

Children's Symptoms in the Wake of *Challenger*: A Field Study of Distant-Traumatic Effects and an Outline of Related Conditions

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Objective: The *Challenger* space shuttle explosion in January 1986 offered an opportunity to determine what, if any, symptoms of posttraumatic stress disorder (PTSD) and bereavement normal latency-age children and adolescents would develop after a distant, horrifying event. **Method:** With a structured interview, the authors assessed the symptoms of 153 randomly selected children from Concord, N.H., and Porterville, Calif. Responses were statistically compared between East Coast children, who saw the event on television and who generally cared more about the teacher aboard *Challenger*, and West Coast children, who heard about it first; between latency-age children and adolescents; and between children seen 5–7 weeks later and those same children seen 14 months later. **Results:** More than 60% of the subjects feared at least one stimulus related to *Challenger* within the first 5–7 weeks of the explosion. The East Coast and latency-age groups appeared significantly more symptomatic than did the West Coast and adolescent groups. Over the 14-month study period, most symptoms dramatically faded. However, adolescents' diminished expectations for the future in general increased, and latency-age children's changed approach to space careers held relatively steady. Three East Coast latency-age children met the DSM-III-R symptom requirements for PTSD in 1986; no children met these in 1987. **Conclusions:** Children's symptomatic patterns after *Challenger* relate to the patterns for PTSD listed in diagnostic manuals and to three symptoms not in the DSM-IV list. To the authors, distant traumas appear to be one of a newly defined spectrum of trauma-related conditions that include relatively evanescent symptoms and a few longer-lasting ones. These symptoms may affect large numbers of normal children.

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"I don't care what happens when a shuttle goes up. But it better not be *my* teacher! I want to be a schoolteacher when I grow up. But never, never in space!"

—Girl, age 8, Porterville, Calif., 1986

The ill-fated January 18, 1986, *Challenger* space shuttle launch was watched live on television by mil-

lions of American schoolchildren. Children from the Northeastern states were particularly attentive because, along with the seven-person crew, New Hampshire schoolteacher Christa McAuliffe, the winner of a national NASA teachers' contest, was aboard to instruct youngsters directly from space. In fact, a small group of Concord, N.H., children, mostly third-grade classmates of Ms. McAuliffe's son, had traveled to Cape Canaveral, Fla., to see the launch firsthand. Thousands of children in the Pacific time zone, however, were not watching. In rural West Coast areas where children are bused, children had not yet arrived at school by the time of the explosion, which occurred at 8:38 a.m. in the Pacific time zone.

Almost every child in the United States eventually knew about the *Challenger* tragedy and saw taped replays of the shuttle's 73-second flight. Initially, however, there were three major levels of perceptual expo-

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sure to the disaster: watching from Cape Canaveral viewing stands, watching live on television, or hearing about it afterward. There were also three levels of emotional involvement: intensely involved (Cape Canaveral viewers who knew Christa McAuliffe), involved (East Coast children who were not students of Ms. McAuliffe), and less involved (West Coast children). These emotional levels of involvement corresponded well, but not perfectly, to the perceptual levels of exposure—watching the launch from Cape Canaveral (East Coast), watching live on television (East Coast), and hearing about it afterward (West Coast).

Although obviously not planned in the sense of a laboratory experiment, this unexpected chain of events allowed for a systematic study and comparison of East Coast and West Coast experience of the explosion and latency-age children's and adolescents' memory (1), thinking (2), and symptoms. It also allowed for a comparison of young people's early responses (at 5–7 weeks) with their later responses (at 14 months).

In recent years, groups of similarly traumatized children have been studied for posttraumatic symptoms and signs. A group of kidnapped California schoolchildren, for instance, exhibited such symptoms as repeated dreams, event-specific fears, fears of the mundane, posttraumatic play, personality changes, psychophysiologic and behavioral reenactments, and diminished expectations for the future (3–5). These signs and symptoms were later found in various groups of children traumatized by different events (6–8). In a number of studies, however, symptoms have been found to fall short of the diagnosis of posttraumatic stress disorder (PTSD) (8, 9). For example, an Epidemiologic Catchment Area survey of the heads of Midwestern households in 1987 found that 15% of the participants had had some symptoms of PTSD, although they did not meet the full criteria for the diagnosis (10). A Los Angeles study of children exposed indirectly to a school playground sniper shooting while they were on rotating vacations found that these children fell just short of the diagnosis of mild PTSD (11).

In the last few years, the concept of a spectrum of psychologically and psychophysiologically related conditions has been developing among psychiatrists studying such illnesses as depression (12, 13), bipolar disorder (14), panic and agoraphobia (15), and obsessive-compulsive disorder (16, 17). Another related and developing concept, the subthreshold condition (12, 18), posits that an emotional disturbance falling short of the full DSM-IV criteria for a disorder may still create serious problems requiring clinical intervention. As far as we know, however, the words "spectrum" and "subthreshold" have not been applied to the variants of PTSD.

Over time, one of us (L.C.T.) has considered how great a distance and how indirect a blow constitutes a traumatic exposure in childhood (19). We have been interested in the effect of traumatic or near-traumatic events on normal development (20, 21). The *Challenger* tragedy offered us the opportunity to do a field

study of what would likely be subsyndromal PTSD symptoms in a large number of healthy youngsters with varying levels of exposure. It also offered us the chance to determine whether symptoms not ordinarily labeled as typical of PTSD would be caused by a distant event. What symptoms, if any, would children relate? Would those nearest in proximity to the event (Cape Canaveral) or who had previously been traumatized be more likely to experience this kind of symptom? How would children of various levels of emotional involvement and of corresponding perceptions (East and West Coasts) compare? Would there be age differences? And, if studied over time, would the symptoms subside? These questions had not been posed or answered in any studies we had seen.

METHOD

Our methods have been described in detail in earlier reports on children's memories and thinking after the *Challenger* explosion (1, 2). In brief, we considered children from Concord, N.H., and Porterville, Calif., a town that buses its students to school, as relatively well-matched communities for study and comparison. The hometown of Christa McAuliffe, Concord, N.H., had sent some of its children to Cape Canaveral to view the launch, giving us a third, smaller group for comparison.

In 1986 and 1987, one of us (L.C.T.) administered a 298-item, 45-minute structured interview of our own design (22) to third- and 10th-grade students who had been selected by school officials using our random number tables and their complete school registration lists. We employed only one interviewer because the need to reach two communities within days of the disaster precluded the training and testing of additional personnel. A year later, we opted for consistency and used the same interviewer for the follow-up study. Because only one interviewer was used and because people at the interview locations were not blind to the purpose of the interviews, there was a possibility of either exaggerated or diminished interview responses.

Among the children selected for study, 90% returned written informed consent forms, signed by both parent and child. While waiting in a schoolroom for the interview to begin, each child was asked by one of us (S.M.) to draw or write something about *Challenger*. Only the children who were preliminarily determined (by S.M.) to have seen the explosion live (on the East Coast) or who had heard about it later (on the West Coast) were included in the study. Fewer than five children were eliminated on this basis.

The interviewer asked about background and health, emotional and learning problems, past traumatic experiences, and responses to *Challenger*. Many of the questions had to do with memory (1) and thinking (2). Others had to do with childhood symptoms of bereavement (23). The interviewer also inquired into a variety of behavioral and physical problems, anxieties, and habits. Symptoms of PTSD were explored in depth. With such complex symptoms as play or dreams, the child was first asked a yes/no question—for instance, "Have you had dreams about *Challenger* since the explosion?"—then the child was asked for an estimate of the frequency of dreams, and then the child's verbal descriptions were recorded.

To the main study group of 124 children we added nine Concord third-graders and one Concord high school student, a self-selected group that had watched the launch from the Cape Canaveral viewing stands. We added another 19 students from the Concord and Porterville schools from which students had been previously drawn; they had been chosen randomly at the schools in 1986 but were placed into our study in 1987 as an interview comparison group in order to help determine if the interviews of 1986 had promoted or diminished any symptoms in the larger group of 124. We lost one child from the study in 1986 and five children in 1987 (a 1-year retention rate of over 95%).

TABLE 1. Children's and Adolescents' Self-Reported Symptoms 5 to 7 Weeks After the Challenger Explosion (1986)

Symptom	East Coast Subjects (N=72) ^a		West Coast Subjects (N=61)		Significant Difference (df=1) ^b		Latency-Age Children (N=71) ^c		Adolescents (N=62) ^d		Significant Difference (df=1) ^b	
	N	%	N	%	χ^2	p	N	%	N	%	χ^2	p
<i>Challenger-related repetitive symptoms</i>												
Dreams	45	62	16	26	16.07	0.0001	33	46	27	44		
Play												
Drawing	27	38	9	15	7.54	0.006	31	44	4	6		0.0001
Pretending	7	10	11	18			11	15	1	2		
Writing	17	24	11	18			11	15	16	26		
Reenactment												
Behavioral	10	14	0	0		0.003	6	8	4	6		
Psychophysiologic												
Stomach aches	4	6	0	0			4	6	0	0		
Dizziness, faintness	2	3	4	7			5	7	1	2		
Other (mostly chills)	2	3	2	3			2	3	2	3		
Avoidance												
Of people who remind of disaster	4	6	1	2			2	3	3	5		
Of drawing, writing assignment	7	10	3	5			9	13	1	2		0.02
Diminished expectations												
Of future in general	27	38	14	23			18	25	22	35		
Of personal future (pooled)	28	39	29	48			40	56	18	29	8.96	0.003
Fears and fear-related items												
Mundane fear of being alone	7	10	7	11			11	15	3	5		0.05
Clinging habits	15	21	2	3		0.003	8	11	1	2		0.04
Changed approach to space careers	20	28	19	31			31	44	8	13	13.66	0.0002
<i>Challenger-related fears</i>												
Pooled	58	81	46	75			64	90	41	66	10.08	0.001
Of death and dying	32	44	27	44			31	44	28	45		
Of taking risks	22	31	23	38			34	48	11	18	12.12	0.0004
Of explosions	47	65	34	56			46	65	21	34	11.45	0.001
Of fires	18	25	15	25			27	38	6	10	12.78	0.0001
Of space	28	39	12	20	4.92	0.03	29	41	11	18	7.34	0.007
Of airplanes	12	17	2	3		0.02	10	14	4	6		

^a Includes 62 children from Concord, N.H., schools and 10 from the Cape Canaveral viewing stands.

^b Chi-square test with Yates's continuity correction. Fisher's exact test was used when any of the four cells in the two-by-two contingency table had fewer than five occurrences (i.e., stomach aches and avoidance of people who remind of the disaster). The p values were not adjusted for multiple comparisons. The conservative Bonferroni correction method for adjusting p values entails multiplying each p value by the total number of symptoms that were compared to address a particular research question (see introduction). The reader might apply a more stringent significance ($p < 0.005$) criterion to each individual symptom being compared.

^c Includes 62 children from schools and nine from the Cape Canaveral viewing stands.

^d Includes 61 adolescents from schools and one from the Cape Canaveral viewing stands.

Recording and grading of interviews was done by using a number code for the subjects, schools, and locations. We then used standard statistical tests, setting up a frequency table expressed in percentages, and placing each child into two groups out of a possible four—East Coast (involved, watched live television) and West Coast (less involved and heard later); and latency-age children and adolescents. To compare the groups, we employed Yates's continuity-corrected chi-square tests with one degree of freedom. To compare children when any of the cell frequencies were less than 5, we employed Fisher's exact test. To compare the groups' symptomatic changes from 1986 to 1987, we used two-sample t tests in which the dependent variable was change. To determine which symptoms children reported 14 months after the explosion compared with the symptoms that those same children had reported 5–7 weeks afterward, we used paired-comparisons t tests (matched pairs). We made no attempt to gauge the emotional intensity of any particular finding; however, the frequency of symptoms provided some data on this.

We asked a great number of questions, and the p values reported were not adjusted for multiple comparisons. The reader may wish to calculate Bonferroni corrections, as suggested in table 1, footnote b. If one uses $p < 0.005$, instead, as a more stringent alternative, one may recognize that although adjustments could be made for multiple comparisons, a number of the findings in this study attain this more exacting level of significance. We emphasize those particular findings in our Results and Discussion.

RESULTS

Viewing at Cape Canaveral Versus on Television

"I'm scared of explosions now."

—Girl, age 8, Cape Canaveral viewer, 1986

In comparing Concord children who traveled to Florida to view the shuttle liftoff in person with the Concord children who viewed it on television, we found no significant symptomatic differences. We then pooled the results from these two groups.

Missing the 1986 Interview

"Yes, I've been afraid to be alone since the shuttle. One day I felt very scared [after] it got dark and the television went off!"

—Girl, age 9, interview comparison group, Concord, N.H., 1987

In 1987, the interview comparison group of 19 children who had not previously been interviewed exhib-

ited symptoms similar to those of the larger groups interviewed in 1986. This interview comparison group's results were then pooled with those of the appropriate 1987 groups.

Being Exposed to a Personally Traumatic Event

"I was just 3, and my dad was holding me in his lap. He was about to take me to Florida. My mom came in and shot him! I see that picture in my mind a lot. Now I also picture being an astronaut—and exploding."

—Girl, 15, trauma-exposed group, Porterville, Calif., 1986

We considered an event in a child's life to be traumatic if it went well beyond what was to be expected in an ordinary childhood, if it was horrifying, and if it carried a threat against life, physical well-being, or personal security. There were 27 children, almost equally divided among the four major subgroups, who told us of such exposures. When we compared them to the children who denied experiencing any past traumatic events, these 27 children tended to be resistant to a few *Challenger*-related symptoms. For example, none of them reported *Challenger*-inspired behavioral reenactments 5–7 weeks after the tragedy, whereas nine children from the group with no previous traumatic exposure did so ($p=0.001$, Fischer's exact test). Fewer of them reported *Challenger*-related fears at 5–7 weeks than did the group with no previous exposure to trauma ($p=0.02$, two-sample t test). Previously traumatized youngsters, however, did not lose their negative predictions for marriage, having children, and long life (pooled) as readily as did the larger groups (change in the group with no previous exposure to trauma: $p=0.0001$, $df=100$, two-sided t test of difference between 1987 and 1986; change in the trauma-exposed group: $p=0.33$, $df=26$, two-sided t test of difference between 1987 and 1986).

Meeting Symptomatic Criteria for PTSD

In 1986, three latency-age children from the East Coast met the full symptomatic criteria (DSM-III-R) for PTSD. In 1987, no child met these same criteria. The computer-generated diagnoses, however, meant little because the first and most important criterion for PTSD is exposure to a traumatizing event, and none of our subjects met this requirement with respect to *Challenger*.

Dreams

"I had a dream the other night of a fire in my barn. One horse of mine and eight other horses were killed."

—Girl, age 15, Concord, N.H., 1986

Shortly after the explosion, shuttle-related dreams were prevalent, especially on the East Coast, where they occurred at a rate of 62% (table 1). While many of the children's dreams took place on their own turf, the *Challenger* connections were evident in dream-generated ex-

plosions, deaths, fires, and injuries. At 14 months after the explosion, *Challenger*-related dreaming had significantly diminished in all groups (table 2 and table 3).

Posttraumatic Play

"This year I did 23 pictures or something of the shuttle. This Saturday, I did one. It's barely going to launch. I didn't used to draw shuttles before the explosion. It makes me feel better to remind myself of it."

—Boy, age 9, Porterville, Calif., 1987

We considered spontaneous *Challenger*-related drawing, pretending, story writing, journal writing, and poetry writing to be forms of posttraumatic play (21). At 5–7 weeks after the tragedy, 44% of our latency-age subjects had drawn one or more *Challenger*-related pictures, as opposed to only 6% of the adolescents. At 14 months following the explosion, 35% of the latency-age children were still reporting posttraumatic drawing.

Pretend play on a *Challenger* theme occurred in 15% of the latency-age children and 2% of the adolescents 5–7 weeks after the explosion:

"I hadn't been into pretend until the space shuttle exploded. Now three of us guys play 'Christa Patrol.' We have a shuttle and it explodes a little. It's, like, winter, and we're floating in freezing temperatures. We live. It makes me happy—it's about Christa staying alive."

—Boy, age 9, Concord, N.H., 1986

Writing was the most common form of *Challenger*-related play in adolescents (26% at 5–7 weeks):

"I've done 13 pages of diary entries on *Challenger*."

—Girl, age 15, Concord, N.H., 1986

Once a child began playing after the trauma, that child often continued playing throughout the next year (table 3).

Behavioral Reenactments

"I did something weird. I baked something with the wrong ingredients. I put in salt—I didn't realize it. I set the oven on high. And the whole thing exploded!"

—Boy, age 9, Concord, N.H., 1986

The initial incidence of behavioral reenactment (strange, sometimes dangerous behaviors related to *Challenger*) was relatively low in all groups. At 14 months, behavioral reenactments had diminished to a near absence (table 2).

Psychophysiological Reenactments

"Thinking that the *Challenger* cabin stayed intact under the sea made me worry a lot about the astronauts running out of oxygen. That's worse than being killed outright. Now I'm afraid of running out of air myself."

—Asthmatic boy, age 15, Concord, N.H., 1987

TABLE 2. Children's and Adolescents' Self-Reported Symptoms 14 Months After the *Challenger* Explosion (1987)

Symptom	East Coast Subjects (N=87) ^a		West Coast Subjects (N=60)		Significant Difference (df=1) ^b		Latency-Age Children (N=80) ^c		Adolescents (N=67) ^d		Significant Difference ^b	
	N	%	N	%	χ^2	p	N	%	N	%	χ^2	p
<i>Challenger</i> -related repetitive symptoms												
Dreams	17	20	3	5		0.01	13	16	7	10		
Play												
Drawing	25	29	8	13	4.00	0.05	28	35	5	7	14.34	0.0001
Pretending	6	7	4	7			8	10	2	3		
Writing	18	21	6	10			12	15	12	18		
Reenactment												
Behavioral	4	5	0	0			1	1	3	4		
Psychophysiologic												
Stomach aches	3	3	0	0			2	3	0	0		
Dizziness, faintness	1	1	1	2			0	0	2	3		
Other (mostly chills)	1	1	0	0			0	0	1	1		
Avoidance												
Of people who remind of disaster	0	0	0	0			0	0	0	0		
Of drawing, writing assignment	0	0	4	7		0.03	4	5	0	0		
Diminished expectations												
Of future in general	21	24	23	38			24	30	39	58		
Of personal future (pooled)	23	26	15	25			19	24	19	28		
Fears and fear-related items												
Mundane fear of being alone	3	3	0	0			3	4	0	0		
Clinging habits	2	2	0	0			4	5	0	0		
Changed approach to space careers	30	34	21	35			40	50	11	16	16.70	0.0001
<i>Challenger</i> -related fears												
Pooled	49	56	33	55			56	70	26	39	13.15	0.0002
Of death and dying	17	20	7	12			17	21	6	9		
Of taking risks	14	16	12	20			17	21	9	13		
Of explosions	23	26	21	35			32	40	12	18	7.46	0.006
Of fires	15	17	10	17			17	21	8	12		
Of space	17	20	14	23			23	29	8	12	5.22	0.02
Of airplanes	6	7	2	3			8	10	0	0		0.008

^a Includes 60 children from Concord, N.H., schools, eight from the Cape Canaveral viewing stands, and 19 from the Concord schools who were brought into the study only in 1987 (interview comparison subjects).

^b Chi-square test with Yates's continuity correction. Fisher's exact test was used when any of the four cells in the two-by-two contingency table had fewer than five occurrences (i.e., avoidance of drawing/writing assignment). The p values were not adjusted for multiple comparisons (see table 1, footnote b).

^c Includes 61 children from schools, seven from the Cape Canaveral viewing stands, and 12 interview comparison subjects.

^d Includes 59 children from schools, one from the Cape Canaveral viewing stands, and seven interview comparison subjects.

The incidence of physical sensations duplicating bodily sensations that occurred upon early exposure to the tragedy was relatively low: the highest incidence was 7% for latency-age children's feelings of faintness or dizziness (table 1). By 1987, there were very few psychophysiologic problems reported (table 2).

Fear of Being Alone; Clinging Habits

"I've been following my family around a lot lately."
—Boy, age 9, Porterville, Calif., 1986

We found that 15% of latency-age children and 5% of adolescents were afraid to be alone 5–7 weeks after the *Challenger* tragedy. This fear virtually disappeared within 1 year's time (table 2). The habit of clinging to others could be logically grouped with the fear of being alone. In 1986, 21% of East Coast children reported new clinging habits, whereas only 3% of West Coast children reported these habits (table 1). By 1987, clinging had dramatically diminished in the East Coast group (table 3).

Avoidance of People; Avoidance of a Request to Draw or Write

"I have nothing to say."
—Girl, age 9, Porterville, Calif., 1986, in response to S.M.'s request for a piece of writing or art

Six percent of the East Coast subjects reported withdrawing from people following the *Challenger* explosion (table 1). When each child was asked to draw or write something about *Challenger* before the interview, some young people, especially of latency age, refused (table 1). With time, these two types of avoidance behaviors diminished (table 2 and table 3).

Challenger-Specific Fears

"Having a bad feeling as you die scares me."
—Boy, age 8, Concord, N.H., 1986

"I've been worrying a lot—what it feels like not to exist."
—Boy, age 8, Concord, N.H., 1986

TABLE 3. Children's and Adolescents' Self-Reported Symptoms Changing With Time After the *Challenger* Explosion

Direction of Change and Degree of Significance ^a	East Coast Subjects (N=68)	West Coast Subjects (N=60)	Latency-Age Children (N=68)	Adolescents (N=60)
Diminishing symptoms $p \leq 0.0001$	<i>Challenger</i> -related dreams	Fear of death	<i>Challenger</i> -related dreams, fear of risks	<i>Challenger</i> -related dreams, fear of death
$0.0001 < p \leq 0.001$ $0.001 < p \leq 0.01$	Clinging Fear of death, fear of risks, fear of explosions, fear of planes	<i>Challenger</i> -related dreams, fear of being alone, fear of explosions	Fear of being alone, fear of explosions, clinging	
$0.01 < p \leq 0.05$	Avoidance of drawing/writing assignment, diminished expectations for the future	Fear of risks	Fear of fires	Fear of risks
Steady or increasing symptoms $p > 0.2$	<i>Challenger</i> -related pretending, <i>Challenger</i> -related writing, changed approach to space careers	<i>Challenger</i> -related drawing, changed approach to space careers	<i>Challenger</i> -related writing	<i>Challenger</i> -related drawing, <i>Challenger</i> -related pretending, changed approach to space careers
$0.2 \geq p > 0.1$		<i>Challenger</i> -related writing	<i>Challenger</i> -related drawing, changed approach to space careers	<i>Challenger</i> -related writing
$0.1 \geq p > 0.05$	<i>Challenger</i> -related drawing ^b	<i>Challenger</i> -related pretending ^b	<i>Challenger</i> -related pretending ^b	
$p \leq 0.05$				Diminished expectations for the future ^c

^a Significance of two-sided t test of difference between 1987 and 1986 values.

^b Reflects diminution with time.

^c Indicates significant increase with time.

The children in our study experienced high numbers of *Challenger*-specific fears—of death and dying, taking risks, explosions, fires, space, airplanes—5–7 weeks after the explosion (table 1). When these fears were pooled, a very high percentage of children (for example, 90% of latency-age children) were found to suffer from one or more fears. Fears were significantly more prevalent in the latency-age children; however, at 5–7 weeks, more than 60% of all children, even in the less affected groups, reported at least one *Challenger*-related fear. By 14 months, the incidence of event-specific fears had significantly diminished (table 3), but among latency-age youngsters—and with the exception of airplane fears—these fears still affected more than 20% of subjects (table 2).

Gloomy Life Expectations; Changed Plans for Space Careers

"I'll die. Maybe at 60. That's old. My grandparents are already in their 50s, but they're not going to die so soon. I might get killed. Shot, maybe."

—Girl, age 9, Porterville, Calif., 1986

"I had wanted to be a space shuttle [sic], but I gave it up."

—Girl, age 9, Porterville, Calif., 1987

In 1986, more than 23% of the subjects were non-committal or negative about the future in general (table 1). By 1987, this finding had significantly diminished in the East Coast group but had significantly increased in the adolescent group (table 3). This result

corresponds to those of our *Challenger*-based thinking project (2), which showed that by 1987, a significantly greater number of adolescents were expressing negative attitudes about the United States and the world's future, as well.

In 1986, when the subjects' expectations for their own personal futures were pooled, we found that 43% of the entire group expressed a limitation. Over 14 months, personal diminished expectations for the future decreased to about 25% in each of the four study groups (table 2).

We also asked children if, since the *Challenger* disaster, they had experienced any changes of interest in space careers (both new enthusiasms and new dreads were scored). The latency-age children responded yes at rates of 44% in 1986 and 50% in 1987, whereas the adolescents responded yes at significantly lower rates in both years (tables 1 and 2). In individual children, these revised interests in space careers held steady over time (table 3).

DISCUSSION

The *Challenger* interviews attempted to discover what symptoms children at two stages of development and with three kinds of exposure would develop following a shocking, but not personally threatening, event. The interviews could not be blind; a large number of questions were asked. However, even in using a particularly stringent p value of 0.005, we found that East Coast and latency-age children were initially sig-

nificantly more symptomatic than West Coast children and adolescents. There was more dreaming, drawing, behavioral reenactment, and clinging in the East Coast group. There was more drawing, diminished life expectations, new approaches to space careers, and event-specific fears among latency-age children. Three of our latency-age child subjects would have qualified for the diagnosis of PTSD within the first year if not for their failure to meet the first criterion for PTSD—having endured a traumatic event.

The concepts of subthreshold and spectrum PTSD are new and are thus far unique, as far we can tell, to this article. We would not have been comfortable labeling any of our subjects as having subthreshold PTSD, however, because they did not go through an event personally directed at them. That term should be reserved, we suggest, for children who experience sexual or physical abuse, kidnappings, accidents, natural disasters, massive or painful surgeries, or cancer and its treatments—in other words, direct events—yet who miss meeting the full symptomatic criteria for PTSD.

Trying to find terminology, therefore, for what happened to American schoolchildren after the *Challenger* explosion was difficult because none of the subjects went through a personally threatening experience. We believe that a second category, spectrum—one that has recently gained favor in the mood and anxiety field—may apply here. If we call what happened to the *Challenger* subjects “distant trauma,” if we define their responses as “the reaction (memory, thinking, symptoms) to a disastrous event, experienced at the time of the event, but from a remote and realistically safe distance,” we might also propose that distant trauma be considered part of a broad range of trauma-related conditions, or the “trauma spectrum.”

What should distant trauma consist of? Here, our data on symptoms from this *Challenger* study should be useful. We found that dreams, posttraumatic play (writing, drawing, pretending), trauma-specific fears (death and dying, taking risks, explosions, fires, space, airplanes), trauma-related approaches to space careers, and diminished expectations for the future were the most likely symptoms to appear within the first few weeks following this horrifying, far-off event. After a year had passed, we found lingering fears, posttraumatic play, new approaches to related careers, and diminished expectations for the future. In fact, there were a few symptoms that appeared particularly difficult to shake. If a child initially started posttraumatic pretending, drawing, or writing, for instance, that child could very well continue that activity over a year's time. This lasting quality of posttraumatic play has previously been noted in a study of children with clinically diagnosed trauma (21). If a latency-age child initially changed his or her expectations for a career in space, these expectations also tended to hold. In adolescents, gloomy attitudes about the general future significantly gained momentum (table 3). Thus, even though posttraumatic fears and dreams were likely to spontaneously disappear at what seems to be a signifi-

cant rate, some fears, play, and a sense of diminished expectations for the future might easily persist into a second year.

Three symptoms not previously appearing in our diagnostic manuals for PTSD are of special interest in this study. The first of these is trauma-specific fear, a finding evident in 90% of latency-age subjects 5–7 weeks after the *Challenger* explosion. In fact, despite the observation that over time these fears diminished in incidence, large numbers of children and adolescents continued to harbor at least one event-specific fear for more than a year. The fear of being left alone and the habit of clinging to others were also important enough in this *Challenger* study that they should be taken into account whenever a physician or mental health worker considers a trauma-related condition, especially in a child under 10 years of age. As a matter of fact, clinging and the fear of being left alone are closely connected in infants and toddlers with disorders of attachment (24–26), conditions that very likely would be considered part of a trauma spectrum were the idea to take hold.

Event-specific fears were the most common indication that the children in our study had been affected by the explosion in space. This corresponds to findings from a Los Angeles schoolyard sniper attack, indicating that fears of another shoot-out, although highly prevalent, did not significantly separate the children who had been under fire from the children who were away from school (11). It appears that when children under 10 become intensely concerned about an external event, distant or not, they have a high likelihood of developing an event-specific fear.

One might wonder what causes latency-age children to be significantly more symptomatic than adolescents. One might also wonder why we found that thinking and attitude changes were significantly more common in teenagers than in the younger groups (2). The answer probably lies in a reciprocal relationship between emotions and thought. Adolescents, who have already lived through a few other distant events, are probably more able to think through a tragedy by employing the larger context of their other unpleasant experiences (27). Through thinking it out, they may be able to spare themselves overwhelming emotions and resultant symptoms. Latency-age youngsters, on the other hand, more easily experience raw emotion and confusion. They occasionally regress. Perhaps these factors increase the possibility of symptom appearance. After the *Challenger* explosion, adolescent thinking was not entirely protective. While their pessimistic attitudes tended to grow over time (2), their diminished expectations for the future in general significantly gained new believers (table 3). Thus, the teenagers in this study were not at all spared the effects of the events in space; their experience was simply different from that of the younger children.

Because the question of what makes people vulnerable to trauma is not settled, we were interested in whether the previously trauma-exposed children in our

TABLE 4. Terr et al. Proposal for a Group of Trauma-Related Conditions Not Connected to Personal or Direct Threat

Condition	Definition (Terr et al.)	Examples
Distant trauma	The reaction (memory, thinking, symptoms) to a real disastrous event, observed at the time of the event but from a remote, safe distance	Responses to the <i>Challenger</i> explosion (1, 2, and this report); Los Angeles Armenian children's responses to the 1988 earthquake in Armenia (29); vacationing children's responses to a Los Angeles sniper's shooting at their school (6, 11)
Close-call trauma	The reaction to a real disaster, missed by a narrow margin by the subject	Reactions of a boy who missed the Chowchilla school bus kidnapping (3, 4) and a boy who slept through an earthquake (19)
Indirect trauma	The reaction to a historical, fictional, or enacted event or to a real event that was not directly observable	Children's responses to the Polly Klaas kidnapping (30); Janet Leigh's inability to take showers after making the film <i>Psycho</i> (31); children's fears of Freddy Krueger, a character in <i>Nightmare on Elm Street</i> (19)
Vicarious trauma	The reaction to a true, massively threatening historical or contemporary tragedy that was not directly observable but was nationally threatening	Reactions to the nuclear bombing of Hiroshima (32) and to the Holocaust (33)
Mass threat	The reaction to a pending or possible worldwide or nationwide disaster	Reactions to the Cold War (34–36), predictions of an earthquake at the New Madrid Fault (37), an environmental disaster (38), and biological or chemical warfare
Mass hysteria ^a	The reaction to a generalized, unspoken, or non-specified threat and the acquisition of symptoms transmitted through peers, the media, or social means	Reactions to exposure to peculiar smells or to sick individuals (39–42) and to breast implants; symptoms among American children during the Persian Gulf War (43)
Copycatting	Without obvious threat, the imitative reaction to a symptom, either real or fictional, transmitted through peers, the media, or social means	Teen suicide rings (44–46); adolescents lying in the middle of roads after the film <i>The Program</i> (47)

^a The Centers for Disease Control and Prevention apparently has renamed this condition "mass sociogenic illness" (39). Its definition, "a group of nonspecific physical symptoms for which no organic cause can be determined and that is transmitted among members of a group by 'line of sight,'" offers no particular improvement on the current name or definition.

study would be more or less prone to symptoms than the children who admitted to experiencing no previous traumatic events. In two respects—those of pooled fears and behavioral reenactments—they were less symptomatic. While they harbored a symptom—diminished expectations for the future—that did not fade dramatically with time, these children's future visions had probably been curtailed, in large part, by their earlier traumas, not by the *Challenger* disaster. Multiple traumas are already widely known to cause serious psychopathology (28). But distant traumas, when added to personal ones, may not have the same effect.

The symptomatic similarity of the 19 children withheld from the study until 1987 to the children interviewed in both 1986 and 1987 showed us that our interview probably exerted no deleterious effect. Despite a belief among the general public that children should not be studied after upsetting events, our interview comparison group was no more and no less symptomatic than the group of children who had been interviewed in 1986.

It might be interesting to speculate here whether distant traumatic exposures, like that of *Challenger*, play a part in ordinary short-term human development. Our findings suggest that they do. Distant traumas might be grouped into a superstructure of mental conditions involving no personal or direct threat that are commonly encountered in the course of a lifetime. We have listed, defined, and exemplified these in table 4. The reader may call this the "trauma spectrum." This grouping includes, among others, distant traumas (similar to that of *Challenger*), close calls or near misses, indirect traumas, vicarious traumas, mass

threats, mass hysterias, and copycat syndromes. Every symptom in these closely related conditions has not yet been described. From this particular study, a set of memory (1), thinking (2), and symptomatic findings begin to characterize one of these conditions—distant trauma.

Challenger shows that those who initially watched and who were the most emotionally concerned with this tragic, distant event tended to suffer the most. Within this general framework, however, small differences in distance and emotional involvement (such as being in Cape Canaveral versus being in Concord watching television) appeared to make little difference. We conclude that for children raised from birth with television, the immediacy of the medium seems almost as real as pure, untouched reality.

One of our 8-year-old Cape Canaveral subjects was quoted by a reporter on the 10th anniversary of the *Challenger* tragedy (48):

"When the sky is that certain blue of the day of the launch, I always think of *Challenger*. But you always recover. You move on."

—Boy, age 18, Concord, N.H., 1996

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