

Disruptive Mood Dysregulation Disorder: A New Diagnostic Approach to Chronic Irritability in Youth

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Disruptive mood dysregulation disorder (DMDD), a newcomer to psychiatric nosology, addresses the need for improved classification and treatment of children exhibiting chronic nonepisodic irritability and severe temper outbursts. In recent years, many of these children have been diagnosed with bipolar disorder, despite the lack of distinct mood episodes. This diagnostic practice has

raised concerns, in part because of the escalating prescription of atypical antipsychotics. This article provides an overview of the limited literature on DMDD, including its history and relevant studies of assessment and treatment. A case study is included to illustrate key points, including diagnostic issues that clinicians may encounter when considering a diagnosis of DMDD.

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Severe, chronic irritable mood in children has long presented a challenge to pediatric psychiatry because of its poor diagnostic specificity and its inclusion in numerous mood, anxiety, and disruptive behavior disorders (1). A consequence has been the frequent diagnosis of bipolar disorder in children with chronically irritable mood, thus redefining bipolar disorder in early life as a nonepisodic syndrome. It is likely that this diagnostic approach has contributed to the dramatic rise in the rate of pediatric visits for bipolar disorder in the United States, from an estimated 25 per 100,000 in 1994–95 to 1,003 per 100,000 in 2002–2003 (2). Approximately 60% of medical visits with this diagnosis result in treatment with polypharmacy, and 48% include an atypical antipsychotic. While antipsychotics ameliorate symptoms of mania in bipolar disorder (3) as well as aggression and irritability in autism (4), they have not been tested in other children with chronic irritability and severe outbursts. Thus, this clinical trend has caused concern about improper diagnosis and treatment.

In the 1990s, efforts to better characterize adolescents with chronic irritability resulted in the delineation of a broad phenotype named “severe mood dysregulation” (5). In contrast to bipolar disorder, severe mood dysregulation is defined by nonepisodic irritability, exaggerated emotional reactivity, and hyperarousal. Severe mood dysregulation and bipolar disorder differ with regard to familial aggregation (6), physiological responses to frustration (7), and neural responses to social stimuli (8). Reanalysis of longitudinal data from the Great Smoky Mountains Study found associations between severe mood dysregulation and later depression (9). The relationship between early chronic irritability and later depressive disorders is consistent with findings that irritability symptoms in childhood (i.e., loses temper, easily annoyed) predict later depression (10–12).

These findings provided the foundation for the diagnosis of disruptive mood dysregulation disorder (DMDD) and its placement among the DSM-5 depressive disorders, which emphasizes the disorder’s mood component and its distinction from the bipolar disorders. The core feature of DMDD is “chronic, severe persistent irritability” accompanied by severe temper outbursts, at least three times per week, that are out of proportion to provocation and inconsistent with developmental level. Symptoms are pervasive in the sense that they characterize the child’s comportment across multiple settings. The minimum duration of symptoms is 1 year (without interruption exceeding 3 months), with onset by age 10. These symptoms are consistent with those of severe mood dysregulation, with one exception: severe mood dysregulation includes symptoms of hyperarousal, which are not included in DMDD. The diagnosis is not applied before age 6 or after age 18 (an age range that approximates that of children in studies of severe mood dysregulation), if there is more than 1 day of manic or hypomanic symptoms, or if the symptoms are explained by another disorder. These clinical criteria indicate that DMDD, correctly, is not designed to include all children with severe outbursts. For example, in a cohort of 5- to 9-year-olds with a long history of frequent, severe temper outbursts (13), we found that half did not meet criteria for DMDD because they failed to exhibit chronic irritability.

When DMDD was proposed, one objection to it was that it had insufficient empirical support, in part because it had been studied only in adolescents temporarily hospitalized for research purposes, by a single group. Nevertheless, the diagnosis was introduced to preclude the erroneous diagnosis of bipolar disorder in children with chronic irritable mood.

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An 8-year-old boy with frequent temper outbursts is evaluated.

"Dillon," an 8-year-old boy living with his parents and his younger brother, was evaluated because his parents were at their "wits' end" regarding how to handle his explosive outbursts, which were occurring several times a day. Ms. A, Dillon's mother, stated, "It has gotten to the point where I dislike my child."

At the time of the evaluation, Dillon was exhibiting temper outbursts several times a day that lasted approximately 10 minutes, and more intense 30-minute outbursts multiple times a week, during which he became physically aggressive. For example, during a recent tantrum, Dillon kicked and punched holes in his bedroom door, causing destruction that warranted the door's removal. Additionally, Ms. A. reported that she always had bruises on her arms from blocking Dillon's strikes. Dillon's parents described him as irritable and cranky for the better part of the day on most days. When irritable, Dillon appeared agitated and restless and often expressed that he wanted to be left alone. Attempts to cheer him up were typically unsuccessful and sometimes worsened his irritability.

Dillon was in the second grade in a restrictive classroom environment, classified under special education as emotionally disturbed. In the past school year, Dillon had been suspended three times—for physical aggression toward school personnel, for throwing a chair in the classroom, and for knocking over a bookcase. Despite his average to superior cognitive abilities, Dillon struggled academically, partly because of the large amount of time he spent out of the classroom because of disruptive behavior. Teachers noted that Dillon often appeared to be in an irritable, agitated mood and that he rarely smiled or appeared happy. They often felt they were walking on eggshells to avoid his rageful outbursts.

History of Presenting Illness

Ms. A reported that Dillon had always been a difficult child. As a baby, he was colicky and cried incessantly for several hours each day. As a toddler, he threw tantrums multiple times per day, which Ms. A attributed to the "terrible twos." Unfortunately, Dillon's outbursts escalated as he grew older. By the time Dillon was 5, his temper tantrums included hitting and kicking his parents and throwing breakable objects. His difficulties were also manifest outside the home, as evidenced by his expulsion from prekindergarten because of unmanageable behavior.

Dillon's tantrums and noncompliance at home increased once he entered school, as homework added another source of frustration and negative interactions. He was highly distractible and exhibited strong opposition when asked to do homework. He was constantly restless, fidgeting, and getting out of his seat, and he was difficult to control. He also tried to avoid daily routines, such as picking up his clothes and brushing his teeth, and he threw tantrums regularly to avoid them. During this time, Dillon's irritability worsened as well. Around the time he started first grade, he began to appear constantly "on edge" and was easily bothered by little things, such as others sitting

too close to him. His mood remained cranky for most of the day, sometimes for several days at a time. When his parents tried to cheer him up by suggesting a fun activity, he would snap, demanding to be left alone. Dillon also started to make hostile attributions regarding his peers' intentions. For example, when playing tag, Dillon would get angry, believing the others had hit him on purpose when they were merely tagging him. He also expressed the negative thoughts that no one liked him, that he did not have any friends, and that his parents did not love him. At times, Dillon had difficulty controlling these thoughts, in episodes that Ms. A referred to as "mind spirals." Dillon would bring up an angering event out of nowhere, such as being yelled at by his teacher a few days earlier, and remain upset for several hours.

Dillon's outbursts at school led to his classification as emotionally disturbed, and he was moved to a smaller classroom. Despite this more supportive environment, Dillon continued to be disruptive and to have difficulty focusing, following instructions, and completing classwork. He became bored easily and refused to do his work. Over time, Dillon's academic progress declined. Teachers eventually placed fewer academic demands on him to avoid outbursts.

In Dillon's early schooling, he made friends and enjoyed interacting with peers. However, because of his temper tantrums and hostile attributions, his peers began to avoid him. His parents restricted family outings. They stopped attending mass when Dillon was in second grade because he could not sit still and would throw tantrums in church. They cut back on family gatherings and avoided including Dillon on errands, because of the embarrassment caused by his tantrums.

Conceptualization

A comprehensive diagnostic interview, which included the parent version of the Schedule for Affective Disorders and Schizophrenia for School-Age Children, a clinical child interview, and teacher rating scales, confirmed that Dillon's behaviors and mood symptoms were consistent with disruptive mood dysregulation disorder (DMDD). His temper outbursts were frequent (at least three per week), severe, and explosive, causing impairment at home and in school. Between explosive episodes, Dillon's mood was chronically irritable. These symptoms had been present for several years without periods of amelioration. In addition, Dillon met criteria for attention deficit hyperactivity disorder (ADHD), combined type, as well as oppositional defiant disorder. However, according to DSM-5, when criteria for oppositional defiant disorder and DMDD are met, only the latter diagnosis is assigned. Mania symptoms were not reported, and Dillon's irritable mood was chronic, which ruled out bipolar disorder.

Treatment

Dillon's parents were first provided with an overview of DMDD and ADHD and their impact on Dillon's functioning. Next, they and Dillon consulted with a child psychiatrist to discuss medication. The psychiatrist prescribed

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methylphenidate in the hope that it would improve Dillon's hyperactivity and frustration tolerance and thus reduce his tantrums. Because Dillon's outbursts at home had become a means of avoiding demands, and his parents were unsure about managing them, the parents were referred for parent management training, which offers specific strategies that enhance effective communication and discipline. At the same time, Dillon received individual

cognitive-behavioral therapy aimed at teaching him how to better regulate his mood and improve his frustration tolerance. He was taught coping skills to regulate his anger and to identify and relabel distortions that contributed to his hostile reactions. Finally, a school behavior daily report card was developed that functioned like a token economy through which Dillon was rewarded for specific positive behaviors in the classroom.

Differential Diagnosis

Differentiating DMDD from other disorders relies primarily on careful characterization of irritable mood and temper outbursts. For example, differentiation between bipolar disorder and DMDD rests on the fact that the latter is characterized by chronic irritability, whereas irritability in bipolar disorder is episodic, representing a change from the person's usual state. Thus, the typical mood of DMDD is consistently irritable or angry, while that of bipolar disorder varies across euthymia, depression, and mania. Other diagnoses are distinguished from DMDD on the basis of outburst characteristics alone or in combination with irritability. Table 1 is designed to allow comparisons across these disorders, which include intermittent explosive disorder and oppositional defiant disorder. As shown in the table, intermittent explosive disorder and DMDD differ in frequency of outbursts (twice a week for 3 months for intermittent explosive disorder; three times a week for 1 year for DMDD). Critically, persistent irritability is not a criterion of intermittent explosive disorder, although it may be present. Thus, criteria may be met for both disorders. In such instances, DSM-5 specifies that DMDD takes precedence over intermittent explosive disorder. However, intermittent explosive disorder may be appropriate when the duration is less than 1 year. Both DMDD and oppositional defiant disorder criteria include irritability and temper outbursts. However, the disorders differ in three respects: 1) severity: outbursts must occur three times a week in DMDD, but only once a week in oppositional defiant disorder; 2) duration: the required duration is 12 months for DMDD and 6 months for oppositional defiant disorder; and 3) pervasiveness and impairment: in DMDD, function must be impaired in two of three settings, and it must be severe in one setting; oppositional defiant disorder has no such requirement. Thus, more children with DMDD will meet criteria for oppositional defiant disorder than the reverse. Indeed, in two large community samples (14), approximately 70% of children with DMDD met criteria for

oppositional defiant disorder, but less than 40% with oppositional defiant disorder met criteria for DMDD.

Reliability and Validity

The ultimate goal of establishing a new diagnosis is to guide treatment. However, a necessary first step is reliable assessment. This is a particular challenge for DMDD, as clinicians have conceptualized these children in different ways, resulting in a multiplicity of diagnoses. For example, in the DSM-5 field trials, interclinician reliability varied markedly by setting (15); reliability was acceptable ($k=0.49$) in inpatient settings, but unacceptable in outpatient settings (k values, 0.06–0.11). Similarly, symptoms of

No controlled trials have been conducted in DMDD, and thus treatment decisions are based on studies of related psychopathology (i.e., aggression, irritability) in other pediatric samples.

DMDD are more frequently endorsed by parents than by hospital staff (16). However, this may reflect a diminution in irritability on admission to an inpatient setting.

The clinical validity of DMDD has been estimated from existing data sets. Axelson and colleagues (17) generated DMDD diagnoses from previous interviews of children in the Longitudinal Assessment of Manic Symptoms study. Two groups were contrasted, one with elevated parent ratings of mania ($N=621$), the other without ($N=86$). DMDD was twice as prevalent among children with elevated ratings than among those without. Children with DMDD had significantly higher rates of attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder, and conduct disorder than those without. Specifically, 96% of youths with DMDD had oppositional defiant disorder or conduct disorder, and 77% had ADHD and oppositional defiant disorder or conduct disorder. Only 19% of children initially diagnosed with DMDD maintained the disorder across 12- and 24-month follow-ups, suggesting that the disorder has relatively low stability but remains chronic in a small proportion of children. This finding is consistent with retrospective formulations of severe mood dysregulation in the Great Smoky Mountains Study, which found that, among children who met criteria for severe mood

TABLE 1. Comparison of Diagnostic Criteria for Disruptive Mood Dysregulation Disorder (DMDD), Oppositional Defiant Disorder, and Intermittent Explosive Disorder^a

Criteria	DMDD	Oppositional Defiant Disorder	Intermittent Explosive Disorder
Temper outbursts/ irritable mood	All (A through J) are required A. Severe recurrent temper outbursts manifested verbally and/or behaviorally that are out of proportion in intensity or duration to the situation or provocation. B. The temper outbursts are inconsistent with developmental level. C. The temper outbursts occur, on average, three or more times per week. D. The mood between temper outbursts is persistently irritable or angry most of the day, nearly every day, and is observable by others.	A. At least four of eight A criteria are required Criteria A.1–A.3: 1. Often loses temper; 2. Often touchy or easily annoyed; 3. Often angry or resentful. No specific frequency for 1, 2, or 3.	A through C are required A. Recurrent behavioral outbursts stemming from failure to control aggressive impulses: 1. Verbal or physical aggression toward property, animals, or others at least twice weekly for at least 3 months that does not result in injury or destruction. 2. Three or more behavioral outbursts resulting in injury or property destruction. B. Magnitude of aggression is grossly disproportionate to provocation. C. Aggressive outbursts are impulsive, not premeditated or committed to achieve tangible objectives.
Additional clinical criteria	None	Criteria A.4–A.8: 4. Often argues with adults; 5. Often defies or refuses to comply with adult rules; 6. Deliberately annoys others; 7. Often blames others for mistakes; 8. Spiteful/vindictive (at least twice in the past 6 months).	None.
Duration	E. Criteria A–D have been present for at least 12 months, with no period of more than 3 consecutive months without.	Four of the eight criteria have been present for at least 6 months. If younger than age 5, the “behavior” must occur most days. If age 5 or older, the “behavior” must occur at least once per week.	A.1. Outbursts occur at least twice weekly, on average, for 3 months. A.2. Three outbursts causing destruction of property or physical injury to people or animals, in the past 12 months.
Number of settings	F. Criteria A–D are present in at least two of three settings (home, school, peers) and are severe in at least one setting.	No settings stipulated, but must occur with at least one individual other than a sibling.	No settings stipulated.
Age range and onset age	G. The child must be at least age 6 and no older than age 18. H. Criteria A–E must have occurred before age 10.	No minimum or maximum onset age.	E. At least 6 years old, or equivalent developmental level. No maximum age.
Is not limited to:	J. An episode of major depressive disorder.	None.	F. Major depressive disorder, bipolar disorder, DMDD, psychosis, antisocial personality disorder, borderline personality disorder.
Is not better explained by:	J. Autism spectrum disorder, posttraumatic stress disorder, separation anxiety disorder, persistent depressive disorder.	C. Does not occur exclusively during a psychotic, substance use, depressive, or bipolar disorder.	F. Major depressive disorder, bipolar disorder, DMDD, psychosis, autism spectrum disorder, schizoid personality disorder, borderline personality disorder. Diagnosis not given in patients ages 6 to 18 if aggression occurs as part of an adjustment disorder.
Cannot coexist with:	J. Oppositional defiant disorder, intermittent explosive disorder, bipolar disorder. DMDD is not diagnosed if there is a history of a manic or hypomanic episode.	C. DMDD: If criteria for both oppositional defiant disorder and DMDD are met, only the latter diagnosis is assigned.	DMDD: If criteria for both intermittent explosive disorder and DMDD are met, only the latter diagnosis is assigned.

^a Criteria are reprinted from American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, 5th ed. Washington, DC, APA, 2013. Copyright 2013, American Psychiatric Association. Used with permission.

dysregulation, 82.5% did so in only one of four waves of assessments (9). The lifetime prevalence of severe mood dysregulation dropped dramatically (from 3.3% to 0.4%) when criteria had to be met in two consecutive waves. In previously ascertained community samples, including the Great Smoky Mountains Study cohort, Copeland et al. (14) found prevalence estimates of about 1% for DMDD in children over age 6. Comorbidity was the rule. DMDD was associated with high levels of social impairment, service use, and school suspensions, as well as family poverty, supporting the clinical importance of the diagnosis.

Treatment Considerations

Since DMDD is a new diagnosis, there are no informative clinical trials from which to establish judicious practice. However, rational clinical guidelines may be distilled from treatment studies of disorders that share the main inclusion criteria with DMDD (ignoring exclusion criteria). Following this approach, some indirect recommendations can be made on the basis of treatment studies of children with severe mood dysregulation, oppositional defiant disorder, or aggressive behavior, for whom a range of treatments, psychopharmacological and psychosocial, have been examined.

Several psychosocial interventions that focus on positive parenting have demonstrated efficacy in children with oppositional behavior. In younger children, parent training has shown efficacy (18). In adolescents, this approach has been found to provide limited benefit; instead, individualized cognitive-behavioral treatment is recommended. These interventions are systematized but allow for variation to accommodate specific clinical problems. Recently, a novel behavioral intervention aimed at mood regulation has shown promise in children with severe mood dysregulation and ADHD (19), although it awaits systematic testing.

The frequent co-occurrence of irritability and severe temper outbursts in children with ADHD (13, 14) has led to the examination of the effects of stimulants on these symptoms. Meta-analyses report moderate to large effects of stimulants on aggression in children with ADHD as well as those without it (20, 21). For example, beneficial effects of stimulants have been found for aggression in children with conduct disorder, regardless of ADHD comorbidity (22). A crossover study (23) tested combined behavioral management and methylphenidate treatment in children with ADHD and severe mood dysregulation ($N=33$) and in children with only ADHD ($N=68$). The two clinical groups had identical responses on ADHD symptoms. Notably, children with severe mood dysregulation exhibited reductions in "manic" symptoms. The results suggest that combined stimulant and behavioral treatment may ameliorate mood dysregulation in children with ADHD. Atomoxetine, another compound approved for ADHD, has not been shown to reduce aggressive symptoms in children with

ADHD (21). Alpha agonists such as clonidine, which are frequently used as an adjunctive treatment for ADHD, show limited effects on broadly defined conduct symptoms and are associated with significant side effects (24, 25); they have not been examined in relation to symptoms of DMDD.

Two double-blind placebo-controlled studies have suggested that valproate, an anticonvulsant used as an antimanic agent, may be useful for treating mood dysregulation of the type seen in DMDD. In a study of 20 outpatients with oppositional defiant disorder or conduct disorder (26), mostly adolescents, with symptoms closely reminiscent of DMDD (mood lability and history of pervasive, severe explosive outbursts), eight of 10 youths treated with valproate responded (exhibiting reduced symptoms of anger-hostility and of aggressive/explosive outbursts), whereas none of the 10 youths who received placebo did. Blader et al. (27) investigated the efficacy of valproate as an adjunctive treatment to stimulants and behavioral treatment in children with ADHD and aggression. Significantly more children who were treated with valproate met remission criteria than those who received placebo (57% compared with 15%). Of note, aggression remitted in approximately 42% of children receiving combined stimulant and behavioral treatment before randomization to valproate or placebo, suggesting efficacy of these interventions. Because valproate is an antimanic agent, it is tempting to conjecture that this effect is due to its targeting of behaviors reminiscent of mania. However, in a placebo-controlled trial (28), lithium was not found to have beneficial effects for children with severe mood dysregulation (ages 7–17). Similar to the results of the Blader et al. study (27), 45% of children improved over the course of the medication washout period and 2-week placebo lead-in, to the point that they no longer qualified for the trial. Thus, inpatient management alone, even in the absence of pharmacological intervention, may lead to significant improvements.

Antipsychotics have a long history of treatment efficacy for dysregulated behavior at all ages. A meta-analysis (18) reported that risperidone, compared with placebo, has a strong effect on aggression, which is often considered a proxy for dysregulated behavior. Moreover, risperidone has been reported to shorten the duration of rages in hospitalized children (29). No study has examined the drug's effect in children with mood dysregulation. A single uncontrolled trial in severe mood dysregulation (30) reported reductions in irritability, ADHD symptoms, and depressive symptoms with risperidone. Atypical antipsychotics may be shown to improve symptoms of DMDD, such as irritability and aggression; however, side effects, even with short-term treatment, may limit their widespread use.

In sum, no controlled trials have been conducted in DMDD, and thus treatment decisions are based on studies of related psychopathology (i.e., aggression, irritability) in other pediatric samples. Based on this literature, a likely first step would be stimulant treatment, since this often enhances children's resilience and frustration tolerance

and reduces aggression, with minimal side effects. The addition of psychosocial interventions, such as parent training for young children and individualized cognitive-behavioral therapy for older children, is also suggested. If insufficient improvement occurs with combined stimulant and psychosocial treatment, consideration of a mood stabilizer (e.g., valproate) or an atypical antipsychotic may follow, keeping in mind their significant potential for side effects. Given the complex clinical picture of children with DMDD and the negative ramifications the disorder has on family function and parent-child relationships, a combination of therapeutic approaches will likely be needed to achieve meaningful improvement.

Conclusions

Because DMDD has just entered the nosology, only approximate recommendations are feasible. It is unknown whether use of this diagnosis will reduce diagnoses of pediatric bipolar disorder. If so, it will at the very least preclude communicating to parents that their child potentially has a lifelong illness, which is often the case for individuals with true bipolar disorder. It is further hoped that use of the diagnosis will lead to the identification of a group of highly impaired children for whom targeted interventions can be established.

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Clinical Guidance: Treating Disruptive Mood Dysregulation Disorder

Because disruptive mood dysregulation disorder (DMDD) is a new diagnosis, treatment decisions are based on trials for childhood disorders that share major characteristics, such as irritability and temper outbursts. Stimulants often enhance frustration tolerance and reduce aggression in children with DMDD, and side effects are minimal. Roy et al. also suggest concurrent psychosocial interventions: parent training for young children and cognitive-behavioral treatment for older youths. If the combination of stimulant and psychosocial treatment is insufficient, a mood stabilizer or atypical antipsychotic may be considered, but the side effects are significant.