

Original Articles

Temper Tantrums in Young Children: 1. Behavioral Composition

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ABSTRACT. Although tantrums are among the most common behavioral problems of young children and may predict future antisocial behavior, little is known about them. To develop a model of this important phenomenon of early childhood, behaviors reported in parental narratives of the tantrums of 335 children aged 18 to 60 months were encoded as present or absent in consecutive 30-second periods. Principal Component (PC) analysis identified Anger and Distress as major, independent emotional and behavioral tantrum constituents. Anger-related behaviors formed PCs at three levels of intensity. High-intensity anger decreased with age, and low-intensity anger increased. Distress, the fourth PC, consisted of whining, crying, and comfort-seeking. Coping Style, the fifth PC, had high but opposite loadings on dropping down and running away, possibly reflecting the tendency to either "submit" or "escape." Model validity was indicated by significant correlations of the PCs with tantrum variables that were, by design, not included in the PC analysis. *J Dev Behav Pediatr* 24:140–147, 2003. Index terms: *anger, crying, distress, emotion.*

Temper tantrums are common in children between the ages of 18 months and 4 years.^{1–3} Tantrum behaviors range from commonplace crying to less-frequent, attention-getting events such as breath holding and head banging to spectacular displays of dysregulation in presumably "normal" children. There are children who grunt and growl and those whose shrieks reportedly sound to their parents like the cries of "a prehistoric bird." Parents have told us about children who scream so loudly and so long that capillaries in their cheeks burst and their eyes become bloodshot. Others scream until they vomit or become rigid as statues with tension, even to the point of toppling over if unsupported.⁴

Unfortunately, tantrums are more than a source of fascinating observations. They are among the most common childhood behavioral problem reported by parents.^{5,6} In extreme cases, when tantrums are frequent, prolonged, or involve object destruction or serious aggression, parents can become angry with or even frightened by their child's behavior; they then may become anxious about their own feelings.⁷ Frequent tantrum throwers are reportedly more likely to be abused.⁸ Tantrums are an item on a number of scales identifying externalizing psychopathology in

childhood^{9,10} and in older children may predict future antisocial behavior.¹¹ There is, correspondingly, a clinical literature on tantrum control^{12,13} and an abundance of sometimes contradictory advice to parents. The reasons for such contradictions are easy to find. Although surveys of childhood behavior have identified some important psychosocial factors associated with extreme tantrums, such as minor illness, the presence of other behavior problems, corporal punishment, maternal depression, and low social class,^{14–16} remarkably little is known about the organization of this important phenomenon of early emotional life. The sole English language monograph on tantrums, Goodenough's *Anger in Young Children*, was published 70 years ago.¹⁷ More recent, seminal work on stimulus and reinforcement contingencies controlling assertive and coercive parent-child interactions identify some individual tantrum behaviors, but often treat tantrums as a single, undifferentiated member of a class of coercive behaviors.^{18,19}

Our perspective is that of naturalistic emotion research; we are interested in tantrums as a window on emotional processes of an intensity rarely accessible to direct study. Our earlier analysis⁴ and descriptions in the literature indicate that tantrums throughout early childhood may fit a general behavioral pattern. If such a general model of tantrum organization can be elucidated, sensible inquiry could then be made into potential modifier variables such as gender, age, the nature of the conflict triggering the tantrum, the level of autonomic activity during the tantrum, and parental reactions. Lacking an a priori definition of what

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constitutes a tantrum and concerned about prematurely excluding any particular observation, we proceeded inductively, using parental accounts of tantrums in a “prototype” or “script” approach, which has been found useful in other emotion-related domains.²⁰

Because tantrums vary greatly among children, examination of a large sample was necessary. To do so within a manageable period, we solicited narrative descriptions of tantrums from parents. Such parental observations have been found to provide valuable, reliable information on salient but low base-rate problem behaviors seldom seen by outside observers.²¹ Here we report our methodology and findings on tantrum behavioral composition; analyses of time course will follow.

METHOD

Participant Selection

We interviewed parents of children whose birth announcements had been collated from Madison area newspapers by the University of Wisconsin’s Waisman Center for Human Development and Mental Retardation. These announcements represent a large sample of Madison area in-hospital births. To highlight changes in tantrum characteristics with age, we selected noncontiguous age groups of children aged 18 to 24, 30 to 36, 42 to 48, and 54 to 60 months. Data were gathered in two steps.

Telephone Interview

Psychology undergraduates were trained through mock interviews to ask a series of questions about the prevalence, frequency, duration, and general behavioral characteristics of the child’s tantrums. To ensure both a standardized format and appropriate expressions of empathy with parental comments, the first author supervised each student’s initial (and subsequent random) interviews. Almost all (>90%) parents reached consented to be interviewed. In 991 of the 1219 families contacted, the child was reported to have at least one tantrum per month. Children’s reported reactions varied from brief, isolated responses to full-blown screaming, kicking, falling-down tantrums. These reactions lay along a continuum of intensity and complexity; we could identify no “natural” lower limit to what could be counted as a tantrum. There was also no “natural” lower limit on tantrum duration; for 18- to 24-month-old children, the modal tantrum duration was less than 1 minute. (Parents are loathe to call an event lasting <30 sec a tantrum; only one of the narratives described an event lasting <30 sec. However, subsequently collected home videotapes include several events lasting 10–20 sec that qualify as mini-tantrums, i.e., negative emotional episodes containing at least one of the listed behaviors.) Thus, we operationally defined tantrums as negative emotional episodes containing at least one of the behaviors listed under “Defining Tantrums.” Parents were asked to estimate mean tantrum frequency in the last month along a scale of seven easily understood, approximately geometric steps: less than one per month, one to two per month, one to two per week, three to six per week, one to two per day, three to six per day, and more than six per day.

Mean duration was similarly estimated along a seven-step scale: less than 1 minute, 1 to 2 minutes, 2 to 4 minutes, 5 to 10 minutes, 10 to 20 minutes, 20 to 40 minutes, and more than 40 minutes. Parents recalled the date of the most recent tantrum in the recency categories of today, yesterday, or the day before, 3 to 6 days ago, between 1 week and 2 weeks ago, or 3 to 4 weeks ago. Parents also estimated the relative frequencies (usually, sometimes, rarely/never) of a list of individual tantrum behaviors in the last month.

Written Tantrum Descriptive Narrative, Checklists, and Questionnaires

At the end of the telephone interview, parents were asked if they would provide a written description of one of their child’s tantrums. To indicate the desired level of detail and to enhance narrative reliability, the packet sent to consenting parents included two “sample” narratives that emphasized the reporting of concrete, directly observed behaviors.²² The order of events in the included samples was scrambled so as not to bias parental expectations (samples available from the first author). Parents also indicated which behaviors they had observed in the tantrum by checking them on a list of 14 behaviors printed on the back of the form. In most cases, once the narrative had been received, the parent was called back to verify details and resolve any inconsistencies between the narrative and the checklist. Parents also recorded visible signs of autonomic reactivity (e.g., turning red, sweating, drooling, and nose running) from an included list.²³ More complex, global judgments, such as the child’s mood, were assessed by separate checklists. Parents rated the intensity of the reported tantrum *relative* to the child’s other tantrums during the past month on a five-point scale from one (among the least intense) to three (approximately average) to five (among the most intense). Family socioeconomic status was also assessed. Parents not returning the packet within 3 weeks were followed up by telephone.

Defining Tantrums in the Narratives

In the parental narratives, we defined tantrums as beginning with the first occurrence of a major tantrum element: stiffening limbs and arching back (*stiffen*), dropping to the floor (*down*), shouting, screaming, crying, pushing/pulling, stamping, hitting, kicking, throwing, or running away. The tantrum was defined as over when the last of these behaviors had stopped. Whining (*whine*) was scored as a tantrum element but was not used as a marker for tantrum onset or offset because it often occurred by itself. Issues triggering the tantrum were coded as eating, sleeping, dressing, conflict with siblings and/or peers, or frustration with inanimate objects. Tantrums with multiple or unclear conflicts were not coded for issue.

Forty narratives contained gaps of 0.5 to 7.0 minutes during which no tantrum behaviors were reported. To distinguish one tantrum with a pause from two tantrums with an interval between them, the following rules were adopted: For tantrums lasting 10 minutes or less, a gap of 2.5 minutes or more with no tantrum behaviors was interpreted as separating two distinct tantrums. For tantrums lasting more

Table 1. Tantrum Behaviors: Prevalence and Interrater Reliability

Index	Behaviors												
	Cry	Scream	Shout	Down	Kick	Hit	Pull/Push	Away	Stiffen	Stamp	Whine	Throw	Affiliate
P _r v _i ^a	.86	.47	.39	.37	.27	.26	.23	.23	.19	.17	.13	.12	.11
r ^b	.97	.95	.93	.77	.92	.83	.85	.81	.73	.97	.95	.96	.87
κ	.70	.83	.70	.80	.69	.84	.59	.64	.70	.83	.80	.75	.41

^aPrevalence (p_rv_i) is the decimal fraction of tantrums in which the behavior occurred.

^bCorrelation coefficients (*r*) are for total durations and kappa (κ) coefficients are for patterns of behavior. All correlations are significant ($p < .001$).

than 10 minutes, the criterion gap was 3 minutes. Only the first tantrum was included in our analysis.

Constructing Tantrigrams

We converted the written narratives into “tantrigrams,” time \times behavior matrices in which time was partitioned into consecutive 0.5-minute units, and behavior in each of 14 different categories was scored as occurring or not occurring within each unit. In addition to the italicized codes in the previous section, the following rules were used in this conversion: We coded grabbing things, tugging, and slamming doors as *pull/push*. *Down* was scored for any substantial lowering of the body; in most cases the child lay on the floor but also included were instances of sitting, squatting, and kneeling on the floor. We coded “yell” and “holler” as *shout*; “shrieking” was coded as *scream*. Attempts by the child to solicit comfort during the tantrum, for example, by holding onto his or her mother’s leg, were coded as *affiliate*. Behaviors not counted as part of a tantrum included a series of complaints made without raising the voice, a fight with a sibling, or a period of deliberate and unemotional noncompliance (any or all of these might precede a tantrum).

If a parent’s estimate of a given behavior duration was a range, for example, 1 to 2 minutes, then the behavior was scored as occurring for the mean value of the range, for example, 1.5 minutes. In some cases, a behavior was reported as occurring throughout a period, but there was no indication whether it was continuous or intermittent. On the basis of our general experience and information from parents, screaming, shouting, and crying are generally continuous, whereas physically angry behaviors are typically intermittent. If no other information was available, these latter behaviors were scored in the first, last, and alternate intervals of the reported period.

Parent behavior in the following 10 categories was also coded as occurring or not occurring in the 0.5-minute units: (1) *verbal* communication (any utterance directed at the child), (2) *restrain* (e.g., hold by wrist to stop hitting or by the arm or shoulder to prevent running away), (3) *give* some object to or (4) *take* some object from the child, (5) pick up or *carry* the child, (6) *punish* the child (push, slap, hit, or spank), (7) *dress* or undress the child, (8) *leave* the room, (9) physically *comfort* the child (put on lap, hold, or hug), (10) impose a *time out* (e.g., seat child on chair, send child to room).

Tantrigrams for each narrative were prepared separately by two trained undergraduate raters. The raters then resolved discrepancies by discussion or by referral to a

supervisor. The supervisor subsequently reviewed and corrected the final tantrigram. To evaluate the reliability of this process, a subset of 68 narratives (20% of the total sample) was selected at random within a stratification for sampling equally across age, gender, and tantrum duration. New pairs of raters constructed a second tantrigram for each of these tantrums, which was reviewed and corrected by a new supervisor. The correlation between the original and corroborative reconstructions of tantrum duration was .99. The correlations (*r*) between the original and corroborative reconstructions of total durations of individual behaviors were also high (Table 1). As indicated by the kappa (κ) coefficients of agreement between original and corroborative tantrigrams that evaluated the concordance of equivalent 0.5-minute behavior cells in the original and corroborative tantrigrams, temporal patterning for almost all behaviors also replicated with reasonable fidelity (Table 1). Because of its unacceptably low κ , a conglomerate “aggressive behavior” category consisting of the infrequently reported biting, pinching, scratching, and hair-pulling was excluded from further analysis. The reliability of reconstruction might be expected to depend on the amount of data available, that is, the duration of the tantrum. For the subgroup of tantrums lasting 0.5 to 1.5 minutes, the mean κ for total tantrums was .66. For three subgroups of tantrums longer than 1.5 minute, mean κ s were .81 or .82.

RESULTS

Sample Characteristics

Tantrum prevalence was found to increase from 87% at 18 to 24 months to 91% at 30 to 36 months and then decrease to 59% at 42 to 48 months, paralleling results from the longitudinal study of MacFarlane et al.³ Of 991 packets mailed to parents, 349 packets were returned. Of these, 335 narratives (for 178 boys and 157 girls) were usable. The mother was the informant in 325 cases and the father in 10 cases. The median interval between the telephone interview and writing of the narrative was 30 days (interquartile range of 10–84 d). The median reported delay between the tantrum and when the parent wrote the narrative was 2.75 hours (interquartile range of 0.5–14.0 hr).

Table 2 shows the equivalent age and gender distributions of children in the telephone survey and narrative sample. Table 3 shows the equivalent mean frequencies and durations of tantrums for contributors and noncontributors of narratives. There were no differences in family size between contributors and noncontributors. Two of the contributors reported themselves to be Asian, the remainder

Table 2. Comparison of Telephone Survey Sample and Narrative Subsample (Percentages of Sample)

	Age, yr			
	1	2	3	4
Telephone survey				
Male	15.4	14.0	12.1	9.5
Female	13.1	13.8	12.7	9.3
Narrative subsample				
Male	17.6	14.5	11.5	10.3
Female	12.4	13.6	11.5	8.4

This table compares the age and gender percentages of children in the total telephone sample with the subsample of children whose parents subsequently submitted a narrative.

identified themselves as white. The mean years of education \pm SD for mothers and fathers was 15.8 ± 2.1 and 16 ± 2.5 , respectively. The mean \pm SD of family socioeconomic status scores, a weighted combination of parents' mean years of education and job ratings,²⁴ was 26.5 ± 12.3 . Thus, the assembled data are drawn from a white, college-educated, largely middle-class sample.

Reliability Checks on Parental Reporting

Frequency and Duration Estimates. Parents estimated mean tantrum frequency and duration in the preceding month during the telephone interview and again at the time the narrative was written. The correlation between the frequency estimates was $r(332) = .61$ and $p < .001$. Within the telephone survey, we also found the expected inverse relationship between parents' recall of the recency of the last tantrum and their estimate of mean tantrum frequency during the last month to be $r(328) = -.55$ and $p < .001$.

The correlation between parental estimates of mean tantrum duration during the telephone interview and at the time of the narrative was $r(331) = .43$ and $p < .001$. The correlation between our reconstruction of the duration of the tantrum in the narrative and the parents' estimate of mean tantrum duration in the preceding month was $r(331) = .55$ and $p < .001$. This is reasonable agreement given that these are not a priori measures of the same event(s), and that our definition of tantrums is not necessarily that of any given parent.

Behavior Content. Shouting usually involves words, whereas screams are typically nonverbal vocalizations of higher pitch. Verbal content was reported in 71% of the

narrative accounts of shouting but in only 33% of screaming ($\chi^2 [1] = 42.1, p < .001$). In the telephone interview, parents had estimated the relative frequencies of their child's various tantrum behaviors. The probability of behaviors subsequently reported in the narratives was consistent with the original estimates: combining across all behaviors, behaviors originally reported as "usually" occurring appeared in the 52% of the corresponding narratives, behaviors reported to occur "sometimes" appeared in 39%, and reportedly rare or absent behaviors appeared in 34%. Parents may underestimate the absolute frequency of more rarely occurring behaviors but are quite reliable in ordering relative frequency ($p < .005$), indicating their consistency as observers of their children.

Prevalence of Individual Behaviors

Prevalence and Status Variables. Table 1 includes the prevalence of the various tantrum behaviors. Log-linear gender \times age analyses showed a reduction with age in the number of tantrums in which stiffening occurred and an increase in the number with shouting; the marginal and partial associations generated a $\chi^2(3)$ greater than 30.0 and $p < .001$. There were no significant differences in behavior prevalence between genders, although there was a trend for boys to affiliate more.

Intratantrum Variables. The mean number of different behaviors reported in a given tantrum increased from two in the shortest tantrums to a plateau of approximately four in tantrums lasting 3 to 4 minutes or longer. Behaviors that became more prevalent in longer tantrums were *hit*, *kick*, *pull/push*, *scream*, and *shout*. *Cry* also increased, appearing in 60% of the shortest tantrums but in 90% or more of tantrums 3 to 4 minutes or longer. That is, practically all children whose tantrums were longer than 3 minutes were reported to cry. That a systematic increase in prevalence occurred in only some of the behaviors, and that the number of behaviors plateaued for tantrums longer than 4 minutes, eliminates a model in which behaviors are randomly added as long as the tantrum continues.

Principal Emotional and Behavioral Components and Their Correlates

To evaluate the associations among tantrum behaviors and to reduce these variables to a more manageable number, we used Principal Component (PC) analysis of behavior duration. The duration of a behavior was defined as the total

Table 3. Mean Tantrum Frequency and Duration Reported by Telephone

Age, yr	Mean Frequency, /wk				Mean Duration, min			
	Narrative		No Narrative		Narrative		No Narrative	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
1	7.5	8.1	8.7	9.7	2.1	2.4	2.2	3.0
2	8.7	8.6	6.2	7.3	3.9	4.9	3.9	4.6
3	6.1	3.9	5.4	6.6	4.2	3.5	4.5	5.3
4	4.8	5.8	6.2	7.6	5.0	4.0	4.9	4.9

This tables compares the mean tantrum frequency and duration (\pm SD) of children in the total telephone sample to the narrative subsample.

Table 4. Loadings in Principal Component Analysis of Tantrum Behaviors^a

Behavior	High Anger	Intermediate Anger	Low Anger	Distress	Coping Style
Kick	.73				
Scream	.63				
Hit	.50		.39		
Stiffen	.49				
Pull/Push	.39				
Throw		.81			
Shout		.66	.40		
Stamp			.79		
Cry	.38				.67
Affiliate					.67
Whine					.58
Away					-.75
Down					.62
Eigenvalue	2.03	1.27	1.15	1.46	1.14
Percent variance explained	14.3	9.7	8.9	11.2	8.8

^aLoading in bold >0.45; loadings ≤0.26 are not shown.

number of 0.5-minute periods during which the behavior had occurred in the tantrum. We compared several different transforms of these data and analyses of the whole data set versus various subsets, for example, boys versus girls, shorter versus longer tantrums, random splits, and so forth. A relatively small number of interpretable factors recurred in these analyses. Table 4 presents the five-factor solution to a PC analysis followed by a Varimax rotation of $\log(x + 1)$ transformed behavior durations. The first PC, defined by high loadings on scream, kick, stiffen, and hit is labeled High Anger. The second PC, loading highly on whine, cry, and affiliate, is labeled Distress. The third and fourth PCs, loading on stamp and on shout and throw, respectively, are identified as Low and Intermediate Anger. The fifth PC, with high positive loadings on down and high negative loadings on away, is interpreted as Coping Style, reflecting the child's often exclusive decision to either lower herself or escape. This five-factor solution was chosen because the eigenvalues of the five PCs are each greater than 1.0, the loading of major contributors to the PCs are 0.45 or greater, and the five PCs together account for more than 50% of the

variance, they are representative of the factors found to recur in the analyses of subsets, and they are the most interpretable. Finally, as described next, these PCs relate in a significant, orderly, and comprehensible fashion to a number of intratantrum variables that were, by design, not included in the PC analysis.

Intratantrum Variables. The general results of separate stepwise regressions of tantrum duration, autonomic activation, and intensity on the set of PCs are that (1) Distress and High Anger each have significant correlations with these variables and (2) among the Anger PCs, Low, Intermediate, and High Anger have progressively higher correlations (Table 5).

Status and Tantrum Precursor Variables. A gender × age (years) multivariate analysis of variance of the five sets of PC scores showed no difference between genders (Rao's R [5, 323] = 1.5), but a highly significant effect of age (Rao's R [15, 892] = 3.96, $p < .001$). Follow-up univariate analyses of variance showed that High Anger decreased with age ($F [1, 327] = 3.33, p < .02$), whereas Intermediate Anger ($F [1, 327] = 7.76, p < .001$) and Low Anger increased ($F [1, 327] = 5.36, p < .002$). With a Bonferroni-adjusted alpha value of .01, the age effects on High Anger should be regarded as a trend. These results are consistent with the log-linear analyses of age trends in behavior prevalence reported previously. There were no age or gender effects on Distress scores. The issues triggering the tantrum and the child's pre-tantrum mood had no effect on any PC scores.

Parent-Child Interactions During Tantrums

The effects of parent intervention on tantrums is an important and interesting issue. Unfortunately, parents were the source of information about their child's actions as well as their own in this study, thus maximizing the problem of source variance. For this reason, we examined this data set for only the most robust and general effects. We partitioned tantrums into those for which no intervention at all was reported ($n = 72$) and those in which at least one intervention was reported ($n = 263$). Log-linear analysis showed no significant effects of the child's age or gender on the probability of intervention. Intervention had a low but significant correlation with tantrum duration ($r [334] = .13$,

Table 5. Intratantrum Variables Correlated with Behavioral Principal Components

Principal Component	Intratantrum Variables ^a											
	Tantrum Duration			Autonomic Activation			Muscle Tension			Tantrum Intensity		
	B	SE B	β	B	SE B	β	B	SE B	β	B	SE B	β
High Anger	2.29	.24	.39***	.22	.04	.31***	.01	.01	.05	.23	.05	.25***
Intermediate Anger	1.52	.24	.26***	.10	.04	.14**	.03	.01	.14*	.08	.05	.09
Low Anger	.18	.24	.03	.05	.04	.07	.01	.01	.03	.02	.05	.02
Distress	2.91	.24	.50***	.11	.04	.17**	-.02	.01	-.06	.26	.05	.28***
Coping Style	.43	.24	.07	-.04	.04	-.07	.01	.01	.04	.02	.05	.02

B, regression coefficient; SE B, standard error of B; β , standardized regression coefficient.

^aEach triplet of columns represents the results of a simultaneous multiple regression.

* $p < .02$, ** $p < .01$, *** $p < .0001$.

$p < .02$). The probability of intervention increased significantly from 69% for tantrums of below average intensity to 77% for tantrums of average intensity and to 89% for tantrums of above average intensity (log linear analysis partial association $\chi^2 [1] = 116.2, p < .001$).

Each PC had its own distinct pattern of significant correlations with parental interventions, underscoring both the differentiation among the PCs and their connections to parent behaviors (data not shown). Low, Intermediate, and High Anger had an increasing number of significant correlations with parental behavior, as might be expected.

DISCUSSION

Methodology: Reliability, Validity, and Sampling

Telephone interviews, such as we used to recruit subjects, have been found to generate reliable information about a variety of behavior patterns²⁵⁻²⁷ relative to in-person assessment, including the parental report on children's behavior, which is most important.^{21,28} Furthermore, trained lay people can elicit such information as well as professionals.²⁹ In this study, evidence for reasonable reliability in parents' estimates of tantrum frequency, duration, and content was presented. In keeping with the suggestions of Patterson et al²² for increasing reliability, we had parents focus on tantrum behaviors that can be directly observed. When using such discrete, highly salient problem behaviors, prior studies have found moderate interobserver agreement (in the range of $.4 < r < .7$) between mothers and fathers^{21,30} and between parents and outside observers (John Reid, Guillermo Hinojosa-Rivero, Rudy Lorber, unpublished data, 1979).^{21,31} We used global ratings, such as parental judgment of child mood or tantrum "intensity," sparingly and largely for corroboration.

The tantrum components derived from our behavioral Principal Component (PC) analysis seem to be robust in that similar loadings were found using different transformations of the behavior duration data. Restricting the PC analysis to tantrum behaviors and using other intratantrum variables as validity checks on the derived components has succeeded, as shown by the high and differential correlations between the five PCs and the other variables. We have also replicated a number of the results of the Eino and Potegal⁴ survey, which was performed under quite different conditions. Finally, direct evidence for the validity of parental reports is that children subsequently selected from our sample for reported low or high levels of tantrum frequency, duration, and severity differed significantly in their objectively measured temperament characteristics.³²

However, an important limitation of this study is the lack of a reliability measure for the parental reporting of individual tantrum behaviors. Parents may differ in what they count as a whine, scream, and so forth. Parents' selection of which tantrum to record may not have been random. By combining results from a relatively large sample, however, we expected that individual differences in children, as well as individual biases in parents, would tend to wash out, and that results emerging from the grouped

data would be likely to represent general trends. Some biases may remain. Some behaviors, such as whine and cry, are reported more reliably than others, such as yell.³³ Other factors working against reliability³⁴ include the loss of details during the delay between the tantrum and the writing of the narrative, the relatively large number of behavior categories used, parents' pre-existing expectancies of their child's behaviors, and the fact that parents knew their observations would not be reviewed for accuracy (the problem of observer "reactivity"). Thus, it is clear that specific hypotheses derived from the model must be tested with more direct recording of tantrums, for example, by videotaping. However, these direct observation techniques have their own difficulties, such as greater selection bias because fewer parents would be willing to have their privacy so invaded and perturbation of children's and parents' behavior by being videotaped. Furthermore, these techniques require considerable manpower and logistic effort.²¹ Each approach to the study of tantrums carries its own biases; a valid picture of tantrum organization will emerge only from those findings that are consistent across approaches. We strongly believe that collecting parental narratives was appropriate to generate the initial working model presented here.

These data reflect a white, largely middle-class, Midwestern sample. In view of evidence that variables such as social class, maternal depression, and number of hours of nonmaternal care in the first year are predictors of "trouble in the second year,"^{35,36} development of a more general model will depend on the sampling of other populations, for example, lower-class whites, ethnic minorities, and families with diagnosed psychopathology.

Comments on the Principal Components

Anger: In addition to the face validity of labeling the three Anger PCs as anger, the second article in this series demonstrates that all behaviors loading heavily on these PCs have similar temporal profiles of an initial peak at or near tantrum onset followed by a relatively rapid decline. Thus, they probably reflect the same underlying processes. Low Anger was accepted as a PC for this reason, although it was defined by only a single behavior. We identified these three PCs as different levels of the same emotion for three reasons: (1) The stepwise regressions of autonomic activation and tantrum intensity on the PCs indicate that Low, Intermediate, and High Anger have progressively higher correlations with these variables, corresponding to progressively higher anger levels. (2) The PCs also had progressively higher correlations with tantrum duration. This differential relationship is intuitive in the sense that higher levels of emotional and behavioral arousal may take longer to resolve.^{37,38} (3) The kicking, hitting, and pulling/pushing of High Anger is often directed against people in reach. Such proximate aggression entails the risk of immediate retaliation; intense anger may increase tolerance for such risk.^{39,40} Throwing, associated with Intermediate Anger, is usually done at a distance and therefore involves less risk. Stamping, the behavior defining Low Anger, is a symbolic demonstration of anger for onlookers, involves

neither directed aggression nor contact, and thus presents the least risk.

Distress. Camras⁴¹ identified sadness as an emotion appearing later in the tantrum. Because our PC also included an element of active help-seeking that extends beyond the display of sadness, we labeled this combination of behaviors Distress. This labeling is consistent with other studies showing that help-seeking is associated with discomfort.⁴² That anger and sadness are both routinely represented in tantrums is consistent with their reportedly frequent co-occurrence in childhood.^{43–45} Cole et al⁴⁶ similarly found two components in the emotional response of 2-year-old children to mishaps. One component loaded on worry, tension, and anger, and the other on sadness and reparation.

Coping Style. The appearance of *down* and *away* as oppositely signed loadings on a single factor has an ethological interpretation. Lowering the body is a sign of submission in many animal species (e.g., the supine posture forced on the loser of play-fighting matches among human children in many cultures⁴⁷). Submission is also associated with the expression of infantile behaviors, which is exactly

the impression conveyed by a regression to the prone or supine crying and flailing of infancy. More generally, *down* and *away* are instances of submission and escape, the standard alternative coping strategies of losers in intraspecific agonistic encounters.

Up to this point, we have not addressed the waxing and waning of tantrum behaviors over time. The second article in this series demonstrates a convergence between the PCs of tantrums identified here and an independent analysis of behavior time course in a working model of tantrum organization.

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