

## REVIEW

# Narrative Review: Impairing Emotional Outbursts: What They Are and What We Should Do About Them

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**Objective:** Impairing emotional outbursts, defined by extreme anger or distress in response to relatively ordinary frustrations and disappointments, impact all mental health care systems, emergency departments, schools, and juvenile justice programs. However, the prevalence, outcome, and impact of outbursts are difficult to quantify because they are transdiagnostic and not explicitly defined by current diagnostic nosology. Research variably addresses outbursts under the rubrics of tantrums, anger, irritability, aggression, rage attacks, or emotional and behavioral dysregulation. Consistent methods for identifying and assessing impairing emotional outbursts across development or systems of care are lacking.


**Method:** The American Academy of Child and Adolescent Psychiatry Presidential Task Force (2019-2021) conducted a narrative review addressing impairing emotional outbursts within the limitations of the existing literature and independent of diagnosis.

**Results:** Extrapolating from the existing literature, best estimates suggest that outbursts occur in 4%-10% of community children (preschoolers through adolescents). Impairing emotional outbursts may respond to successful treatment of the primary disorder, especially for some children with attention-deficit/hyperactivity disorder whose medications have been optimized. However, outbursts are generally multi-determined and often represent maladaptive or deficient coping strategies and responses.

**Conclusion:** Evidence-based strategies are necessary to address factors that trigger, reinforce, or excuse the behaviors and to enhance problem-solving skills. Currently available interventions yield only modest effect sizes for treatment effect. More specific definitions and measures are needed to track and quantify outbursts and to design and assess the effectiveness of interventions. Better treatments are clearly needed.

**Key words:** dysregulation, mood, outbursts, phasic irritability, reactive aggression

*J Am Acad Child Adolesc Psychiatry* 2022;■(■):■-■.

 Outbursts in children and adolescents are a major public health dilemma and are responsible for a substantial number of referrals to emergency departments,<sup>1,2</sup> inpatient units,<sup>3-5</sup> schools,<sup>6</sup> outpatient clinics,<sup>7-9</sup> and residential treatment settings.<sup>10</sup> Yet, as outbursts are transdiagnostic and variably defined, they are difficult to track and study across different systems of care. In fact, our 2 classification systems even differ in how irritability and outbursts are categorized.

The study of outbursts evolved, in part, from the question of whether severe chronic irritability was a broad phenotype of bipolar disorder in children.<sup>11,12</sup> In comparing episodic and chronic irritability, Leibenluft *et al.*<sup>11</sup> delineated what became disruptive mood dysregulation disorder (DMDD) in *DSM-5*.<sup>13</sup> Criteria for DMDD includes “severe recurrent temper outbursts manifested

verbally (eg, verbal rages) and/or behaviorally (eg, physical aggression towards people or property) that are grossly out of proportion in intensity or duration to the situation or provocation.”<sup>13(p156)</sup> In *DSM-5*, DMDD became classified as a mood disorder.<sup>14</sup>

Alternatively, *ICD-11*<sup>15</sup> emphasized the temper outbursts defined in oppositional defiant disorder (ODD) and placed ODD outbursts in disruptive behavior or dissocial disorders.<sup>16,17</sup> Per *ICD-11*, ODD may manifest with or without “chronic irritability and anger,” which is characterized by a “negative mood often accompanied by regularly occurring severe temper outbursts that are grossly out of proportion in intensity or duration to the provocation.”<sup>16,17</sup> ODD in *DSM-5* requires “often loses temper” rather than temper outbursts.<sup>13(p462)</sup>

The only other condition in either *DSM-5* or *ICD-11* for which outbursts are core symptoms is intermittent

explosive disorder (IED) (“recurrent behavioral outbursts representing a failure to control aggressive impulses”).<sup>13(p466)</sup> In DMDD and IED, outbursts are necessary but not sufficient for diagnosis. For example, outbursts that occur fewer than 3 times per week and/or are not associated with persistent irritability between episodes do not meet criteria for DMDD<sup>13</sup> or ODD irritable subtype.<sup>15</sup> Similarly, if outbursts occur in the context of other psychiatric conditions (eg, mood or psychotic disorders or, in *ICD-11*, ODD or conduct disorder [CD]), the diagnosis of IED is excluded.<sup>13</sup> The lack of a standard definition or diagnostic home has relegated outbursts to nosological orphanhood.<sup>18</sup>

## METHOD

As part of the 2019-2021 presidential initiative for the American Academy of Child and Adolescent Psychiatry (AACAP), our task force was established to address emotion dysregulation in children and adolescents, focusing on developing methods for clinicians to identify, characterize, and treat impairing emotional outbursts. Although there are excellent reviews of irritability<sup>12,16,17,19-22</sup> and DMDD,<sup>23,24</sup> these articles do not adequately define or characterize outbursts. Our review specifically examined outbursts, within the limitations of the existing literature, independent of diagnosis.

## RESULTS

Currently there are no agreed-upon definitions for outbursts. The *DSM-5* glossary defines “temper outbursts” (also called a “tantrum”)<sup>13(p830)</sup> as episodes of emotional distress, angry ranting, and loss of physical control. However, concerns about pathologizing “normal tantrums” limit the use of that term. In addition, outbursts may include distress symptoms, not just anger. Rages, affective storms, meltdowns, mood swings, anger attacks, and, more recently, phasic irritability, are other terms that have been used<sup>9</sup> and may or may not be synonymous.

First, to address the lack of standard definitions and terminology, our AACAP Task Force adopted the term “impairing emotional outbursts” and defined these episodes as “developmentally inappropriate displays of anger or distress manifested verbally and/or behaviorally with physical aggression toward people, property, or self that are grossly out of proportion in frequency, intensity, and/or duration to the situation or provocation and lead to significant functional impairment.” Our definition is currently under consideration by the American Psychiatric Association *DSM-5* Task Force to be added as an R code. R codes encompass “symptoms, signs, and abnormal clinical and

laboratory findings, not elsewhere classified,” including those “involving cognition, perception, emotional state, and behavior” (<https://www.psychiatry.org/psychiatrists/practice/dsm/proposed-changes>). The R code for impairing emotional outbursts is intended to capture clinically significant outbursts across disorders or clinical presentations except for DMDD or IED, which are exclusion criteria. For example, a child with attention-deficit/hyperactivity disorder (ADHD) combined and outbursts would get an F 90.2 code and an R 45.8 A code.

Until this R code (or an alternative standard definition) is adopted and incorporated into research methods, much of the information regarding the nature, course, and treatment of outbursts must be extrapolated from studies of related behavioral and emotional symptoms, including at least 4 different, but overlapping constructs<sup>25,26</sup>:

1. Irritability, despite having at least 21 different definitions, being a symptom of many disorders, and used interchangeably with irritable mood,<sup>26</sup> is not specifically or consistently defined in *DSM-5*. Irritability is generally characterized by excessive reactivity to negative emotional stimuli with an affective component, anger, and a behavioral component, aggression.<sup>26</sup> Irritability has 2 dimensions: tonic (eg, grouchy, easily annoyed) and phasic (eg, loses their temper, becomes verbally or physically aggressive).<sup>27,28</sup> Phasic variably refers to outbursts or to distinct episodes of irritability (in contrast to chronic irritability).<sup>29</sup>
2. Anger is an intense emotional state associated with a strong, uncomfortable, and noncooperative response to a perceived provocation, hurt, or threat. It is the affective component of irritability and when unregulated leads to aggression.<sup>29</sup>
3. Aggression is defined as a “behavior that is intentionally carried out with the proximate goal of causing harm to another person who is motivated to avoid that harm.”<sup>30(p76)</sup> Aggression has been classified in many ways. Overt aggression is an observable response to an environmental event that may be further divided into proactive (or instrumental) or reactive (or “hot” or impulsive). Reactive aggression, an angry response to provocation or frustration, often results in behaviors characteristic of outbursts (temper tantrums, yelling, damaging things, hitting).<sup>31</sup> Although proactive aggression is clearly reflected in the criteria for CD, reactive aggression as a dimension is not well captured by *DSM-5*.<sup>32</sup>
4. Emotion dysregulation is characterized by too much emotion, expressed too often, too quickly, and for too long relative to the antecedent triggering event. While

this can apply to many different emotions (eg, sadness, excitement, fear), anger dysregulation is usually the core feature characterizing outbursts.<sup>33</sup>

### Outbursts in Clinical Samples

Outbursts may stem from precipitants and risk factors specific to the child (eg, anxiety, fear, anger, poor impulse control, sensory overload, psychosis, developmental impairments), to environmental exposures (eg, trauma, domestic violence, social chaos), to specific interactions (eg, parent–child and/or peer conflicts), and, finally, as part of different disorders whose criteria include irritability, anger, and/or aggression.

How frequent are outbursts in different psychiatric disorders? We cannot definitively answer that question. Outbursts are most frequently associated with diagnosed ADHD with comorbid ODD/CD.<sup>34–37</sup> However, while emotion dysregulation, irritability, and reactive aggression are common in children with ADHD, these symptoms are not part of the criteria.<sup>38–40</sup> Outbursts are implied in the description of ODD (“often loses temper”), but the criteria do not clearly explain what children do when they lose their tempers. Thus, the criteria defining conditions most commonly associated with outbursts are not specific enough to systematically assess the behaviors.

Although outbursts may be inferred in some disorders, they are only specifically named and studied in a few. For example, while outbursts are hypothetically subsumed in the term “irritable mood” for depression, we found no studies characterizing outbursts in depressed children and adolescents. In studies of prepubertal mania, severe outbursts are hallmark symptoms based on the irritable mood criterion.<sup>38</sup> However, although outbursts can be inferred from the Young Mania Rating Scale (YMRS)<sup>41</sup> ratings of aggressive behavior (“threatens interviewer; shouting; interview difficult” and “assaultive; destructive, interview impossible”), studies generally report only mean item and total YMRS scores, rather than responses to individual items. Thus, the frequency of outbursts in children characterized by the literature as manic is difficult to extrapolate.

Criterion E for posttraumatic stress disorder (PTSD) specifies “irritable behavior and angry outbursts with little or no provocation, typically expressed as verbal or physical aggression toward people or objects.”<sup>13(p272)</sup> Yet no systematic studies have examined the rates of these behaviors in children with PTSD. Finally, in disorders in which outbursts have been reported (Table 1), definitions and measures used to characterize outbursts varied widely.

While *DSM-5* does not specifically define irritability, most structured and semistructured interviews for children have a question addressing irritability or irritable mood in

their depression and mania sections.<sup>48</sup> The Schedule for Affective Disorders and Schizophrenia for School-Age Children (K-SADS), for instance, has addressed irritability, but differently over the years. The most frequently cited 1997 version of K-SADS conflated frequency and severity in the depression section (eg, moderate irritability is defined as irritable/angry mood greater than 50% of awake time *or* [emphasis ours] often shouts, loses temper).<sup>49</sup> Irritable mood was not assessed at all in the mania section. Since 2009, the K-SADS versions (D. Axelson, B. Birmaher, J. Zelazny, J. Kaufman and M.K. Gill, unpublished data, 2009) have added explosive irritability to mania, but much of the research on pediatric mood disorders was done using the earlier version. This possibly explains the absence of data on rates of outbursts in the mania literature. Other irritability questions are for ODD, where severe temper outbursts are based on frequency (3 times per week), not behavioral severity. For anxiety, irritability is rated as either present or absent (neither frequency nor severity). Ironically, while the frequency of outbursts might be a good measure of proneness to anger, severity of aggression during an outburst has been shown to contribute more to impairment.<sup>50</sup>

### Outbursts in Nonclinical Samples

Inconsistency of terms and measures for outbursts also makes it difficult to identify rates in nonclinical samples. The data are most straightforward in preschool children. In epidemiological surveys, tantrums, defined as uncontrolled outbursts of anger and frustration, are reported in greater than 80% of preschool children.<sup>51</sup> The mean duration of tantrums ranges from approximately 2 minutes at 18 months of age to 4–5 minutes at 3 and 4 years of age.<sup>52</sup> Low-level symptoms are considered normative, whereas more severe preschool tantrums are defined by their frequency (daily), duration (>5 minutes), aggression severity, and context (significant aggression with a nonparent adult).<sup>53</sup> Predictors of persistent tantrums and/or developing DMDD after age 6 years include bouts of frustration at least 3 times per week, periods of becoming extremely angry and unable to calm down, and tantrums outside of familiar surroundings with unfamiliar people and/or tantrums for no apparent reason at least monthly.<sup>54</sup> Distinguishing developmentally typical tantrums from pathological tantrums has implications for early intervention.

Across epidemiological studies of older children, although definitions of tantrums and outbursts vary, clinically significant indicators include greater frequency and longer duration of outbursts, more serious aggression, outbursts in multiple settings, and functional impairment. In

**TABLE 1** Examples of Outburst Frequency in Specific Clinical Samples

Diagnosis	Sample	Measurement	Outcome
OCD: specialty clinic for OCD <sup>42</sup>	N = 86; ages 6-17; 56% male; 90% White	ROARS; Rage Attacks Questionnaire	<ul style="list-style-type: none"> <li>• 54.7% had "clinically significant rage" on ROARS over the past week</li> <li>• 53% had "rage attacks" in the past month</li> <li>• Of those with rage: 61% exhibited verbal attacks; 60%, physical attacks; 40%, threatening and/or hitting; 9%, "completely out of control"</li> </ul>
Pediatric OCD Clinic at Maudsley Hospital, between 2005 and 2011 <sup>43</sup>	n = 387; mean age 14.4 years (SD 2.24, range 7-18); 39.4% male; N = 18,415	Temper outbursts were endorsed as "certainly true" on SDQ	<ul style="list-style-type: none"> <li>• 38.5% of young people with OCD in clinical sample and 43.5% of their parents: ICC between parent report and self-report of temper outbursts was 0.32 (<math>p &lt; .001</math>)</li> </ul>
Anxiety disorders (including separation, social, generalized, and panic): 3 outpatient clinics <sup>44</sup>	N = 107; ages 7-17; 55.4% male; 83.2% White	Anxiety Disorders Interview Schedule; ROARS; CGI-Rage	<ul style="list-style-type: none"> <li>• 55.1% had rage episodes in the past week</li> <li>• 7.5% had daily rage episodes</li> <li>• 49.0% scored in moderate or severe range on ROARS</li> <li>• 29.0% scored in moderate to severe range on CGI-Rage</li> <li>• 25.2% with rage episodes lasting &gt;15 min</li> </ul>
Tics/Tourette's disorder with rage attacks: movement disorders specialty practice in New York <sup>45</sup>	N = 48; ages 7-17; 83% male; 98% White	Rage Attack Questionnaire	<ul style="list-style-type: none"> <li>• 81% had rage attacks of at least moderate intensity</li> <li>• 25%-70% of patients with Tourette's syndrome have episodic behavioral outbursts (estimated from prior studies)</li> </ul>
ASD: sample from Interactive Autism Network, a large ASD research registry <sup>46</sup>	N = 462; ages 3-25; 85.9% male; 87.7% White	Mental Health Crisis Scale	<ul style="list-style-type: none"> <li>• 24% with tantrums that lead to crisis (ages 3-11)</li> <li>• 28% with tantrums that lead to crisis (ages 12-25)</li> </ul>
ASD: Interactive Autism Network and Inpatient Psychiatric Autism Network <sup>47</sup>	Community N = 1,169; inpatient n = 335	EDI item (caregiver report, past 7 days)	<ul style="list-style-type: none"> <li>• 46.8% of community ASD sample above EDI cutoff</li> <li>• 92.9% of inpatients with autism above EDI clinical cutoff</li> </ul>
ADHD: combined data from 2 family studies of children with ADHD, clinical research sample from Boston <sup>40</sup>	N = 274; age 6-17; 50% male by design; race not stated	K-SADS: explosive irritability from mania description: "Have you ever had a period of 1 week or longer when you felt super-angry, grouchy, or cranky (or irritable) all of the time?" Present for at least 50% of the day	<ul style="list-style-type: none"> <li>• 18% were identified as "super-angry/grouchy/cranky," the most severe form of irritability from among several considered in this study</li> </ul>

**Note:** ADHD = attention-deficit/hyperactivity disorder; ASD = autism spectrum disorder; CGI-Rage = Clinical Global Impressions of Rage; EDI = Emotion Dysregulation Inventory; ICC = intraclass correlation coefficient; K-SADS = Schedule for Affective Disorders and Schizophrenia for School-Age Children; OCD = obsessive-compulsive disorder; ROARS = Rage Outbursts and Anger Rating Scale; SDQ = Strengths and Difficulties Questionnaire.

one community sample, 11% of 6-year-olds had tantrums  $\geq 3$  times/week, whereas only 3.6% had destructive outbursts.<sup>48</sup> Data from the Great Smoky Mountains sample (ages 9-13 and 9-17) found frequent ( $\geq 3$  times/week), severe (not defined) tantrums in 6.3%-7.1% of school-aged children.<sup>51</sup> In the National Comorbidity Study, 14% of adolescents (7.8% with IED and 6.2% with IED but with diagnostic exclusions) reported having at least  $\geq 3$  lifetime “anger attacks” characterized by sudden loss of control resulting in threats and property or physical violence.<sup>55</sup>

In both outpatient<sup>9</sup> and inpatient<sup>34</sup> clinical samples, behaviors reported most often include swearing and shouting, slamming doors, punching walls and kicking and hitting things, and aggression toward others. Tearful, sad, and anxious behaviors are also common.<sup>9</sup> These behaviors are quite similar to tantrums in preschool children except that the episodes last longer, and the aggression or property destruction is more severe.<sup>56</sup>

### Demographic Influences in Youth With Impairing Emotional Outbursts

Although the data are limited, epidemiological studies do not find differences in rates of disruptive behaviors in younger children (4 years of age) based on gender or race.<sup>57</sup> Gender differences become more prominent among middle school-aged children, with greater rates of disruptive behaviors in boys, at least in Western cultures.<sup>58</sup>

However, Black, Hispanic, and Asian youth are significantly less likely to receive a diagnosis of ADHD<sup>59</sup> and are much more likely to receive a diagnosis of a disruptive behavior disorder compared with White youth exhibiting the same symptoms.<sup>60</sup> Several studies of Black and Hispanic youth in juvenile detention have discovered that youth with previous diagnoses of ODD or CD have unrecognized diagnoses of anxiety, mood, or trauma-related disorders that contributed to dysregulated behaviors.<sup>61</sup> These findings suggest evidence of bias in the way disruptive behaviors are diagnosed and disciplined among minoritized populations in schools and juvenile justice settings. Characterization of impairing emotional outbursts among minoritized populations has thus been hampered by the same factors confounding data for all groups, with bias in the assignment of diagnostic categories as an additional challenge.

### Measures

Most measures of aggression, irritability, and mood dysregulation were developed for research rather than for clinical use and were not necessarily designed for children. Further, these tools generally do not assess factors specific to emotional outbursts,<sup>26,62</sup> including how quickly and

frequently the child gets upset (level of reactivity), how upset the child gets (quantifying verbal and aggressive behaviors), how long it takes the child to calm down (duration), or the context (where and when outbursts occur). Although different components of outbursts are related statistically,<sup>37,50</sup> impairment can be caused by any one or all of these factors, such that each needs to be identified and quantified separately. Althoff and Ametti<sup>63</sup> reviewed several broad and narrow measures of dysregulation and aggression. Table 2 presents a subset of brief and freely available clinical measures and interviews to help clinicians assess outbursts.

### Outcomes

The Berkley Longitudinal Study specifically addressed outcomes in “the life course patterns of explosive children” (age 10) as adults (age 40).<sup>73</sup> Downward mobility and poor educational and occupational outcomes were the rule. Significant correlations were noted between “childhood ill-temperedness” and adult personality traits such as “overreactive to minor provocation/is irritable” ( $r = 0.33$ ,  $p < .05$ ) and “under-control of needs and impulses” ( $r = 0.45$ ,  $p < .01$ ).<sup>74</sup>

Otherwise, information regarding the outcomes of children and adolescents with impairing emotional outbursts must be extrapolated from studies of irritability and aggression. Follow-up studies of irritability in general (without distinguishing phasic and tonic components) from preschool to school age or school age to adolescence appear to predict both internalizing (depression, anxiety) and externalizing (ODD, ADHD) disorders.<sup>16,54,75-78</sup> When subjects were followed into adulthood, childhood irritability most often predicted outcomes of depression, anxiety, and neuroticism,<sup>16,75,78,79</sup> rather than bipolar disorder or externalizing disorders. However, in many adult follow-up studies, conditions such as ODD or temper outbursts were not explicitly assessed. Only mood and anxiety disorders, substance abuse, and antisocial personality were examined.

Different results emerge when outcomes of tonic and phasic irritability are independently studied. Tonic irritability uniquely predicts depressive and anxiety disorders,<sup>80</sup> whereas phasic irritability uniquely predicts externalizing disorders such as substance use disorder, ODD, and CD.<sup>81</sup> Teacher ratings of apparent phasic irritability (eg, “often loses temper” and reactive aggression) in children 6-12 years of age also predict subsequent suicidal behaviors,<sup>82-84</sup> consistent with the reported association between reactive aggression and suicide-related behaviors.<sup>85</sup>

Not surprisingly, longitudinal studies of reactive aggression,<sup>17,86-89</sup> which includes impairing emotional outbursts, found outcomes similar to those reported in

**TABLE 2** Free Brief Rating Scales With Specific Emphasis on Phasic Irritability/Outbursts

Rating scale	Description
SDQ <sup>64</sup> <a href="https://www.sdqinfo.org/">https://www.sdqinfo.org/</a>	General brief measure of psychopathology, with parent, youth, and teacher report versions. 5-item subscales address emotional symptoms, conduct problems, hyperactivity/inattention, peer relationships and prosocial behaviors. Translated and normed for dozens of different countries to allow quantification of sample severity. A "dysregulation profile" reflects a broad dysregulation state. <sup>65</sup> Paper versions may be downloaded and subsequently photocopied without charge by individuals or nonprofit organizations provided that they are not making any charge to families.
ARI <sup>66</sup> <a href="https://www.nimh.nih.gov/research/research-conducted-at-nimh/research-areas/clinics-and-labs/edb/mbdu/affective-reactivity-index-ari">https://www.nimh.nih.gov/research/research-conducted-at-nimh/research-areas/clinics-and-labs/edb/mbdu/affective-reactivity-index-ari</a>	6-item scale rating irritability/anger (how often does the person get angry, lose their temper, get annoyed, stay angry). An impairment item assesses whether irritability causes a problem. Parent and child version.
EDI <sup>67</sup> <a href="http://www.reaact.pitt.edu">www.reaact.pitt.edu</a>	7-item caregiver survey quantifies items by severity over the past week, addressing different aspects of outbursts, including whether the child explodes quickly and more severely than the situation warrants, does the child cry or stay angry for 5 or more min, and are they hard to calm down.
EMO-I <sup>50</sup> <a href="https://www.aacap.org/AACAP/Resources_for_Primary_Care/EMO-I.aspx">https://www.aacap.org/AACAP/Resources_for_Primary_Care/EMO-I.aspx</a>	Assesses outburst triggers; what the child does during an outburst (argue, scream, threaten, throw things, hit/kick/spit, need restraint, hurt self, or something else); and specifically how often and how long the outbursts lasts, whether there is irritability between outbursts, and how the child feels afterward. Has been used with parents and teachers.
R-MOAS <sup>68</sup> <a href="https://www.thereachinstitute.org/wp-content/uploads/2021/06/MOAS_Parent.pdf">https://www.thereachinstitute.org/wp-content/uploads/2021/06/MOAS_Parent.pdf</a> <a href="mailto:blader@uthscsa.edu">blader@uthscsa.edu</a>	4-part behavior rating scale used to evaluate and document the frequency and severity of a child's aggressive episodes. The 4 categories are verbal aggression, aggression against objects, aggression against self, and aggression against others. It has been modified from the adult version for weekly outpatient use in children.
PAPA <sup>69</sup> /CAPA <sup>70</sup> <a href="https://devepi.duhs.duke.edu/measures/the-preschool-age-psychiatric-assessment-papa/">https://devepi.duhs.duke.edu/measures/the-preschool-age-psychiatric-assessment-papa/</a> <a href="https://devepi.duhs.duke.edu/measures/the-child-and-adolescent-psychiatric-assessment-cap/">https://devepi.duhs.duke.edu/measures/the-child-and-adolescent-psychiatric-assessment-cap/</a>	Diagnostic interviews available through Duke University that elicit specific information about outbursts/tantrums severity independent of mood. The PAPA/CAPA evaluates tantrums in the ODD section.
DAWBA <sup>71</sup> <a href="https://dawba.info/a2.html">https://dawba.info/a2.html</a>	Comprehensive interview that has a specific irritability, temper, and anger control section that ascertains outbursts in the greatest detail.
CL-ARI <sup>72</sup> <a href="mailto:brotmanm@mail.nih.gov">brotmanm@mail.nih.gov</a>	Semistructured parent-child interview assessing temper outbursts and prolonged irritable mood over the past week. Additionally, the CL-ARI assesses irritability-related impairment.

**Note:** ARI = Affective Reactivity Index; CL-ARI = Clinical Affective Reactivity Index; DAWBA = Development and Well-Being Assessment; EDI = Emotion Dysregulation Inventory; EMO-I = Emotional Outburst Inventory; ODD = oppositional defiant disorder; PAPA/CAPA = Preschool Age Psychiatric Assessment/Child and Adolescent Psychiatric Assessment; R-MOAS = Retrospective Modified Overt Aggression Scale; SDQ = Strength and Difficulties Questionnaire.

studies of irritability. From childhood to adolescence, reactive aggression predicted both internalizing (anxiety, depression) and externalizing (violence, delinquency) problems and substance use. In adulthood, unique predictions remained for anxiety, hard drug use, and possibly marijuana use.<sup>87</sup> Research using various trajectory methods from childhood to adolescence to adulthood found that the highest levels of aggression attenuated somewhat over time but remained much higher than the comparison groups.<sup>17,86,88,89</sup> Still, none of the studies specifically tracked the natural course or treatment outcomes of temper loss or outbursts that occurred in youth.

### Treatment

The goal of treatment is to eliminate, or at least significantly diminish, impairing emotional outbursts. Effective treatment begins with a comprehensive diagnostic assessment that is attentive to the conditions and situations with which these outbursts are associated. Standardized measures (eg, Table 2) are needed to quantify the severity of the child's problems as well as track progress in treatment. Functional behavioral analyses should be used to identify factors that potentially trigger and/or reinforce the outburst behaviors. Determinations regarding whether outbursts are primarily driven by internal stimuli and disorganized thinking vs reactive maladaptive responses to social negotiations and interpersonal conflicts are critical distinctions for treatment planning.

Diagnostically specific treatments and transdiagnostic therapeutic strategies are both important. Interventions that target the core features of the underlying psychiatric disorder, eg, impulse control for ADHD, mood stabilization for bipolar disorder, and delusions and hallucinations in psychotic disorders, can also ameliorate outbursts. However, youth with impairing emotional outbursts often have complex comorbid clinical presentations, and further research is needed to determine how best to adapt and tailor interventions across diagnostic and co-occurring categories.<sup>90</sup> Further, characterizing outbursts solely as a symptom of a specific disorder potentially obscures functional aspects of the behaviors.

Impairing emotional outbursts often represent maladaptive or deficient coping skills, including deficits in problem solving, communication, or interpersonal negotiation.<sup>91,92</sup> Outbursts often occur when a child feels overwhelmed in response to a triggering interpersonal conflict and frustration regarding the perception of unmet needs and demands. Risk factors that increase a child's vulnerability include impulsivity, developmental lags, recurrent familial conflicts, mismatches in parent-child temperament,

and trauma histories.<sup>93</sup> Patterns of clinically significant impairing emotional outbursts often develop in response to inconsistent, invalidating, coercive, and/or chaotic environmental exposures.<sup>94</sup> These risk factors and environmental exposures are common in child psychiatry populations, regardless of diagnosis.

Within this framework, eliminating outbursts ultimately requires teaching and reinforcing more adaptive coping and problem-solving skills. Clinicians must be able to engage and motivate patients and families to participate in treatment, conduct functional behavioral analyses, and use contingency management and self-regulation or family regulation skill building to shape behaviors and teach more positive coping skills. Given the clinical complexity of outbursts, clinicians need a tool belt of effective treatments that can be mixed and matched to address the specific needs of a child and family.<sup>95</sup>

Therapies designed to target oppositional behaviors, trauma, aggression, developmental lags, autism spectrum disorder, speech and language delays, mania, psychosis, depression, and anxiety all may lead to reductions in emotion dysregulation and impairments secondary to outbursts.<sup>96</sup> Principles of behavioral modification and cognitive-behavioral therapies (CBTs) underlie most evidence-based strategies,<sup>97,98</sup> including parent training,<sup>99,100</sup> dialectical behavioral therapy,<sup>101</sup> collaborative problem solving,<sup>102</sup> applied behavioral analysis,<sup>103</sup> and trauma-focused CBT.<sup>104</sup> Family and parenting interventions helpful for childhood psychiatric disorders often associated with irritable mood and anger outbursts include family-focused therapy (mood and psychotic disorders),<sup>105</sup> multi-family psychoeducational psychotherapy (mood disorders),<sup>106</sup> and parent-child interaction therapy (tantrums and aggression in young children).<sup>107</sup> Adaptations of evidence-based strategies have been used to address youth with emotional and behavioral dysregulation in different settings, including schools,<sup>6</sup> inpatient and residential units,<sup>108</sup> and juvenile justice programs.<sup>109,110</sup>

Modules of evidenced-based treatments can be combined into a comprehensive care plan individually tailored to patient and family needs. For example, the Modular Approach to Therapy for Children with Anxiety, Depression, Trauma and Conduct Problems uses behavioral parent training and CBT as first-line interventions for irritability.<sup>95</sup>

Dialectical behavioral therapy combines CBT techniques for emotion regulation, reality testing, distress tolerance, mindfulness, and acceptance and has been adapted for adolescents with suicidal and self-harming behaviors<sup>111</sup> and for children with DMDD.<sup>112</sup> In dialectical behavioral therapy, the goal is to replace maladaptive

behaviors, which are often the consequence of traumatic or invalidating environments, with more effective coping strategies.

Treatments targeting PTSD and related comorbidities include developmentally focused CBT approaches with psychoeducation, parenting skills and behavior management, coping strategies for anxiety and trauma reminders, trauma narration (gradual exposure and cognitive restructuring), affect regulation, in vivo exposure, and enhancing safety.<sup>113</sup> In younger children, there is an added focus on attachment, the parent-child dyad, and parental reflective attunement.<sup>114</sup> Children with more complex presentations of PTSD, including comorbid symptoms of affect dysregulation, negative self-concept, and interpersonal problems, respond equally well to trauma-focused CBT as youth with uncomplicated PTSD, despite having overall higher levels of symptom severity.<sup>115</sup>

Other potential novel interventions include exposure-based CBT, which identifies scenarios that are triggers for the child and then uses exposure techniques, skill building, and distress tolerance strategies to help youth with severe irritability.<sup>116</sup> Programs are also being designed to correct perceptual biases in youth that misinterpret ambiguous facial expressions as angry or threatening.<sup>72</sup>

Effective intervention depends on a functional understanding of the behaviors, including factors that trigger, reinforce, or excuse the behavior, either in the present or historically. Once established, maladaptive coping strategies may persist even if they are no longer effective or if the environment has changed, unless patterns of reinforcement are addressed and the child or family system is taught new skills. For example, a child who hates school, has an outburst and is suspended, and gets to avoid the classroom. A dysregulated child fearful of being alone in their room alone ends up sleeping in their parent's bed. Functional behavior assessments are necessary for designing interventions tailored toward a particular patient's needs, with emphasis on teaching the patient and family how to meet their needs in a more adaptive way.

### Medications

Medication management is generally based on treating the underlying psychiatric disorder or disorders, starting with agents approved by the U.S. Food and Drug Administration for the pediatric population. For example, youth with ADHD and explosive anger outbursts were found to have a significant reduction in aggression when treated with the combination of optimized stimulants and family-based behavioral therapy/parent training. For some children, stimulants were sufficient. Others needed the addition of

divalproex or risperidone to further treat aggression, although children who needed adjunctive medication never improved as much as children on stimulants alone.<sup>68,117</sup>

Of the available classes of medications, antipsychotics have been studied the most for reducing aggression and outbursts in the context of psychotic illnesses,<sup>118</sup> bipolar disorder,<sup>118</sup> and autism spectrum and developmental disorders.<sup>119</sup> In the pediatric population, the best evidence currently available for reactive aggression is risperidone.<sup>120</sup> However, effectiveness comes at the cost of significant side effects and unclear long-term consequences.<sup>121</sup> Data are lacking for other atypical antipsychotics.

Some studies support the use of lithium and divalproex sodium for aggression and mood instability in children, although findings are mixed.<sup>120</sup> Very limited evidence suggests that alpha-2-agonists and atomoxetine may be helpful for aggression associated with ADHD, but the findings are not nearly as robust as for stimulants.<sup>122</sup> Although a few studies suggest that antidepressants are helpful for aggression and irritability, the results are inconsistent,<sup>120</sup> and a meta-analysis of randomized controlled trials found that risk of aggression doubled for youth on antidepressants compared with placebo (similar to the findings for suicidality).<sup>123</sup> Any agent that causes activation or akathisia is at risk to increase aggression in some patients. Beyond the above findings, the evidence base is limited or nonexistent for other agents.<sup>120</sup>

### Acute Treatment of Impairing Emotional Outbursts

Psychiatric hospitalization in approximately 50%-75% of children is due to impairing emotional outbursts.<sup>9</sup> These youth generally have chronic problems with mood and behavioral dysregulation and account for high rates of failed treatment and readmissions.<sup>124</sup> Brief length of stay is not adequate to gauge the effectiveness of medication trials, and in most cases, psychotropic agents by themselves are not sufficient to address the complex mood, behavioral, and psychosocial issues that led to hospitalization (at least in the short term). In a recent study, the absence of a behavior modification program was found to be the predictor of increased numbers of p.r.n. medication use (as a proxy for outbursts), seclusions, and restraints.<sup>4</sup> Neither standing neuroleptic medication nor p.r.n. medication appeared to be effective in shortening the duration of outbursts or decreasing their frequency.<sup>4</sup> In fact, what little literature there is does not support p.r.n. medication use as helpful.<sup>2,3,125,126</sup>

De-escalation techniques for managing impairing emotional outbursts are even less well studied, and the data so far are not encouraging, at least in adults.<sup>127</sup> Although a



number of initiatives describe strategies to diminish seclusion and restraint during inpatient care, these efforts generally do not assess the impact on outbursts, aggression, or long-term outcomes.<sup>4,124</sup> The goal of treatment is to eliminate outbursts and improve long-term functioning, not simply to avoid more restrictive interventions while placating acting-out behaviors.

When discharged, many children return to families and outpatient care systems that are ill-equipped to care for them, with few available intermediate care services (eg, partial hospital programs, school-based day treatment, intensive in-home services). Many outpatient programs are unwilling to admit high-risk patients. These children then frequently bounce back, boarding in emergency departments and pediatric beds awaiting another short-term hospitalization.<sup>128,129</sup> Lack of consistent care discourages and demoralizes children and families. Desperate prescribers try multiple aggressive medication regimens,<sup>130</sup> without being able to address the longer-term needs of these children, who may require a more rehabilitative model of care.

Additional studies are sorely needed to establish optimal first-line and stepped strategies for the immediate, short-term, and long-term treatment of children with outbursts.<sup>131</sup> Medication comes with tolerability and side-effect problems.<sup>130</sup> Parent training, the best-studied nonmedical intervention, has a treatment effect size of around 0.5.<sup>132</sup> In outpatient studies for children with severe mood dysregulation using medication, behavioral treatments, parent management training, and group therapies, treatment response was modest, and improvements were not sustained when the interventions were stopped.<sup>133,134</sup>

Ultimately, clinicians must select treatments based on available empirical evidence, individual clinical characteristics, patient/family preferences, and safety concerns. For most youth with impairing emotional outbursts, medications are not sufficient and, when used, must be combined with CBT interventions designed to target maladaptive coping strategies and to teach new skills.

### Systems of Care

Outbursts in children and adolescents confer enormous costs to the individual, family, and society. The complex array of symptoms associated with impairing emotional outbursts, including volatile moods, aggression, self-harm, property destruction, substance abuse, treatment non-adherence, and other unsafe provocative and disruptive behaviors, accounts for a disproportionate amount of emergency department visits and hospitalizations as well as negatively impacts placement and service planning in

other systems of care, including schools, social welfare, and developmental disability services.<sup>1,6,9,108,124</sup> Impairing emotional outbursts are difficult to treat and challenge therapeutic programming across levels of care. The absence of effective services adds to disparities in referral patterns for mental health services, resulting in disadvantaged and minority youth being disproportionately referred to law enforcement and juvenile justice programs.<sup>135,136</sup>

Pediatric mental health care needs to be reimaged to address the needs of youth with chronic impairing emotional outbursts.<sup>137</sup> Teams of providers trained in evidence-based interventions are needed within organized continuums of care. As it is, services within most community pediatric mental health care systems are disjointed and disconnected.<sup>124,138</sup> Rather than integrating evidence-based medication and psychotherapeutic approaches, most treatment focuses on short-term crisis management. Well-trained therapists capable of providing effective interventions are in short supply.<sup>139</sup> As a result, children and families typically move from one setting to another without any significant coordination of care.

A cohesive continuum of care is needed, with the integration of inpatient and intensive community-based resources. As outbursts often represent maladaptive coping strategies, successful treatment requires ongoing psycho-educational and cognitive-behavioral strategies to teach and reinforce new skills in the child and family that ideally occur in settings where the outbursts are most common. Skill development takes practice and coaching and is not easily accomplished with short-term interventions. Investment is needed to develop multidisciplinary teams that can provide evidence-based treatments and long-term intensive case management across settings, with patient and family involvement in treatment planning and resource acquisition.<sup>140</sup>

Efforts are underway to improve the current systems of care. For example, there are national efforts such as the National Suicide Hotline Designation Act to be implemented in July 2022, which aims to redesign crisis response services to provide more comprehensive coordinated care, with a single point of entry and access to services.<sup>141</sup>

Currently available pediatric mental health care services are not adequate for preventing and treating impairing emotional outbursts. Research is needed to better identify outbursts; to understand their clinical characteristics, course, and associated sequelae; to design and implement more effective interventions; and to efficiently integrate those treatments into an organized continuum of care.

**TABLE 3** Key Points and Recommendations

Key point number	Recommendation
1.	Impairing emotional outbursts significantly impact child and family functioning and confer enormous costs and burden on systems of care. Our current pediatric mental health care system does not adequately address outbursts (nor do we even know the extent of the problem given definitional and measurement issues).
2.	An established definition of outbursts is needed that clinicians, systems of care, and payers can use to characterize the frequency, severity, duration, and functional impact of outbursts.
3.	Clinicians and other stakeholders need a way to identify and code outbursts without invoking disorders that children do not have. At this time, an R code R 45.8A defining impairing emotional outbursts is under consideration as an addition to <i>DSM-5</i> . This R code would provide an accurate descriptive label for children presenting with clinically significant outbursts who do not meet criteria for DMDD or IED (including younger children, as neither DMDD nor IED can be diagnosed until 6 years of age). In the presence of comorbid conditions (eg, for children with ADHD, ODD, etc), the R code would provide more accurate information regarding why the child was referred for evaluation and treatment.
4.	Youth-focused outcome measures are needed to track the dimensions of outbursts (frequency, severity, duration) in different settings.
5.	Severe tantrums/outbursts in young children predict persistent difficulties with mood and behavior and warrant early intervention.
6.	Treatment formulation and planning needs to optimize treatment for underlying psychiatric conditions; use functional behavioral analyses to identify and target factors that trigger and reinforce outbursts to prevent their recurrence and to teach the child and family more effective coping strategies; and build on a foundation of evidence-based interventions, which at the moment include contingency management, parent management training, and interventions based on cognitive-behavioral strategies (eg, psychoeducation, distress tolerance, mindfulness, communication skills building, problem solving).
7.	For medication therapies, the best data are for optimizing stimulant therapy for youth with ADHD and aggression. Limited data support the use of antipsychotic medications (particularly risperidone), but also raise concerns of side effects. Currently, there are no data supporting the use of p.r.n. medications for acute outbursts, and definitive studies are needed. We need a Food and Drug Administration–approved target to treat, and we need more effective medications.
8.	Inpatient psychiatric care needs to be redesigned to better address impairing emotional outbursts in children and adolescents. Brief lengths of stay are not adequate to address chronic mood and behavioral dysregulation and may inadvertently reinforce maladaptive behaviors. Youth with these behaviors have high rates of readmission and treatment failure. If hospitalization is needed, the model of care should be based on the length of time and types of treatments necessary to effectively intervene, rather than an arbitrary number of days based on funding or administrative priorities.
9.	Inpatient, residential, and other high-intensity acute care settings need well-trained frontline professionals and quality improvement programs (with physician involvement) that track and target outbursts and aggressive behavior. Specific measures of outburst frequency and severity are needed (beyond just tracking seclusion and restraint), with a focus on improving treatment effectiveness and reducing the risk of injury to patients and staff.
10.	A continuum of programs and resources is needed to provide evidence-based behavioral and cognitive-behavioral strategies for both inpatients and outpatients (including intensive outpatient, partial hospitalization, and therapeutic school programs and mobile response teams).

### Neuroscience Underlying Outbursts and Next Steps

Understanding the biological underpinnings of impairing emotional outbursts is key for developing more effective treatments. As with clinical science, neurobiological research focuses on indices or proxies for outbursts, including

aggression and irritability. Across species, aggression is essential for survival and necessary for self-protection and resource acquisition. Recent cross-species discoveries examine how instinctual aggressive behaviors are shaped by internal states and past experiences<sup>142</sup>; validate proactive and reactive

subtypes<sup>143</sup>; and describe how these behaviors are regulated,<sup>144</sup> are sexually dimorphic,<sup>145</sup> and depend on (social) context.<sup>146</sup>

Brain-based models of outbursts can offer clues about their etiology and how certain behaviors might be reinforced, particularly in subpopulations. For example, expression and activation of orexin neurons in the lateral hypothalamus promote male-to-male aggression in mice.<sup>147</sup> Forward translating these findings to humans may advance understanding of how the brain regulates the expression of emotional outbursts.<sup>148</sup>

To facilitate translation, definitions of outbursts must be operationalized and harmonized with related constructs such as irritability or the “elevated proneness to anger, relative to peers,” given their primacy in many psychiatric disorders. Basic mechanisms underlying irritability have been proxied by constructs such as frustrative nonreward, in which irritability is understood as an aberrant response to frustration and to threat. Increased irritability has been associated with increased frontostriatal activity when children attempt to complete an attentional task immediately after frustration.<sup>149</sup> Thus, neuroimaging and other *in vivo* neuroscience methods can be useful to guide aggregate evidence of validation for complex phenotypes, such as impairing emotional outbursts.

Varying trajectories of irritability signal the need to contextualize the developmental origin of impairing emotional outbursts.<sup>76,150</sup> Individual differences also add complexity, associated with variable functional connectivity patterns during frustration.<sup>151</sup> Ecological momentary assessments can potentially help determine with more granularity whether phasic and tonic components have different courses, outcomes, or responses to treatment or can be used to explain the degree to which the frequency, severity, duration, or pervasiveness of an outburst impacts treatment response.<sup>152</sup> If common and unique mechanisms underlying various subcomponents of irritability, outbursts, and related constructs<sup>153</sup> can be identified, we may be able to better predict the course of children presenting with these complex phenotypes to help guide treatment.

There are key clinical translational questions about the biology and timing of outbursts that will help guide scientific progress: How can an impairing emotional outburst be systematically defined, and what are the most common and significant etiologies to target?<sup>154</sup> Can artificial intelligence be leveraged to help identify problematic behaviors that precede an outburst in order to prevent the next one?<sup>144</sup> Can technology help disseminate well-supported high-quality interventions at scale? As epidemiological evidence suggests critical sensitive windows when outbursts might be highly prevalent, when should prevention strategies begin?

Does prevention begin at preconception with universal and targeted parent training? How can health promotion (primary prevention) strategies be implemented for outbursts and, more broadly, for violence prevention?<sup>155</sup> How do existing treatments compare with each other (comparative effectiveness), and how can we more effectively match youth to the right treatment and at the right time?<sup>95</sup> Finally, for youth living with impairing emotional outbursts, how do we improve their functioning and quality of life? In beginning to address these questions, early and preventive efforts can be harnessed for most youth, while also concentrating on advancing multilevel therapeutic efforts in youth at greatest risk for the poorest outcomes.

## DISCUSSION

Impairing emotional outbursts are crippling to families and children, to schools and neighborhoods, and to the mental health care system at large. Despite this, we lack reliable and validated methods to identify, measure, and determine the natural course and outcomes of outbursts. Without this information, it is difficult to assess the benefits of treatment. Studies of related concepts such as irritability and reactive aggression suggest that impairing emotional outbursts are often chronic and disabling. Yet they are frequently treated as acute transient episodes that one clinician or program can cure. Rehabilitative multisystem models of integrated care are needed to address the problem. Services and resources need to be redesigned to meet the needs of children and families (Table 3).

Because impairing emotional outbursts often represent maladaptive coping strategies, contingency management and cognitive-behavioral strategies are important for teaching children more adaptive problem-solving and conflict resolution skills. Medications that successfully treat conditions associated with outbursts can be helpful. Too often, however, treatment success is modest and not sustained either because we have not identified the right target or because our interventions, far from being “powerful,” are simply inadequate. Outbursts need to be better defined, characterized and measured, before we can identify etiologies and develop precise treatments.

Accepted March 21, 2022.

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The authors have reported no funding for this work.

This article is a part of a special review series devoted to child and adolescent emotion dysregulation as part of the presidential initiative of American Academy of Child and Adolescent Psychiatry (AACAP) President Gabrielle A. Carlson, MD (2019-2021). Articles were selected to cover a range of topics in the area, including reviews of genetics, neuroimaging, pharmacological and nonpharmacological treatment, screening tools, and prevention, among others. The series was edited by Guest Editor Daniel P. Dickstein, MD, Associate Editor Robert R. Althoff, MD, PhD, and Editor-in-Chief Douglas K. Novins, MD.

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The authors thank those who contributed to the conceptualization, including Spencer Evans, PhD, of the University of Miami, Ellen Leibenluft, MD, of the National Institute of Mental Health, Amy Krain Roy, PhD, of Fordham University, and Benjamin Shain, MD, PhD, of NorthShore University HealthSystem, and those who served on Dr. Carlson's AACAP Presidential Initiative Task Force on Emotion Dysregulation in Children and Adolescents—Coming Together to Treat the Sickest Kids, including Avanti Bergquist, MD, of Eating Recovery Center Bellevue, John Constantino, MD, of Washington University, and Michael Houston, MD, of George Washington University School of Medicine.

**Disclosure:** Dr. Carlson has received grant support from the National Institute of Mental Health (NIMH) and honoraria from AACAP. Her spouse has reported serving on the Data and Safety Monitoring Board for Pfizer and Lundbeck. Dr. Singh has received grant or research support from the National Institutes of Health (NIH), NIMH, the National Institute on Aging, the Brain and Behavior Research Foundation, the Patient-Centered Outcomes Research Institute (PCORI), Allergan, Johnson and Johnson (Janssen), the Stanford Department of Psychiatry and Behavioral Sciences, and the Stanford Maternal Child Health Research Institute. She serves on the advisory boards of Skyland Trail and Sunovion. She serves as a consultant to Johnson and Johnson, Alkermes, and Neumora. She has received royalties from American Psychiatric Association Publishing and Thrive Global and honoraria from AACAP. Dr. Amaya-Jackson has served on the advisory board/as a consultant to NIH. She has received grant and research support from The Duke Endowment and the Substance Abuse and Mental Health Services Administration (SAMHSA). She receives annual training funding from the North Carolina General Assembly. Dr. Benton has served as trustee to Friends Central School and the Juvenile Law Center. Dr. Althoff has received grant or research support from NIMH, the

National Institute on Drug Abuse, and the Klingenstein Third Generation Foundation. He has served on the editorial board of *Child Psychiatry and Human Development* and as consulting editor of the *Journal of Clinical Child and Adolescent Psychology*. He has received honoraria from the Massachusetts General Hospital Psychiatry Academy and Frontline Medical Communications, Inc. He is a partner of WISER Systems, LLC. Dr. Bellonci has served on the advisory board of the Association of Children's Residential Centers and the National Alliance to Advance Adolescent Health. He has served as a consultant to Children's Rights and the National Center for Youth Law. He has received grant support from the Administration for Children and Families—funded Quality Improvement Collaborative for LGBTQ Youth in Child Welfare, the Health Resources and Services Administration—funded telehealth grant, and SAMHSA-funded The Center of Excellence on LGBTQ+ Behavioral Health Equity. Dr. Bostic has received grant support from SAMHSA. Dr. Findling has served as an advisor/consultant to Acadia, Adamas Pharmaceuticals, Inc., Afecta Pharmaceuticals, Inc., Akili Interactive, Alkermes, Allergan, Inc., Arbor Pharmaceuticals, LLC, Axsome Therapeutics, Inc., Emalex Biosciences, Inc., F. Hoffmann-La Roche Ltd., Gedeon Richter (UK) Ltd., Genentech, Inc., Idorsia Pharmaceuticals Ltd., Intra-Cellular Therapies, Inc., Luminopia, Inc., Lundbeck, MedAvante-ProPhase, Inc., MJH Life Sciences, NIH, Neurim Pharmaceuticals, Inc., Otsuka America Pharmaceutical, Inc., PCORI, Pax-Medica, Inc., Pfizer Inc., Physicians' Postgraduate Press, Q BioMed Inc., SAGE Publications, Signant Health, Sunovion Pharmaceuticals, Inc., Supernus Pharmaceuticals, Inc., Syneos Health, SyneuRx International (Taiwan) Corp., Teva Pharmaceuticals Industries, Ltd., and Tris Pharma, Inc. He has received grant support from Akili Interactive, Allergan, Inc., Arbor Pharmaceuticals, LLC, F. Hoffmann-La Roche Ltd., Lundbeck, NIH, Neurim Pharmaceuticals, Inc., Sunovion Pharmaceuticals, Inc., Supernus Pharmaceuticals, Inc., and SyneuRx International (Taiwan) Corp. He has received research support from Lundbeck, PCORI, Pfizer Inc., Viatrix, and Shire, a Takeda Company. He has received an honorarium for participation in the AACAP meeting. He has received royalties from American Psychiatric Press and SAGE Publications. Dr. Galanter has received royalties from American Psychiatric Publishing, Inc. She has served on the Scientific Steering Committee of and as speaker for Patient-Centered Mental Health in Pediatric Primary Care of the REACH Institute. Dr. Gerson has received royalties from American Psychiatric Publishing, Inc. Dr. Sorter has received grant support from PCORI. Dr. Stringaris has received funding from NIH Intramural Research Program and is a coauthor of the Affective Reactivity Index (ARI), a cost-free psychometric instrument. He has received royalties from Cambridge University Press for *The Maudsley Reader in Phenomenological Psychiatry* and Oxford University Press for *Disruptive Mood: Irritability in Children and Adolescents*. Dr. Waxmonsky has received grant or research support from Pfizer Inc. and Supernus Pharmaceuticals. He has served as a consultant to Intra-Cellular Therapies and Purdue Pharma L.P. Dr. McClellan has received grant support from NIH (MH125054). Dr. Chua has reported no biomedical financial interests or potential conflicts of interest.

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<https://doi.org/10.1016/j.jaac.2022.03.014>

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