

Development and Validation of a Child Version of the Obsessive Compulsive Inventory

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Surprisingly, only 3 self-report measures that directly assess pediatric obsessive-compulsive disorder (OCD) have been developed. In addition, these scales have typically been developed in small samples and fail to provide a quick assessment of symptoms across multiple domains. Therefore, the current paper presents initial psychometric data for a quick assessment of pediatric OCD across multiple symptom domains, a child version of the Obsessive Compulsive Inventory (the OCI-CV). Data from a sample of over 100 youth ages 7 to 17 with a primary *DSM-IV* diagnosis of OCD support the use of the 21-item OCI-CV. Results support the use of the OCI-CV as a general index of OCD symptom severity and in 6 symptom domains parallel to those assessed by the revised adult version of the scale (OCI-R). The OCI-CV showed strong retest

reliability after approximately 1.5 weeks in a subsample of 64 participants and was significantly correlated with clinician-rated OCD symptom severity and parent and child reports of dysfunction related to OCD. Significantly stronger correlations with self-reported anxiety than with depressive symptoms provide initial support for the divergent validity of the measure. Finally, preliminary data with 88 treatment completers suggest that the OCI-CV is sensitive to change.

OBSESSIVE-COMPULSIVE DISORDER (OCD) occurs in approximately 1 in 100 children and adolescents (Douglass, Moffitt, Dar, McGee, & Silva, 1995; Flament, Whitaker, Rapoport, & Davies, 1988; Heyman et al., 2003; Zohar, 1999) and is associated with significant academic, social, and family impairment (Piacentini, Bergman, Keller, & McCracken, 2003; Valderhaug & Ivarsson, 2005). Given its prevalence and impact upon sufferers, increased attention has been paid to treatment of pediatric OCD in recent years. The first randomized clinical trials examining treatment of pediatric OCD have

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been published within the last 10 years (Barrett, Healy-Farrell, & March, 2004; de Haan, Hoogduin, Buitelaar, & Keijsers, 1998; Pediatric OCD Treatment Study Team [POTS Team], 2004; Storch, Geffken, et al., 2007). However, psychometrically sound measures for assessing pediatric OCD symptoms are still limited. The most commonly used method for evaluating OCD symptoms in youth is the Child Yale-Brown Obsessive Compulsive Scale (CY-BOCS; Scahill, Riddle, McSwiggin-Hardin, & Ort, 1997). The CY-BOCS is a semi-structured interview that includes a checklist of obsessions and compulsions and separate severity scores for obsessions and compulsions along with a total severity score. This clinician-administered instrument has many advantages, such as allowing the interviewer to separate severity of obsessions and compulsions and to parcel out comorbidity. However, clinician-administered measures can be time-consuming and expensive, requiring interviewer training and establishment of interviewer reliability. These constraints may preclude their use in many clinical settings.

For these reasons, a comprehensive yet brief self-report measure of the symptoms of pediatric OCD would be advantageous. However, although many reliable and valid self-report measures for adult OCD exist (e.g., Compulsive Activity Checklist, Maudsley Obsessive-Compulsive Inventory, Padua Inventory-Washington State University Revision, Self-report of the Yale-Brown Obsessive-Compulsive Scale, Obsessive Compulsive Inventory, Vancouver Obsessional Compulsive Inventory; see Antony, Orsillo & Roemer, 2001, for a review), there are only three published self-report measures to directly assess pediatric OCD: the Leyton Obsessional Inventory-Child Version, the Children's Florida Obsessive Compulsive Inventory, and the Children's Obsessional Compulsive Inventory. These measures are reviewed to highlight their strengths and limitations.

Several iterations of the Leyton Obsessional Inventory (LOI) have been developed for assessing pediatric OCD. Originally based on a card-sorting task (Berg, Rapoport, & Flament, 1986), self-report versions of the child LOI have recently been developed. Berg, Whitaker, Davies, & Flament (1988) presented a 20-item self-report version of the LOI that required respondents to report on the presence or absence of each symptom and then rate the degree of interference for each symptom that was endorsed. More recently, Bamber et al. (2002) further revised the LOI by changing the response format to ratings of the frequency of each symptom (0 = *never* to 3 = *always*) and reducing the number of items from 20 to 11. This 11-item scale represents symptoms in three domains: Obsessions/Incompleteness, Compulsions, and Cleanliness. Examina-

tion of the psychometric properties of this 11-item scale showed that the total and subscale scores were internally consistent and that both the obsessions and compulsions subscales discriminated adolescents with OCD from community controls. However, confidence in these findings is limited by the small sample (23 participants with OCD) and the restricted age range of the participants (ages 12 to 16). Further, data establishing the construct validity of the 11-item child LOI (e.g., correlations with CY-BOCS scores) have not been presented.

Another brief measure of pediatric OCD was recently developed as a screening tool by Storch, Kaufman, et al. (2007), the Children's Florida Obsessive Compulsive-Inventory (C-FOCI). The C-FOCI consists of 17 items across 2 subscales, 8 items assessing obsessions and 9 items assessing compulsions, with each item rated for the presence or absence of the symptom (yes/no). Data from 47 patients with OCD and 23 nonpsychiatric controls from ages 7 to 16 indicated that the C-FOCI has good convergent and divergent validity and can distinguish between individuals with OCD and controls. The authors note that the obsessions and compulsions subscales are in need of empirical validation, given past research failing to support this common distinction (see McKay et al., 2003; Storch et al., 2005; see also Amir, Foa, and Coles, 1997). It is also important to underscore that, as noted above, the C-FOCI is intended as a screener rather than as a severity index and therefore does not attempt to represent all OCD symptoms and may not tap less frequent symptoms.

Finally, Shafran et al. (2003) developed a comprehensive measure of pediatric OCD, the Children's Obsessional Compulsive Inventory (CHOCI). The CHOCI is a self-report assessment of symptom content and severity. The symptom content is assessed with items similar to those in the Maudsley Obsessional Compulsive Inventory (MOCI). Ten items assess obsessions and 10 assess compulsions, with each item rated on a 3-point scale. After the symptom lists, respondents are asked to write in their three most upsetting obsessions and compulsions and then to respond to 6 questions similar to the CY-BOCS assessing severity of obsessions and 6 items similar to the CY-BOCS assessing severity of compulsions. Shafran et al. reported that the CHOCI takes approximately 15 minutes to complete. Initial validation data have been presented for 24 OCD patients, 18 anxiety disorder patients, and 46 nonpatient controls, ranging in age from 7 to 17 (Shafran et al., 2003). These data indicated that the CHOCI was internally consistent and had acceptable convergent validity (correlations with CY-BOCS = .38 to .49).

Further, CHOCI scores discriminated between children with OCD and controls. In addition, a revised version of the CHOCI eliminating 9 of the symptom items has recently been published using a sample of 285 children and adolescents with OCD (Uher, Heyman, Turner, & Shafran, 2008). Analyses of the psychometric properties of the revised scale suggest that it has moderate to strong internal consistency, convergent validity, and divergent validity (with conduct problems). The revised measure appears to have significant promise as a measure of global severity of obsessions and compulsions in children and adolescents with OCD, but not for measuring specific symptom subtypes. In addition, divergent validity of the CHOCI and CHOCI-R from depressive symptoms, retest reliability, and sensitivity to change remain to be examined.

The above review suggests the need for additional scale development efforts in pediatric OCD. The current paper examines the development of the Obsessive Compulsive Inventory–Child Version (OCI-CV). The OCI-CV represents an important addition to the field, with a number of important features. First, it can be used in a wide age range (ages 7 to 17). Second, it is more detailed than a brief screener but can be administered quickly. Third, the OCI-CV yields symptom severity scores across six common domains of OCD symptoms (e.g., washing, hoarding, etc). Finally, the OCI-CV was developed in conjunction with the Obsessive Compulsive Inventory and OCI-R for adults (OCI; Foa, Kozak, Salkovskis, Coles & Amir, 1998; Foa et al., 2002). The OCI-R is a reliable and valid multisymptom self-report measure of adult OCD that has documented efficacy as a screening tool and has been shown to be sensitive to treatment change (see Abramowitz, Tolin, & Diefenbach, 2005) and can validly measure symptom subtypes (Abramowitz & Deacon, 2006; Huppert et al., 2007). Therefore, development of the child OCI using the same conceptualization and methods as in the adult OCI holds promise for the assessment of pediatric OCD. Finally, the availability of a set of companion scales for assessing OCD in both adults and children would greatly facilitate comparisons across age groups.

Method

PARTICIPANTS

Participants were 109 individuals from the *POTS Team* (2004) examining the efficacy of cognitive-behavior therapy (CBT), sertraline, and their combination, for pediatric OCD. From the 112 participants in the POTS study, 1 participant was dropped from the current sample because he/she did not complete the OCI-CV before treatment and 2 were dropped due to substantial missing data

(>20% of the items on the OCI-CV). Retest reliability data were available for a subsample of 64 participants. In addition, pre-post treatment data were available only for participants who completed treatment. However, there were no significant differences between completers and dropouts on the OCI-CV total or subscale scores nor on the CY-BOCS total score (all p 's > .15).

Participants ranged in age from 7 to 17, with a mean age of 11.7 ($SD=2.7$), and there was a relatively even distribution between boys and girls (48.6% and 51.4%, respectively). Regarding the racial/ethnic composition of the sample, 92.7% were Caucasian, 3.7% were African-American, 2.8% were Hispanic, and 0.9% were Asian. Children were diagnosed with a primary *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994) diagnosis of OCD, using the Anxiety Disorders Interview Schedule for Children (ADIS-C; Silverman & Albano, 1996). For additional information regarding the inclusion and exclusion criteria and study procedures see Franklin, Foa, & March (2003) and POTS (2004).

MEASURES

Development of the OCI-CV

Originally, the OCI-CV was developed to parallel the 42-item adult OCI. First, the developers decided that a shorter scale would be more practical for use in children. Therefore, the 42 items of the original adult OCI were subjected to an exploratory factor analysis to identify the strongest items from each subscale. Second, in order to represent the full range of symptoms, items that represent each of the seven subscales of the original version of the adult OCI were selected: Washing, Checking, Hoarding, Doubting, Ordering, Obsessing, and Neutralizing (Foa et al., 1998). Third, in order to have multiple items per scale and to balance the need for internal consistency and brevity, we selected the 3 strongest items for each scale, thereby producing a 21-item scale. The wording of the 21 items identified from the OCI was then reviewed and revised as necessary for use with children. For example, the OCI item "I get upset if objects are not arranged properly" was modified to "I get upset if my stuff is not in the right order" and the item "I feel that I must repeat certain words or phrases in my mind in order to wipe out bad thoughts, feelings, or actions" was modified to "If a bad thought comes into my head, I need to say certain things over and over." Fourth, the response options for each item were simplified. It was decided that only the frequency of symptoms would be assessed (dropping the distress ratings from the original adult OCI). Second, the 5-point

Likert-type rating scale of the OCI (0=*never* to 4=*almost always*) was simplified to a 3-point scale (0=*never* to 2=*always*). A 3-point scale was utilized to increase sensitivity beyond simple yes/no responses while also maintaining simplicity. In addition, review of existing measures of child psychopathology (e.g., the CBCL, Achenbach, 1991) and anxiety (e.g., the SCARED, Birmaher et al., 1997) supported the use of 3-point scales with children. Although the OCI-CV was originally intended to parallel the OCI, the OCI-R (Foa et al., 2002) has been developed since, and it has been shown to have strong psychometric properties, including the factor structure of the 6 subscales. Therefore, our discussion includes a comparison of the OCI-CV to the OCI-R rather than the OCI.

CY-BOCS

The CY-BOCS (Scahill et al., 1997) is a semi-structured clinician-administered interview used to assess symptom severity for children and adolescents with OCD. Specific symptoms are assessed for presence currently or in the past via a symptom checklist. Ten items are then rated for the severity of overall obsessions and compulsions. Obsessions and compulsions are each rated separately regarding time consumed, distress, interference, degree of resistance, and control, and these two subscale scores are summarized into a total score. Validation data from 65 children with OCD from ages 8 to 17 revealed strong internal consistency ($\alpha=.87$ for the 10-item severity score) and good interrater reliability (intraclass correlation coefficients=.84 for the total score; Scahill et al.). Interrater reliability within the current study was also high ($r=.81$). Further, the convergent and divergent validity of the CY-BOCS were supported by findings that CY-BOCS scores were more strongly correlated with self-reported OCD symptoms ($r=.62$) than with depressive symptoms ($r=.34$) or general anxiety symptoms ($r=.37$).

NIMH Global Obsessive-Compulsive Scale

The NIMH Global Obsessive-Compulsive Scale (GOCS; Insel et al., 1983) is a single-item clinically rated index of overall OCD severity. Severity is rated from 1 to 15, with higher scores indicative of increased severity. The convergent validity of the GOCS is supported by strong correlations with Y-BOCS scores (r 's between .63 and .77; Black, Kelly, Myers, & Noyes, 1990; Kim, Dysken, & Kuskowski, 1992; Kim, Dysken, Kuskowski & Hoover, 1993). Further, there is support for the retest reliability of the GOCS over 2 weeks, with intraclass correlation coefficients of .87 to .98 (Kim et al., 1992, 1993).

Child OCD Impact Scale

The Child OCD Impact Scale (COIS; Piacentini, & Jaffer, 1999) is a self-report measure of the impact of OCD on child functioning. Parallel child and parent versions provide information regarding the impact of OCD symptoms on school, home, and social functioning. A list of over 50 specific items from these psychosocial domains are rated regarding impairment in the past month, followed by global ratings of domain-specific impairment. Ratings reflect the extent to which OCD has interfered, from 0 (*not at all*) to 3 (*very much*). Research has supported the internal consistency and construct validity of the COIS (Piacentini et al., 2003). Further, COIS scores were significantly correlated with clinician severity ratings (Piacentini et al., 2003) and CY-BOCS scores (particularly the child COIS, Valderhaug & Ivarsson, 2005) and predicted treatment response (Liebowitz et al., 2002).

Multidimensional Anxiety Scale for Children

The MASC is a 39-item self-report measure developed to assess a wide range of anxiety symptoms in children and adolescents (ages 8 to 19), cutting across disorders (March, Parker, Sullivan, Stallings, & Conners, 1997). Each item is rated on a 4-point Likert-type scale with higher scores indicative of greater anxiety. Factor analysis of the MASC items has revealed four primary scales: Physical Symptoms, Social Anxiety, Separation Anxiety, and Harm Avoidance. The four primary scales can be combined into a total anxiety score. The MASC total score has been shown to have strong internal consistency ($\alpha=.90$; March et al., 1997; see also Muris, Merckelbach, Ollendick, King, & Bogie, 2002) and good retest reliability over periods as long as 3 months (single-case ICC=.87; March et al., 1997; see also March, Sullivan, & Parker, 1999). Further, the convergent and divergent validity of the MASC total score is supported by significant correlations with another measure of anxiety ($r=.63$), but nonsignificant correlations with measures of depressive symptoms and hyperactivity (r 's=.19 and .07, respectively; March et al., 1997).

Children's Depression Inventory

The Children's Depression Inventory (CDI; Kovacs, 1985) is a 27-item self-report measure of depressive symptoms for children and adolescents. Items assess a range of depressive symptoms (e.g., self-evaluation, vegetative symptoms, etc.) and consequences of depression (e.g., impact on school). Each item presents a series of three statements and asks respondents to mark the statement that best describes them during the past 2 weeks. The items of the CDI can be summarized into five scales (Negative Mood,

Table 1
Items of the OCI-CV and Factor Loadings from Exploratory Factor Analysis

	Factor 1: Doubting/ Checking 27.61%	Factor 2: Obsessing 12.41%	Factor 3: Hoarding 11.34%	Factor 4: Washing 8.26%	Factor 5: Ordering 6.86%	Factor 6: Neutralizing 6.16%
Variance accounted for:						
Item # and Brief Description:						
4. Checking things	.61	-.02	.02	.12	.01	.15
5. Doubting if did things	.75	-.11	.03	-.09	-.10	-.07
13. Worry didn't finish things	.78	.07	-.11	-.07	.05	-.00
15. Checking doors, windows, etc.	.54	.04	-.00	.08	-.05	.03
20. Doubting if did something "right"	.75	.04	.06	-.03	.09	-.01
1. Can't stop bad thoughts	.01	.79	.00	.09	-.04	-.04
11. Upset by bad thoughts	-.04	.92	-.05	-.03	.05	-.02
14. Upset by intrusive bad thoughts	.07	.73	.17	-.02	-.25	.01
18. Saying things in response to bad thoughts	-.06	.57	-.09	-.06	.13	.17
3. Collect stuff that gets in way	-.03	.04	.80	.08	.08	.01
7. Collect things don't need	-.09	.03	.93	-.06	-.01	.09
16. Difficulty discarding	.14	-.05	.76	-.04	.05	-.14
2. Compulsive washing	-.10	.06	.01	.92	.09	-.01
10. Worry about cleanliness	.07	.15	-.05	.58	.22	-.22
21. Wash more than others	.03	-.16	.01	.90	-.22	.12
8. Upset if things not in order	.17	-.02	-.02	.05	.66	-.06
17. Upset if people move things	-.11	-.06	.04	-.06	.96	-.03
19. Need things certain way	-.02	-.03	.09	.04	.68	.18
6. Counting	-.01	.00	.04	.08	-.05	.95
9. Repeating	.22	.05	-.01	.04	.15	.41
12. Repeating numbers	-.01	.04	-.06	-.12	.05	.84

Note. OCI-CV = Obsessive Compulsive Inventory – Child Version. Significant factor loadings in bold print.

Interpersonal Problems, Ineffectiveness, Anhedonia, Negative Self-Esteem) or a total score. The CDI total score has been shown to have strong internal consistency in psychiatric samples ($\alpha = .86$) and acceptable retest reliability (r over 1 month = .43; Kovacs, 1985). Further, CDI scores have been shown to be significantly correlated with self-esteem ($r = -.59$; Kovacs, 1985), and there is some support for the ability of the CDI to discriminate between individuals with and without depressive disorders (Kovacs, 1985). Finally, recent data support the use of the CDI as a continuous measure of depressive symptoms in anxious youth (children with generalized anxiety disorder, separation anxiety disorder, or social phobia; Comer & Kendall, 2005).

Missing Value Procedure

Participants who had more than 20% missing data on the OCI-CV were excluded from the analyses ($n = 2$). For the remaining participants, missing values were replaced with the mean of the remaining items within that subscale. In the baseline data, there was <1% missing data.

Results

FACTOR STRUCTURE

An exploratory common factor analysis with promax rotation was conducted on the 21 items of

the OCI-CV.¹ We utilized common factor analysis to examine the relations among scale items with respect to underlying constructs and because it has been shown to provide estimates that hold up well to replication using confirmatory methods (see Floyd & Widaman, 1995). Promax rotation was employed to allow for correlations between the factors given that the OCI-CV subscales assess the larger construct of OCD symptoms.

Examination of initial eigenvalues yielded 6 factors with eigenvalues greater than 1, accounting for 72.65% of the variance overall. Parallel analysis (Horn, 1965) was also conducted using 50 random samples and supported the retention of 6 factors.² Parallel analysis adjusts for the effect of sampling error and is thought to be one of the most accurate methods for determining the number of factors to retain from an exploratory factor analysis (Hayton, Allen, & Scarpello, 2004). Therefore, the 6-factor solution was explored for interpretability. Factors were considered to load onto an item if the factor loading was $\geq .40$ and the strength of that loading was at least .10 greater than that item's loading on

¹ Use of varimax rotation produced an identical pattern of findings regarding which items loaded onto which factors.

² Additional details regarding the parallel analysis are available upon request.

any other factor. Inspection of the items with high factor loadings suggested that the solution was interpretable and that the components represented the following six symptom domains: *Factor 1*: Doubting/Checking (5 items), *Factor 2*: Obsessing (4 items), *Factor 3*: Hoarding (3 items), *Factor 4*: Washing (3 items), *Factor 5*: Ordering (3 items), and *Factor 6*: Neutralizing (3 items; see Table 1). Notably, these results were similar to those of the OCI-R (Foa et al., 2002), which found the following six subscales for the adult OCI-R: Checking, Obsessing, Neutralizing, Hoarding, Washing, and Ordering.

DESCRIPTIVE STATISTICS

To provide a context for understanding the results of statistical analyses below and to provide initial descriptive data for the OCI-CV, means and standard deviations for all study measures are shown in Table 2. Given the use of a 3-point scale, we also examined whether there was evidence for excessive midpoint responding. Results showed that there was not evidence that children over-endorsed the middle response option (a “1”). The proportion of OCI-CV responses were as follows: “0” response: 39.81%; “1” response: 39.57%; and “2” response: 20.76%. In addition, a repeated measures analysis of variance was conducted on the subscale mean item scores to explore the types

of symptoms endorsed by the sample. This analysis failed to reach statistical significance, suggesting similar levels of symptoms across the domains assessed by the OCI-CV, $F(5, 540)=2.14, p=.06$. Finally, potential age and gender differences in OCD symptom severity were also examined. Given the number of comparisons conducted, a more conservative alpha level (.01) was used for each set of tests to reduce the likelihood of a Type I error. No significant gender differences were detected. Results comparing children (ages 7–11) and adolescents (ages 12–17) revealed two significant age differences: adolescents endorsed significantly more symptoms on the OCI-CV total score [$t(107)=2.9, p=.005$, adolescents: $M=19.0$ ($SD=7.8$), children: $M=14.8$ ($SD=7.5$)] and on the doubting/checking subscale [$t(107)=2.6, p=.005$, adolescents: $M=0.92$ ($SD=0.53$), children: $M=0.66$ ($SD=0.52$)] than younger children.

INTERNAL CONSISTENCY

The OCI-CV total score and six subscale scores were all found to have strong internal consistency (coefficient alpha's $\geq .81$; see Table 3).

SUBSCALE INTERCORRELATIONS

Spearman correlations were computed among the subscales and the total score for the OCI-CV (see Table 4). Correlations with the total score were

Table 2
Means and Standard Deviations for Study Measures

	Pre <i>M</i> (<i>SD</i>)	Post <i>M</i> (<i>SD</i>)	Change <i>M</i> (<i>SD</i>)
OCI-CV Total	17.02 (7.90)	10.16 (7.58)	6.39 (7.30)
Doubting/Checking	0.80 (0.54)	0.45 (0.50)	–
Obsessing	0.92 (0.59)	0.54 (0.53)	–
Hoarding	0.76 (0.68)	0.40 (0.50)	–
Washing	0.82 (0.68)	0.51 (0.63)	–
Ordering	0.82 (0.58)	0.54 (0.49)	–
Neutralizing	0.69 (0.65)	0.37 (0.50)	–
Highest Subscale	1.46 (0.47)	1.02 (0.51)	0.44 (0.61)
CY-BOCS			
Total	24.64 (4.13)	13.85 (8.30)	4.27 (4.26)
Obsessions	11.83 (2.34)	6.58 (4.10)	4.27 (4.24)
Compulsions	12.81 (2.21)	7.26 (4.46)	4.47 (4.52)
NIMH GOCS	8.97 (1.34)	6.16 (3.13)	2.78 (2.80)
COIS Parent Total	16.45 (10.13)	11.72 (11.45)	4.79 (7.54)
COIS Child Total	12.06 (8.87)	7.83 (7.63)	4.16 (8.91)
MASC Total	49.36 (18.43)	–	–
MASC Physical	11.12 (7.34)	–	–
MASC Harm Avoidance	17.29 (4.71)	–	–
MASC Social Anxiety	11.01 (6.61)	–	–
MASC Separation	9.94 (4.88)	–	–
CDI	11.21 (8.40)	5.64 (7.55)	5.00 (7.35)

Note. OCI-CV=Obsessive Compulsive Inventory – Child Version; CY-BOCS=Children's Yale-Brown Obsessive Compulsive Scale; GOCS=Global Obsessive-Compulsive Scale; COIS=Child Obsessive Compulsive Impact Scale; MASC=Multidimensional Anxiety Scale for Children; CDI=Children's Depression Inventory. OCI-CV subscale scores are average item scores.

Table 3
Internal Consistency and Retest Reliability for the OCI-CV
Total and Subscale Scores

	Internal Consistency (<i>N</i> =109)	Retest reliability (<i>N</i> =64)
Total	.85	.77
Doubting/Checking	.82	.68
Obsessing	.83	.85
Hoarding	.88	.79
Washing	.83	.89
Ordering	.83	.70
Neutralizing	.81	.83

Note. OCI-CV = Obsessive Compulsive Inventory – Child Version.

moderate to strong (r 's = .36 to .79), suggesting that the subscales measure a broader construct of OCD symptoms. Correlations among the subscales ranged from weak (e.g., between washing and hoarding, ordering and neutralizing) to strong (e.g., between hoarding and ordering), suggesting that the subscales are related but not synonymous.

RETEST RELIABILITY

Retest reliability over a period of approximately one and a half weeks (retest interval in days: $M = 11.02$, $SD = 5.35$) was assessed in a subset of the sample ($N = 64$)³. This analysis revealed strong retest reliability for the total score and all subscale scores (see Table 3).

CONVERGENT AND DISCRIMINANT VALIDITY

Supporting the convergent validity of the OCI-CV are the results showing a significant correlation between total OCI-CV scores and clinician-rated levels of OCD symptoms as measured by the CY-BOCS Total and Obsessions and Compulsions scores (see Table 5). Further, total OCI-CV scores were significantly correlated with the NIMH Global Score and with both parent and child reports of dysfunction related to OCD. Overall, the correlations ranged from small to moderate in magnitude, with the strongest correlations found between OCI-CV scores and the child's self-report of dysfunction related to OCD.

Additional evidence for the convergent validity of the OCI-CV comes from the findings that the OCI-CV total score was significantly correlated with self-report of overall anxiety symptoms as assessed by the MASC and the four basic scales of the MASC: Physical Symptoms, Harm Avoidance, Social Anxiety, and Separation/Panic. These corre-

lations were generally strong. Finally, OCI-CV total scores were also significantly, and moderately, correlated with depressive symptoms as measured by the CDI (see Table 5).

Given that self-reports of OCD symptoms as measured by the OCI-CV were significantly correlated with self-reports of both anxiety symptoms (MASC) and depressive symptoms (CDI), we tested the prediction that OCI-CV scores would be significantly more strongly correlated with MASC scores than with CDI scores, given that OCD is an anxiety disorder. A z -test of dependent correlations (cf. Meng, Rosenthal, & Rubin, 1992) was conducted to determine whether these correlations differed significantly in magnitude. Results showed that OCI-CV total scores were significantly more strongly correlated with MASC total scores than with CDI total scores ($z = 1.77$, $p_{1-tail} = .04$).

Finally, given the results of the correlations with the OCI-CV, we examined whether method variance might account for the relationships between the measures. Therefore, we ran a principal components analysis (PCA) using the pretreatment measures (CY-BOCS, NIMH-Global, OCI-CV, COIS-Child Total, MASC Total, CDI). The PCA produced two factors corresponding to the self-report measures and the clinician administered measures, with the first factor (self-reports) accounting for 49.99% of the variance and the second factor accounting for 22.39% of the variance.

SENSITIVITY TO CHANGE

In order to examine sensitivity to change, we calculated residual change scores for posttreatment (Week 12) controlling for pretreatment scores and then examined the correlations of these residual change scores. These analyses were conducted with a sample of 88 participants that had data at both time points. Given results showing that the highest score of all of the subscales for any individual were more highly correlated with Y-BOCS outcome in adults (Abramowitz et al., 2005), we also include this measure here. Again supporting the convergent validity of the OCI-CV, residual change in total OCI-CV scores was significantly correlated with residual change in clinician-rated levels of OCD symptoms as measured by the CY-BOCS Total, Obsessions, and Compulsions scores. Residual change in OCI-CV Total scores were also significantly correlated with changes in the clinician-rated NIMH Global Score and child and parent reports of dysfunction related to OCD (see Table 4). Residual change in OCI-CV Total scores was also significantly correlated with changes in self-reported levels of depressive symptoms. Finally, to explore the relative sensitivity to change of the OCI-

³ Individuals who completed the retest had somewhat lower OCI-CV total and neutralizing scores and lower parent COIS, CY-BOCS total and compulsion scores than those who did not.

Table 4
Intercorrelations Among OCI-CV Subscales

	Doubting/ Checking	Obsessing	Hoarding	Washing	Ordering	Neutralizing
Doubting/Checking	-					
Obsessing	.38***	-				
Hoarding	.35***	.16	-			
Washing	.12	.10	.05	-		
Ordering	.50***	.20*	.68***	.09	-	
Neutralizing	.40***	.39***	.16	-.05	.31	-
Total	.79***	.62***	.57***	.36***	.73***	.60***

Note. OCI-CV=Obsessive Compulsive Inventory – Child Version.

*** $p < .001$, ** $p < .01$, * $p < .05$.

CV, we compared the sensitivity of the OCI-CV to change across treatments to that of the CY-BOCS. Results revealed significant interactions of treatment condition by time for both OCI-CV and CY-BOCS scores (both p 's $< .01$), and the magnitude of these effects was similar across the two measures (eta squared = .15 for OCI-CV and .19 for CY-BOCS). This suggests that the OCI-CV is as sensitive to changes in OCD symptom severity as the CY-BOCS. To provide a benchmark for future research and clinicians using the OCI-CV, mean posttreatment severity according to treatment conditions was as follows: Placebo: 14.68 ($SD = 7.66$); Sertraline: 10.31 ($SD = 8.99$); CBT: 10.36 ($SD = 5.74$); Sertraline + CBT: 5.27 ($SD = 4.39$).

Discussion

The current paper presents initial psychometric data for the OCI-CV, a child version of the adult

Table 5
Convergent and Divergent Validity

	Pre OCI-CV Total	Residual Change (Pre to Post) OCI-CV Total
CY-BOCS		
Total	.31***	.61***
Obsessions	.28**	.64***
Compulsions	.28**	.55***
NIMH GOCS	.23*	.59***
COIS Parent Total	.32***	.50***
COIS Child Total	.45***	.55***
MASC Total	.62***	—
MASC Physical	.53***	—
MASC Harm Avoidance	.43***	—
MASC Social Anxiety	.50***	—
MASC Separation	.62***	—
CDI	.47***	.59***

Note. OCI-CV=Obsessive Compulsive Inventory – Child Version; CY-BOCS=Children's Yale-Brown Obsessive Compulsive Scale; GOCS=Global Obsessive-Compulsive Scale; COIS=Child Obsessive Compulsive Impact Scale; MASC=Multidimensional Anxiety Scale for Children; CDI=Children's Depression Inventory.

* $p < .05$, ** $p < .01$, *** $p < .001$.

measure that is widely used to assess OCD symptoms in adults. Results provide encouraging support for the use of the 21-item OCI-CV in youth ages 7 to 17. First, data from a sample of over 100 children diagnosed with OCD revealed that the OCI-CV has a meaningful structure that is similar to that of the adult OCI-R. Specifically, we found support for six subscales of the OCI-CV as follows: Doubting/Checking, Obsessing, Hoarding, Washing, Ordering, and Neutralizing. The cohesion of the scales was supported by strong internal consistency within subscales and in the total scale. Further, as expected, correlations among the scales suggest that they are related but not identical. These results support the use of the OCI-CV as a general measure of OCD symptoms as well as a tool for assessing specific symptom domains. We also found the OCI-CV scores to be stable over time for a subsample of study participants (mean test-retest interval of approximately 1.5 weeks), increasing confidence in the stability of measure. Modest convergent validity of the OCI-CV is reflected in the correlations between the OCI-CV scores and CY-BOCS scores, the gold standard of assessment in pediatric OCD. In addition, OCI-CV scores were significantly correlated with NIMH Global scores, and with both parent and child reports of dysfunction related to OCD. In support of the divergent validity of the measure, OCI-CV scores were significantly more strongly correlated with self-reported anxiety (MASC scores) than self-reported depressive symptoms (CDI scores). Finally, analyses on a subsample of 88 treatment completers showed that residual change in OCI-CV scores was significantly correlated with residual change in clinician-rated and self-report measures of OCD symptoms and related dysfunction (CY-BOCS, NIMH Global, child and parent COIS); the OCI-CV demonstrates similar sensitivity to change as the CY-BOCS.

Findings of the current study are generally supportive of the reliability and validity of the OCI-CV. However, some findings were inconsistent

with expectation. Most notably, it was surprising that the OCI-CV was more strongly correlated with the CDI ($r = .47$) than with the CY-BOCS ($r = .31$ for CY-BOCS total). Indeed, the correlations of the OCI-CV and the CY-BOCS scales were small to moderate in magnitude. Given that both the OCI-CV and CY-BOCS tap the construct of OCD, larger correlations would have been expected. One possible explanation may lie in method variance (the OCI-CV is a self-report measure while the CY-BOCS is clinician-rated). Findings that OCI-CV scores were more strongly correlated with self-reported levels of dysfunction related to OCD (child COIS, $r = .45$) than with clinician-rated levels of OC symptoms (CY-BOCS scores, $r = .31$) are consistent with this explanation. Further, results of a principal components analysis of our pretreatment measures were consistent with this proposal. Specifically, the principal components analysis produced two factors, one comprised of the self-report measures and the other comprised of the clinician-rated measures. This suggests that there are meaningful differences in ratings made via self-report versus clinicians in regards to pediatric OCD and highlights the importance of getting information from multiple sources.

In addition to considering the psychometric properties of the OCI-CV independently, it is also important to consider the present findings within the context of other self-report measures of OCD. As a context for interpreting the various results, it is noteworthy that the current sample of youth with OCD contained over twice as many participants as the validation samples for most other self-report measures of OCD in youth (see Bamber et al., 2002; Shafran et al., 2003; Storch, Kaufman, et al., 2007; for an exception, see Uher et al., 2008). Therefore, the data presented here may be more reliable. Regardless, comparison of the psychometric properties of the LOI-CV, C-FOCI, CHOCI-R, and OCI-CV reveals that all four scales have strong internal consistency. Data regarding convergent and divergent validity are not available for all of the other scales. The correlations of the OCI-CV, the C-FOCI, and the CHOCI-R with the CY-BOCS Total score are all moderate in size (although the correlation of the OCI-CV with the CY-BOCS was the smallest in magnitude). Data regarding divergent validity from depressive symptoms are only available for the OCI-CV and the C-FOCI. These data suggest that the C-FOCI better discriminates symptoms of OCD from symptoms of depression than does the OCI-CV, but this may be due to the differences in samples (i.e., the current study only examined participants with OCD while Storch, Kaufman et al., collapsed their sample for

correlational analyses). Finally, data supporting the retest reliability and sensitivity to change are only available for the OCI-CV. On the other hand, support for the discriminant validity of the LOI-CV, C-FOCI, and CHOCI-R are available, but the discriminant validity of the OCI-CV remains untested. Given that these measures each have separate strengths and weaknesses and that they are intended for different purposes, we propose that there is room for all of these scales. The OCI-CV will likely be useful for assessing OCD symptoms in youth across various domains and for tracking changes in symptom severity overtime. Finally, the OCI-CV can also be advantageous for comparisons across age groups given the existence of the adult OCI (and OCI-R) and the development of a parent version of the OCI (OCI-PV) that is currently under way.

Given that the OCI-CV is designed to parallel the adult versions of the measure (OCI and OCI-R), it is also worth considering how the psychometric properties of this new scale compare to those of the existing adult scales. First, the OCI-CV was found to have a factor structure similar to the adult OCI-R, which has six subscales (Foa et al., 2002). Interestingly, in both the OCI-R and the OCI-CV, the decrease from the seven OCI subscales to six subscales was due to combining the doubting and checking subscales. The validity of the 6-scale structure has been established in multiple samples of adults (e.g., Huppert et al., 2007; Mataix-Cols et al., 2005), whereas the applicability of the original seven subscales of the 42-item OCI in nonclinical samples has been questioned (Wu & Watson, 2003). The fact that both the OCI-R and the OCI-CV have six subscales therefore permits comparisons across ages according to symptom subtype. Moreover, in both the OCI-R and the OCI-CV, obsessing symptoms were most highly endorsed in patients with OCD, whereas neutralizing symptoms were the least endorsed.

While a comparison of symptom patterns in adults and children is of interest, it is important to remember that other aspects of symptom presentations may differ across the developmental spectrum (e.g., children appear more likely to exhibit magical thinking than adults). There is now support for the internal consistency of all of the OCI-CV, OCI, and OCI-R scales in samples of individuals with OCD. Indeed, review of the internal consistency coefficients for the three versions of the OCI shows that in individuals with OCD the alpha coefficients for all of the total scores and subscale scores exceed .70. In addition, data support the temporal stability of the OCI-CV, the OCI, and the OCI-R. Correlations of these scales with other measures of OC

symptoms support the convergent validity and discriminant validity of the OCI and the OCI-R. Discriminant validity for the OCI-CV remains to be established, but has been established in the adult OCI. Finally, despite all of the strengths of these measures, it is important to note that high correlations with measures of depressive symptoms have frequently been found. The OCI-R is strongly correlated with self-reported and clinician-rated measures of depressive symptoms (r 's = .70 and .58, respectively) in an OCD sample. However, the OCI and the OCI-CV show more modest, but still noteworthy, correlations with depressive symptoms (r 's = .31 and .47, respectively). Although better divergent validity would be desirable, our results are not surprising given the strong association between OCD and depression (see Clark, 2002, for a review) and the frequent difficulty in distinguishing anxiety from depression in self-report measures (Feldman, 1993; Stark & Laurent, 2001; see also Kocovski, Endler, Cox, & Swinson, 2004). Indeed, Clark and Watson (1991) estimated that .34 might be the lower bound estimate for correlations between self-report measures of anxiety and depression.

The strengths of the current instrument development study notwithstanding, the study has several limitations. The most notable limitation of the current study is a lack of data on the psychometric properties of the OCI-CV in comparison samples. Data are needed on the OCI-CV in samples of youth with other anxiety disorders and without psychiatric diagnoses. Such data could be used to assess the discriminant validity of the OCI-CV. Another limitation is that only the data of participants whose intake and baseline visits were spaced 2 weeks apart and completed the OCI-CV at both appointments were included in the test-retest reliability analyses. Thus, assignment to the 2-week window was not random.

It would be useful to determine the relationship of the OCI-CV to other self-report measures of child OCD to better determine the convergent validity and potential benefits of these instruments. It will be important to also determine the psychometrics of the OCI-CV in children with diverse ethnicities in future studies. Further research with community samples could examine the ability of the OCI-CV to be used as a screener or to track OCD symptoms in community samples. However, the low base-rate of OCD may make such a task particularly difficult. Finally, replication and further validation of the psychometric properties of the OCI-CV is warranted. Although, as mentioned above, it will be important to evaluate the divergent validity of the OCI-CV in future research, given our large sample size, the wide age range of youth

included, the wide range of OCD symptoms assessed by the OCI-CV, and the stability of the measure, we believe that the OCI-CV holds promise for filling an important gap in the assessment of pediatric OCD.

Appendix A

OCI-CV

On this page there are several questions that we want you to answer. Read each sentence carefully and tell us how much it has happened to you in the last month. If it never happens to you, circle the word "never." If it sometimes happens to you, circle the word "sometimes." If it happens to you almost always, circle the word "always." This is not a test, so there are no right and wrong answers.

Example:

I think a lot about dogs. never sometimes always

1. I think about bad things and can't stop.	never	sometimes	always
2. I feel like I must wash and clean over and over again.	never	sometimes	always
3. I collect so much stuff that it gets in the way.	never	sometimes	always
4. I check many things over and over again.	never	sometimes	always
5. After I have done things, I'm not sure if I really did them.	never	sometimes	always
6. I need to count while I do things.	never	sometimes	always
7. I collect things I don't really need.	never	sometimes	always
8. I get upset if my stuff is not in the right order.	never	sometimes	always
9. I get behind in my school-work because I repeat things over and over again.	never	sometimes	always
10. I worry a lot about things being clean.	never	sometimes	always
11. I'm upset by bad thoughts.	never	sometimes	always
12. I have to say some numbers over and over.	never	sometimes	always
13. Even after I'm done I still worry that I didn't finish things.	never	sometimes	always
14. I get upset by bad thoughts that pop into my head when I don't want them to.	never	sometimes	always
15. I check doors, windows, and drawers over and over again.	never	sometimes	always

Appendix A (continued)

Example: I think a lot about dogs.	never	sometimes	always
16. I don't throw things away because I'm afraid I might need them later.	never	sometimes	always
17. I get upset if people change the way I arrange things.	never	sometimes	always
18. If a bad thought comes into my head, I need to say certain things over and over.	never	sometimes	always
19. I need things to be in a certain way.	never	sometimes	always
20. Even when I do something very carefully I don't think I did it right.	never	sometimes	always
21. I wash my hands more than other kids.	never	sometimes	always

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