with the more similar constructs of the CPRS and BASC highlight the distinctness between the two factors.

A similar explanation exists for the fact that the attention difficulties factor correlated with all of the BASC and CPRS subscales except for the anxiety subscales. ADHD is highly comorbid with ODD and CD, and all three are categorized as disruptive behavior disorders. As such, it would not be surprising to find correlations with constructs related to these disorders. These correlations were slightly higher than expected in the current study, though still generally smaller than the correlation with ADHD related subscales. In addition, many behaviors associated with ADHD can be confused with symptoms of ODD. For instance, a child who is not paying attention because of attention problems can be perceived as simply being disobedient. Lack of attention may cause children to need instructions or requests repeated to them several times. Items in the oppositional behavior factor of the ECBI represent these types of behaviors. If caregivers associate lack of attention with these behaviors (e.g. needing to repeat instructions) then a correlation between the Attention Difficulties factor and ODD-related subscales is understandable.

Regardless of the limitations of the study, data presented here continue to support the idea that the ECBI is best accounted for by a three-factor structure with validated factors. Nevertheless, more research is still needed. While Burns and Patterson (2000) suggested cutoff scores for the ECBI factors, the usefulness of these cutoff scores has only bee tested in the study by Weis et al. (2005). Here, the investigators focused on the ability of the ECBI factors to differentiate between specific behavior clusters in a restricted sample of young children. Given these limited findings, these cutoff scores should be validated with a wider age range as well as in both general clinical and more specific clinical samples similar to the one used in our study. This would allow researchers to better ascertain the utility of the factors to differentiate between children with different clinical problems (i.e. attention problems versus oppositional behavior, disruptive behavior problems versus depression or anxiety). Although researchers have looked at specificity and sensitivity of the ECBI factors (Weis et al.), the DBDRS used in these discriminative validity analyses is a clinician rating scale which does not include information often considered when deciding on a diagnosis (e.g. age of onset of symptoms, aspects of impairment, teacher data) and is also based partially on parent report. This, as the researchers note, introduces a degree of shared method variance between the ECBI and DBDRS ratings. The ECBI factors could be best evaluated by assessing their ability to differentiate between children who have been independently diagnosed with these various disorders. This would provide support for the usage of the ECBI as a pre-screener to indicate areas which may require further assessment.

Future research should include continued validation of the three-factor structure. Using a larger specific clinical sample, with which multivariate normality assumptions can be met, a CFA of the current results should be conducted. Again, these factors should be subjected to

convergent and discriminant validity analyses, sensitivity and specificity tests in the manner described above, as well as further assessment of internal consistency. Test-retest reliability of the factors should be ascertained along with the individual factors' sensitivity to treatment effects. Once these analyses have been conducted, researchers and clinicians can begin to extract even more information from the ECBI than they can currently obtain.

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BIOGRAPHICAL SKETCH

Melissa Kay Stern was born on March 27, 1981 in Boston, Massachusetts. The youngest of two, she grew up in the greater Boston area, graduating from Needham High School in 1999. She earned her B.A. in psychology from Brandeis University. Upon graduating with high honors in 2003, Melissa took a position as a research coordinator at the Massachusetts General Hospital (MGH) and Freedom Trail Clinic in Boston, Massachusetts. She spent 15 months coordinating research projects at the hospital's schizophrenia and severe mental illness outpatient clinic.

In September of 2004, Melissa left MGH for a position at the National Center for Posttraumatic Stress Disorder (PTSD) at Boston University and the Boston Veteran's Administration, where she was employed as a research technician for projects investigating the psychophysiological and cognitive effects of nicotine on veterans with PTSD. Melissa relocated to Gainesville, Florida in August of 2005 to begin her graduate career in clinical psychology. Upon completion of the M.S., Melissa will continue on in her program and apply for doctoral candidacy in the Department of Clinical and Health Psychology at the University of Florida.