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Oppositional Defiant Disorder as a Clinical Phenotype in Children with Autism Spectrum Disorder

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Abstract

To examine the validity of oppositional defiant disorder (ODD) as a clinical phenotype distinct from attention-deficit hyperactivity disorder (ADHD), parents and teachers completed a DSM-IV-referenced rating scale and a background questionnaire for 608 children (ages 3–12 years) with autism spectrum disorder (ASD). The ASD sample was separated into four groups: ODD, ADHD, ODD + ADHD, and neither (NONE). Comparison samples were non-ASD clinic ($n = 326$) and community ($n > 800$) controls. In the ASD sample, all three ODD/ADHD groups were clearly differentiated from the NONE group, and the ODD + ADHD group had the most severe co-occurring symptoms, medication use, and environmental disadvantage. There were few differences between ASD + ODD and ASD + ADHD groups. Findings for ASD and control samples were similar, supporting overlapping mechanisms in the pathogenesis of ODD.

Keywords

Oppositional defiant disorder; Autism spectrum disorder; Autism; Asperger's syndrome; PDDNOS; Pervasive developmental disorder; Attention-deficit/hyperactivity disorder; DSM-IV; Diagnosis

Introduction

A large percentage of children with autism spectrum disorder (ASD) exhibit the symptoms of DSM-IV-defined oppositional defiant disorder (ODD), which is characterized by a pattern of hostile and defiant behavior directed toward adults. For example, two recent studies found that the percentage of 3- to 5- and 6- to 12-year-olds with ASD meeting DSM-IV symptom criteria for ODD according to their parents was 13 and 27%, respectively, and the rates for teachers were 21 and 25%, respectively (Gadow et al. 2004a, 2005). Interestingly, these symptom prevalence rates for ODD in children with ASD are comparable to the rates for ODD in non-ASD children referred for child psychiatric outpatient clinic evaluation. Moreover, there are other similarities (age, gender, and rater differences) in clinical characteristics associated with ODD in ASD, clinic-based, and

community-based samples, which support the notion that ODD may be a unique behavioral syndrome in children with ASD, and equally important, may be the same (or a similar) disorder as observed in non-ASD children. This having been said, whether ODD and other behavioral disturbances in children with ASD are epiphenomena (i.e., pleiotropic manifestations of the ASD diathesis), unique to children with ASD (i.e., phenocopies of conventional child psychiatric syndromes), or “true” DSM-IV-defined syndromes is a matter of considerable debate.

For both children with and without ASD, the most common co-occurring psychiatric disorder with ODD is attention-deficit hyperactivity disorder (ADHD). This high rate of co-occurrence has led some to question whether ODD is a unique clinical entity separate from ADHD in the general population. Investigations that have examined this issue have generally shown that ODD and ADHD are distinct disorders. For example, studies of non-ASD children with ODD (without ADHD) versus ADHD (without ODD) indicate that children with ODD versus ADHD differ with regard to gender distribution (more discrepant in ADHD), co-occurring psychiatric symptoms, treatment (higher for ADHD), referral for evaluation (higher in ADHD), and psychosocial risk factors (e.g., Carlson et al. 1997; Drabick et al. 2004; Gadow and Nolan 2002). Moreover, ODD + ADHD appears to be a unique clinical entity evidencing a greater degree of complex symptomatology and clinical impairment, even greater than what would be predicted from a simple combination of the two disorders in preschoolers (Gadow and Nolan 2002), children (Drabick et al. 2004), and adults (Gadow et al. 2007). Although the extant literature supports the notion that shared genetic influences contribute to the covariation of ODD and ADHD, findings from a recent twin study indicate additional unique genetic factors (Dick et al. 2005). Lastly, the clinical features of parent- versus teacher-defined ODD are dissimilar (Drabick et al. 2007), and there is evidence that the underlying genotypes for parent- versus teacher-defined ODD may also be different (Hudziak et al. 2005), which appears to be the case with parent- versus teacher-defined ADHD as well (Gadow et al. 2004b; Martin et al. 2002).

This study addresses the more general issue of the nosology of behavioral disturbances in children with ASD. Because this is such a complex topic, progress will likely be made only with programmatic research and multiple strategies. One approach was formulated by Robins and Guze (1970; Feighner et al. 1972), who identified several general criteria for validating behavioral syndromes, one of which was clinical features broadly defined to include psychosocial risk factors. In this study, we examined the clinical features of ODD in children with ASD, which were assessed with developmentally appropriate DSM-IV-referenced (American Psychiatric Association 1994) rating scales: the Early Childhood Inventory-4 (ECI-4) (Gadow and Sprafkin 1997, 2000) and the Child Symptom Inventory-4 (CSI-4) (Gadow and Sprafkin 1994, 2002); demographic characteristics; and treatment history. Our hypotheses were based primarily on similar studies of non-ASD samples, and if supported, would lend credence to the notion that ODD in children with ASD is a behavioral syndrome. Specifically, we predicted that children with ASD with and without ODD would differ in clinically relevant ways (e.g., severity of conduct disorder; ODD + ADHD, ODD Only > NONE). It was also expected that children with ODD Only would differ from the ADHD Only group (e.g., severity of conduct disorder; ODD Only > ADHD Only). Moreover, children with both disorders (ADHD + ODD) would exhibit more severe co-occurring symptoms and risk factors than any other group. With regard to informant, we predicted that teacher-defined syndromes would evidence greater group differentiation than parent-defined syndromes. Lastly, we hypothesized there would be more similarities than differences in the pattern of group differences in our ASD sample versus non-ASD child psychiatry clinic referrals.

Method

Participants

Children were consecutive referrals to a University Hospital Developmental Disabilities Specialty Clinic from 1994 to 2004 (ASD sample) and a Child Psychiatry Out-patient Service (clinic controls) and enrollees in regular preschool and elementary schools (community controls) from 1995 to 1999, all located in the same geographic area (Long Island, NY). Children were separated into two age groups, 3–5 and 6–12 years. Their demographic and background characteristics are presented in Table 1. All three samples are described in other publications (Gadow et al. 2004a, 2005; Sprafkin et al. 2002). A University Institutional Review Board approved this retrospective chart review study, and appropriate measures were taken to protect patient (and rater) confidentiality.

ASD diagnoses were based on a comprehensive developmental history of language and social development and inflexible or repetitive behaviors that were obtained from a structured questionnaire completed prior to intake and clinician interview, direct observations of the child in the clinic, and review of parent- and teacher-completed rating scales and prior records. Diagnoses for both age groups were made by a child psychiatrist (or his supervisee) who had more than 20 years of clinical and research experience with ASD. The interrater reliability of the of the clinical diagnoses for both samples was determined in a related study of 3- to 5-year-olds evaluated by the same clinicians by comparing them with an independent clinician's evaluation of 45 randomly selected charts that were "edited" to exclude mention of the initial diagnoses and ECI-4 findings (Sprafkin et al. 2002). The two sets of ASD diagnoses were compared, and agreement (κ) was excellent ($\kappa = .90$), which is consistent with the findings for the DSM-IV Autism Field Trial (Klin et al. 2000). Approximately 35% of the children in the ASD sample were administered the Autism Diagnostic Observation Schedule (ADOS; Lord et al. 2000), which confirmed diagnoses of autism or autism spectrum disorder. Importantly, t -tests indicated that the ADOS- and expert-diagnosed groups did not differ in (a) severity of any of the 12 DSM-IV ASD symptoms or (b) any demographic characteristics. Moreover, they were not meaningfully different (all partial η s $< .20$) in the severity of any of their co-occurring psychiatric symptoms (ECI/CSI).

In the ASD sample, comparisons between age groups indicated no significant differences in gender, ethnicity, socio-economic status (SES) (Hollingshead 1975), or family income. However, medication use and living in a single-parent household was higher in 6- to 12- versus 3- to 5-year-olds.

Procedure

Clinic Samples—Prior to scheduling the evaluations of the ASD and clinic control samples, the parents of potential patients were mailed a packet of materials including behavior-rating scales for both parents and teachers to complete, a background information questionnaire, and permission for release of school records. Parents were required to complete and return their forms as well as distribute school materials prior to the first appointment. In most cases (94%), the child's mother completed ratings. Clinical evaluations included interviews with the children and their caregivers; informal observation of parent-child interaction; school reports, psycho-educational, and special education evaluations; a questionnaire of developmental, educational, medical, and family histories; and scores from several parent- and teacher-completed behavior-rating scales including the ECI-4/CSI-4.

Community Controls—Early childhood and elementary school programs were contacted for participation in a normative data study of the ECI-4 and the CSI-4 (Gadow and Sprafkin 1997, 2000, 2002). Parent ratings were obtained for 507 preschool and 385 elementary school children. In most cases (97%), ratings were completed by the child's mother. Teacher ratings were obtained for additional samples of 407 preschoolers and 404 elementary students, none of whom was receiving special education services. Details of the sampling procedure appear in prior publications (Gadow et al. 2004a, 2005; Gadow and Sprafkin 1997, 2000, 2002; Nolan et al. 2001).

Measures

ECI-4/CSI-4—Items represent DSM-IV symptoms, and they are scored in two different ways: Screening Cutoff (categorical) and Symptom Severity (dimensional) scores. Symptom categories include ADHD inattentive (I) type, ADHD hyperactive-impulsive (HI) type, ODD, conduct disorder (CD), generalized anxiety disorder (GAD), separation anxiety disorder (SAD), major depressive disorder (MDD), dysthymic disorder, schizophrenia (teacher ratings of 6- to 12-year-olds only), mania (teacher ratings of 6- to 12-year-old clinic samples only), and the triad of ASD symptoms: social deficits, language deficits, and perseverative behaviors (i.e., restricted, repetitive, stereotyped behaviors). Numerous studies indicate that the ECI-4/CSI-4 demonstrate satisfactory internal consistency (Cronbach's alpha), reliability, and convergent and discriminant validity in community-based normative, clinic-referred non-ASD, and ASD samples (Gadow and Sprafkin 2007). ECI-4/CSI-4 scores show little relation to age, IQ, or SES. Screening Cutoff scores exhibit moderate to high sensitivity for identifying ODD, ADHD, and ASD.

Parent Questionnaire—The Parent Questionnaire includes questions pertaining to parental education and employment from Hollingshead's (1975) criteria, marital status, and family income. Additional questions pertain to the child's educational and medical history, including treatment with psychotropic medication.

Subgrouping

Children in the ASD sample were sorted into one of four groups based on their ECI-4/CSI-4 Screening Cutoff scores: ODD Only, ADHD Only, ODD + ADHD, and neither disorder (NONE). ADHD symptom category contains 18 items and includes the I, HI, and combined (C) subtypes; the Screening Cutoff scores for these categories are ADHD:I (6), ADHD:HI (6), and ADHD:C (both I and HI). Children who met criteria for any ADHD symptom category were placed into an ADHD group. The ODD symptom category of the ECI-4/CSI-4 contains eight items (Screening Cutoff 4).

Group classifications were created separately for parent and teacher ratings for each age group. There was little overlap in parent- and teacher-defined symptom groupings of children with ASD. For 3- to 5-year-olds, of the total number of children classified parent-defined versus teacher-defined, the percentage of children in common was as follows: ODD Only (1%, $n = 2$, $\phi = .32$), ADHD Only (13%, $n = 22$, $\phi = .17$), ODD + ADHD (6%, $n = 10$, $\phi = .32$), and NONE (35%, $n = 59$, $\phi = .34$). For 6- to 12-year-olds, of the total number of children classified parent-defined versus teacher-defined, the percentage of children in common was as follows: ODD Only (1%, $n = 3$, $\phi = .10$), ADHD Only (17%, $n = 61$, $\phi = .14$), ODD + ADHD (6%, $n = 22$, $\phi = .11$), and NONE (18%, $n = 64$, $\phi = .22$).

Statistical Analyses

For the ASD sample, chi-square tests (categorical variables) and analysis of variance (ANOVAs; continuous variables) were used for ODD/ADHD group comparisons (i.e., ODD Only, ADHD Only, ODD + ADHD, NONE). Tukey HSD tests (equal variances) and

Dunnett's C tests (unequal variances) were performed to localize differences between groups. To identify the source of significant interaction effects, subsequent simple effects tests were conducted. Age and SES were only minimally correlated with severity of all symptom categories and therefore were not treated as covariates. Owing to the exploratory nature of analyses, we report all group differences that are significant at the $p < .05$ level. However, this means that some "significant" findings may be a chance occurrence. Therefore, it should be noted that the Bonferroni-corrected alpha for the ANOVAs of parent and teacher ratings is $p < .003$. Given our interest in source specificity, we tested whether the magnitude of significant differences between ODD/ADHD groups in the ASD sample varied as a function of informant (see Gadow et al. 2004b; Gadow and DeVincent 2005).

To determine if obtained ODD/ADHD group differences in the ASD sample were similar to those in clinic controls, we conducted sample (ASD versus clinic controls) $\times$ symptom group ANOVAs for each age group (3–5, 6–12 years), each informant (parent, teacher), and each co-occurring symptom category (e.g., CD, GAD) for which there was a main effect in any sample. Significant interactions would indicate a varied pattern of ODD/ADHD group differences for ASD versus clinic controls. Identical analyses were performed to permit comparisons between ASD and community control samples. To avoid confounds associated with symptom overlap among diagnostic categories, psychiatric symptoms that either define or are clearly associated with ASD (obsessions, compulsions, tics) were excluded from these analyses as was the parent-defined ODD Only group (small sample size). The number of parent/teacher dependent variables, respectively, was 6/ 7 for 3- to 5-year-old and 8/7 for 6- to 12-year-olds. Given our concerns about interpreting sample $\times$ group interactions (e.g., unequal number of participants in the ODD/ ADHD groups), we also conducted analyses of each control sample separately.

Results

Is ODD a Distinct Behavioral Disorder in ASD with Regard to Co-occurring Psychiatric Symptoms and is the Comorbid Condition (ODD + ADHD) a Unique Clinical Entity?

Parent-defined Groups

Findings for 3- to 5-year-olds indicated significant main effects of group for six symptom categories (Table 2). Post hoc analyses indicated differences for all but the mother-defined ODD Only group, which was too small for statistical comparisons. Among 6- to 12-year-olds, there was a main effect of group for 10 symptom categories (Table 2). Collectively, findings support the notion that ASD children with and without ODD are different and that ODD + ADHD is unique in terms of the breadth and severity of co-occurring symptoms.

Teacher-defined Groups

In preschoolers, the findings for the teacher-defined groups were largely similar to parent-defined groups, with the exception of perseverative behaviors (Table 3). However, the pattern of findings for the teacher-defined 6- to 12-year-old groups differed from the parent-defined groups.

Interactions with Age

There were nine parent and eight teacher symptom categories in the ECI-4/CSI-4 with identical items. For these symptoms there was only one significant Age $\times$ ODD/ ADHD group interaction (i.e., parent ratings of perseverative behaviors), which indicates that the pattern of ODD and ADHD group differences with regard to co-occurring symptoms was nearly identical for younger and older children with ASD.

External Validators

Groups were compared for age, gender, SES, ethnicity, income, single-parent household, and medication use. For 3- to 5-year-olds, the only significant differences for the parent-defined ODD/ADHD groups were in SES (NONE > ODD Only) and single-parent homes (ODD + ADHD > NONE). For teacher-defined groups (3- to 5-year-old), significant differences emerged for income (NONE > ODD + ADHD), medication use (ODD + ADHD > ADHD Only, NONE), and single-parent homes (ODD + ADHD > NONE). For 6- to 12-year-olds, the significant differences for the parent-defined groups were medication use (ODD + ADHD > NONE) and single-parent homes (ODD + ADHD > ADHD Only > NONE). For teacher-defined groups (6- to 12-year-olds), males outnumbered females (ODD Only > ADHD Only, NONE).

Is ODD Source-specific?

In 3- to 5-/6- to 12-year-olds with ASD, there were several parent (three variables/eight variables) and teacher (one variable/seven variables) co-occurring symptom variables for which the magnitude of ODD/ADHD group differences varied depending on the informant who served as the basis for classifying the children. For each variable, parent- and teacher-defined groups were best differentiated by their respective informant. In other words, teacher-defined groups were best characterized by teacher ratings of co-occurring symptoms, and vice versa.

Is ODD in ASD a Phenocopy?

Examination of interaction terms indicated that the pattern of differences between ADHD/ODD groups revealed more similarities than differences for ASD and non-ASD clinic controls. The exceptions were parent ratings of CD (3–5), MDD (3–5), dysthymia (3–5/6–12), and SAD (6–12, assessed by parents only); and teacher ratings of CD (3–5/6–12). Similarly, there were few significant interactions for ASD versus community controls with the exception of parent ratings of CD (3–5/6–12), and teacher ratings of CD (3–5/6–12), GAD (3–5), and MDD (6–12). Collectively, these findings support the notion that ODD in children with ASD is similar in many respects to ODD in non-ASD children. Importantly, the only consistent finding across age groups and informants was for CD symptom severity.

Discussion

To the best of our knowledge, this is the first study to examine the diagnostic validity of ODD as a behavioral syndrome in children with ASD. In general, findings support the notion that DSM-IV-defined ODD is a distinguishable behavioral syndrome in children with ASD to the extent that children who exhibit these behaviors (ODD + ADHD, ODD Only) are different from those who do not (NONE) with regard to co-occurring psychiatric symptoms. Evidence supporting a distinction between the ODD Only and ADHD Only groups was limited to teacher-defined groups of 6- to 12-year-olds; nevertheless, there was no evidence that one informant's ratings were superior overall in defining ODD/ADHD groups. As has been reported in several studies of non-ASD samples, the combination of ODD and ADHD symptoms resulted in a condition characterized by a much more severe pattern of co-occurring psychiatric symptoms, treatment with psychotropic drugs, and environmental adversity. Collectively, these results are comparable to similar studies of ODD and ADHD in non-ASD children and adults (Carlson et al. 1997; Drabick et al. 2004; Gadow and Nolan 2002; Gadow et al. 2007). Comparison of ODD/ADHD groups in the ASD versus clinic and community control samples indicated few between-sample differences in the relative severity of co-occurring symptoms in ODD/ADHD groups, which suggests that similar processes may explain at least some of the ODD/ADHD syndrome

differentiation in all three samples. Although these analyses are exploratory, this interpretation is supported by similar results for ADHD subtypes (Gadow et al. 2006), anxiety and psychotic symptoms (Weisbrot et al. 2005), sleep problems (DeVincent et al. 2007), and tics (Gadow and DeVincent 2005).

One notable instance where co-morbid symptoms were associated with a modestly different pattern of ODD/ADHD group differences in children with ASD was the severity of CD symptoms, which was evident in both age groups and for both informants. The primary sample difference was a slightly greater degree of ODD/ADHD group differentiation in the ASD versus control samples. Previously, we have reported that screening prevalence rates of CD (but not other disorders) were markedly lower in ASD children versus clinic controls, and in preschoolers, rates of CD among ASD and community controls were actually comparable (Gadow et al. 2004a, 2005), suggesting that the core features of ASD may alter the clinical presentation of CD in children with ASD, at least as CD is defined by DSM-IV criteria. This seems plausible owing to the social cognition demands of many behaviors that define CD, but much additional research is necessary to establish this interpretation. Given the fact that ODD is commonly associated with CD (Burke et al. 2002; Loeber et al. 2000), it is possible that co-occurring CD symptoms may have influenced observed group differences. To address this potential confound, we repeated our analyses controlling for CD symptom severity; however, this did not alter the overall pattern of results. Although not as clearly illustrated as in the case of CD, the varied pattern of sample differences for co-occurring depression and, to a lesser extent, anxiety symptoms, clearly warrants further study.

Limitations

Generalization of study findings is bounded by participant, assessment, and methodological features. It is important to emphasize that our findings pertain to the severity of psychiatric symptoms, and that individuals classified on the basis of symptom frequency and severity may not be comparable to samples identified on the basis of clinical diagnoses, structured interviews, or best estimate diagnoses. Study samples were relatively large and representative for one geographic area; nonetheless, findings may not apply to ethnic minorities or children in residential facilities. Although there was some evidence of ODD/ADHD group divergence for variables that were unlikely to be biased in any way by the raters who provided reports of symptoms (i.e., external validators), much additional research is needed to explore a wider range of variables (see Burke et al. 2002). We did not have IQ scores for all ASD participants; nevertheless, IQ likely had little impact on our results because ODD and ADHD severity ratings were minimally correlated with IQ (all r 's < .30) and the mean IQ of the four ODD/ADHD groups was comparable. Nevertheless, specific language or adaptive skills may be differentially associated with ODD severity. It is possible that a few children in the community sample may have had undiagnosed ASD, which may have had a slight effect on group means. Lastly, owing to the relative rarity of ODD Only (which was also true for community and clinic controls), reported results for comparisons of ODD Only with other groups should be considered tentative.

Clinical Implications

Regardless of whether the behavioral disturbances associated with ASD are epiphenomena, children with ASD vary greatly with regard to the severity of their disruptive behavior, anxiety, and mood symptoms. Thus, routine clinical care should include the systematic assessment of these comorbid behavioral and emotional disturbances, which will have important implications for medical interventions, school placement, and family life. Further examination of comorbid conditions also could contribute to an understanding of whether other psychiatric conditions are distinct in the context of ASD. Although much additional

work will be necessary to disentangle the relations among these comorbid conditions and ASD, such knowledge could inform tertiary prevention efforts (i.e., to prevent the development of comorbid conditions in children with ASD). In particular, prospective examination of co-occurring symptoms in children with ASD could contribute to an understanding of how comorbid conditions may impact the course of ASD and response to treatment. For example, over time, children with ASD may begin to exhibit ODD behaviors more frequently in response to increasing contextual stressors (e.g., academic, peer demands). Because many interventions for children with ASD involve identifying antecedents for problematic behaviors, these same strategies could be applied to the identification of the contextual factors that precipitate oppositional or defiant behaviors toward adults, as well as increased impulsivity in children with ASD. Research that examines specific aspects of behavioral interventions in children with and without ASD could help to determine whether similar strategies are useful in these populations, even though the antecedents and manifestations of oppositionality likely differ among children with and without ASD. To this end, norm-based measures may be helpful in calibrating symptom severity and determining response to treatment. In addition, comparisons of the developmental trajectories of children with and without ASD in terms of course, risk factors, and sequelae would facilitate placing these findings into a larger developmental context. Lastly, it would be prudent to consider programmatic research into the taxonomy of these disturbances with the intent of informing treatment decisions, and for the parents and teachers of these children, providing a basis for helping to make important life decisions.

Future Directions

The present study investigated a relatively limited number of variables either implicated or associated in some way with the pathogenesis of behavioral and emotional disorders. Although all of the co-occurring symptoms and most of the external validators examined in this study have both genetic and environmental components, there are many other variables to consider in future research including genetic, morphologic, neurophysiologic, metabolic, obstetric, familial (e.g., history of psychopathology, parental characteristics, family dynamics), and stress to name but a few. Moreover, there is a considerable body of research that supports the distinction between ODD and conduct disorder. Although rates of conduct disorder appear to be lower in children with ASD compared with non-ASD psychiatric controls (Gadow et al. 2005), to be consistent with DSM-IV criteria future research should consider co-occurring ODD and conduct disorder as a distinct clinical entity (Burke et al. 2002; Loeber et al. 2000). Perhaps the most glaring gap in research about this topic with regard to Robins and Guze's (1970; Feighner et al. 1972) criteria pertains to natural history. We know virtually nothing about how these apparent behavioral syndromes change over time or differentiate into other disorders in children with ASD. Nor do we know whether developmental changes in ASD symptom severity impact ODD symptoms. In summary, our findings must be considered preliminary, and much additional research remains to be done.

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Table 1

Sample characteristics

Variable	ASD sample 3–5 years (<i>n</i> = 210)	6–12 years (<i>n</i> = 398)	non-ASD samples				Community samples			
			non-ASD samples		6–12 years (<i>n</i> = 191)		3–5 years		6–12 years	
			3–5 years (<i>n</i> = 135)	6–12 years (<i>n</i> = 191)	3–5 years	6–12 years	Parent (<i>n</i> = 507)	Teacher (<i>n</i> = 407)	Parent (<i>n</i> = 385)	Teacher (<i>n</i> = 404)
Age (<i>M</i> / <i>SD</i>)	4.2 (0.8)	8.4 (1.9)	4.6 (0.6)	8.7 (2.0)	3.9 (0.7)	4.3 (0.7)	3.9 (0.7)	4.3 (0.7)	8.9 (2.0)	8.0 (1.6)
Gender (males; <i>F</i> %)	166 (79)	336 (84)	99 (73)	136 (71)	264 (52)	233 (57)	264 (52)	233 (57)	186 (48)	207 (51)
IQ (<i>M</i> / <i>SD</i>)	(<i>n</i> = 76)	(<i>n</i> = 268)	(<i>n</i> = 58)	(<i>n</i> = 82)			NA	NA	NA	NA
Ethnic status (<i>F</i> %)	91 (17.6)	92 (22.7)	92 (14.4)	98 (15.8)						
Caucasian	195 (94)	368 (94)	111 (82)	159 (86)	285 (75)	459 (80)	285 (75)	459 (80)	313 (90)	389 (96)
African-American	2 (1)	9 (2)	13 (10)	17 (9)	54 (14)	76 (13)	54 (14)	76 (13)	6 (2)	2 (1)
Latino/a	6 (3)	6 (1)	10 (7)	6 (3)	36 (10)	29 (5)	36 (10)	29 (5)	14 (4)	4 (1)
Other	4 (2)	10 (3)	1 (1)	3 (2)	4 (1)	7 (2)	4 (1)	7 (2)	14 (4)	9 (2)
Special education (<i>F</i> %)	192 (92)	336 (85)	70 (52)	63 (33)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Medication (<i>F</i> %)	14 (7)	156 (40)	13 (10)	27 (14)	0 (0)	1 (0.2)	0 (0)	1 (0.2)	7 (2)	8 (2)
SES (<i>F</i> %)	(<i>n</i> = 209)	(<i>n</i> = 396)	(<i>n</i> = 100)	(<i>n</i> = 176)	(<i>n</i> = 356)				(<i>n</i> = 337)	
Lower (1–3)	18 (9)	41 (10)	18 (18)	42 (24)	48 (14)	NA	48 (14)	NA	21 (6)	NA
Middle (4–6)	101 (48)	185 (47)	47 (47)	94 (53)	189 (53)	NA	189 (53)	NA	154 (46)	NA
Upper (7–9)	90 (43)	170 (43)	35 (35)	40 (23)	119 (33)	NA	119 (33)	NA	162 (48)	NA
Income level (<i>M</i> / <i>SD</i>)	4.3 (1.0)	4.3 (0.9)	3.1 (1.5)	3.4 (1.2)	NA	NA	NA	NA	NA	NA
Single parent (<i>F</i> %)	15 (7)	54 (14)	NA	42 (24)	NA	NA	NA	NA	NA	NA
ASD subtype										
Autistic disorder	81 (39)	133 (33)	NA	NA	NA	NA	NA	NA	NA	NA
Asperger's disorder	27 (13)	109 (27)	NA	NA	NA	NA	NA	NA	NA	NA
ASD-NOS	102 (48)	156 (40)	NA	NA	NA	NA	NA	NA	NA	NA

Note: SES, socioeconomic status assessed with Hollingshead's (1975) 9-point index of occupational status; ASD, autism spectrum disorder; income level (low = 1, high = 5); and NA, not applicable

Table 2
Means (*SD*) and comparison statistics for parent ratings of parent-defined symptom groups

Variable	ODD Only (<i>n</i> = 4)	ADHD Only (<i>n</i> = 62)	ODD + ADHD (<i>n</i> = 21)	NONE (<i>n</i> = 110)	<i>F</i> -ratio	Post hoc comparisons
3- to 5-year-old						
CD	2.8 (1.7)	0.8 (1.4)	3.5 (3.2)	0.4 (0.9)	27.29***	OA > A,N
MDD	5.0 (1.3)	5.2 (3.6)	6.6 (3.1)	3.7 (1.6)	9.04***	OA,A > N
Dysthymia	3.8 (1.5)	4.0 (2.8)	4.8 (2.4)	2.7 (1.3)	9.48***	OA,A > N
Compulsions	1.0 (1.4)	0.7 (0.9)	1.6 (1.1)	0.7 (0.9)	5.22**	OA > A,N
Social deficits	8.0 (2.6)	6.5 (3.4)	8.2 (2.9)	5.0 (2.9)	8.10***	OA,A > N
Perseverative behaviors	4.5 (1.0)	4.5 (2.8)	7.8 (2.2)	3.8 (2.4)	14.56***	OA > A,N
6- to 12-year-old						
CD	1.4 (2.0)	0.8 (1.5)	3.8 (4.2)	0.4 (0.8)	42.61***	OA > A,N; OA > O
GAD	7.6 (4.7)	3.8 (3.2)	7.1 (4.0)	3.2 (2.8)	29.70***	OA > A,N; O > N
MDD	7.7 (5.3)	4.4 (2.9)	7.9 (4.8)	3.6 (2.5)	33.14***	OA > A,N; O > N
Dysthymia	7.3 (5.3)	4.0 (2.8)	7.6 (4.6)	3.3 (2.6)	34.11***	OA > A,N
SAD	4.7 (5.1)	2.2 (2.9)	4.5 (5.1)	1.5 (2.2)	15.82***	OA > A,N
Specific phobia	1.4 (1.2)	0.8 (0.9)	1.2 (1.1)	1.0 (1.0)	3.96**	OA > A
Obsessions	1.1 (1.4)	0.6 (0.8)	1.0 (1.1)	0.4 (0.7)	8.83***	OA > A,N
Motor tics	1.1 (1.2)	0.8 (0.9)	0.8 (1.0)	0.5 (0.8)	3.60*	A > N
Language deficits	5.8 (4.0)	5.8 (3.2)	4.6 (3.0)	5.6 (3.7)	2.76*	A > OA
Perseverative behaviors	6.5 (3.0)	5.8 (3.0)	5.7 (2.9)	4.7 (3.0)	3.76*	A > N

Note: ADHD, attention-deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; GAD, generalized anxiety disorder; SAD, separation anxiety disorder; MDD, major depressive disorder

* $p < .05$;

** $p < .01$;

*** $p < .001$

Table 3
Means (*SD*) and comparison statistics for teacher ratings of teacher-defined symptom groups

Variable	ODD Only (<i>n</i> = 11)	ADHD Only (<i>n</i> = 57)	ODD + ADHD (<i>n</i> = 30)	NONE (<i>n</i> = 84)	<i>F</i> -ratio	Post hoc comparisons
3- to 5-year-old						
CD	4.5 (4.2)	0.8 (1.5)	4.0 (4.6)	0.4 (0.8)	24.34***	OA > A,N; O > N
MDD	5.2 (3.1)	4.4 (2.2)	5.7 (2.7)	3.2 (1.8)	10.99***	OA,A > N
Dysthymia	3.5 (2.1)	2.5 (1.6)	3.7 (2.1)	1.9 (1.3)	10.80***	OA > N
Social deficits	7.2 (3.4)	9.2 (2.9)	9.5 (3.2)	6.3 (3.8)	10.76***	OA,A > N
6- to 12-year-old						
CD	2.8 (2.9)	1.0 (2.1)	3.4 (4.0)	0.4 (1.3)	25.21***	OA,O > A,N
GAD	6.0 (3.3)	3.5 (2.6)	6.2 (3.6)	3.4 (2.9)	18.54***	OA,O > A,N
MDD	6.7 (4.3)	4.4 (2.9)	7.2 (4.0)	3.1 (2.4)	30.78***	OA > A > N; O > N
Dysthymia	6.0 (3.8)	3.5 (2.6)	6.3 (3.9)	2.7 (2.5)	27.89***	OA,O > A,N
Mania	4.2 (2.9)	3.0 (3.4)	6.9 (4.8)	2.2 (2.7)	28.99***	OA > O > N; OA > A
Obsessions	1.0 (1.1)	0.5 (0.9)	1.0 (1.2)	0.6 (0.9)	4.30**	OA > A
Social deficits	6.8 (3.5)	7.9 (2.9)	8.7 (3.2)	5.3 (3.3)	23.85***	OA > O,N; A > N
Language deficits	4.2 (3.4)	6.7 (3.6)	6.4 (4.0)	4.2 (3.7)	13.21***	OA,A > O,N
Perseverative behaviors	5.7 (2.7)	5.3 (3.2)	7.2 (3.1)	3.8 (2.8)	20.09***	OA > A > N; O > N

Note: ADHD, attention-deficit/hyperactivity disorder; ODD, oppositional defiant disorder; CD, conduct disorder; GAD, generalized anxiety disorder; MDD = major depressive disorder

* $p < .05$;

** $p < .01$;

*** $p < .001$