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The behavioral organization, temporal characteristics, and diagnostic concomitants of “rage” outbursts in child psychiatry in-patients

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Abstract

Angry outbursts, sometimes called “rages”, are a major impetus for children's psychiatric hospitalization. In hospital, such outbursts are a management problem and a diagnostic puzzle. Among 130 4-to-12 year olds successively admitted to a child psychiatry unit, those having in-hospital outbursts were likely to be younger, have been in special education, have a pre-admission history of outbursts, and a longer hospital stay. Three subsets of behaviors, coded as they occurred in 109 outbursts, expressed increasing levels of anger; two other subsets expressed increasing levels of distress. Factor structure, temporal organization and age trends indicated that outbursts are exacerbations of ordinary childhood tantrums. Diagnostically, children with outbursts were more

likely to have language difficulty and a trend towards ADHD. Outbursts of children with anxiety diagnoses showed significantly more distress relative to anger. Outbursts were not especially associated with our small sample of bipolar diagnoses.

Introduction

When children's repeated outbursts of agitated anger, distress and (sometimes) aggression cannot be controlled in home or school environments, they are often referred for psychiatric hospitalization. If admitted, some, but not all, children go on to have outbursts on the ward. These outbursts are important because they disrupt ward functioning, create management challenges, may indicate greater psychopathology, and are associated with longer hospitalizations [1]. For clinical planning, it would be useful to predict which children are more likely to have outbursts, how many, and how soon after admission [e.g., is there a post-admission "honeymoon" period as conjectured by Blader et al [2] during which children self-regulate while assessing their new situation?]

Diagnostically, some clinicians interpret outbursts as instances of severe but nonspecific emotional dysregulation [3]. Others view them as "rages" associated with mania [e.g., 4] and even as a diagnostic criterion for severe mood dysregulation [5]. However, apparently similar "rages" have been found in Tourettes Disorder [6], Intermittent Explosive Disorder and conduct disorder [7,8], and other conditions. The term "rages" seemingly implies that these episodes consist solely of high intensity anger, but, in fact, we know little about their content or structure. If the presence or absence of outbursts does not distinguish among diagnoses, it is still possible that outburst content and/or structure might vary with psychiatric condition. It is, for example, reasonable to suppose that children with internalizing disorders might behave differently during outbursts than those with externalizing disorders. Therapeutically, managing outbursts on the ward is challenging and involves selecting among alternatives such as seclusion, restraint and/or medication, each with its own advantages and drawbacks.

In this paper, we provide some background to each of these issues, then briefly describe our findings that: 1) Clinical history and, to a lesser extent, psychiatric diagnoses predict which children are most likely to have outbursts on the ward (and when and how many they are likely to have), 2) the outbursts themselves are mixtures of anger and distress and are exaggerated versions of ordinary childhood tantrums in other ways as well, and 3) the ratio of anger to distress may have some diagnostic significance.

Understanding outbursts

Various scales have been used to characterize outbursts (e.g., the Overt Aggression Scale, [9]); some of them make particular clinical connections, e.g., Kronenberger et al's [10] Outburst Monitoring Scale correlated significantly with parent-reported ODD and CD. However, Collett et al., [11] note that although these scales "cover multiple problem areas....(they) offer little depth for understanding a specific behavior pattern or for monitoring treatment effects." Moreover, these scales focus more on aggression than on anger and other clinically important emotions. For example, less than half of children's episodes of aggression reported in Bambauer and Connor's [12] outpatient study involved anger. Finally, all published studies have relied upon retrospective reports by parents or clinicians; more reliable, detailed and deeper understanding of these complex emotional outbursts requires direct observation.

Older reports of the outbursts of institutionalized, conduct-disordered older children and adolescents describe several stages [3,13-15]. Initial hostility escalates to angry resistance to adult authority followed by sadness, withdrawal and/or comfort seeking. Notably, this pattern resembles the ordinary tantrums of younger, typically developing children. In these tantrums,

behaviors form two broad factors, anger and distress [16]. Within the anger factor, behaviors fall into 3 subfactors of intensity. Thus, Low Anger is defined by foot stamping; Intermediate Anger includes pushing and throwing; and High Anger contains screaming, hitting and kicking. The Distress factor is consistently composed of crying and comfort seeking [17,18]. Independent analyses of temporal distributions revealed strikingly different profiles of anger and distress: angry behaviors rise quickly and fall slowly; distress behaviors distribute more evenly across the tantrum [17]. Similar patterns in on-ward outbursts are described below

Treating outbursts

Seclusion or restraint (S/R) of agitated children has a long history [19,20]; children in some subpopulations have required seclusion/restraint as often as 4-5 times/day [21,22]. Because of S/R's potential for abuse, alternatives like behavior modification [23] and collaborative problem solving [24] have been increasingly used. Short term medication is another approach [25], especially in children who appear impervious to behavioral interventions. However, there are few studies of this approach [23,26,27] as opposed to the success of chronic medication in reducing aggression in children with conduct disorder [28] and irritability in autism [29].

Methods

Sample Characteristics

The parents or guardians of 130 4-to-12 yr olds, consecutively admitted between January 2003 and June 2004 to a 10 bed university-based child psychiatry inpatient unit consented to DSM IV-based interviews and rating scale evaluations of their child, and to allow their child's behavior to be observed and recorded during any outbursts that might occur. (The study was approved by the university's IRB). Of these children, 78.5% were male; 78.5% were white. Mean age was 9.6 ± 2.1 years. Mean Full Scale WISC III or IV scores available for 118 children were 101 ± 19 ; ten (7.3%) scored lower than 70 on one WISC subtest. Outbursts prior to admission were a reason for referral in 55.4% of the sample. Diagnostic comorbidity was extensive, with most children having multiple diagnoses. Either or both ADHD and ODD/CD were diagnosed in 71.5% of the children, comorbid internalizing/externalizing disorder in 29.2%, any autism spectrum disorder in 34.4%, any psychosis or schizophrenia in 13.1%, and any mania in 6.9%. In addition, 55.3% had a significant language disorder (either speech/language delay, educational classification at one time or another for speech impairment, or language testing on the Goldman Fristoe Auditory Discrimination testing of $<20\%$ ile).

Children's Agitation Inventory (CAI)

The CAI is a list of the most salient behavioral constituents of outbursts. Nursing staff on all 3 shifts who supervise the unit's behavioral management program contributed behaviors they had observed when children needed either isolation or prompt sedation. Some items occurring in the tantrums of young children were added and the list was then pared down to include only those behaviors that could be reliably operationalized and coded. The final set of 17 items consisted of verbal acts (whining, verbal threats, cursing, yelling/screaming), discrete physical acts (disrobing, pacing, stamping, pushing/pulling, throwing things, biting/scratching, punching the wall, hitting others, kicking others or objects), and expressive, "psychomotor" behaviors (looking tearful/sad, anxious/fearful, or withdrawn/unresponsive.) In practice, the CAI was used in the form of a grid of these behavioral items X 7 observation times to code "what happens when" during outbursts. The time points of observation were "0" (for the first observation) and 5, 15, 30, 45, 60, 90 and 120 min after the first observation.

Outburst definition, management and observation

Outbursts arose most commonly after a child had refused to comply with three repeated staff request/demands to do or not do something, or following provocation by another child. Following standard behavior management procedures [30], the child was then asked to sit in the “time out” chair to calm down and rethink the situation (active aggression toward others was an exception in that the child was given a “time out” immediately and without a warning). For this study, an outburst was defined as starting when the child refused the time out by becoming loudly verbally defiant (e.g., swearing, shouting), aggressing against property (e.g. hitting, kicking or pushing the wall or the time out chair), or engaging in other behaviors on the CAI. The child was then isolated in a less stimulating setting, i.e., his/her room, the “quiet room”, the “seclusion room” (the quiet room with the door closed.) A strategically placed mirror in this room allowed the child to be observed unobtrusively. An outburst was defined as over when its behaviors had subsided and the child was able to sit quietly in the time out chair for 10 min. If a child had any subsequent outbursts, s/he was given the opportunity to help shorten it by taking oral risperidone PO (starting at 0.015 mg/kg) while in the quiet room. If any episode lasted longer than 60 min, diphenhydramine was administered by injection.

Results and discussion

Characteristics of children with in-hospital outbursts

Once in the hospital, 35% of the children had outbursts. Half of these children had one, the other half had between 2 and 9 outbursts. There were relatively few demographic differences between children with and without in-hospital outbursts. Children having them were significantly younger and more likely to have been in special education. The major predictor was clinical history; the odds that children admitted for outbursts would then have one in the hospital were nearly 8 times those of children without such history. This cross-situational carryover is consistent with the general principal that past behavior is the best predictor of future behavior.

Considering psychiatric diagnoses one at a time, children having outbursts were significantly more likely to have a diagnosis of ADHD (OR 4.8, CI 2.0-11.6), but less likely to have an anxiety disorder (OR 0.37, CI 0.15-0.94.) Although 24.5% had been referred with a diagnosis of bipolar disorder, rates of actual bipolar diagnosis were much lower (7% overall), and did not differ between outburst and non-outburst groups. However, this one-at-a-time approach to diagnostic association does not take into account the multiply overlapping diagnoses in this extensively comorbid sample. When this issue was appropriately addressed by ordinal regression of number of outbursts (categorized as 0, 1 or >1) on clinical history and diagnoses, the major predictor of in-hospital outbursts was admission on an atypical antipsychotic ($P < .001$.) Having a language disorder also significantly contributed to outburst likelihood ($p < .01$.) Thus, knowing a child's medication status on admission appeared to be important in predicting outbursts. If medication status is omitted from the regression, the only two significant predictors are pre-hospitalization history of outbursts and, secondarily, a language disorder; all psychiatric diagnoses drop out. The association between language disorder and outbursts is consistent with the more general connection between language and behavior problems that has been well established through both clinic based [e.g., 31] and community based, epidemiological studies [e.g., 32]. Presumably, the frustrating inability to understand the verbal communications of others and/or express one's own feelings and needs gives rise to anger in young children and weakens their self-control [33 34]. In the current context, comorbidity with learning/language impairment is, unfortunately, rarely addressed in studies of children with outbursts [24,35].

Length of stay and outburst onset

On average, children having outbursts stayed in the hospital more than 50% longer than those who did not (49 vs. 31 days.) This statistically significant difference replicates Gold et al's [1] finding of an association between in-hospital outbursts and greater length of stay. Like Fryer et al [20] and Mellesdal [36], we found no "honeymoon period" for outbursts. Survivor analysis of time-to-the-first-outburst suggested three stages of progressively decreasing risk. The highest risk stage was in the first two days when 44% of children with outbursts had their first, or only one. In the second stage, from days 3 through 29, 50% of children with outbursts had their first, or only, one. The third stage continued from 30 days to the end-of-stays which was when the remaining children had their first or only outburst.

Duration

Over the 18 months of data collection, there were 117 outbursts in 49 admissions. There were 49 initial, unmedicated outbursts, and 68 subsequent ones for which liquid risperidone was given with the intent of shortening outburst duration and avoiding subsequent seclusion. Because there were no differences between the behavior scores of medicated and unmedicated outbursts, the data were combined for further analysis. Outburst durations were varied, but long. The mean ($\pm$ S.D.) was 47.5 ($\pm$ 31.6) min; 8% were < 15 min, 11% were 16-30 min, 63% were 30 - 60 min, and 19% were > 60 min. Overall, these outbursts were longer than the aggressive episodes of child outpatients reported by Bambauer & Connor [12]. By comparison, most of their sample (43%) had episodes lasting seconds, almost a third had episodes lasting 30 minutes, 10% had episodes lasting a day.

Behavioral organization

Complete behavioral data were available for 109 of the outbursts. Among the 17 coded behaviors, yelling/screaming, stamping and kicking were the most common, being tearful/sad or anxious/fearful occurred less frequently, and head-banging and unresponsive withdrawal were among the least common. Stagewise factor analyses of the correlations among outburst behaviors converged with a completely independent cluster analysis of their time course to yield a consistent model of outburst organization. In this five factor model, which accounted for 54% of the variance, three of the factors were readily interpretable as progressive levels of anger intensity. That is, some behaviors, like stamping and head-banging indicated Low Anger, other behaviors, e.g., pushing, pulling and throwing, reflected Intermediate Anger, while shouting, screaming, hitting and kicking were associated with High Anger. The two other factors were plausibly interpreted as levels of distress. Low Distress involved whining and tears; High Distress was largely composed of disrobing and an unresponsive withdrawal.

A separate analysis of time course strongly supported the factoring of behaviors into those that are anger related and those that are distress related. In this approach, outbursts were grouped by duration and the probability of every behavior was calculated at each time point within each duration group (e.g., in the 45 minute duration group, the probability of each behavior occurring at the 0, 15, 30 and 45 minute points was calculated.) In general, anger-related behaviors declined over time (i.e., their slopes were negative) while distress behaviors remained relatively constant (they had 0 slopes.) A hierarchical cluster analysis correctly classified 16 of the 17 behaviors as either anger or distress based on their slopes ($p < .005$.) It was even possible to discriminate within the set of anger behaviors: High Anger behaviors had more negative slopes (declined more rapidly) than Low Anger behaviors.

The importance of this behavioral organization of outbursts is that they closely resemble the tantrums of preschoolers [17]. At the item level, Low Anger in both tantrums and outbursts involves stamping, Intermediate Anger involves throwing things, and High Anger involves screaming, hitting and kicking. In both types of events, whining and crying/tears is associated

with Distress. Furthermore, the temporal profiles are the same, with anger-related behaviors peaking early and then declining while distress behaviors are more evenly distributed across both outbursts and tantrums.

Diagnostic correlations with outburst characteristics

To quantify the relative proportions of anger and distress within individual outbursts, we used an Anger/Distress Index (A/D-I):

$$A/D - I = \frac{\text{Total Angry Behavior Score} - \text{Total Distress Behavior Score}}{\text{Total Angry Behavior Score} + \text{Total Distress Behavior Score}}$$

The A/D-I's ranged from -1.0 to 1.0 (i.e., pure distress to pure anger); the mean value of 0.49 ± 0.53 indicates that these outbursts were predominantly angry. To search for diagnostic correlations, each child's set of diagnoses was represented as a string of 0's (diagnosis absent) and 1's (diagnosis present.) A multinomial regression of the A/D-I on 6 diagnostic categories with at least 7 children/diagnosis indicated a significant overall effect of diagnosis. Post-hoc likelihood ratio tests indicated that this effect was due to lower levels of anger relative to distress associated with anxiety and PDD diagnoses [$p < .05$.] An examination of raw scores showed that the outbursts of the 7 children with anxiety diagnoses had lower rates of High, Intermediate and Low Anger behaviors than any other diagnostic group while their levels of High and Low Distress were among the highest values recorded for any group. This finding is consistent with the DSM-IV listing of tantrums, crying, and "clinging" as "Specific Features" of phobias and social anxiety [37, p. 413.] In fact, crying and "clinging" (i.e., comfort-seeking) are main aspects of the distress component of tantrums. Thus, in the presence of anxiety, outburst characteristics shift in the direction of greater distress.

Outbursts and tantrums: Similarities, differences and implications

Several lines of evidence support the hypothesis that the outbursts of child psychiatry inpatient are exacerbated tantrums. We found that outbursts become less likely with age, as others have for tantrums [38,39]. Language problems are a significant predictor of outbursts; so too, speech impediments and language delays increase tantrum proneness [e.g., 40]. More direct evidence for their similarity arises from our close examination of outburst behaviors. Younger children's tantrums consist of some behaviors expressing different intensities of anger and other behaviors expressing distress (sadness.) The outbursts of child psychiatry in-patients are composed of anger, exhibited at 3 levels of intensity, and distress, exhibited at 2 levels of intensity. [We note in passing that the factors found in our analysis were not organized by similarity of form (e.g., vocal vs. physical expression), but by the nature and intensity of the affect they express.] The distinction between anger and distress revealed by the factor analysis of behavioral content is strongly supported by the completely independent cluster analysis of time course [the factor analysis is based on associations among the total scores (durations) of individual behaviors; the cluster analysis is based on similarities in their rates of decline over time.]

The temporal characteristics of outbursts also resemble younger children's tantrums in which anger rises quickly and falls slowly while distress is more evenly distributed. Unfortunately, the current observations did not capture the rising phase of anger. Apparently, by the time a child had been isolated (the 0 point of our observations), anger had already risen to its peak (or perhaps isolation terminated its rise.) Given that ward staff intervened early in outbursts, and that children were isolated within a few minutes of becoming angry and agitated, it is quite likely that the overall contour of outbursts was a more rapid rise and a considerably slower fall. The available data do reveal a differential distribution of behaviors across outbursts, with anger declining and distress being more evenly distributed. Under the quite reasonable

assumption that anger rose relatively rapidly in these outbursts, both behavioral content and overall temporal organization suggest that outbursts are prolonged and exacerbated versions of ordinary childhood tantrums.

Of course, there are differences between the in-home tantrums of typically developing 18-60 month olds and the on-ward outbursts of 5-12 yr old psychiatry inpatients. Two of these relate to the distress factors. The anxiety/fearfulness that appeared in on-ward outbursts is not reported by parents of typically developing children under 5 growing up in higher SES, better functioning families. Similarly, the existence of two levels of distress in outbursts, with the higher level taking the form of extreme social withdrawal, has not been reported in tantrums. Withdrawal has been noted as part of the later phase of outbursts in psychiatrically disturbed older children [3,13-15]. The most obvious difference is the protracted duration of on-ward outbursts. Duration may be a marker of psychopathology. A community based study found that 4 yr olds with mild to moderately elevated externalizing or internalizing CBCL scores have longer tantrums than peers with average CBCL scores [18]. The outbursts of our children were longer on average than those of child psychiatry outpatients [12]. Children become inpatients because they are very disturbed and their outbursts are correspondingly longer. The linkage between psychopathology and excessive tantrums goes even further. Tantrums occurring beyond age 5, when their prevalence in the population has dropped below 50%, predict antisocial behaviors in later childhood [41] and continuing life course difficulties into adulthood [42]. Even at age 3, when tantrums are normative, their identification by parents as a “marked problem” predicts violent offenses in adulthood [43].

Limitations

As noted above, our conclusions are constrained by our lack of data about the rising phase of the outbursts. While the isolation may have altered the natural history of the outbursts, the clinical necessity for adequate behavioral management takes precedent over the niceties of experimental methodology.

Conclusions and potential applications

This study yields three sets of generalizations:

1. Compared to child inpatients who did not have outbursts, those having one or more were significantly more likely to have had a history of outbursts prior to admission, to be younger, and to have been in special education settings. Outbursts significantly increased hospital length of stay.
2. Given that outbursts are similar to tantrums in age trends, causal associations, factor structure, and temporal organization, we propose the working hypothesis that they are indeed prolonged and exacerbated versions of ordinary childhood tantrums. We used the term “rage outbursts” in our title so that the events we are describing would be recognized. However, the term rage misleadingly implies that these events consist solely of high intensity anger. In fact, the specific behaviors comprising outbursts reflect at least two types of emotional processes, each of which varies in intensity. Referring to outbursts as exacerbated tantrums should help reduce diagnostic and clinical confusion. It follows that the most complete analyses and best understanding of these events will be generated by treating the initial anger together with the overlapping and subsequent distress (sadness, remorse, withdrawal and so forth) as a single complex event, which ends only when the child has returned to his usual baseline emotional state.

A common trigger for in-hospital outbursts is a series of demands from an adult authority with which the child refuses to comply. The resulting outbursts may function as an escape from

such demands, just as do some of the tantrums of younger children [e.g., 44,45]. Future studies that take into account both the triggers for, and the functions of, outbursts will increase our understanding of these striking and clinically significant events.

3. When psychiatric diagnoses are considered singly, children having outbursts were significantly more likely to have a diagnosis of ADHD, but less likely to have an anxiety disorder. When the multiple comorbidities are appropriately addressed, the major predictor of in-hospital outbursts was admission on an atypical antipsychotic; having a language disorder also contributed significantly. If medication status is omitted, the only two significant predictors are a pre-hospitalization history of outbursts and a language disorder.

Outbursts of children with anxiety or PDD diagnoses showed less anger relative to distress (independent of any other diagnoses). The internalizing symptoms these children manifest in their daily lives may also color their tantrums and, perhaps, serve to limit their anger. We found no evidence linking outbursts to bipolar diagnoses, but this conclusion is tempered by the small number of children with such diagnoses in our sample. The possibility that the outbursts of children with bipolar disorder contain an excess of high anger and, perhaps, less distress should be examined.

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