JOURNAL OF CHILD AND ADOLESCENT PSYCHOPHARMACOLOGY
Volume 25, Number x, 2015

Pp. 1–7
DOI: 10.1089/cap.2015.0004

**Original Article**

# Sociodemographic and Clinical Features of Disruptive Mood Dysregulation Disorder: A Chart Review

Evren Tufan, MD,[1] Zehra Tapal, MD,[1] Nuran Demir, MD,[1] Sarper Taskiran, MD,[2] Uğur Savci, MD,[1] Mehmet Akif Cansiz, MD,[1] and Bengi Semerci, MD[3]

## Abstract

***Objective:*** Disruptive mood dysregulation disorder (DMDD) is a novel diagnosis listed in *Diagnostic and Statistical Manual of Mental Disorders,* 5th ed. (DSM-5) to encompass chronic and impairing irritability in youth, and to help its differentiation from bipolar disorders. Because it is a new entity, treatment guidelines, as well as its sociodemographic and clinical features among diverse populations, are still not elucidated. Here, DMDD cases from three centers in Turkey are reported and the implications are discussed.

***Methods:*** The study was conducted at the Abant Izzet Baysal University Medical Faculty Department of Child and Adolescent Psychiatry (Bolu), and American Hospital and Bengi Semerci Institute (Istanbul) between August 2014 and October 2014. Records of patients were reviewed and features of patients who fulfilled criteria for DMDD were recorded. Data were analyzed with SPS Version 17.0 for Windows. Descriptive analyses, $\chi^2$ test, and Mann–Whitney *U* test were used for analyses. Diagnostic consensus was determined via Cohen's $\kappa$ constants. $p$ was set at 0.01.

***Results:*** Thirty-six patients (77.8 % male) fulfilled criteria for DMDD. $\kappa$ value for consensus between clinicians was 0.68 ($p = 0.00$). Mean age of patients was 9.0 years (S.D. = 2.5) whereas the mean age of onset for DMDD symptoms was 4.9 years (S.D. = 2.2). Irritability, temper tantrums, verbal rages, and physical aggression toward family members were the most common presenting complaints.

***Conclusions:*** Diagnostic consensus could not be reached for almost one fourth of cases. Most common reasons for lack of consensus were problems in clarification of moods of patients in between episodes, problems in differentiation of normality and pathology (i.e., symptoms mainly reported in one setting vs. pervasiveness), and inability to fulfill frequency criterion for tantrums.

## Introduction

The clinical importance of severe, impairing and chronic irritability among youth has been recognized since the 1990s (Krieger et al. 2013; McGough 2014) although its diagnostic relevance has been controversial (Leibenluft et al. 2003; McGough 2014). Some authors posited that pediatric bipolar disorder (BP) could be divided into ''narrow'' and ''broad'' phenotypes with the former displaying classical symptoms of mania/ hypomania (i.e., grandiosity/euphoria) in an episodic course whereas the latter was characterized by unyielding irritability as a hallmark symptom (Leibenluft et al. 2003). According to this position, patients with the ''broad'' phenotype (also called severe mood dysregulation disorder [SMDD]) displayed chronic, nonepisodic, impairing irritability and hyperarousal without classic symptoms of mania (Leibenluft et al. 2003). Probably secondary to this broad classification, there had been a dramatic rise in rates of pediatric BP from the mid-1990s to the early 2000s (Krieger et al. 2013) along with debates about the ''true'' phenotype of pediatric BP (Parry and Richards 2014; Stringaris and Youngstrom 2014).

Further studies revealed that episodic and chronic irritability in youth had distinct consequences and etiologies (Stringaris et al. 2009; Deveney et al. 2013). Accordingly, it was posited that severe, episodic irritability in childhood correlated with BP in adulthood (Brotman et al. 2007; Copeland et al. 2014), whereas severe, chronic irritability in childhood correlated with unipolar depression and anxiety disorders (Stringaris et al. 2009). Regardless of this hypothesis, irritability in childhood remained a nonspecific symptom that was listed among criteria for various disorders listed in *Diagnostic and Statistical Manual of Mental Disorders,* 4th ed., Text Revision (DSM-IV-TR) including oppositional defiant disorder (ODD), major depressive disorder (MDD), intermittent explosive disorder, and generalized anxiety disorder (American Psychiatric Association 2000).

[1]Department of Child and Adolescent Psychiatry, Abant Izzet Baysal University Medical Faculty, Bolu, Turkey.
[2]Department of Psychiatry, Koc University Medical Faculty, Istanbul, Turkey.
[3]Department of Child and Adolescent, Bengi Semerci Institute, Istanbul, Turkey.

Disruptive mood dysregulation disorder (DMDD) is a novel diagnosis that is included in *Diagnostic and Statistical Manual of Mental Disorders,* 5th ed. (DSM-5) among depressive disorders partly to solve this quandary (American Psychiatric Association 2013), although it has its detractors (Parens et al. 2010; Krieger et al. 2013; Regier et al. 2013; McGough 2014). It is characterized by severe, pervasive, impairing, developmentally inappropriate and recurrent temper outbursts that are grossly out of proportion to the situation at hand. The outbursts may be manifested verbally and/or behaviorally and should occur at least three times per week for ≥1 year, with a symptom-free interval of <3 consecutive months. Between outbursts, children with DMDD display a persistently irritable or angry mood, most of the day and nearly every day. The onset of symptoms must be before age 10, and a DMDD diagnosis should not be made for the first time before age 6 or after age 18. BP, ODD, and intermittent explosive disorder should be excluded for diagnosis (American Psychiatric Assocation 2013). DSM-5 reports a prevalence that is probably between 2.0% and 5.0 %, with a male preponderance both in the community and in clinical samples. Homotypical continuity in 1 year follow-up is reported to be ~50.0%, and MDD, attention deficit/hyperactivity disorder (ADHD), and anxiety disorders are reported to be the most common comorbid diagnoses (American Psychiatric Association 2013).

The diagnosis of DMDD is criticized because of its potential to pathologize physiological behavior (i.e., temper tantrums) with a consequent elevation in use of psychotropic medications, paucity of empirical evidence supporting the validity of diagnosis, low test–retest reliability and supporting studies focusing at selected centers, and a not entirely overlapping diagnosis (i.e., SMDD) (Parens et al. 2010; Regier et al. 2013; McGough 2014). On the other hand, there are also studies supporting its validity as a distinct diagnosis (Copeland et al. 2013; Deveney et al. 2013; Copeland et al. 2014; Dougherty et al. 2014).

Because it is a new entity, the treatment guidelines for DMDD as well as its sociodemographic and clinical features among diverse populations are still not elucidated. Here, we present 36 cases from three centers in Turkey who fulfill criteria for DMDD as set forth in DSM-5 (2015), and their treatment as well as their diagnoses as per DSM-IV-TR (2000) and DSM-5 and discuss the implications in an effort to better understand sociodemographic characteristics of this population.

## Methods

### *Study centers, design, and ethics*

This retrospective chart review was conducted at the Abant Izzet Baysal University Medical Faculty Department of Child and Adolescent Psychiatry (Bolu), and American Hospital and Bengi Semerci Institute (Istanbul) between August and October 2014. The patients were seen between June 2013 and June 2014 in Bolu, between January 2013 and July 2014 at American Hospital, and between January 2011 and March 2014 at Bengi Semerci Institute. At two of the study centers (Bolu and Bengi Semerci Institute) parents and teachers of the patients completed the DSM-IV-Based Scale for Disruptive Behavior Disorders (Turgay 1994; Ercan et al. 2001) whereas at the other center (American Hospital), the Turkish version of Swanson, Nolan, and Pelham, Version IV (SNAP-IV) was used (Bussing et al. 2008; Guler et al. 2014a,b; Kaner 2011). For broadband screening, all study centers used Conners' Scales (Goyette et al. 1978). A lesser-known Turkish version provides more detail (Dereboy et al. 2007; Kaner et al. 2013). All parents and children were then administered DSM-IV-TR-based unstructured interviews as part of their evaluations.

Charts were screened using 2 or 3 (''much'' or ''very much'' on the 8th (''ready to pick up a fight, quick to anger'') and 21st (''is cranky and sullen'') items on Conners Parent Rating Scale-48. Details of temper outbursts (i.e., frequency, duration), irritability, and aggression were culled from chart reviews and screening instruments. A subset of patients (Abant Izzet Baysal University) were reached via phone, and their primary caretakers were interviewed about symptoms of DMDD. Closed-ended questions pertaining to symptoms of DMDD listed in DSM-5 (American Psychiatric Association 2013) were used for interviewing. For the phone interviews, children (<12 years of age) gave oral assent, whereas adolescents (≥12 years of age) gave written assent. Parents provided informed consent for the participation of their children in the study. Institutional Review Board approval was procured from Abant Izzet Baysal University.

Each clinic serves a somewhat different clientele and we were interested in similarities and differences in DMDD within each clinic. We were also interested in gender differences in the phenomenology of DMDD.

### *Statistical analyses*

Data were analyzed with Statistical Program for Social Sciences (SPSS) Version 17.0 for Windows. Descriptive analyses, $\chi^2$ test and Mann–Whitney *U* test were used for analyses. Diagnostic consensus was determined via Cohen's $\kappa$ constants. Bonferroni adjustment was made for multiple comparisons. Because it was a self-selected sample with a limited size, $p$ was set conservatively at 0.01. All comparisons were two tailed.

## Case 1: Diagnosis and Treatment of a Male Child Diagnosed with DMDD at one of the Centers

A 9-year-old, male third grade student was brought in by parents after a school counselor recommended a psychiatric evaluation for ''explosive anger outbursts and defiant behavior.''

The patient had current symptoms of inattention, distractibility, forgetfulness, refusal to engage in activities that required sustained mental effort, difficulty in following directions, restlessness, excessive running and climbing in inappropriate situations, frequent inappropriate wandering in the classroom, leaving and running away from the classroom, interrupting others, impatience, and disruptive outbursts. Difficulty following directions and avoidance of activities requiring mental effort was affecting his functioning in class, at home, and in swimming and soccer. His mother was able to handle these symptoms better than his father because she was described as more structured.

Other disabling symptoms were irritability, behavioral and emotional disinhibition, and explosive outbursts causing harm to self and others. An example of these episodes happened the week before the evaluation when the patient was told that he was not selected for the math team. He started yelling and crying, and when his teachers tried to calm him down he started throwing his pencils and scissors (causing harm to his best friend who happened to be in his way). When the teacher left the classroom, the patient barricaded the door with desks, crawled under them, and cried while he hit his head repeatedly on the desks. Outbursts had been happening three or four times a week. Irritability was present even when the patient was not having an outburst.

He was described as a loving child with a kind heart. He felt intense sorrow after these episodes. He said he is not in control

when he is having an outburst. He is not vindictive or spiteful, and he tried to apologize and make amends afterwards. His actions are not planned or manipulative.

### *Family history*

The patient's mother and maternal grandmother both have had episodes of MDD. The patient's parents separated when the patient was 2.5 years old. His mother remarried and was 22 weeks pregnant from her second marriage. The patient's father was in a long term relationship. The patient was spending weekdays with his mother and weekends with his father. The couple have an amicable relationship and they frequently communicate about the patient's needs.

### *Collateral information*

School SNAP ratings were positive for inattentive and hyperactive symptoms and for impulsivity and aggression. A home video recorded by the patient's father showed the patient with an intense negative affect during an outburst at the father's home, which escalated with the father's calm redirection and soothing statements, and ended with the patient hitting his head on the wall.

### *Medical history*

The patient's medical history was noncontributory. There was no history of febrile or absence seizures, no allergies, and no medications, and a recent whole blood count was within normal limits.

### *Mental status examination*

The patient was calm and cooperative, and entered the office willingly. He was well groomed, and appeared his stated age. He was smiling and appeared comfortable. He was noted to be constantly fidgeting during the interview. He played with a marker that he grabbed without permission. He dropped it multiple times and colored his hands and the desk when he doodled unprompted. His speech had a normal tone and cadence. He was easily bored, and could not stay with the task he was given for >5 minutes. His mood was happy, and his affect was mood congruent and intense, shifting quickly. His thought content was age appropriate, and he talked about frustration with peers who reject him. There was no delusional content. His thought processes were organized and linear, with frequent derailments. When prompted, he was able to be redirected, and he could remember his trail of thought. There was no perceptual disturbance. Cognition was grossly intact, and the patient had insight into his impulse control issues and anger outbursts. He said he wants to correct them, asked for help, and was motivated.

### *Tests*

He made frequent errors on the Trailmaking test, and made many omission errors and showed distractibility during the attention test. His no-go inhibition was not affected. Wechsler Intelligence Scale for Children (WISC-R) revealed a verbal intelligence quotient (IQ) of 108, performance 124.

He was started on osmotic controlled release oral delivery system (OROS) metlhyphenidate18 mg initially. SNAP ratings showed a significant decline in ADHD scores; however, irritability and anger outbursts continued to impair his functioning. Risperidone was started 0.25 mg bi.d., and at the 1 month follow-up, irritability decreased. First month Clinical Global Impressions (CGI)-Improvement ratings were 2 (much improved).

## Results

A total of 403 charts were reviewed for children and adolescents between the ages of 6 and 17 who were seen in our clinics between reported time frames. In 80 charts (39.7 %), there were not enough data to determine whether the onset of symptoms occurred prior to 10 years of age. Ultimately, 36 patients ($n=27$ in Istanbul, $n=9$ in Bolu; $n=28$ male, 77.8 %) fulfilled criteria for DMDD. We did not adhere to exclusionary diagnostic criteria. Prevalence of DMDD diagnosis among all applications for irritability/temper tantrums within the study period was 4.5 % for Abant Izzet Baysal University, whereas it was 6.5 % and 5.0 %, respectively, for American Hospital and Bengi Semerci Institute. As a group, patients in Istanbul (75.0 %) came from more affluent families and had more educated parents (mean education of mothers 13.3 years [SD = 2.2] vs. 8.1 [SD = 5.6] years; mean education of fathers 14.1 [SD = 2.0) years vs. 8.1 [SD = 3.3] years). We therefore analyzed the groups separately and compared them on our variables of interest. Sociodemographic features of patients according to study centers are listed in Table 1.

$\kappa$ value for consensus among clinicians (E.T., S.T., B.S.) was 0.68 ($p=0.00$) for the diagnosis of DMDD. There was a discrepancy among diagnoses applied by clinicians for approximately one fourth of patients (22.2 %). Criteria accounting for lack of consensus were presence of anger between tantrums, and presence of symptoms in more than one setting (87.5% for each), determining frequency criteria for temper tantrums (37.5 %), and tantrum severity (e.g., displaying only verbal outbursts during tantrums, 37.5 %) and unclear duration of symptoms (12.5 %).

Mean age of patients was 9.0 years (SD = 2.5), whereas the mean age of onset for DMDD symptoms was 4.9 years (SD = 2.2). Mean duration of symptoms was 48.7 months (SD = 28.6). Mean ages at application for treatment and onset for females were both significantly higher than for male patients (Mann–Whitney $U$ test; $Z=$ −2.7 and −2.4, respectively; $p=0.01$).

Table 1. Sociodemographic Features in Children with Disruptive Mood Dysregulation Disorder According to Study Center

| | *Bolu* (n = 9) | *Istanbul* (n = 27) | p | *ES φ* | *% 95 CI* |
|---|---|---|---|---|---|
| Gender- Male | 77.8% | 77.8% | 1.00 | 0.00 | –0.33–0.38 |
| Paternal occupation (own-civil servant) | 55.6% | 100.0% | 0.00 | 0.62 | 0.43–0.85 |
| Maternal occupation (own-civil servant) | 22.2% | 85.2% | 0.00 | 0.61 | 0.29–0.93 |
| SES-2011- High | 22.2% | 74.1% | 0.00 | 0.71 | 0.46–0.93 |

$\chi^2$ test.
ES, effect size, CI, confidence interval, SES-2011, socioeconomic status according to Family Structure in Turkey Study.

Table 2. Presenting Complaints in Children with Disruptive Mood Dysregulation Disorder According to Gender

| | *Males (n = 28)* | *Females (n = 8)* | p |
|---|---|---|---|
| Irritability | 100.0% | 100.0% | *NS* |
| Temper tantrums | 100.0% | 100.0% | NS |
| Anger | 28.6% | 25.0% | NS |
| Verbal rages | 100.0% | 100.0% | NS |
| Physical aggression | | | |
| To peers | 17.9% | 25.0% | NS |
| To family | 100.0% | 100.0% | NS |
| To objects | 82.1% | 75.0% | NS |
| Separation anxiety | 3.6% | 25.0% | NS |
| Hyperactivity | 67.9% | 25.0% | 0.05 |
| Inattention | 64.3% | 25.0% | NS |

$\chi^2$ test.

The patients from Istanbul did not differ in mean age from those evaluated at Bolu, although their symptoms started earlier and lasted longer (Mann–Whitney *U* test; $Z = -2.8$ and $-2.7$, respectively; $p = 0.01$). Median number of temper tantrums reported for patients was 4.0 per week (interquartile range = 2.0) and this did not differ significantly between genders or centers.

Presenting complaints did not differ according to gender or center and are listed in Table 2.

Most of the patients had family histories positive for psychopathology (77.8 %), and the most common disorders reported in family members were MDD (55.6 %), ADHD (25.0 %), and anxiety disorders (16.7 %). Male and female patients did not differ according to family history for psychopathology ($\chi^2$ test). Family history for anxiety disorders and conduct disorder were only present in male patients (28.6 % and 3.6 %, respectively).

Comorbid conditions in children with DMDD included eating problems and anhedonia, sadness, and suicidal thoughts that met criteria for anorexia nervosa and MDD respectively (2.8 % and 16.7 %, respectively for the whole sample), whereas 14.3 %, 7.1 %, and 3.6 % of the males had social problems, reading difficulty, and self- injurious behavior, respectively. One of the female adolescents was judged to display borderline personality traits.

The median number of diagnoses according to DSM-IV-TR and DSM-5 criteria in the sample were 2.0, whereas their dispersion was less with DSM-5 criteria (interquartile range = 1.0 and 0.0, respectively). Median number of diagnoses according to DSM-IV-TR or DSM-5 did not differ between genders or centers (Mann–Whitney *U* test).

DSM-IV-TR and DSM-5 based diagnoses of patients according to their gender are listed in Table 3.

With the application of DSM-5 criteria, all patients with ODD, conduct disorder (CD), and BP spectrum disorders lost their diagnoses.

Patients in Istanbul were reported by their parents to have significantly more problems than those in Bolu (Conners' Parent Rating Scale-Revised [CPRS]-48; total score mean 69.1 [SD = 12.3] vs. 56.0 [SD = 11.9), respectively; $Z = -2.7$, $p = 0.01$; Mann–Whitney *U* test); 72.2 % of the whole sample scored above clinical cutoff on the Learning Problems/Inattention subscale of CPRS-48 whereas the corresponding rates for oppositionality, hyperactivity, and behavioral problems subscales were 63.9 %, 61.1 %, and 55.6 %, respectively. Analysis with $\chi^2$ test revealed that patients from Bolu were significantly less likely to score above the clinical cutoff on the Learning Problems/Inattention Subscale ($\varphi = 0.5$, $p = 0.00$), whereas there were no significant differences for other subscales.

All patients received similar treatment without a statistically significant difference among genders or centers. Most common agents used in treatment were risperidone (44.4 %), OROS methylphenidate (33.3 %), atomoxetine (22.2 %), and immediate release (IR) methylphenidate (19.4 %).

## Discussion

This retrospective study from three treatment centers evaluated 36 cases of DMDD. There was a significant consensus among clinicians for DMDD diagnosis, although diagnostic consensus could not be reached for almost one fourth of cases. The most common reasons for lack of consensus were problems in

Table 3. DSM-IV-TR and DSM-5 Based Diagnoses of Patients with Disruptive Mood Dysregulation According to their Gender

| | *DSM IV TR diagnoses* | | | *DSM 5 diagnoses* | | |
|---|---|---|---|---|---|---|
| | *Males (n = 28)* | *Females (n = 8)* | p | *Males (n = 28)* | *Females (n = 8)* | p |
| ADHD | 78.6% | 37.5% | 0.04 | 78.6% | 37.5% | 0.04 |
| ODD | 50.0% | 37.5% | NS | - | - | - |
| CD | 7.1% | - | - | - | - | - |
| LD | 7.1% | - | - | 7.1% | - | - |
| MDD | 10.7% | 37.5% | NS | - | 12.5% | - |
| BP spectrum disorders | 21.4% | 25.0% | NS | - | - | - |
| Separation anxiety disorder | 3.6% | 12.5% | NS | 3.6% | 12.5% | NS |
| Anxiety disorder- NOS | - | 12.5% | - | - | 12.5% | - |
| Tic disorders | 3.6% | - | - | 3.6% | - | - |
| Night terror | 3.6% | - | - | 3.6% | - | - |
| Anorexia nervosa | - | 12.5% | - | - | 12.5% | - |
| Borderline personality traits | - | 12.5% | - | - | 12.5% | - |

$\chi^2$ test.

DSM-IV-TR, *Diagnostic and Statistical Manual of Mental Disorders,* 4th ed., Text Revision; DSM-5, *Diagnostic and Statistical Manual of Mental Disorders,* 5th ed.; ADHD, attention-deficit/ hyperactivity disorder; LD, learning disability; ODD, oppositional defiant disorder; CD, conduct disorder; MDD, major depressive disorder; BP spectrum: bipolar spectrum disorders (i.e. I, II, not otherwise specified); NOS, not otherwise specified.

clarification of moods of patients in between episodes, pervasiveness of symptoms, and questions of frequency of tantrums.

We observed a male preponderance. In our sample, patients were mainly school-age children. Irritability, temper tantrums, verbal rages, and physical aggression toward family members were the most common presenting complaints. The most common diagnosis was ADHD; 69.4% of the whole sample had ADHD, whereas 47.2% had ODD. Patients with both ADHD and ODD formed 30.6% of the sample. Family history was positive for most cases, with MDD, ADHD, and anxiety disorders being the most commonly reported diagnoses. DMDD is thought to represent a new diagnostic entity characterized by severe and recurrent temper outbursts that are grossly out of proportion in intensity or duration to the situation, and which lie on a spectrum with depressive disorders. It was reported that some of these children may have been previously diagnosed with BP, even though they did not have cardinal signs and symptoms (i.e., broad phenotype (Copeland et al. 2013, 2014). In accordance with those reports, 22.2% of our sample had been previously diagnosed with BP spectrum disorders according to DSM-IV-TR criteria, and MDD was the most common disorder reported in their family histories. Patients met mostly irritability, inattention/distractibility, talkativeness, psychomotor agitation/excessive goal directed activity, and impulsivity criteria (22.2% for each) and the most common DSM-IV-TR diagnosis was BP-not otherwise specified (NOS) ($n=7$, 87.5 % of BP spectrum disorders).

As a result of applying DMDD criteria, none of the patients retained BP diagnosis. There was no significant difference for receiving a previous diagnosis of BP spectrum disorder between genders in our sample, although this should be clarified with further studies.

As a novel diagnosis, DMDD was criticized because of its low reliability in DSM-5 field trials as well as the potential to pathologize normal behavior, and the scarcity of evidence supporting its validity (Parens et al. 2010; Deveney et al. 2013; Krieger et al. 2013; Regier et al. 2013; McGough 2014). Interrater reliability in our study was significant, although, because of sampling bias (i.e., a clinical, self-referred sample), our results should be deemed preliminary and will need to be replicated with further studies. Methodological heterogeneity and limitations of telephone interviews to a subgroup of patients may also be limitations. Also, it should be borne in mind that we did not evaluate test–retest reliability and other measures of validity. Also, agreement was more difficult regarding the pervasiveness of irritability and outbursts, whether verbal or only physical outbursts should be counted, and the state of interoutburst irritability. Further studies from diverse populations are needed to determine the importance of specific symptoms and criteria for the diagnosis.

Previous studies reported that DMDD is highly comorbid especially with ODD, MDD, ADHD, and peer problems (Dougherty et al. 2014; Copeland et al. 2013). Because of the DSM-5 exclusion criterion, none of our patients had an ODD comorbidity, whereas rates for peer/social problems (19.4 %) were lower than previously reported. For MDD, DSM-5 stipulates that DMDD symptoms should not be better accounted for by MDD (American Psychiatric Association 2013). As a result of applying DMDD criteria, none of the male patients retained the MDD diagnosis, whereas this was not observed for the female patients. Post-hoc analysis demonstrated that none of the males with MDD in our sample displayed anhedonia, and received their diagnoses by virtue of their irritable mood, whereas this was also true for two of the three females with MDD diagnosis. Although affected by sampling bias and a limited sample size, this finding may reflect that applying diagnostic criteria for DMDD may also change diagnoses of MDD. This hypothesis should be clarified with further studies.

On the other hand, and similar to the previous results, ADHD was the most common comorbid diagnosis (69.4%). Parental reports in broad-based screening scales reflected diverse problems with learning, anxiety, hyperactivity/impulsivity, oppositionality, and behavior problems. Our results may have been affected by sampling bias as well as the clinical nature of the sample, and should be replicated with further studies and systematic interviews of clinical samples.

DSM-5 reports a prevalence of 2.0–5.0% for DMDD in clinical samples with a male preponderance, and although our sample was highly self-selected and biased, the 3 month prevalence in our centers is similar to that reported in DSM-5 (i.e., 4.5–6.5%) (American Psychiatric Association 2013). Within our sample, females were reported to have later onset of DMDD symptoms, and they were also brought later for treatment. This difference may reflect recall bias and gender differences in types of aggression displayed, or be the result of sampling bias, and should be evaluated with further studies.

The boundaries with ODD in our cases were also problematic as previously reported, and it was not easy to distinguish ODD as a diagnosis. The lack of a pervasive pattern of oppositionality to authority figures, predominance of angry outbursts and temper tantrums in clinical presentation, and the nature of outbursts (limited to occasions of frustration rather than coming out of spite) might support a DMDD rather than an ODD diagnosis. The observation that irritability and temper outbursts were not related to instances or intimations of separation from caregivers helped rule out separation anxiety disorder as the primary diagnosis. The lack of cardinal symptoms of mania such as grandiosity and expansiveness as well as of distinct periods of change in moods helped rule out BP, although considering previous attempts at classifying pediatric BP, this was not easy (i.e., broad phenotype) and a subgroup of our patients were previously diagnosed as having BP spectrum disorders according to DSM-IV-TR criteria, reflecting the lack of a better alternative. The patients were diagnosed with BP-NOS mostly, by other clinicians, and records of criteria endorsed for BP-NOS reveal that most overlapped with symptoms of ODD and ADHD. Previous diagnoses of BP-NOS may reflect problems in delineating episodic versus chronic irritability, and the effects of the ''broad phenotype'' concept on clinicians. Post-hoc analysis of patients with BP-NOS diagnoses showed that all ($n=8$) had a family history of MDD, whereas half ($n=4$) had a family history of BP disorders in first and second degree relatives, and, as such, their clinicians may have evaluated signs and symptoms of irritability, anger, and temper outbursts as markers of being on the mood disorders spectrum at the time.

Again reflecting the diagnostic conundrum as well as high rates of comorbidity, atypical antipsychotics, stimulants, and atomoxetine were the most common treatment choices, and a minority of patients received polypharmacy, reflecting the need for evidence-based treatment guidelines targeting DMDD and irritability (Aman 2015; Farmer et al. 2015).

The main limitations of our study are its retrospective nature, the lack of representativeness of our clinic sites, and our use of clinical records rather than systematic interview to derive numbers of temper tantrums and targets of aggression. We had phone interviews with only a subset of patients' parents. Use of an older version of the CPRS may also be counted among limitations, and had we used the newer version, we might have been able to report scores on emotional reactivity, and might have screened in more subjects.

Although the majority of our cases seemed to improve moderately with methylphenidate/atomoxetine combined with risperidone, it must be kept in mind that those combinations were off-label, and that the natural evolution of DMDD and treatment guidelines are still not clearly known and that studies with larger samples who would be followed for longer periods will be necessary.

## Conclusions

The limitations of our sample and data collection preclude any hypotheses about cultural differences in symptoms of DMDD. However, it is known that emotions, including anger, involve subjective, physiological, motivational, and behavioral components and ''display rules'' that govern how a particular emotion is expressed are acquired via socialization and maturation (Potegal and Qiu 2010). In accordance with those views, it may be prudent to posit that some symptoms of the DMDD construct may vary among cultures, depending upon display rules endorsed culturally.

## Clinical Significance

This retrospective study from three treatment centers evaluated 36 cases of DMDD. Gender ratios, clinical prevalence, and ages of the sample corresponded with previous studies. There was a significant consensus among clinicians for DMDD diagnosis, although differentiating pathology proved problematic in a subgroup. The most common reasons for lack of consensus were problems in clarification of moods of patients in between episodes, problems in differentiation of normality and pathology (i.e., symptoms mainly reported in one setting vs. pervasiveness), and inability to fulfill frequency criterion for tantrums. Irritability, temper tantrums, verbal rages, and physical aggression toward family members were the most common presenting complaints. Family history was positive for most cases, with MDD, ADHD, and anxiety disorders being most commonly reported diagnoses.

## Disclosures

No competing financial interests exist.

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Address correspondence to:
*Evren Tufan, MD*
*Department of Child and Adolescent Psychiatry*
*Abant Izzet Baysal University Medical Faculty*
*Bolu 14200*
*Turkey*

*E-mail:* tevrenus@yahoo.com