

Psychometric Properties and Standardization of the Korean Version of the Eyberg Child Behavior Inventory

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Abstract The Eyberg Child Behavior Inventory (ECBI) is a parent rating scale widely used to assess disruptive behaviors in children and adolescents. The purpose of this study is to assess psychometric properties and conduct standardization of the Korean ECBI. The Korean version of the ECBI was administered to parents of 707 children between the ages 2 and 12 (grade 6) from five areas of South Korea. For Korean children, the means of Intensity and Problem Scale raw scores were 70.7 and 3.5, respectively, much lower than the US norms. Cronbach's alpha was 0.93 for the Intensity Scale and 0.93 for the Problem Scale of the Korean ECBI, indicating high internal consistency. The test–retest reliability was 0.92 and 0.97 for the Intensity and Problem Scales ($n = 66$), respectively. Convergent validity was assessed and confirmed by comparing the ECBI and the Child Behavior Checklist (CBCL). The ECBI Intensity Scale score correlated with the total problem score (0.81), externalizing problem score (0.85), and internalizing problem score (0.50) of the CBCL. Both Intensity and Problem Scale scores were significantly different between typical children and children receiving counseling services ($n = 88$): $t = -13.365$, $t = -11.215$, both $p = .001$, respectively. The factor structure of the ECBI indicated eight factors. Results indicated that the

Korean ECBI is psychometrically sound. Further study is recommended to explore and confirm factor structures of the Korean version of the ECBI.

Keywords Child assessment · Eyberg Child Behavior Inventory (ECBI) · Parent rating scale · Korean standardization · Disruptive behavior problems

Introduction

Childhood disruptive behaviors are of great concern for parents, caregivers, and mental health service providers. Frequent displays of severely disruptive behavior in children can result in a diagnosis of Oppositional Defiant Disorder (ODD) or Conduct Disorder (CD). Such diagnoses may develop into antisocial behavior or personality disorders as individuals enter adolescence and adulthood. Given the costly consequences of untreated severe disruptive behaviors, such behavior should not be overlooked (McNeil and Hembree-Kigin 2010; Rich and Eyberg 2001).

There are few assessment tools available to identify disruptive behavioral problems in children (Webster-Stratton and Herbert 1994). The Eyberg Child Behavior Inventory (ECBI) is one of the tools widely used to assess disruptive behaviors among children and adolescents. It consists of 36 items and yields two scores: an Intensity Scale for frequency of problem behaviors and a Problem Scale for parental perception of the behavior as “problematic.” The simple administration and scoring system of the ECBI allows for quick screening of childhood disruptive behaviors (Rich and Eyberg 2001). In addition, the ECBI is reported to have sound psychometric properties (Burns and Patterson 2000; Colvin et al. 1999; Reedtz et al. 2008). Internal consistency coefficients indicated by Cronbach's alpha for the Intensity

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Scale and Kuder-Richardson 20 for the Problem Scale were 0.98 for both scales in initial standardization studies, and 0.95 and 0.93, respectively, in a restandardization study (Colvin et al. 1999). In the initial standardization studies, test–retest reliability for three-week, twelve-week, and ten-month intervals ranged from 0.75 to 0.86 for the Intensity Scale and from 0.75 to 0.85 for the Problem Scale. The interrater reliability coefficient for parents of normal teenagers was 0.86 and 0.79, and for parents of preschool children with conduct disorder was 0.69 and 0.61 for the Intensity and Problem Scales, respectively (Eyberg and Pincus 1999). Given its usability and sound psychometric properties, the ECBI is a useful assessment tool for childhood disruptive behavioral problems.

A few studies have attempted to assess ethnic or cultural differences in ECBI scores within the United States, and found mixed results. A comparison among African-American, Latino, and non-Latino White preschool children from ages 2 to 4 within a major city in the United States found racial/ethnic and income effects of the ECBI (Gross et al. 2007). The Intensity Scale score ($M = 82.6$, $SD = 31.2$) of African-American children was significantly lower than the other two groups ($M = 89.6$, $SD = 30.7$ for Latino; $M = 91.3$, $SD = 27.6$ for non-Latino White) and the standardized samples ($M = 96.6$, $SD = 35.2$). They also found a higher rate of Latino children (14.1 % compared with 6.5 % for African-American and 5.8 % for non-Latino White) and children in the low-income group (13.4 % compared with 7.7 % for middle/upper income group) in the clinical range of the Problem Scale. However, the restandardization study indicated no significant differences between African-American and Caucasian children (Eyberg and Pincus 1999). The ECBI scores of treatment referred children with disruptive behavior problems also were not significantly different between African-American and Caucasian children (Capage et al. 2001).

Moving beyond the United States, there have been efforts to increase utility of the ECBI in other languages and cultural groups (Axberg et al. 2008; García-Tornel Florensa et al. 1998; Leung et al. 2005; Reedtz et al. 2008; Werba 2002). The psychometric properties and norms of the ECBI have been studied in Australia, China, Norway, Spain, and Sweden, demonstrating high reliability, with Cronbach's alpha values ranging from 0.92 to 0.94 for the Intensity Scale and from 0.85 to 0.92 for the Problem Scale, with one exception of the Spanish sample which found a Cronbach's alpha of 0.73 for the Intensity Scale.

Although the ECBI is considered to be a reliable measure, the mean scores vary according to language and culture. A child who is considered within an acceptable behavioral range in one cultural group could be assessed as having behavioral problems in another group if their context is not considered (see Table 1 for mean scores of different cultural groups.) As shown in Table 1, mean

Table 1 The ECBI mean scores by cultural groups

Groups	Intensity Scale <i>M</i> (<i>SD</i>)	Problem Scale <i>M</i> (<i>SD</i>)	Children's age
U.S.	96.6 (35.2)	7.1 (7.7)	2–16
Australia	107.14 (26.32)	6.93 (6.73)	3–4
China (Hong Kong) ^a	117.13 ^a	7.18 ^a	4
Japan	100.4 (24.6)	6.47 (6.56)	2–7
Norway	89.9 (24.6)	3.1 (4.5)	4–12
Spain	96.8 (26.6)	3.93 (5.9)	2–12
Sweden	88.2 (26.0)	3.09 (5.03)	3–10

^a Hong Kong Chinese group provided 95 % confidence interval of 115.67–118.59 for Intensity Scale and 6.73–7.63 for Problem Scale. Data reported in studies by Axberg et al. (2008), García-Tornel Florensa et al. (1998), Ito et al. (2013), Leung et al. (2005), Reedtz et al. (2008), Werba (2002)

scores ranged from 88.2 to 117.13 for the Intensity Scale and from 3.09 to 7.18 for the Problem Scale, indicating a large gap between cultural groups. These results with samples outside the US confirm that both the frequency of disruptive behaviors in children and parental perceptions should be considered within the context of their own linguistic and cultural groups.

Many studies reported cross-cultural differences in children's behavioral and psychological problems (Crijnen et al. 1999; Dwairy et al. 2010; Rescorla et al. 2012; Roessner et al. 2007). Rescorla et al. (2012) compared behavioral and emotional problems of preschoolers from 15 countries using the Caregiver-Teacher Report Form (C-TRF) to consider children's behavior within their contexts. They found that nine societies scored within 1 SD, three societies scored greater than 1 SD, and three societies scored greater than 2 SD above the total mean. These differences again confirm that assessment scores should be considered within the client's own cultural context. Otherwise, there is a risk of over-reporting or minimizing behavioral difficulties. Standardized norms allow children's disruptive behaviors to be assessed within their own cultural environment (Van Widenfelt et al. 2005). Culturally specific normative data allows children's behavior to be evaluated accurately within their own context.

Given this interconnection between culture and assessment, it is important that the Korean version of the ECBI be standardized. Doo (2010) utilized the ECBI to identify Korean children with behavioral problems and to measure behavioral changes through the course of treatment. In this study, a three-factor model with 22 items selected from the ECBI was used as suggested by Burns and Patterson (2000), instead of the full 36 items of the original ECBI. No study has reported the psychometric properties or norms for the Korean version of the ECBI in its original form.

Table 2 Demographic description of parents

Category	N	%
Respondents		
Father	58	8.2
Mother	641	90.7
Grandparent or guardian	8	1.1
Age (in years)		
20–29	9	1.3
30–39	356	50.4
40–49	335	47.4
50+	7	0.9
Education		
Education up to high school	82	11.6
2-year college	136	19.2
4-year college degree	386	54.6
Graduate education	103	14.6
Economic status^a		
Upper (80–100 percentiles)	254	35.9
Upper-middle (60–80 percentiles)	136	19.2
Middle-middle (40–60 percentiles)	149	21.1
Lower-middle (20–40 percentiles)	96	13.6
Lower (lower than 20 percentile)	54	7.7
Unanswered	18	2.5

^a Percentiles are based on the 2011 population/household statistical database from Statistics Korea

Validity and standardization of the ECBI in Korea would broaden the selection of assessment tools for identifying disruptive behavioral problems of Korean children. Such a tool would support an increase in epidemiologic studies within the mental health field regarding children and youth in Korea, an area where no clear data is currently available (National Youth Policy Institute 2011). The availability of an assessment tool that can be easily administered across multiple settings (e.g., schools and doctor's offices) also would enhance early identification of children who need further treatment.

With normative data, the ECBI can be very useful for Korean children as a quick screening measure for childhood disruptive behaviors. The purpose of this study was to assess psychometric properties and provide standardized norms of the Korean version of the ECBI.

Method

Participants

Participants of this study were contacted through preschools, community organizations, and educational institutions in the major areas of South Korea including Seoul,

Gyeonggi Province, Chungcheong Province, Jeolla Province, and Gyeongsang Province. A total of 707 parents of young children between the ages of 2 and 12 (grade 6) completed the Korean version of the ECBI. See Tables 2 and 3 for demographic information of parents and children. Education level and economic status of parents were higher than national averages (48 % up to high school, 17 % 2-year college, 28.3 % 4-year college degree, and 6.2 % graduate education; 7.7 % upper 20 %, 13.6 % upper-middle, 21.1 % middle-middle, 19.2 % lower-middle, and 35.9 % lower economic status; Statistics Korea 2014). The relationship between ECBI scores and parents' education and economic status was examined using one-way ANOVA. There was no significant relationship between ECBI scores and parents' education or economic status (Intensity Scale $F = 1.84$, $p = .14$; $F = 0.77$, $p = .59$; Problem Scale $F = 1.08$, $p = .36$; $F = 1.33$, $p = .24$, respectively). The validity study included 88 additional children who were in treatment at community counseling centers.

Procedure

We first contacted preschools, community organizations, and educational institutions representing different regions and age groups in Korea, and then identified people who could play a key role in collecting the surveys at participating organizations. After explaining and answering any questions about the study, these people had understood the necessity of the study and agreed to distribute and collect the surveys. Survey participants were also informed about the purpose of the study, amount of time needed, confidentiality, and voluntary-based participation. All participants provided written informed consent. They were not provided with direct compensation. The institutional research ethics board was not established nor required when this study was conducted. Such review is now required since February of 2013 in Korea.

A total of 768 surveys were distributed and 730 were returned. The 95 % return rate for this study is comparable with 92 % return rate reported in the CBCL 1.5–5 Korean standardization study (Kim et al. 2009). Twenty-three surveys were incomplete, so 707 surveys were included in the final data analysis. To evaluate validity of the ECBI, parents of 88 children from two community counseling centers in Seoul completed the CBCL in addition to the ECBI. For test–retest reliability, 66 participants in school-age range from Gyeongsang completed the ECBI again after three weeks. Korea is relatively small in area, slightly larger than the state of Indiana, in the United States. Since no studies have found that children differ by geographical regions in Korea, sites were selected based on the availability and willingness to participate in this study, and

Table 3 Participants by age, gender, and province

	Province					Total
	Seoul	Gyeonggi	Chungcheong	Jeolla	Gyeongsang	
2–6 years	71	77	42	42	15	247
Male	30 (42.3)	47 (61.0)	19 (45.2)	24 (57.1)	3 (20.0)	123 (49.8)
Female	41 (57.7)	30 (39.0)	23 (54.8)	18 (42.9)	12 (80.0)	124 (50.2)
7–12 years	134	105	102	68	51	460
Male	62 (46.3)	63 (60.0)	40 (39.2)	29 (42.6)	24 (47.1)	218 (47.4)
Female	72 (53.7)	42 (40.0)	62 (60.8)	39 (57.4)	27 (52.9)	242 (52.6)
Total	205	182	144	110	66	707

Number within () denotes % proportion

convenience for data collection. The US ECBI standardization study also indicated that residence, urban or rural, does not affect the ECBI scores (Eyberg and Pincus 1999).

Measures

Eyberg Child Behavior Inventory (ECBI)

The Eyberg Child Behavior Inventory (ECBI) is a 36-item parent rating scale designed to measure disruptive behavior problems in children ages 2 through 16 years (Eyberg and Pincus 1999). The ECBI is widely used to measure treatment efficacy and to screen for child conduct problems. The ECBI consists of two scales: the Intensity Scale measures the frequency of problem behaviors, and the Problem Scale measures whether the parent considers the behavior problematic or not. The Intensity Scale is rated from “Never” (1) to “Always” (7), and the total score can range from 36 to 252. The Problem Scale is rated either “Yes” (1) or “No” (0), and the total score can range from 0 to 36. The ECBI manual provides normative data for children living in the US. Clinical cutoff scores of 131 (60T) for the Intensity Scale ($M = 96.6$, $SD = 35.2$) and 15 (60T) for the Problem Scale ($M = 7.1$, $SD = 7.7$) are recommended. For this study, the Korean language version of the ECBI was obtained through Psychological Assessment Resources, Inc. The Korean version of the ECBI is a direct translation of the American English ECBI with no items added or omitted.

Child Behavior Checklist (CBCL)

The Child Behavior Checklist (CBCL) is a parent rating scale designed to measure a wide range of problems in children such as internalizing and externalizing problems (Achenbach and Rescorla 2001). Two forms of the CBCL are currently available in the Korean language with Korean normative data: one for children ages 18 months through 5 years (CBCL 1.5–5) and the other for children ages 6 through 18 years (CBCL 6–18) (Kim et al. 2009). For this

study, both forms of the Korean CBCL were used according to the ages of children to check for validity of the Korean ECBI.

Data Analyses

All data analyses were conducted using IBM SPSS Statistics, version 20. Descriptive and normative data analyses were performed for the Korean ECBI. Internal consistency reliability was assessed with Cronbach’s alpha coefficient. Three-week test–retest reliability was assessed with Pearson product-moment correlation with 66 children in Gyeongsang Province. For the construct validity of the ECBI (Burns and Patterson 2000; Weis et al. 2005), a factor analysis was conducted using an exploratory principal components method with a varimax rotation. Convergent validity was assessed with Pearson product-moment correlations with CBCL externalizing, internalizing, and total problem scores of 66 children from Gyeongsang Province. For the discriminant validity, the ECBI Intensity and Problem Scale scores of typical children and children receiving counseling services were compared using the t tests.

Results

Normative Data

The normative data for Korean children are shown in Tables 4 and 5. Parents rated “constantly seeks attention”, “dawdles or lingers at mealtime”, and “cries easily” as the most frequently displayed disruptive behaviors. Meanwhile, “steals”, “destroys toys and other objects”, and “wets the bed” were the least frequently displayed disruptive behaviors. The mean score was 70.7 ($SD = 22.1$) for the Intensity Scale and 3.5 ($SD = 5.6$) for the Problem Scale. The difference in the Intensity Scale scores between boys and girls was significant ($t = 2.78$, $p < .01$). However, for children ages 2–6, there was no significant

Table 4 Means and SDs for the intensity and problem scales

	N	Intensity Scale		Problem Scale	
		Mean	SD	Mean	SD
All children	707	70.7	22.1	3.5	5.6
2–6 years	247	76.9	20.9	4.2	5.7
7–12 years	460	67.3	21.9	3.2	6.0
Boys	341	73.1	21.5	3.8	5.6
2–6 years	123	77.8	20.1	4.6	6.0
7–12 years	218	70.4	21.7	3.3	5.8
Girls	366	68.5	22.4	3.2	5.6
2–6 years	124	76.0	21.7	3.8	5.5
7–12 years	242	64.7	21.8	3.0	5.7

difference in the Intensity Scale scores between boys and girls ($t = 0.68, p = .50$). For elementary school students, the difference of the Intensity Scale scores between boys and girls was significant ($t = 2.81, p < .01$). There was no significant difference in the Problem Scale scores between boys and girls ($t = 1.42, p = .16$). Preschool children had significantly higher Intensity and Problem Scale scores than school-aged children ($t = 5.65, p < .0001, t = 2.15, p = .03$, respectively).

Reliability

Internal Consistency and Test–retest Reliability

In this study, Cronbach’s alpha was 0.93 for the Intensity Scale and 0.93 for the Problem Scale indicating high reliability. The item-total correlations ranged from 0.24 for “wets the bed” to 0.74 “refuses to obey until threatened with punishment”. With an exception of the three items, “wets the bed” ($r = 0.24$), “steals” ($r = 0.25$), and “verbally fights with sisters and brothers” ($r = 0.36$), all other item correlation coefficients were 0.40 or higher. The three-week test–retest correlation for the ECBI Intensity and Problem Scales were high, 0.92 and 0.97, respectively. These results indicate that the Korean version of the ECBI is a very reliable assessment tool for identifying children with disruptive behavioral problems in the Korean context.

Validity

Factor Analysis of Korean ECBI

As a result of exploratory factor analysis, eight factors were extracted explaining 63.27 % of the total variance. Eigen values of the extracted factors were 4.29, 4.17, 3.58, 2.87, 2.63, 2.18, 1.90, and 1.17. These factors explained 11.91, 11.57, 9.93, 7.98, 7.31, 6.04, 5.28, and 3.24 % of the total variance respectively. Table 6 shows the factor analysis

Table 5 Means and SD for ECBI intensity and problem scales by age and sex

Age	Sex	N	Intensity Scale		Problem Scale	
			Mean	SD	Mean	SD
2	Boys	27	83.54	18.91	4.48	4.48
	Girls	32	80.50	23.92	5.19	5.01
	Total	59	81.89	21.64	4.86	4.74
3	Boys	27	87.67	17.69	3.44	4.36
	Girls	40	79.33	19.80	3.88	6.53
	Total	67	80.27	18.87	3.70	5.72
4	Boys	40	73.93	18.21	4.88	5.95
	Girls	25	73.48	19.04	2.12	4.12
	Total	65	73.75	18.39	3.82	5.46
5	Boys	29	74.40	24.28	5.43	8.35
	Girls	27	68.11	22.77	3.56	5.16
	Total	56	71.37	23.57	4.53	7.00
6	Boys	17	70.53	19.37	4.88	7.43
	Girls	12	76.25	22.13	9.50	17.48
	Total	29	72.90	20.37	6.79	12.47
7	Boys	46	78.65	27.80	4.22	5.80
	Girls	45	66.89	20.57	3.42	6.55
	Total	91	72.84	25.07	3.82	6.16
8	Boys	35	68.46	19.00	2.63	4.07
	Girls	40	68.30	23.33	2.95	4.86
	Total	75	68.37	21.27	2.80	4.48
9	Boys	38	72.00	19.65	2.87	5.51
	Girls	36	61.19	18.11	3.28	6.45
	Total	74	66.74	19.55	3.07	5.95
10	Boys	19	65.21	15.78	2.79	4.97
	Girls	29	64.88	27.11	2.52	5.21
	Total	48	65.01	23.09	2.63	4.96
11	Boys	41	64.88	20.44	2.80	4.21
	Girls	47	63.59	19.68	2.47	4.51
	Total	88	64.19	19.98	2.63	4.35
12	Boys	22	68.14	20.77	3.64	5.76
	Girls	34	58.56	21.95	2.26	5.36
	Total	56	62.32	21.82	2.80	5.51
Total	Boys	341	73.09	21.45	3.79	5.57
	Girls	367	68.52	22.41	3.38	6.29
	Total	708	70.72	22.06	3.58	5.95

result of the Korean ECBI. Items with the factor loading greater than 0.3 are written in bold type, and items for each factor are highlighted. The first factor is classified as “ADHD behavior” for items 29, 30, 31, 32, 33, 34, and 35. The second through eighth factors are classified as “Disruptive behavior toward adults”, “Disruptive behavior expressed overtly”, “Problems of daily living-Clothing and eating”, “Disruptive behavior toward peers & expressed passively”, “Problems of daily living-Sleeping”,

Table 6 Factor loadings for exploratory factor analysis with maximum likelihood extraction and varimax rotation of ECBI Intensity Scale

Items	1	2	3	4	5	6	7	8
<i>F1: ADHD behavior</i>								
34. Difficulty concentrating	0.84	0.19	0.10	0.07	0.10	0.09	0.04	0.07
31. Short attention span	0.82	0.17	0.17	0.04	0.14	0.09	0.10	0.06
30. Easily distracted	0.77	0.18	0.18	0.12	0.25	0.09	0.11	−0.01
32. Fails to finish tasks	0.71	0.18	0.12	0.16	0.10	0.19	0.10	0.18
35. Is overactive or restless	0.61	0.31	0.24	0.05	0.25	−0.01	0.09	0.06
33. Has difficulty entertaining himself or herself alone	0.52	0.06	0.07	0.32	0.05	0.04	0.05	−0.22
29. Interrupts	0.34	0.13	0.38	0.21	0.40	0.08	0.29	−0.05
<i>F2: Disruptive behavior toward adults</i>								
10. Acts defiant when told to do something	0.16	0.75	0.27	0.10	0.11	0.15	0.11	0.04
14. Sasses adults	0.22	0.74	0.15	0.15	0.16	−0.09	0.04	−0.11
11. Argues with parents about rules	0.20	0.72	0.28	0.12	0.04	0.17	0.07	0.11
15. Whines	0.31	0.60	0.03	0.08	0.22	0.09	0.23	−0.15
8. Not obey house rules	0.25	0.55	0.30	0.23	0.15	0.34	0.02	0.10
9. Refused to obey until threatened with punishment	0.26	0.53	0.35	0.19	0.15	0.25	0.12	0.07
12. Gets angry when doesn't get own way	0.14	0.52	0.52	0.12	0.10	0.21	0.20	−0.09
5. Refused to do chores	0.09	0.50	0.05	0.31	0.18	0.27	0.03	0.16
<i>F3: Disruptive behavior expressed overtly</i>								
19. Destroys toys and objects	0.15	0.09	0.73	0.03	0.12	−0.09	−0.06	0.06
18. Hits parents	0.06	0.18	0.72	0.22	0.02	0.12	−0.13	0.00
13. Has temper tantrums	0.11	0.34	0.69	0.04	0.05	0.11	0.21	0.00
17. Yells or screams	0.16	0.34	0.61	0.16	0.14	0.11	0.28	−0.12
20. Careless w/toys and objects	0.35	0.14	0.50	0.03	0.29	0.08	−0.04	−0.06
16. Cries easily	0.15	0.12	0.35	0.17	0.08	0.27	0.29	−0.27
<i>F4: Problems of daily living—clothing and eating</i>								
2. Dawdles/lingers at mealtime	0.10	0.05	0.08	0.84	0.02	0.09	0.08	−0.01
3. Has poor table manners	0.13	0.20	0.21	0.79	0.09	0.02	0.08	0.07
4. Refuses to eat food presented	0.08	0.31	0.08	0.72	0.01	0.08	0.03	0.08
1. Dawdles in getting dressed	0.19	0.07	0.09	0.53	0.01	0.33	−0.02	−0.13
<i>F5: Disruptive behavior toward peers and expressed passively</i>								
23. Teases/provokes children	0.24	0.21	0.18	−0.01	0.73	−0.04	0.13	0.12
24. Verbally fights with friends	0.24	0.23	0.02	0.03	0.77	0.03	0.06	−0.10
26. Physically fights with friends	0.10	0.08	0.03	0.02	0.70	0.03	0.10	0.22
28. Constantly seeks attention	0.18	−0.01	0.08	0.28	0.41	0.24	0.20	−0.40
22. Lies	0.37	0.30	−0.09	0.08	0.35	0.10	0.18	0.18
<i>F6: Problems of daily living—sleeping</i>								
6. Slow in getting ready for bed	0.15	0.18	0.05	0.15	0.03	0.83	0.06	0.04
7. Refuses to go to bed on time	0.12	0.21	0.14	0.13	0.01	0.82	−0.02	0.01
<i>F7: Problems in sibling relationships</i>								
25. Verbally fights with sisters and brothers	0.16	0.16	−0.08	0.01	−0.09	0.00	0.82	0.07
27. Physically fights with sisters and brothers	0.09	0.12	0.18	0.11	0.17	0.03	0.78	0.08
<i>F8: Stigmatized behavior</i>								
21. Steals	0.22	0.11	−0.05	0.04	0.16	0.04	0.18	0.65
36. Wets the bed	−0.02	−0.22	0.36	0.23	0.18	0.24	0.00	0.39
Eigen value	4.29	4.17	3.58	2.87	2.63	2.18	1.90	1.17
Variance explained	11.91	11.57	9.93	7.98	7.31	6.04	5.28	3.24
Variance accumulated	11.91	23.48	33.41	41.4	48.71	54.75	60.03	63.27
# of items	6	8	6	4	6	2	2	2

Factor loadings >0.30 are in boldface. Extraction method: Principal component analysis. Rotation method: varimax with Kaiser normalization

ADHD attention deficit/hyperactivity disorder, F1 Factor 1, F2 Factor 2, F3 Factor 3, F4 Factor 4, F5 Factor 5, F6 Factor 6, F7 Factor 7, F8 Factor 8

Table 7 Correlation between ECBI and CBCL

ECBI	CBCL		
	Internalizing problem	Externalizing problem	Total problem
Intensity Scale	.813**	.500**	.847**
Problem Scale	.548**	.351*	.576**

* $p < .05$; ** $p < .01$

“Problems in sibling relationships”, and “Stigmatized behavior.” (see Table 6).

Convergent Validity

Convergent validity refers to the extent to which a measure correlates with other similar measures. This study selected 66 children from the Gyeongsang Province and used the Pearson correlation of the Intensity Scale, the Problem Scale, and the CBCL. The ECBI Intensity and Problem Scales correlated significantly with CBCL externalizing, internalizing, and total problem scores (all at $p < .01$, except the ECBI Problem Scale and CBCL internalizing problem at $p < .05$). The ECBI Intensity score showed a correlation of 0.85 with CBCL externalizing problem score, 0.50 with internalizing problem score, and 0.81 with total problem score. The ECBI Problem score correlated 0.58 with externalizing problem score, 0.35 with internalizing problem score, and 0.55 with total problem score (see Table 7).

Discriminant Validity

Discriminant validity is evaluated through the comparison of the ECBI scores between (1) collected normative data and (2) children who are currently receiving mental health treatment at community counseling centers. A total of 88 children from local counseling centers participated in this validity study. In comparison with the normative Intensity Scale scores ($M = 70.72$, $SD = 22.06$), children in treatment received significantly higher Intensity scores ($M = 105.06$, $SD = 27.64$; $t = -13.37$, $p = .01$). For the Problem Scale, children in treatment also received significantly higher scores ($M = 11.34$, $SD = 7.37$) than normative data ($M = 3.58$, $SD = 5.95$; $t = -11.22$, $p = .01$).

In addition, the ECBI scores of children whose parents marked “yes” to their children currently receiving professional help for developmental and/or mental health were compared with those who marked “no” in the standardized sample. These children were not specifically recruited for the validity study. For those receiving professional help, mean scores were 103.23 ($SD = 26.45$) for the Intensity

Scale and 10.98 ($SD = 7.29$) for the Problem Scale. For those who were not in treatment, mean scores were 70.94 ($SD = 22.39$) for the Intensity Scale and 3.57 ($SD = 5.94$) for the Problem Scale. There were significant differences of both Intensity and Problem Scale scores, $t = 12.70$ ($p = .01$) and $t = 10.92$ ($p = .01$), respectively.

Discussion

This study provides psychometric properties and normative data for the Korean version of the ECBI. The results indicated that the Korean version of the ECBI is psychometrically sound for children between the ages of 2 and 12 in South Korea. Internal consistency, test–retest reliability, and convergent and divergent validity results revealed good psychometric properties and were comparable with other linguistic and cultural groups (Axberg et al. 2008; García-Tornel Florensa et al. 1998; Ito et al. 2013; Leung et al. 2005; Reedtz et al. 2008).

The gender and age of children seem to be important factors in understanding disruptive behavioral problems of Korean children. Behavioral problems of school-aged children were significantly lower than preschool children as indicated by both Intensity and Problem Scales. In addition, boys displayed disruptive behaviors significantly more frequently than girls. These findings are similar to previous studies in Swedish and Norwegian samples (Axberg et al. 2008; Reedtz et al. 2008). However, reported gender differences among preschool children and school-aged children were different from Swedish children. Korean preschool children showed no significant gender differences while there was a significant difference in school-aged children; findings among Swedish children were reversed (Axberg et al. 2008). According to the original ECBI standardization study results, demographic variables such as gender, age, and ethnicity do not affect severity of the disruptive behaviors, and only gender and socioeconomic status affected parental perceptions (Eyberg and Pincus 1999; Funderburk et al. 2003). Gender differences in disruptive behavior disorders among US children between 8 and 15 years of age has been reported in the epidemiology study by Merikangas et al. (2010). Their study indicated that boys had significantly higher rates of ADHD while girls had higher rates of mood disorders. Gender differences were clear in the case of ADHD, but not as clear in CD. Since the ECBI can reflect behaviors associated with both ADHD and CD, it may be possible that boys could have higher ECBI scores due to higher rates of ADHD. In addition, Korean parents may have different levels of tolerance for boys and girls. Lower ECBI scores of school-aged girls may also reflect internalized values and expected sex-roles in Korean culture. Further

studies are recommended to evaluate effects of gender and age with Korean families. In addition, as more behavioral problems are reported for preschool children, interventions targeting preschool children and their parents are needed.

The mean score ($M = 70.7$, $SD = 22.1$) of the ECBI Intensity Scale with Korean children in this study is the lowest among the previously reported scores (Axberg et al. 2008, Sweden; García-Tornel Florensa et al. 1998, Spain; Ito et al. 2013, Japan; Leung et al. 2005, China; Reedtz et al. 2008, Norway). This score is much lower than the US norm ($M = 96.6$, $SD = 35.2$) and even lower than Norwegian and Swedish samples ($M = 89.9$, $SD = 24.6$; $M = 88.2$, $SD = 26.0$, respectively). This finding is similar with the Korean CBCL 1.5–5 standardization study results (Kim et al. 2009). Korean children's externalizing scale and total problem scale scores ($M = 8.66$, $SD = 6.45$; $M = 27.65$, $SD = 17.87$, respectively), but not internalizing behaviors, were significantly lower than the US norms ($M = 12.90$, $SD = 7.70$, $t = 13.29$; $M = 33.30$, $SD = 18.70$, $t = 7.11$, respectively).

Korean parents appear to perceive their children displaying disruptive behaviors less frequently than parents of other cultural groups. Reasons for such marked differences are not clear. Traditional Confucian values may play a role in parenting practices. Filial piety, meeting social norms, and the emphasis of family over an individual's needs are important aspects of Confucian-influenced cultures. Parents are likely to teach their children to obey and meet family expectations at an early age (Moon 2011). Individuality and uniqueness are frequently downplayed. "Fitting in" is encouraged. As parents have higher expectations and less tolerance for children's disruptive behaviors, children may display disruptive behaviors less frequently.

Alternatively, it is possible that Korean parents are more likely to view disruptive childhood behavior as a normal and transitory, part of a child's developmental process. From this perspective, parents would tolerate a child's disruptive behavior because they do not consider it a problem. In this case, they are less likely report behavioral problems so that the mean of the ECBI Intensity and Problem scale scores would yield lower scores. Parents would perceive that their children's behaviors are within normal limits and that disruptive behaviors do not occur frequently. Interestingly, Kwon (2003) reported that Korean parents rated most common emotional and behavioral problems displayed by 4 or 5 years old as "uncertain" rather than "problematic," including items such as "screams when upset," "fights with friends," "not following directions," and "noncompliant." This suggests that Korean parents are less likely to label the misbehavior of young children as problematic.

In comparison to the Intensity Scale, the mean score of the ECBI Problem Scale ($M = 3.5$, $SD = 5.6$) is more similar to studies within other cultural groups. The Problem Scale mean scores for samples from Spain, Norway, and Sweden ranged from 3.09 to 3.93, all much lower than the United States norm ($M = 7.1$, $SD = 7.7$) (Axberg et al. 2008; Eyberg and Pincus 1999; García-Tornel Florensa et al. 1998; Reedtz et al. 2008). As stated previously, parents from different linguistic and cultural groups have varying perceptions for the presence and frequency of disruptive problem behaviors. Since the ECBI was developed in the United States, the manual provides normative data based on the American population. Applying the ECBI norms with Korean children would thus be inappropriate and dismiss many Korean children with disruptive behaviors. ECBI scores within a normal range of US normative data may be in a clinical range for children from the Korean culture (Eyberg and Pincus 1999). Thus, clinical cutoff scores of 92 (60T) for the Intensity Scale and 9 (60T) for the Problem Scale are recommended for the Korean version of the ECBI.

The Korean version of the ECBI correlated significantly not only with the externalizing behavior problem scale of the CBCL, but also with the internalizing behavior problem and total problem scales. The ECBI Intensity Scale showed good convergent validity with the externalizing and total problem scale scores and moderate convergent validity with the internalizing scale score of the CBCL. The ECBI Problem Scale in general showed weak to moderate convergent validity with the CBCL scores. From a conceptual perspective, there should be a correlation between the ECBI scores and the CBCL externalizing behavior problems scale score indicating observable disruptive behavioral problems. In this study, the ECBI Intensity and Problem Scale scores both did correlate significantly with externalizing scale scores. Furthermore, they also correlated with internalizing behavioral problems, which includes withdrawn, somatic, anxious, and depressed behavioral problems.

This finding is not unique to this study; the ECBI manual reported similar findings (Eyberg and Pincus 1999). In addition, Lilienfeld (2003) discussed methodological and substantive reasons for comorbidity between externalizing and internalizing disorders among children. His discussion included consideration of externalizing behavioral problems caused by internalizing behavioral problems, or vice versa. He also proposed hierarchical models of psychopathology where both internalizing and externalizing disorders are caused in part by the same underlying factor. The relationship between externalizing and internalizing behavior problem scales of the CBCL would need to be explored further, possibly with a

hierarchical model, in order to better explain the significant relationship between the ECBI and CBCL scales.

These results also support the discriminant validity of the ECBI in a Korean sample. Despite the fact that the overall mean scores of the ECBI were lower than American norms, both ECBI Intensity and Problem Scale scores for children in treatment were significantly higher than Korean normative data. Thus, the ECBI would be a good assessment tool for disruptive behaviors of children in Korea.

Exploratory factor analysis revealed an eight factor structure and did not confirm the one factor model suggested by the ECBI developer (Colvin et al. 1999; Eyberg and Pincus 1999). In previous studies, a three-factor model, composed of inattentive behavior, oppositional behavior, and conduct problems, was suggested and confirmed (Burns and Patterson 2000; Weis et al. 2005). The Swedish study also tested for the suggested three-factor model and found it acceptable (Axberg et al. 2008). However, in this study with a Korean sample, exploratory factor analysis differed from previous studies. Factors included ADHD behavior, three disruptive behaviors (toward adults; overtly expressed; and toward peers and expressed passively), two problems with daily living (clothing and eating; and sleeping), problems in sibling relationships, and stigmatized behavior. Variances of first two factors were similar (11.91, 11.57 % respectively) and much lower than other studies, 54 % (one factor model, Eyberg and Robinson 1983) or 32.59 % (three factor model, Burns and Patterson 2000). The ADHD behavior factor seems nearly identical with the same items in Burns and Patterson's exploratory study results. It appears that behaviors categorized as "ADHD symptoms" can be identified as ADHD behaviors in both English (United States) and Korean versions of the ECBI. In addition, with an exception of one item, all the other items of the second factor (disruptive behavior toward adults) were identified as items with loadings over 0.50 in the one factor model (Eyberg and Robinson 1983). The current results may be bolstered in the future with confirmatory factor analysis to compare with previous studies. It also would be helpful to replicate factor studies to explore and confirm factors associated with the Korean version of the ECBI.

Parents of lower education level and lower economic status were underrepresented in this study. Although the relationships between ECBI scores and these demographic variables were not significant, it would be helpful to include additional children to have a better representation of Korean families. Furthermore, it may be useful to consider behavioral problems that Korean parents feel important to include. One possible addition could be the Korean language factor. The Korean language has formal or informal way of speaking, often reflecting authority, power, and/or politeness. Therefore, using an inappropriate

language form may be considered a disruptive behavior in the Korean culture, and would be useful to include on a screening measure such as the ECBI. Further study is recommended to understand the Korean children's disruptive behaviors that may be different from children in the US. Overall, the Korean version of the ECBI is psychometrically sound and recommended as a clinical screening measure for children with disruptive behavioral problems.

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