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Disruptive Mood Dysregulation Disorder in a Community Mental Health Clinic: Prevalence, Comorbidity and Correlates

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Abstract

Objective: The revision of the *Diagnostic and Statistical Manual of Mental Disorders*, 5th ed. (DSM-5) added a new diagnosis of disruptive mood dysregulation disorder (DMDD) to depressive disorders. This study examines the prevalence, comorbidity, and correlates of the new disorder, with a particular focus on its overlap with oppositional defiant disorder (ODD), with which DMDD shares core symptoms.

Methods: Data were obtained from 597 youth 6–18 years of age who participated in a systematic assessment of symptoms offered to all intakes at a community mental health center (sample accrued from July 2003 to March 2008). Assessment included diagnostic, symptomatic, and functional measures. DMDD was diagnosed using a post-hoc definition from item-level ratings on the Schedule for Affective Disorders and Schizophrenia for School-Age Children that closely matches the DSM-5 definition. Caregivers rated youth on the Child Behavior Checklist.

Results: Approximately 31% of youth met the operational definition of DMDD, and 40% had *Diagnostic and Statistical Manual of Mental Disorders,* 4th ed. (DSM-IV) diagnoses of ODD. Youth with DMDD almost always had ODD (odds ratio [OR] = 53.84) and displayed higher rates of comorbidity with attention-deficit/hyperactivity disorder (ADHD) and conduct disorder than youth without DMDD. Caregivers of youth with DMDD reported more symptoms of aggressive behavior, rule-breaking, social problems, anxiety/depression, attention problems, and thought problems than all other youth without DMDD. Compared with youth with ODD, youth with DMDD were not significantly different in terms of categorical or dimensional approaches to comorbidity and impairment.

Conclusions: The new diagnosis of DMDD might be common in community mental health clinics. Youth with DMDD displayed more severe symptoms and poorer functioning than youth without DMDD. However, DMDD almost entirely overlaps with ODD and youth with DMDD were not significantly different than youth with ODD. These findings raise concerns about the potentially confusing effects of using DMDD in clinical settings, particularly given that DSM-5 groups DMDD with depressive disorders, but ODD remains a disruptive behavior disorder, potentially changing the decision-making framework that clinicians use to select treatments.

Introduction

In the past two decades, the clinical diagnosis of pediatric bipolar disorder (PBD) increased dramatically, leading to concerns of misdiagnosis (Blader and Carlson 2007; Moreno et al. 2007). Likely driving part of the increase in PBD diagnoses is that some investigators conceptualized nonepisodic severe irritability as a core feature of PBD (Biederman 1995; Leibenluft et al. 2003), whereas other investigators maintained that PBD, like bipolar disorder in adults, consists of episodes with changes in mood and energy (Leibenluft et al. 2003; Youngstrom et al. 2008).

To reduce the rate of diagnosis of PBD and resulting exposure to psychotropic medications (Leibenluft 2011), *Diagnostic and Statistical Manual of Mental Disorders,* 5th ed. (DSM-5) added disruptive mood dysregulation disorder (DMDD) to describe children with chronic irritability (American Psychiatric Association 2013). However, the diagnosis of DMDD has proven to be controversial (Parens and Johnston 2010; Axelson et al. 2011; Stringaris 2011; Taylor 2011). Concerns about DMDD fall primarily into two categories: 1) The lack of a robust empirical basis for the definition (i.e., construct validity of the new diagnosis) and 2) potential iatrogenic consequences of adding a new diagnostic category with unknown treatment parameters. The lack of a robust definition might have contributed to only chance levels of agreement for a youth being diagnosed with DMDD by outpatient clinicians during the DSM-5 field trial (Regier et al. 2013). Guidance

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on differentiating DMDD from other disorders is needed. DMDD is meant to provide a diagnostic home for children with severe, chronic irritability who do not meet a ''classic'' definition of bipolar disorder and who might be too severely disturbed to have ''just oppositional defiant disorder [ODD].'' Therefore, the purpose of the current article is to address the construct validity of DMDD by examining its clinical prevalence, comorbidity, and impairment in a community mental health center.

Limited empirical evidence exists as to the epidemiological prevalence of DMDD as well as to the base rate in different clinical settings. Applying post-hoc diagnoses to three regional epidemiological studies, Copeland and colleagues (2013) suggest an epidemiological base rate between 0.8% and 3.3%. In a cohort enriched for mood symptoms, 26% of youth met criteria for a post-hoc diagnosis of DMDD (Axelson et al. 2012). In a psychiatric inpatient unit, 16–38% of youth met criteria for DMDD, depending upon the exact operationalization of the criteria (Margulies et al. 2012). As expected, the base rate increases as acuity of care increases, and is quite variable depending upon the setting.

In addition to a clinical description of symptoms that can be reliably diagnosed, a disorder should demonstrate: 1) Meaningful differences in laboratory studies from other disorders, 2) longitudinal course, and 3) different patterns of heritability; and 4) should be different from other disorders(Robins and Guze 1970; Cantwell 1996). To date, there are no published studies examining prospectively defined DMDD in terms of these criteria. Therefore, clinical validity of the DMDD diagnosis might be inferred from variations of the operational definition of severe mood dysregulation (SMD), a substantially stricter research definition on which DMDD was based. Compared with youth with bipolar disorder, youth with SMD are less likely to have a family history of bipolar disorder (Brotman et al. 2007), are less likely to demonstrate mania episodes over brief follow-up periods (Stringaris et al. 2010), and demonstrate differences on several neuropsychological domains and measures of brain structure and functioning (Adleman et al. 2012). Over 2 and 4 year follow-up periods, most youth with SMD continue to display clinically significant levels of irritability, but less than half of youth continue to meet criteria for SMD (Deveney et al. 2014). Taken together, these findings suggest that prospectively defined SMD is different from bipolar disorder; however, youth with SMD have not been differentiated from youth with other more common disruptive behavior disorders.

Although prospective studies of DMDD are needed to diagnostically and prognostically identify specific features of the disorder, post-hoc examination of existing data sets can provide some information regarding DMDD. Post-hoc diagnoses of DMDD and SMD demonstrate very high levels of comorbidity with ODD, conduct disorder, and attention-deficit/hyperactivity disorder (ADHD) in both clinical research (Axelson et al. 2012) and epidemiological settings (Brotman et al. 2006; Copeland et al. 2013). These findings are similar to comorbidity patterns seen in prospectively defined SMD in clinical settings (Rich et al. 2010). Additionally, data such as parent-reported questionnaires of symptoms, suggest that youth with DMDD are not different from youth with ODD (Axelson et al. 2012). Therefore, youth with SMD and DMDD likely display a coherent pattern of differences from youth with PBD. However, questions remain about how distinct SMD is from DMDD and how distinct SMD and DMDD are from ODD.

Despite the small but rapidly growing evidence base for DMDD as a diagnosis, the extant available data show that youth with DMDD appear to be more functionally impaired than youth without DMDD (Axelson et al. 2012; Copeland et al. 2013). A more thorough evaluation of DMDD's clinical prevalence, comorbidity, and impairment would provide clinicians with guidance when considering giving a youth the diagnosis. The current article adds to the existing literature by examining a clinically relevant sample of youth presenting at a general community mental health clinic, and examining the post-hoc diagnosis of DMDD. The current article should add to the empirical data about DMDD by examining the following:

1. How prevalent is DMDD in community mental health? In relaxing the stricter research definition of SMD, does the prevalence of DMDD increase?
2. Can DMDD be differentiated from other common disorders in a community mental health clinic? What are the typical *Diagnostic and Statistical Manual of Mental Disorders,* 4th ed. (DSM-IV) clinical diagnoses assigned to cases meeting criteria for DMDD? Are some comorbid conditions so common, such as ODD, as to challenge conceptualizations of DMDD as an independent diagnosis (American Psychiatric Association 1994)?
3. Does DMDD differ from other diagnoses in the severity of presentation on established dimensions of emotion and behavior problems? Are the symptoms noted by different informants, such as the youth or teachers, as well as the caregiver?
4. How impairing is DMDD in a clinical sample relative to other diagnoses?

Method

Participants

Participants ($n = 597$) were recruited from all clinical intakes at a large community mental health center (CMHC) in the Midwestern United States using a consecutive case series design. Study inclusion criteria were: 1) Being 5–18 years of age, 2) both caregiver and youth providing written consent and assent, 3) both caregiver and youth presenting for the assessment, and 4) both caregiver and youth conversant in English. Table 1displays the demographic characteristics of the sample. Additional details of design and sample are available (Youngstrom et al. 2005); the present article concentrates on the community mental health clinic and not the academic medical center subsample. Approximately 95% of youth served by the CMHC qualified for Medicaid.

Measures

Diagnoses. The Kiddie Schedule for Affective Disorders and Schizophrenia for School-Age Children (KSADS) is a semi-structured interview that queries symptoms of common Axis I disorders from both the caregiver and youth. The KSADS version used combined the mood modules from the Washington University KSADS (Geller et al. 2001) with the KSADS Present and Lifetime version (Kaufman et al. 1997). Research assistants were highly trained: Symptom level ratings for new raters were compared with those from a reliable rater for at least five interviews rating along and then five interviews leading. New research assistants passed a session if they achieved an overall $\kappa \geq 0.85$ at the symptom level of the entire interview and a $\kappa = 1.0$ at the diagnostic level. All symptoms were queried, regardless of presenting problem. Research assistants were trained to code mania and depressive symptoms if they occurred in a definable episode. The KSADS includes multiple places where irritability could be coded, because it is a diagnostic symptom of multiple disorders. Raters coded irritability in the depression or mania module if it was 1) a change from typical functioning and 2) occurred in the context of a distinct,

Table 1. Demographic Characteristics with a Focus on Disruptive Mood Dysregulation Disorder (DMDD)

	Overall (n = *597*) n *(%) or Mean (SD)*	*DMDD+* (n = *185*) n *(%)*	*DMDD-* (n = *412*) n *(%)*
Demographics			
Gender, female	235 (39%)	65 (35%)	170 (41%)
Ethnicity			
Non-White	559 (94%)	172 (93%)	387 (94%)
Age in years	10.58 (3.39)	10.40 (3.16)	10.66 (3.49)
Dimensional measures of psychopathology			
Young Mania Rating Scale	6.01 (8.22)	5.43 (7.04)	6.28 (8.70)
Child Depression Rating Scale	29.82 (12.99)	29.44 (12.09)	29.99 (13.39)
Child Behavior Checklist			
Anxious/Depressed	62.24 (9.75)	63.41 (9.76)	61.70 (9.71)
Withdrawn/Depressed	65.68 (11.03)	66.17 (11.29)	65.46 (10.91)
Somatic Complaints	59.46 (8.81)	59.96 (9.49)	59.24 (8.49)
Social Problems	65.62 (9.95)	67.86 (10.18)	64.59 (9.68)
Thought Problems	65.80 (9.98)	67.43 (10.00)	65.05 (9.90)
Attention Problems	70.04 (12.00)	72.17 (11.43)	69.08 (12.14)
Rule-Breaking Behavior	67.99 (8.32)	71.25 (7.23)	66.48 (8.37)
Aggressive Behavior	73.12 (12.56)	79.64 (10.57)	70.17 (12.29)
Internalizing	63.22 (10.43)	64.43 (10.11)	62.67 (10.53)
Externalizing	70.30 (9.74)	75.21 (6.64)	68.08 (10.10)
Total	69.14 (8.93)	72.40 (7.19)	67.67 (9.26)
Youth Self-Report Form ($n = 299$)			
Anxious/Depressed	56.61 (9.01)	58.40 (9.51)	57.16 (9.19)
Withdrawn/Depressed	59.61 (9.94)	60.20 (9.42)	59.79 (9.77)
Somatic Complaints	58.32 (9.71)	59.48 (9.36)	58.68 (9.60)
Social Problems	57.82 (9.07)	60.71 (9.62)	58.71 (9.32)
Thought Problems	57.30 (8.82)	61.51 (10.16)	58.60 (9.44)
Attention Problems	58.59 (9.85)	61.32 (10.56)	59.43 (10.13)
Rule-Breaking Behavior	57.68 (8.28)	61.09 (8.08)	58.73 (8.35)
Aggressive Behavior	58.65 (10.09)	64.95 (10.83)	60.59 (10.71)
Internalizing	55.83 (12.60)	57.61 (12.53)	56.37 (12.58)
Externalizing	56.29 (11.96)	62.50 (11.45)	58.20 (12.13)
Total	56.49 (12.26)	61.21 (12.62)	57.94 (12.54)
Teacher Report Form ($n = 195$)			
Anxious/Depressed	56.74 (7.72)	56.53 (6.70)	56.84 (8.19)
Withdrawn/Depressed	59.87 (9.36)	59.34 (7.94)	60.13 (10.00)
Somatic Complaints	55.91 (8.23)	55.94 (7.66)	55.89 (8.53)
Social Problems	61.51 (8.61)	62.95 (7.46)	60.80 (9.06)
Thought Problems	57.16 (8.57)	57.33 (8.26)	57.08 (8.74)
Attention Problems	65.52 (9.71)	65.88 (8.83)	63.69 (10.07)
Rule-Breaking Behavior	63.96 (8.64)	67.38 (9.06)	62.29 (7.94)
Aggressive Behavior	66.97 (12.00)	72.02 (12.51)	64.50 (10.97)
Internalizing	57.19 (10.46)	57.27 (9.12)	57.16 (11.08)
Externalizing	65.58 (10.63)	69.86 (10.64)	63.50 (10.01)
Total	64.81 (9.60)	67.16 (8.71)	63.66 (9.83)
Children's Global Assessment Scale score (current)	52.73 (8.50)	50.51 (5.78)	53.73 (9.31)
Children's Global Assessment Scale score (most severe past)	49.18 (9.07)	47.84 (6.60)	49.78 (9.94)
Family Environment Scale	67.37 (11.64)	66.15 (11.34)	67.92 (11.75)

episodic change of mood or energy. Raters coded irritability in other modules if the irritability was more chronic and occurred in the context of other symptoms of anxiety or disruptive behavior, or if it was a reaction to a precipitant or traumatic event. Agreement about these distinctions is captured in the $\kappa \geq 0.85$ at the symptom level. Interviews also provided the basis for the Children's Global Assessment Scale (CGAS) (Shaffer et al. 1983) and the Global Family Environment Scale (GFES) (Rey et al. 1997) as overall measures of functioning.

Child Behavior Checklist (CBCL). The CBCL (Achenbach and Rescorla 2001) is among the most widely used measures of child and adolescent behavior problems. The CBCL consists of 113 items that query about common emotional and behavioral problems in youth between the ages of 6 and 18. Caregivers of youth age 5 completed the CBCL 1.5–5.5 years. Youth ages 12–18 ($n = 199$) completed the 112 item Youth Self-Report Form (YSR). Teachers completed the 113 item Teacher Report Form (TRF). All teachers were mailed copies of the TRF and 33% ($n = 195$) returned the TRF. *T* scores use nationally representative age and gender norms.

Young Mania Rating Scale (YMRS). The YMRS (Young et al. 1978) is among the most widely used clinical measures for grading severity of (hypo)mania. The YMRS consists of 11 items querying about different symptoms of mania. Trained research assistants rated each symptom; $\alpha = 0.85$ in the present sample.

Child Depression Rating Scale-Revised (CDRS). The CDRS (Poznanski and Mokros 1996) is a clinician-rated measure of depression symptoms. The CDRS consists of 17 items querying about different symptoms of depression. Trained research assistants rated each symptom; $\alpha = 0.91$ in the present sample.

Retrospective DMDD and SMD diagnoses. Consistent with prior post-hoc definitions of DMDD (Axelson et al. 2012; Copeland et al. 2013) and SMD (Brotman et al. 2006), the following symptom criteria were used:

1. Severe recurrent temper outbursts. This criterion consisted of the ''loses temper'' item at a threshold of ''severe temper outburst 2–5 times per week.''
2. Chronic irritability. This criterion consisted of either the ''easily annoyed or angered'' or ''angry or resentful'' items at a threshold of ''daily or almost daily.''
3. Duration. Participants who completed the ODD section of the KSADS (i.e., all participants who met criteria 1 or 2 at threshold) reported whether the symptoms were present for the prior 6 months regardless of meeting criteria for ODD. These duration criteria differ from the DMDD criterion E (American Psychiatric Association 2013), which states that symptoms must be present for at least 12 months without an interval ≥3 months without symptoms.
4. Impairment in more than one setting. The ODD supplement determined the presence of impairment caused by ODD symptoms at home, with peers, and at school. Impairment had to be rated at threshold in at least two settings (Criterion F).
5. Never have manic or hypomanic symptoms for ≥1 day. DMDD criterion I excludes participants with episodic (hypo)manic symptoms lasting >1 day at a time, thus automatically excluding youth with PBD. However, not all youth display all symptoms of mania; therefore, this criterion consisted of the ''elated mood'' symptom rated as ''mild'' or greater, which is consistent with hypomania or greater severity. Elated mood must be present for at least 4 hours.
6. Symptoms are not occurring exclusively during a psychotic or mood disorder, nor are better accounted for by another disorder (criterion J). Research assistants were trained to rate symptoms only when the symptoms were not clearly accounted for by another disorder (e.g., posttraumatic stress disorder [PTSD], mood disorder, bipolar disorder).
7. Age at time of diagnosis (Criterion G) and age of onset (Criterion H). These criteria were not coded because their definition varies within DSM-5. Additionally, concerns regarding the accuracy of the age-related criteria exist (American Psychiatric Association 2013).

The operational definition of SMD included these additional parameters:

8. Hyperarousal. SMD requires criteria 1–6 similar to DMDD and also requires the presence of hyperarousal, which is defined as at least two of the following: Distractibility, pressured speech, intrusiveness, or racing thoughts/flight of ideas. This criterion consisted of matching symptom ratings at the threshold of ''daily or almost daily.''

Procedure

The study was approved by the Institutional Review Boards at Case Western Reserve University, Applewood Centers, and the University of North Carolina at Chapel Hill. Highly trained research assistants administered the KSADS to the youth and the caregiver. Research assistants were primarily predoctoral psychology interns or research staff. A licensed clinical psychologist assigned final consensus diagnoses using the Longitudinal Evaluation of All available Data procedure (Spitzer 1983). Consensus diagnoses were masked to the rating scales.

Analytic plan

Chi-squared tested associations between DMDD diagnostic status and other categorical disorders. Multivariate analysis of variance (MANOVA) tested for associations between DMDD and dimensional measures of psychopathology (e.g., CBCL subscales). Regression examined associations between DMDD and continuous clinical variables (e.g., number of diagnoses). MANOVA and regression were conducted two different ways. First, ODD and DMDD were operationalized hierarchically as defined in DSM-5 as a single variable for comparison. Second, ODD and DMDD were treated independently, and the interaction between ODD and DMDD was included. In the second set of analyses, youth without DMDD and ODD were compared with youth with only DMDD, only ODD, and both ODD and DMDD. Kappa and odds ratios (OR) provided effect sizes for categorical variables and Cohen's d for continuous variables. Alpha was 0.05.

Results

Aim 1. Prevalence of DMDD

Table 2 displays the diagnostic composition of the sample of which 31% met criteria for DMDD. Only 27% ($n = 160$) of youth met criteria for SMD. All youth who met criteria for SMD also met criteria for DMDD; however, not all youth with DMD met criteria for SMD, $\kappa = 0.90$, $p < 0.001$.

Aim 2. Typical overlap of DSM-IV diagnoses and DMDD

All youth meeting criteria for DMDD had at least one DSM-IV diagnosis. Table 2 displays the patterns of diagnosis for youth with and without DMDD. Youth with DMDD met criteria for significantly more diagnoses than youth without DMDD (Cohen's $d = 0.45$). Compared with youth without DMDD, youth with DMDD were more likely to have comorbid research diagnoses of ODD (OR = 53.84, $p < 0.001$), conduct disorder (OR = 3.71, $p < 0.001$), and ADHD (OR = 3.00, $p < 0.001$). Youth with DMDD were less likely than youth without DMDD to have diagnoses of bipolar I or II, OR = 0.09, $p < 0.001$. Comorbidity profiles for youth with DMDD and without DMDD did not differ in terms of cyclothymia/bipolar not otherwise specified (NOS), unipolar depressive disorders, anxiety disorders, psychotic disorders, developmental disorders, and elimination disorders, $ps > 0.05$. Overall, the pattern of comorbidity suggests that DMDD overlaps with ODD almost entirely.

To determine the boundary between DMDD and ODD, a series of logistic regressions compared the comorbidity profiles of DMDD and ODD, treating each diagnosis independently by not applying the hierarchical rule in DSM-5. Other Axis I diagnoses were predicted by DMDD diagnosis, ODD diagnosis, and the interaction between DMDD and ODD diagnoses. In all models, the interaction step was not significant, all $ps > 0.10$. An additional diagnosis or specifier of DMDD did not change the pattern of overlap.

Table 2. Research Diagnoses Associated with Disruptive Mood Dysregulation Disorder

	Overall (n = *597*) n *(%) or Mean (SD)*	*DMDD+* (n = *185*) n *(%)*	*DMDD-* (n = *412*) n *(%)*	*Test statistic/Odds ratio (95% CI)*	p *Value*
More common among cases with DMDD					
Number of diagnoses	2.62 (1.35)	3.03 (1.30)	2.44 (1.33)	$t = 5.02$	<0.001*
Any disruptive behavior disorder	403 (68%)	179 (97%)	224 (54%)	25.04 (10.85–57.78)	<0.001*
Oppositional defiant disorder	297 (50%)	177 (96%)	120 (29%)	53.84 (25.70–112.80)	<0.001*
Conduct disorder	76 (13%)	44 (24%)	32 (8%)	3.71 (2.26–6.08)	<0.001*
ADHD	388 (65%)	149 (81%)	239 (58%)	3.00 (1.98–4.53)	<0.001*
No significant association with DMDD					
Any mood disorder	247 (41%)	73 (39%)	174 (42%)	0.89 (0.63–1.27)	0.53
Any depressive disorder	171 (29%)	59 (32%)	112 (27%)	1.25 (0.86–1.83)	0.24
MDD	67 (11%)	20 (11%)	47 (11%)	0.94 (0.54–1.64)	0.82
Dysthymia	25 (4%)	9 (5%)	16 (4%)	1.26 (0.55–2.91)	0.58
Depressive disorder NOS	52 (9%)	22 (12%)	30 (7%)	1.71 (0.96–3.06)	0.07
Mood NOS	0 (0%)	0 (0%)	0 (0%)	[a]	1.00
Any anxiety disorder	153 (26%)	46 (25%)	107 (26%)	0.94 (0.6–1.40)	0.76
Psychotic disorder	19 (3%)	6 (3%)	13 (3%)	1.03 (0.38–2.74)	0.96
Pervasive developmental disorder or intellectual disability	12 (2%)	3 (2%)	9 (2%)	0.74 (0.20–2.75)	0.65
Elimination disorder	78 (13%)	28 (15%)	50 (12%)	1.29 (0.78–2.12)	0.32
Less common among cases with DMDD					
Any bipolar spectrum disorder	77 (13%)	14 (8%)	63 (15%)	0.45 (0.25–0.83)	0.01*
Bipolar I/II	25 (4%)	1 (<1%)	24 (6%)	0.09 (0.01–0.65)	<0.001*
Cyclothymia/bipolar NOS	52 (9%)	13 (7%)	39 (9%)	0.72 (0.38–1.39)	0.33

Percentages refer to percentage of column subsample; therefore, the denominator is 597 for overall, 185 for DMDD+, and 412 for DMDD-.
*$p < .05$.
[a]Unable to calculate a statistic.
ADHD, attention-deficit/hyperactivity disorder; MDD, major depressive disorder; NOS, not otherwise specified.

Aim 3. Dimensional emotional and behavioral problem scores for youth with DMDD

Table 1 displays the dimensional measures of psychopathology for youth with and without DMDD. Compared with youth without DMDD, MANOVA indicated that caregivers of youth with DMDD reported more symptoms of aggressive behavior (Cohen's $d = 0.80$), rule-breaking (Cohen's $d = 0.59$), social problems (Cohen's $d = 0.33$), anxious/depressed (Cohen's $d = 0.27$), attention problems (Cohen's $d = 0.26$), and thought problems (Cohen's $d = 0.24$), $F(11, 537) = 12.44$, $p < 0.001$. On measures of specific mood symptoms, youth with DMDD were not significantly different for symptoms of mania (Cohen's $d = 0.10$) or depression (Cohen's $d = 0.04$) than all other youth at the clinic. Youth with DMDD reported significantly more severe aggressive behavior (Cohen's $d = 0.61$), rule-breaking (Cohen's $d = 0.42$), thought problems (Cohen's $d = 0.41$), social problems (Cohen's $d = 0.31$), and attention problems (Cohen's $d = 0.27$) than youth without DMDD, $F(11, 287) = 3.22$, $p < 0.001$. According to teachers, youth with DMDD displayed significantly more severe aggressive behavior (Cohen's $d = 0.65$) and rule-breaking (Cohen's $d = 0.61$), $F(11,183) = 2.65$, $p < 0.01$.

To determine the boundary between ODD and DMDD, two sets of analyses were conducted. First, a MANOVA following the hierarchical rules of DSM-5 compared youth with DMDD with youth with ODD. Youth with DMDD were not significantly different from youth with ODD on caregiver reported symptoms $F(11, 276) = 1.70$, $p = 0.07$. Youth with DMDD were not significantly different from youth with ODD in terms of current mania symptoms (Cohen's $d = 0.10$) and depressive symptoms (Cohen's $d = 0.24$), $ps > 0.10$. Youth with DMDD were not significantly different in self-reported symptoms on the YSR than youth without DMDD, $F(11, 148) = 1.34$, $p = 0.21$. According to teacher report on the TRF, youth with DMDD were significantly different than youth without DMDD, $F(11, 93) = 2.46$, $p = 0.01$. According to teacher report, youth with DMDD were more aggressive than youth without DMDD, $F(1, 103) = 8.60$, $p < 0.01$.

Second, a MANOVA was fit ignoring the hierarchical rule included in DSM-5 so that youth without DMDD or ODD were compared with youth with only ODD, only DMDD, and both DMDD and ODD. The test of the interaction was not significant, indicating that an additional specifier or diagnosis of DMDD in addition to ODD did not cause caregivers to report significantly more or less severe behavior, $F(11, 535) = 1.76$, $p > 0.05$. Additionally, when examining clinician-rated mood symptoms in a regression, the interaction step was not significant, Δr^2s < 0.01, $ps > 0.10$. Similarly, the test of the interaction was not significant, indicating no additional symptom severity above that of ODD for youth with DMDD on the YSR – $F(11, 285) = 1.27$, $p = 0.24$ – and TRF, $F(11, 181) = 1.33$, $p = 0.21$.

Impairment associated with DMDD

Youth with DMDD were significantly more impaired than youth without DMDD for both the current episode (Cohen's $d = 0.38$) and most severe past episode (Cohen's $d = 0.22$). Additionally, youth with DMDD trended toward having poorer family functioning than youth without DMDD, $d = 0.15$. Compared with youth with ODD, youth with DMDD were not significantly different in current impairment (Cohen's $d = 0.12$), most severe past functioning (Cohen's $d = 0.07$), or family environments (Cohen's $d = 0.12$). Finally, regression analyses indicated no significant interaction between DMDD and ODD in predicting current impairment, past impairment or family functioning, Δr^2s < 0.01, $ps > 0.10$.

Discussion

Irritability is the most common reason caregivers bring youth to outpatient treatment (Yeh and Weisz 2001). Chronic, nonepisodic irritability as defined by either the presence of ODD or DMDD was common in an outpatient community mental health clinic. The omission of the hyperarousal criterion from SMD in the DSM-5 definition of DMDD resulted in a higher prevalence of youth with DMDD compared with youth with SMD. Similar to Deveney and colleagues (2014), all youth who met criteria for SMD met criteria for DMDD. However, not all youth with DMDD met criteria for SMD, indicating that DMDD is broader and more inclusive than the research diagnosis on which it was based. As is true for most disorders, we found a substantially higher rate of DMDD than community-based epidemiological studies (Copeland et al. 2013). Our base rate for DMDD was similar to that in an outpatient sample enriched for mood symptoms (Axelson et al. 2012), but lower than that in an inpatient unit (Margulies et al. 2012). Providers in community mental health may expect $\sim$1 in 3 youth to meet criteria for DMDD. Therefore, DMDD is likely to be one of the most common disorders seen in youth treatment settings.

Present data show a coherent pattern of findings when comparing youth who meet DMDD criteria with youth who do not. Similar to all prior studies in both clinical samples (Brotman et al. 2007; Rich et al. 2010; Axelson et al. 2012) and epidemiological samples (Brotman et al. 2006; Copeland et al. 2013), youth with DMDD were more likely to have a disruptive behavior disorder (DBD) (i.e., DBD-NOS, ODD, and conduct disorder) than a mood disorder. In addition to a disruptive behavior disorder, research diagnoses indicated that many youth with DMDD also had ADHD. Our findings indicating extremely high overlap between DMDD and ODD were consistent with all prior findings.

Consistent with the categorical diagnostic profile, the largest effects observed in caregiver-reported symptoms were for aggressive behavior, rule breaking, social problems, and attention problems. Additionally, both youth self-report and teacher report indicated similarly large effects in aggressive behavior and rule breaking. The profile in the dimensional results is more consistent with that of youth with externalizing disorders than with that of youth with internalizing disorders. Therefore, the pattern of overlap for both the categorical and dimensional findings suggests that DMDD manifests more like a disruptive behavior disorder than a mood disorder, at least in cross-sectional data.

According to DSM-5, the diagnosis of DMDD should be reserved for youth with severe irritability that manifests in multiple settings and is impairing in at least one of them. In line with prior findings (Axelson et al. 2012; Copeland et al. 2013), youth with DMDD were more impaired than youth without DMDD. Youth with DMDD trended toward having poorer family functioning than youth without DMDD. In sum, youth with DMDD may represent a subset of youth in the clinic having substantially more difficulties than their treatment-seeking peers.

Is DMDD clinically or phenomenologically distinct from ODD? DMDD was compared with ODD using two different approaches. One set of analyses compared DMDD and ODD as hierarchically defined in DSM-5 so that they could not be comorbid. The second set of analyses relaxed the hierarchical exclusion. In both models, DMDD was not significantly different than ODD in terms of diagnostic comorbidity, dimensional comorbidity, and impairment. Therefore, the propensity toward nearly complete overlap with a common, well-established disorder calls into question the distinctiveness of DMDD. The much greater overlap with disruptive behavior disorders than mood disorders and the dimensional measures indicating externalizing difficulties for youth with DMDD also challenges the DSM-5 including DMDD in the depressive disorders chapter. Grouping DMDD with mood disorders characterized by episodic presentation also seems conceptually inconsistent. Mood disorders emphasize episodicity of symptoms, whereas, DMDD emphasizes chronic, nonepisodic irritability and mood dysregulation (American Psychiatric Association 2013; Leibenluft et al. 2003).

The primary purpose of DSM-5 adding DMDD was to reduce the perceived overdiagnosis of PBD, and, therefore, to reduce exposure to psychotropic medication (American Psychiatric Association 2013). Youth with DMDD were actually significantly less likely to be diagnosed with bipolar I or II disorder. Additionally, if we had excluded all youth from DMDD with definable (hypo)mania as stipulated in DSM-5, then no youth receiving PBD diagnoses would also meet DMDD criteria.

From our data, it is not known whether the use of the diagnosis of DMDD would affect the intended change in prescription practices. Polypharmacy and prescription of atypical antipsychotics are common among youth meeting criteria for research diagnoses of severe DBD without comorbid bipolar disorder (Kowatch et al. 2013). Additionally, trends in outpatient mental health visits indicate increases in the use of polypharmacy and atypical antipsychotics, particularly for youth with mood disorders (Olfson et al. 2006). If a youth is diagnosed with DMDD, a DSM-5 mood disorder, and not ODD, a DSM-5 disruptive behavior disorder, then clinical heuristics imply that it might *increase* medication use. Therefore, it is a vital empirical question for future services research to monitor actual changes in treatment as diagnostic practices change.

Limitations

This sample reflects patients at a typical community mental health clinic in an urban metropolitan area that has well-stratified services for care (i.e., substance abuse and developmental disorders are typically treated through separate settings). Generalizability to other clinics would depend upon the similarity in presenting problems and the extent to which DMDD is stable across race/ethnicity. The rates for different disorders (Table 1) are helpful in this regard. Despite the sample being drawn from a community outpatient setting, our findings display consistency with epidemiological studies as well as other clinical settings. However, the sample is likely not representative of DMDD in settings that include higher functioning youth, such as schools. DMDD symptom criteria were coded post-hoc from KSADS interviews, because DMDD, or an interview for DMDD, did not exist at the time of data collection. Future work should attempt to prospectively distinguish DMDD from ODD. Despite this limitation, findings show remarkable similarity to studies of youth diagnosed with SMD or DMDD.

Conclusions

These post-hoc analyses found that youth meeting DMDD criteria displayed substantial functional impairment with severe behavioral dysregulation. However, the utility of the diagnosis of DMDD to everyday clinicians remains questionable, because differentiation between DMDD and other common disorders (i.e., ODD) was minimal. Most youth who meet DMDD criteria also met criteria for ODD. More importantly, DMDD did not distinguish itself from ODD.

Clinical Significance

Until a better evidence base exists, clinicians should be cautious when diagnosing youth with DMDD, and treatment often might best start with using evidence-based practices for ODD. Future research needs to address both the utility of a different treatment approach as well as elucidate a distinct etiology that might separate DMDD from more commonly occurring disruptive behavior disorders.

Disclosures

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