ORIGINAL ARTICLE

# Phenomenology of Comorbid Autism Spectrum and Obsessive-Compulsive Disorders Among Children

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Abstract The occurrence of obsessive-compulsive disorder (OCD) in youth with autism spectrum disorders (ASD) is common (37% prevalence or higher) and results in additional distress and impairment. The phenomenology of OCD in youth with ASD is under-researched to date. This study compared the clinical characteristics of youth with comorbid ASD and OCD (ASD + OCD) with age and gender matched controls with OCD in 70 youth (7–13 years old). Youth with both syndromes did not present with more severe OCD symptoms. Obsessive-compulsive symptom severity and total number of obsessions and compulsions between the ASD + OCD group and the OCD group did not differ statistically. However, group differences in reports of specific OCD symptoms as well as patterns of comorbidity were identified. Attention deficit/hyperactivity symptoms, social phobia, and separation anxiety disorder were more common among youth with ASD + OCD. Better understanding of OCD/ASD co-morbidity may facilitate treatment development.

**Keywords** Obsessive-compulsive disorder · Autism · Autism spectrum disorder · Comorbidity · Children · Asperger syndrome · OCD

Autism spectrum disorders (ASD; e.g., autism, Asperger syndrome, and pervasive developmental disorder not otherwise specified [PDD NOS]) are common pediatric

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neurodevelopmental disorders that affect as many as one out of every ninety-one children (1 in 58 boys) in the United States (CDC 2007; Fombonne 2005; Kogan et al. 2009; Wood et al. 2009a). Anxiety disorders, in particular obsessive-compulsive disorder (OCD), are common and impairing conditions among children with ASD, with OCD affecting at least 37% of individuals (de Bruin et al. 2007; Leyfer et al. 2006; Muris et al. 1998). The relationship between OCD and ASD may be bidirectional—characteristics of ASD are not uncommon in adults (Bejerot 2007; Bejerot et al. 2001) and youth (Ivarsson and Melin 2008) with OCD who do not meet full diagnostic criteria for ASD. Despite existence of fairly robust therapies for OCD (March and Mulle 1998; Piacentini et al. 2007), presence of comorbidity has the potential to complicate treatment and diagnosis. Unfortunately, to date, impact of ASD on the presentation and severity of OCD is not sufficiently researched, especially in youth.

Much of the extant research involving ASD/OCD co-occurrence focuses on variations in symptom presentation and illness severity across diagnostic classes. In a study comparing adults with high functioning ASD to OCD, a similar pattern of obsessions and compulsions was noted across groups (Russell et al. 2005). More recently, Cath et al. (2008) compared symptom overlap of ASD, OCD, and social anxiety symptoms in adults with OCD, social phobia, and non-clinical controls (each with and without comorbid ASD). Participants with OCD-only exhibited higher obsessive-compulsive symptom severity, followed by OCD + ASD, then by ASD without OCD (Cath et al. 2008). This difference was primarily accounted for by fewer obsessions in adults with ASD in comparison to adults with OCD. Other data from adults suggest that patients with OCD endorsed more autism-related symptoms on the Autism-Spectrum Quotient (Baron-Cohen et al. 2001; Hoekstra et al. 2008) in contrast to non-clinical controls.

Relative to adults, fewer studies have explored phenomenological variations between youth with OCD and those with ASD. McDougle et al. (1995) examined the symptom presentations of youth with OCD versus those with ASD (McDougle et al. 1995). Presence of touching/tapping/rubbing and self-damaging symptoms and the absence of checking, counting, symmetry and aggressive symptoms were related to ASD diagnostic status more robustly than OCD status (McDougle et al. 1995). However, several subjects in this study were nonverbal and cognitive discrepancies may have explained the group differences in obsessive-compulsive symptoms. In another study contrasting children with high functioning ASD and OCD, youth with OCD reported more frequent and more sophisticated obsessions compared to youth with ASD (Zandt et al. 2007). A more recent study contrasted age, gender, and IQ matched youth with OCD, ASD, and non-clinical controls (Ruta et al. 2010). Higher obsessive-compulsive symptom severity was documented in the OCD group, particularly increased rates of contamination and aggressive obsessions and checking compulsions; youth with ASD had more hoarding obsessions and ordering, hoarding, and repeating compulsions (Ruta et al. 2010).

Unfortunately, the extent to which comorbid ASD and OCD presentation impacts symptom presentation, severity of obsessions and compulsions, OCD-related interference, symptom resistance/control, and comorbidity profile remains underresearched (Mandy and Skuse 2008; White et al. 2009b). Researchers have noted a lack of data on the nature of obsessive-compulsive behaviors in ASD and how closely they resemble presentation of obsessive-compulsive behaviors in OCD (Jacob et al. 2009; Wood and Gadow 2010). In fact, a better understanding of phenotypic variations in obsessive-compulsive behaviors shows promise for later family-genetic, linkage and association studies in youth with ASD (Bejerot 2007; Cath et al. 2008; Jacob et al. 2009). Further, given the relative frequency of OCD among children with ASD, OCD could be an important treatment focus for many youth with ASD (Bellini and Peters 2008; Volkmar and Klin 2000). In fact, parents

rate anxiety as the second largest problem for youth with ASD (Mills and Wing 2005), and anxiety disorders including OCD lead to significant functional impairment in youth with ASD. For example, higher parent-rated anxiety was associated with greater impairments in social responsiveness (Sukhodolsky et al. 2008) and social skill deficits (Bellini 2004) in youth with ASD.

A better characterization of OCD/ASD co-occurrence may facilitate treatment planning and case conceptualization for youth with combined presentations. For example, supplemental techniques such as Habit Reversal Therapy (Piacentini and Chang 2005) or differential reinforcement procedures may be indicated for certain ritualistic patterns common in youth with ASD. In the presence of limited symptom resistance, developmentally adapted motivational strategies may be incorporated into treatment protocols to enhance outcome. On the other hand, if other comorbidity is prevalent in youth with ASD and OCD, evaluations for pharmacotherapy may be indicated. Accordingly, this study compared phenomenology of youth with ASD+OCD with age and gender matched controls with OCD based on types of obsessive-compulsive symptoms, OCD symptom severity, and comorbidity profiles.

### Method

#### Participants

The sample consisted of 70 youth (80% boys) between the ages of 7–13 years (M= 9.9, SD=1.8 years) and was recruited from two sites with expertise in the assessment and treatment of pediatric OCD and autism spectrum disorders: the University of South Florida (USF; n=48) and the University of California Los Angeles (UCLA; n=22). Patients were 35 youth with OCD and ASD (ASD + OCD group) and 35 age and gender matched OCD controls (OCD group; consisting of youth with OCD but without an autism spectrum disorder).

Study inclusion required a psychiatric diagnosis of OCD which was defined as the most impairing and primary reason for presentation at the respective clinic (above and beyond ASD); OCD and non-ASD comorbid diagnoses were made using the Anxiety Disorders Interview Schedule for Children and Parents, Fourth Edition (ADIS-IV-C/P) (Silverman and Albano 1996) and was confirmed by a review of all available records and an unstructured clinical interview with a senior clinician. Youth with bipolar disorder, IQ<70, psychotic disorder, or current suicidality were excluded. Ethnicity breakdown was as follows: Caucasian (74%; n=52), Hispanic (4%; n=3), African American (3%; n=2), Asian (3%; n=2), Other (14%; n=10), and no response (1%; n=1). No site differences in clinical or demographic variables were identified, nor were there differences in ethnicity as a function of group membership.

## Measures

Anxiety Disorders Interview Schedule for DSM-IV: Child and Parent Versions (ADIS-IV-C/P) The ADIS-IV-C/P (Silverman and Albano 1996) is a clinicianadministered, semi-structured interview that assesses for the presence and severity of DSM-IV anxiety disorders as well as other co-occurring disorders. The ADIS-IV-C/P yields separate diagnoses and severity ratings based on the youth and parent interviews; clinicians aggregate a composite diagnosis based on the dual reports using guidelines recommended by the creators (Silverman and Albano 1996). Excellent psychometrics have been reported for the ADIS-IV-C/P including test-retest reliability (Silverman et al. 2001), treatment sensitivity (Barrett et al. 2004) and construct validity (Wood et al. 2002).

*Autism Diagnosis Interview-Revised (ADI-R)* The ADI-R (Lecavalier et al. 2006) is a standardized semi-structured interview, administered to the child's primary caregiver, that is designed to assess the presence and severity of symptoms based on the diagnostic criteria for autism spectrum disorders. The ADI-R assesses three categories of core symptoms: deficits in communication, deficits in social relatedness, and restricted range of interests and behaviors.

*Autism Diagnostic Observation Schedule (ADOS)* The ADOS (Lord et al. 1999) is a structured observational assessment administered directly to the child to elicit social interaction, stereotyped behaviors, and atypical use of language; the ADOS has a high level of specificity and sensitivity to discriminate children with autism from those with other developmental disorders.

*Children's Yale-Brown Obsessive Compulsive Scale (CY-BOCS)* The CY-BOCS (Scahill et al. 1997) is a psychometrically sound clinician-administered semistructured measure of obsessive-compulsive symptom presence and severity over the previous week (Scahill et al. 1997; Storch et al. 2004). The parent and child were interviewed together and the clinician used clinical judgment about making final ratings. Obsession and compulsion severity are assessed with five items each; the sum of all items derives a total score. (Storch et al. 2006) The CY-BOCS also includes a psychometrically sound (Gallant et al. 2008) symptom checklist which measures the presence or absence of obsessive-compulsive symptoms (e.g., contamination obsessions, repeating compulsions, ordering/arranging, etc.).

## Procedures

Prior to recruitment, data collection procedures were approved by the respective site institutional review boards. Written informed consent from a parent and assent from the child was obtained for each study or to use data obtained through the clinic for research purposes. All participants were screened through the clinic flow or as part of their possible inclusion in one of several treatment outcome studies (Wood et al. 2009a). After consent/assent was obtained, participants were administered a battery of clinician-rated measures (i.e., ADIS-IV-C/P, CY-BOCS, ADI-R, ADOS) by a

trained rater. Training consisted of didactics about the respective measure, observing videotaped or live administrations, conducting supervised administrations, and formal training workshops with certification (for the ADI-R and ADOS). Autism spectrum disorders (e.g., autism [n=17], Asperger syndrome [n=9], or PDD-NOS [n=9]) were assessed via (a) the ADOS, (b) the ADI-R, (c) unstructured clinical interview/ observation by a child psychologist and/or psychiatrist, and (d) review of available records (Klin et al. 2005).

## Statistical Analyses

Chi-square and independent t-tests were used to examine differences between the ASD + OCD and OCD groups on study constructs of interest. Risk ratios (Greenland 1987) were used to report the increased probability of the comorbidity group (i.e., ASD + OCD) relative to the OCD group in terms of symptom and comorbidity prevalence. Discriminant function analysis (DFA) was utilized to provide a multivariate contrast between characteristics that may distinguish the two study groups. Given the exploratory nature of this research, alpha was set at .05 to indicate statistical significance; no statistical correction was employed.

## Results

OCD Symptom Severity Mean CY-BOCS total severity scores between the ASD + OCD group (M=26.5, SD=8.4) and the OCD group (M=25.9, SD=5.7) did not statistically differ. Similarly, we did not find differences in CY-BOCS total obsessions (ASD + OCD: M=13.4, SD=4.7; OCD: M=13.9, SD=2.9) or compulsions scores (ASD + OCD: M=13.1, SD=4.3; OCD: M=15.9, SD=7.3).

*OCD Symptom Presentation* Group differences in reports of specific obsessive and compulsive symptoms were identified (see Table 1). Youth with ASD + OCD were significantly less likely to endorse sexual obsessions, checking, washing or repeating compulsions in contrast to youth in the OCD group. Nonparametric tests and risk ratios are presented in Table 1. These findings were confirmed via a multivariate analysis. Specifically, discriminant function analysis (DFA) identified one canonical discriminant function that significantly differentiated the two diagnostic groups (OCD versus ASD + OCD), Wilks  $\lambda$ =.70,  $\chi^2$  (7, *N*=70)=23.0, *p*=.002, with 70% of the cases correctly classified (canonical *r*=.55; eigenvalue=.43). Less likelihood of sexual obsessions (*F*(1,68)=4.3, *p*=.04), checking rituals (*F*(1,68)=10.2, *p*=.002), washing/cleaning rituals (*F*(1,68)=8.2, *p*=.006), and repeating rituals (*F*(1,68)=4.2, *p*=.04) distinguished the ASD + OCD group from the OCD group. Box's M (28,16112)=35.9, *p*=.28 was non-significant, meeting the requirement of homogeneity of covariance for the DFA.

*Comorbidity* Youth in the ASD + OCD group were 2.4, 9.0, and 7.3 times more likely to have clinically significant inattention/hyperactive symptoms, separation anxiety disorder, and social phobia, respectively than youth in the OCD group. Youth with ASD + OCD were also significantly less likely to present with a tic disorder diagnosis (see Table 2).

oifferences in obsessive-	compulsive	symptom	presentation a	s a function	on o	
	OCD + ASD	OCD	Statistics			
	n %	n %	$\chi^2 p$ -	Risk	9:	

Table 1 D f group

	ASD							
	n	%	n	%	$\chi^2$	<i>p</i> -value	Risk ratio	95% confidence interval
Contamination obsessions	14	40.0	20	57.1	2.1	0.15	.70	.53–1.6
Aggressive obsessions	10	28.6	16	45.7	2.2	0.14	.63	.33-1.2
Sexual obsessions	2	5.7	8	22.9	4.2	0.04	.25	.06-1.1
Religious obsessions	11	31.4	8	22.9	0.65	0.42	1.3	.63–.30
Checking compulsions	6	17.1	18	51.4	9.1	0.003	.33	.15–.74
Washing compulsions	7	20.0	18	51.4	7.5	0.006	.39	.19–.81
Counting compulsions	5	14.3	7	20.0	0.17	0.68	.71	.25-2.0
Ordering compulsions	9	25.7	12	34.3	0.21	0.78	.75	.36–1.6
Repeating compulsions	8	22.9	16	45.7	4.1	0.04	.50	.24-1.0
Mental rituals	2	5.7	4	11.4	0.49	0.48	.50	.10-2.6
Asking or confession	8	22.9	15	42.9	2.1	0.15	.53	.26-1.1
Touch tap rub	11	31.4	11	31.4	0.12	0.73	1.0	.50-2.0
Just right feeling or touching/ arranging	5	14.3	11	31.4	2.1	0.15	.45	.18–1.2
Hoarding symptoms	14	40.0	11	31.4	0.65	0.62	1.3	.67–2.4

Multivariate analysis provided a similar characterization. Using DFA, one canonical discriminant function that significantly differentiated the two diagnostic groups (OCD versus ASD + OCD), Wilks  $\lambda = .52, \chi^2$  (8, N=70)=42.1, p<.001, with 84.3% of the cases correctly classified (canonical r=.69; eigenvalue=.93). Less likelihood of tic disorders (F(1,68)=4.3, p=.04) and a greater likelihood of separation anxiety, (F(1,68)=23.4, p<.001), social phobia (F(1,68)=32.1, p<.001), and inattentive/hyperactive symptoms (F(1,68)=13.0, p=.001) distinguished the

Symptoms	OCD+ASD		OCD		Statistics				
	n	%	n	%	$\chi^2$	<i>p</i> -value	Risk ratio	95% confidence interval	
Tics	5	14.3	13	37.1	4.8	0.03	0.4	.15–.96	
Inattention/hyperactivity	24	68.6	10	28.6	11.2	0.001	2.4	1.4-4.2	
ODD	7	20	10	28.6	0.70	0.40	0.7	0.3-1.6	
SAD	18	51.4	2	5.7	17.9	< 0.001	8.5	2.1-34.1	
GAD	18	51.4	12	34.3	2.1	0.15	1.4	0.8–2.5	
Social phobia	22	62.9	3	8.6	22.5	< 0.001	7.3	2.4-22.3	
Specific phobia	3	8.6	3	8.6	0.0	1.0	1.0	.22–4.6	

 Table 2 Differences in pattern of comorbidity as a function of group status

Tics Tourette syndrome and chronic tic disorder; OCD obsessive compulsive disorder; ODD oppositional defiant disorder; SAD separation anxiety disorder; GAD generalized anxiety disorder

Symptoms

ASD + OCD group from the OCD group. Box's M (36,15559)=86.9, p<.01 was significant, however, DFA is robust to even when lacking homogeneity of covariance (Silva and Stam 1995).

### Discussion

This study presents the first clinical contrast between youth with comorbid OCD and high functioning autism spectrum disorders (ASD + OCD) and age and gender matched controls with OCD without autism spectrum disorders. Despite presence of both syndromes (as well as possible other comorbid conditions), obsessivecompulsive symptom severity in youth with ASD + OCD was not inflated relative to youth with OCD without ASD. Obsessive-compulsive symptom profiles were not markedly different between the groups. Unlike prior studies suggesting that youth with ASD present with more hoarding, repeating and ordering symptoms in contrast to youth with OCD (McDougle et al. 1995), our sample of youth with ASD + OCD were no more likely that the OCD control group to endorse hoarding, repeating, or ordering symptoms. Similarly, in contrast to our expectations, youth with ASD + OCD were not more likely to endorse touching, tapping, or rubbing rituals. There are several possible explanations for this. First, it is possible that past studies conceptualized symptoms that are actually core phenomena of ASD (e.g., repetitive behaviors, hoarding preferred items) as obsessive-compulsive in nature (Wood and Gadow 2010). Indeed, our clinical experiences suggest that many families come in for treatment complaining of their child's "obsessions" only to find that these symptoms are really reflections of rigid interests/fixations. Second, some literature suggests that the measurement of obsessive-compulsive symptoms in patients with ASD primarily captures compulsive symptoms (Cath et al. 2008). These studies perhaps are representative of those with greater cognitive dysfunction than our sample which required IO to be above 70.

Nevertheless, the youth with ASD + OCD were less likely to endorse several of the most common obsessive-compulsive symptoms, specifically checking, washing and repeating compulsions. One possibility is that these symptoms tend to adhere to the traditional obsessive-compulsive cycle, such that obsessional triggers evoke fear which is followed by compensatory rituals to reduce anxiety (Lewin et al. 2005; Piacentini 2008). This finding may reflect the greater nature of fear-evoking obsessions in those with OCD alone relative to youth with OCD and co-occurring ASD.

Although anxiety disorders are the most common comorbidity among youth with OCD (Lewin and Piacentini 2009), youth with ASD + OCD presented with significantly higher rates of social phobia and separation anxiety disorder relative to those with OCD alone. Rates of generalized anxiety disorder were also 1.5 times higher for youth with ASD + OCD relative to those with OCD alone (not statistically significant). This highlights findings documenting high prevalence of anxiety in youth with ASD (de Bruin et al. 2007; Klin et al. 2005; Leyfer et al. 2006; Russell and Sofronoff 2005; Sofronoff et al. 2005) and further supports the need for research adapting behavioral and/or pharmacological therapies for youth with combined

presentation (Chalfant et al. 2007; Sofronoff et al. 2005; White et al. 2009a, 2010; Wood et al. 2009a, b). Despite preliminary positive reports (DeLong et al. 1998; Steingard et al. 1997), efficacy of serotonin reuptake inhibitors for reducing anxiety in youth with ASD has not been conclusively tested despite frequent use in applied practice (Mandell et al. 2008; Rosenberg et al. 2010). Although one small controlled trial reported efficacy of fluoxetine for repetitive behaviors in youth with ASD (Hollander et al. 2005), large-scale randomized controlled trials of citalopram (King et al. 2009) and preliminary findings from the Study of Fluoxetine in Autism (SOFIA) (Autism Speaks 2009) have failed to show efficacy. Efforts to delineate anxiety from restricted, repetitive behaviors are necessary in future treatment trials as there may be differential efficacy as a function of symptom target. A number of studies have examined adapted cognitive-behavioral approaches for youth with ASD and comorbid anxiety (Lang et al. 2010; White et al. 2009a, 2010; Wood et al. 2009a). For example, Wood et al. (2009a) examined an individualized CBT intervention for children with ASD that employs a modular treatment algorithm, with children ages 7-11 years old (N=40) randomized to CBT or a waiting list. Children randomized to CBT had primary outcomes comparable to those of CBT for typically developing children with anxiety disorders (Walkup et al. 2008), with large effect sizes for most outcome measures. The modular CBT program was superior to a waitlist control in response rate (76.5% vs. 8.7%) and remission rate (52.9% vs. 8.7%).

A number of study limitations warrants mention. First, although this is the first study examining clinical phenomenology in youth with combined ASD + OCD (in contrast to matched controls with OCD), an ASD (without OCD) control group was not available. Second, comprehensive data on overall functional impairment was not available. Further research should investigate the social, familial, and educational burden of a combined ASD + OCD presentation. Finally, the relatively small sample size increases probability of a Type II error. However, the relatively narrow age range and carefully matched control group may help offset this limitation.

In summary, our research presents the first examination of obsessive-compulsive symptoms in youth with high functioning ASD. Findings suggest that obsessive-compulsive symptoms in these youth do not exclusively resemble autism-like repetitive actions/behaviors (e.g., stereotypies, fixated interests, hoarding) and occur with no greater likelihood that in youth with OCD (without an ASD). Nevertheless, many of the classic obsessive-compulsive symptoms were less common in youth with comorbid OCD and ASD, suggesting that at the least, that OCD may be phenotypically altered to some degree in ASD, differing from the monomorbid presentation of OCD in some possibly important respects. Overall, these data highlight the need for evaluating developmentally adapted treatments targeting anxiety for youth with combined ASD and anxiety/OCD.

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