

# Media Exposure in Children One Hundred Miles From a Terrorist Bombing

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This study assessed indirect interpersonal exposure to the 1995 Oklahoma City bombing, broadcast and print media exposure in the aftermath of the explosion, emotional reactions to media coverage, and posttraumatic stress reactions in children distant from the explosion. A survey was administered to 88 sixth-grade students in the public middle school in a community 100 miles from Oklahoma City 2 years after the bombing. Many children reported indirect interpersonal exposure and most reported bomb-related media exposure. Print media exposure was more strongly associated with enduring posttraumatic stress than broadcast exposure. Indirect interpersonal exposure and the interaction of media exposure with emotional reaction to media coverage in the aftermath of the explosion each predicted ongoing posttraumatic stress. The results suggest that children may have lingering reactions to highly publicized terrorist incidents. Concern about the influence of television viewing has long been proclaimed. This study implicates print media exposure as well. Media exposure to terrorist incidents, therefore, should be monitored and those working with children should assess exposure and stress even in children not directly impacted.

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**KEY WORDS:** disaster; media; posttraumatic stress; terrorism; trauma.

## INTRODUCTION

Exposure to trauma can occur in various ways—directly through physical presence or indirectly through relationships or the media. Concern about the impact of indirect forms of exposure was height-

ened after the September 11 terrorist attacks claimed thousands of victims and were covered extensively by the media. The *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV)* (1) criteria for the diagnosis of posttraumatic stress disorder (PTSD) provide little guidance about the potential role of these indirect forms of exposure. Terr and colleagues (2) have addressed the issue by proposing a “spectrum” classification for indirect trauma. They examined children’s responses to the 1986 *Challenger* space shuttle explosion resulting from three forms of perceptual exposure—observing the launch directly from the viewing stands, watching it live on television, and hearing about it later. They also identified three levels of interpersonal involvement—personal relationship with the New Hampshire teacher on the flight, residence in the same geographic region but not students of the teacher, and residence on the West Coast with no relationship to the teacher. East Coast children were significantly more symptomatic initially

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than West Coast children. The spectrum classification includes distant trauma, reaction to a real event observed at the time but from a distant site; indirect trauma, reaction to an event not directly observable; and vicarious trauma, reaction to a highly threatening event that was not directly observable but was nationally threatening.

Indirect exposure is of increasing concern as we now recognize a contagious quality to posttraumatic stress through both interpersonal relationships and the media (3, 4). A number of clinical reports have described interpersonal spread through peers (5) and through family relationships—parent to child (6) and sibling to sibling (5, 7). Research has also suggested the possible influence of television exposure on posttraumatic stress in children (8–12). Pfefferbaum and colleagues (11, 12) found bomb-related television exposure extensive in children in Oklahoma City following the 1995 bombing of the Alfred P. Murrah Federal Building and a positive relationship between television exposure in the aftermath of the explosion and posttraumatic stress 7 weeks later. Children with hyperarousal may be drawn to media coverage to obtain information or to maintain the heightened state of arousal (10, 12). While the relationship between posttraumatic stress and television exposure has been examined (10, 12), we know of no study examining the influence of print media exposure or the importance of the child's emotional response to media coverage on posttraumatic stress.

The April 19, 1995, terrorist bombing of the Alfred P. Murrah Federal Building in Oklahoma City represented the first major terrorist attack in our country in recent history. It resulted in the death of 168 people including 19 infants and young children. Hundreds more were injured. Media coverage began immediately and remained intense for weeks. It documented first the rescue and recovery and later the criminal investigation and trials. Interpersonal exposure was extensive. Over one-third of Oklahoma City adults (13) and children (11) surveyed in the months following the explosion reported that they knew someone killed or injured in the blast. Because children were killed and may have been a target, they were a major focus in the mental health response (14).

We were concerned that children geographically distant from Oklahoma City might also have experienced a sense of personal threat associated with the bombing because the identity of the perpetrators was not immediately known and the potential for continued or repeated attack was real. Furthermore, because Oklahoma is a sparsely populated state with few

major metropolitan areas, we suspected that people throughout the state might have known victims. We also recognized the potential impact of media exposure (11, 12). Schuster and colleagues (15) conducted a random-digit dialing telephone study of U.S. households during the first week after the September 11, 2001, terrorist attacks. A total of 560 adults were interviewed about immediate mental health effects. Over one-third of the parents queried reported that their children had at least one of five stress reactions and almost one-half reported that their children had worried about their own safety or the safety of loved ones. On the day of the attacks, children watched an average of 3 h of television coverage of the incidents. The number of stress symptoms was related to the number of hours of television exposure in those children for whom parents made no attempt to restrict television viewing.

The goal of this study was to describe the relationships among children's indirect interpersonal exposure (defined herein as having a friend who knew someone who was killed or injured), media exposure, reaction to media coverage, and enduring bomb-related posttraumatic stress while controlling for possible gender differences. The study was conducted 2 years after the bombing just as the federal trial of Timothy McVeigh was beginning. This meant that media attention again focused on the incident serving as a reminder of the event. We hypothesized that the children's indirect interpersonal exposure would be directly related to posttraumatic stress 2 years after the bombing and that the relationship between their media exposure in the aftermath of the bombing and posttraumatic stress would be contingent upon their emotional and physiological reactions to media coverage.

## METHODS

### Participants

The sample included sixth-grade students attending a public middle school in a community 100 miles from Oklahoma City. Approximately 67,000 residents live in the county this school serves. The population is 82% Caucasian, 3% African American, 9% Native American, and 2% Hispanic. The median household income is approximately \$32,000 with approximately 14% below poverty level (U.S. Census Bureau: State and County Quickfacts of Creek County, Oklahoma. Available at <http://quickfacts.census.gov/>

qfd/states/40/40037.html; 2001). Private schools are relatively unavailable; therefore, the public middle school these children attended was thought to be representative of the community. Students were presumed to be roughly the same age as they were in the same grade.

All sixth-grade students were asked to deliver a letter describing the study and an informed consent document to their parents. Students whose parents agreed to their participation were also given the option to participate or to refuse participation. Unfortunately, we do not know why nonparticipating students declined or how their bomb-related experiences differed from those of participating students.

A total of 119 students—approximately one-third of the students enrolled in the sixth grade at the time—participated in the study. Thirty-one children gave responses indicating they heard or felt the bomb, were injured, and/or knew someone killed or injured. Because this study focused on those without direct physical or interpersonal exposure, we eliminated these children from the analyses. This left a sample of 88 participants, 42 (48%) of whom were boys and 46 (52%) of whom were girls.

## Measures

The instrument was designed to measure physical, interpersonal, and media exposure to the bombing, reaction to media coverage, and current posttraumatic stress reactions.

The primary demographic variable used in the analyses was gender. All students were in the sixth grade and therefore approximately the same age.

Indirect interpersonal exposure was calculated by assigning a score of 0 to children who denied any relationship to victims and a score of 0.5 to children who reported having a friend who knew someone killed in the explosion and to those who reported that a friend knew someone injured. Those who had both a friend who knew someone killed and a friend who knew someone injured were given a score of 1.

Two variables assessed media exposure: amount of bomb-related television and radio exposure (Broadcast) and amount of bomb-related newspaper and magazine exposure (Print) in the aftermath of the explosion. Each used a Likert scale measuring the proportion of the participant's broadcast or print media exposure that was related to the bombing (*none, a little, some, a lot*). The range on each item was 1–4.

Reaction to broadcast media coverage of the bombing was measured as the sum of four dichoto-

mously scored items (no = 0, yes = 1) asking if the participant felt sad, afraid, nervous, and mad when exposed to television or radio coverage right after the bombing. Similarly, reaction to print coverage of the bombing summed scores on the same four items in relation to feelings when reading magazine or newspaper articles about the incident right after it occurred.

The measure of posttraumatic stress (PTS) was adapted from the Impact of Event Scale (IES) (16) and the Impact of Event Scale-Revised (IES-R) (17). The basic psychometric properties of the IES have been established in adults (16, 18) and in children (19); they have been established for the IES-R in adults (17). The IES has been used in other studies of childhood trauma (19–24) and constituted part of a psychological screening battery found to be effective in identifying traumatized children (23). The items were linked to the bombing. The PTS score was the sum of 21 items representing symptoms of PTSD (Cronbach's  $\alpha = .93$ ). Participants were asked to rate the frequency of the 21 symptoms in "the past seven days" on a scale of 1–4 with the following categories of response, respectively: *not at all, rarely, sometimes, and often*.

## Design and Procedures

During the first class period of the day, sixth-grade teachers distributed the survey instrument to students who completed the questionnaire in group settings. The clinical research team was present to coordinate and assist in data collection. Students without parental consent and those not wanting to participate worked on other assignments as required by the protocol approved by the University of Oklahoma Health Sciences Center Institutional Review Board.

## Data Analysis

Descriptive statistics were calculated for demographic and other study variables. Differences in means by gender for each of the study variables were examined using a significance level of 0.01 for each of five tests. Multiple regression analyses were performed with the PTS score as the dependent variable. Hypothesized predictors of PTS were indirect interpersonal exposure, broadcast and print media exposure, and reaction to broadcast and print coverage. The interactions of gender with each type of media exposure (broadcast and print) and the interactions of each type of media exposure with reactions to media coverage were also assessed as predictors of PTS.

**Table 1.** Correlations Among Variables

Variable	Range	N	M	SD	Variables				
					1	2	3	4	5
1. Indirect interpersonal exposure	0–1	83	0.32	0.39	—				
2. Broadcast: Television and radio exposure following the explosion	1–4	88	3.34	0.86	0.05	—			
3. Print: Newspaper and magazine exposure following the explosion	1–4	88	2.63	1.10	0.15	0.42***	—		
4. Reaction to broadcast media coverage	0–4	87	1.29	1.14	0.21	0.37**	0.50***	—	
5. Reaction to print media coverage	0–4	87	1.09	1.17	0.28*	0.35**	0.45***	0.71***	—
6. PTS: Posttraumatic stress	21–65	69	36.10	12.85	0.40**	0.33**	0.53***	0.49***	0.69***

\*  $p < 0.05$ ; \*\*  $p < 0.01$ ; \*\*\*  $p < 0.0001$ .

Correlations between the study variables and the best fitting multiple regression model for each outcome were calculated. To adjust for the multiple tests, a significance level of 0.004 for each of 14 tests was used to determine which predictors remained in each of the regression models. Differing degrees of freedom across the various models reflect incomplete answers by some of the participants.

## RESULTS

The descriptive statistics for indirect interpersonal exposure, broadcast and print media exposure, reaction to broadcast and print coverage, and posttraumatic stress are presented in Table 1. Indirect interpersonal exposure was significantly correlated with reaction to print media coverage and to posttraumatic stress,  $r = 0.28$  and  $0.40$ , respectively. Broadcast and print media exposure, reaction to broadcast and print media coverage, and posttraumatic stress were all significantly intercorrelated, range of  $r = 0.33$  to  $0.71$ . There were no significant gender differences in indirect interpersonal exposure or posttraumatic stress reactions. Gender differences in media exposure and in reaction to media coverage are described below.

### Indirect Interpersonal Exposure

Twenty-two (25%) of the children reported that a friend knew someone killed and/or injured in the bombing, 16 (18%) reported that both a friend knew someone killed and a friend knew someone injured, and 45 (51%) reported that none of their friends knew anyone killed or injured. Five (6%) of the children had missing scores on whether a friend knew someone injured. There were no gender differences in indirect interpersonal exposure.

### Media Exposure

Bomb-related broadcast media exposure was higher than print media exposure following the bombing ( $n = 48$ , 55% reported *a lot* of broadcast exposure and  $n = 24$ , 27% reported *a lot* of print exposure). There was a trend for girls ( $M = 2.85$ ,  $SD = 1.07$ ) to score higher than boys ( $M = 2.38$ ,  $SD = 1.08$ ) on print exposure,  $t(85) = 2.03$ ,  $p = 0.0455$ ,  $ES = 0.44$ . Sixteen out of 46 (35%) girls reported *a lot* of bomb-related print exposure compared to 8 out of 42 (19%) boys who reported *a lot* of print exposure. There was no significant gender difference for mean scores on broadcast exposure.

### Reactions to Media Coverage

There was a trend for girls to score higher on reaction to broadcast and to print coverage ( $M_{\text{broadcast}} = 1.53$ ,  $SD = 1.10$ ;  $M_{\text{print}} = 1.38$ ,  $SD = 1.09$ ) than for boys ( $M_{\text{broadcast}} = 1.02$ ,  $SD = 1.14$ ;  $M_{\text{print}} = 0.79$ ,  $SD = 1.18$ ),  $t(84)_{\text{broadcast}} = 2.12$ ,  $p = .0367$ ,  $ES = .46$ ,  $t(83)_{\text{print}} = 2.42$ ,  $p = 0.0176$ ,  $ES = 0.52$ .

As shown in Table 1, indirect interpersonal exposure was not correlated with either of the media exposure variables but was correlated with reaction to print media coverage.

### Posttraumatic Stress Reactions

Of the 69 participants who answered all items on the PTS scale, 45 (65%) had scores of 21–41, with 40 (58%) at or below the mean score of 36.10 ( $SD = 12.85$ ). These scores indicated an average response on the PTS items of the scale equal to a frequency of *not at all* to just below *rarely* in the past 7 days. Twenty-two (32%) children scored 42–60 indicating

**Table 2.** Distribution of Responses and Mean PTS Scores Across Levels and Types of Media Exposure

	<i>None</i>	<i>A little</i>	<i>Some</i>	<i>A lot</i>
Broadcast	<i>n</i> = 2 M = 23.0 SD = 1.4	<i>n</i> = 6 M = 34.3 SD = 15.9	<i>n</i> = 23 M = 30.8 SD = 11.1	<i>n</i> = 38 M = 40.3 SD = 12.3
Print	<i>n</i> = 14 M = 24.1 SD = 4.0	<i>n</i> = 18 M = 36.4 SD = 13.1	<i>n</i> = 19 M = 35.5 SD = 10.4	<i>n</i> = 18 M = 45.8 SD = 11.9

*Note.* This table excludes individuals who did not answer all PTS items.

an average frequency of *rarely* to just below *sometimes* on the PTS items. Two (3%) had scores of 63 and 65, respectively, indicating an average response on PTS items of *sometimes*.

Although PTS scores were low on average, many children experienced some reactions with a frequency of *sometimes* or *often* during the 7 days prior to the survey. The most commonly reported reactions were feeling irritable (*n* = 18, 20% *sometimes* and *n* = 24, 27% *often*), thinking about it without meaning to (*n* = 22, 25% *sometimes* and *n* = 2, 2% *often*), having pictures about it pop into mind (*n* = 20, 23% *sometimes* and *n* = 7, 8% *often*; *n* = 1, 1% missing), avoiding thoughts about it (*n* = 13, 15% *sometimes* and *n* = 20, 23% *often*), and having waves of strong feelings about it (*n* = 22, 25% *sometimes* and *n* = 9, 10% *often*; *n* = 2, 2% missing).

Table 2 presents the mean PTS scores across each level of the two media exposure variables. The distribution was negatively skewed for broadcast media exposure and fairly flat for print media exposure. Mean PTS scores were higher with increasing levels of exposure for both broadcast and print coverage. PTS scores were higher across higher levels of print than of broadcast exposure.

The interaction of gender and print exposure accounted for 8% of the total variance in PTS, yet failed to reach significance,  $F(1, 67) = 5.53$ ,  $p = 0.0217$ . The interaction indicated that for both boys and girls, PTS scores were low across all levels of print exposure with the exception that girls at the highest level of print exposure (*n* = 13 of 35 girls, 37%) had the highest PTS scores ( $M = 47.77$ ,  $SD = 9.88$ ). Fewer boys (*n* = 5 of 34 boys, 15%) reported exposure to the highest level of print coverage with lower PTS scores ( $M = 40.60$ ,  $SD = 16.24$ ). The interaction was not significant in the context of the main effects. There were no significant interactions of gender and broadcast exposure, gender and reaction to broadcast coverage, or gender and reaction to print coverage.

The interactions of reaction to broadcast and to print coverage with the amount of exposure were better predictors of PTS than the interaction of gender and print exposure. The interaction of reaction to print coverage and print exposure accounted for 47% of the total variance in PTS,  $F(1, 66) = 58.44$ ,  $p < 0.0001$ . The interaction indicated that PTS scores were low and not related to exposure across increasing levels of print exposure when the reaction to coverage was low, but PTS increased with increasing print exposure as reaction to it increased. Indirect interpersonal exposure demonstrated a nonsignificant trend ( $p = 0.0179$ ) when it was added to the model. The two predictors accounted for 54% of the total variance in PTS,  $F(2, 61) = 35.82$ ,  $p < .0001$ . The main effects of print exposure and reaction to print coverage were not significant in the context of these two predictors.

The interaction of reaction to broadcast coverage with the amount of broadcast exposure explained 26% of the total variance in PTS,  $F(1, 66) = 23.66$ ,  $p < 0.0001$ . The interaction indicated that there was no relationship between exposure and PTS when reaction to broadcast coverage was low. At low levels of reaction to broadcast coverage, PTS was also low. As reaction to broadcast coverage increased, PTS increased with increasing broadcast exposure. Most of the sample was exposed at high levels to broadcast coverage, dampening the magnitude of the interaction effect. The main effects of indirect interpersonal exposure, broadcast exposure, and reaction to broadcast coverage were not significant in the context of the interaction.

## DISCUSSION

Our findings highlight the fact that children, even those with no direct physical or interpersonal exposure, react to major events such as the 1995 terrorist bombing in Oklahoma City. While media exposure itself may be associated with posttraumatic stress, we found that the relationship between the children's posttraumatic stress reactions and media exposure was contingent upon their emotional reactions to media coverage. Though we might expect media content and images to contribute to heightened arousal in some individuals, it may also be that children with heightened arousal are drawn to media coverage to obtain information or to maintain the heightened state of arousal (10, 12). Excessive media exposure, therefore, may indicate the need for reassurance

about safety, assistance in processing emotions, and redirection to other activities.

Of interest, print exposure was more strongly associated with enduring posttraumatic stress than was broadcast exposure. Most of the participants endorsed the highest two responses available for broadcast media exposure (*some* and *a lot*), which may have dampened the association that broadcast exposure had with distress; print exposure was more evenly distributed. There are other possible explanations for differences in the effects of print and broadcast exposure as well. The intentional effort associated with print exposure may reflect the child's level of interest and absorption of the content. Those with more intense reactions to the incident may have actively sought print coverage. There may be differences in processing of broadcast and print material and in memory of information obtained through different modalities. Reading rather than watching or hearing information may be associated with better retention of information, at least in some. While televised scenes of disaster capture terror and are commonly rebroadcast, these scenes are often fleeting. Printed images may be more compelling than televised images in that they spotlight the most salient and graphic part of an experience. Printed portrayals also endure, allowing one to look at the most dramatic and gripping scenes repeatedly over time and for any length of time. It is not uncommon for television or radio coverage to play as background while children engage in other activities. In these instances, the child's attention to coverage would likely be diminished and passive. Broadcast coverage of the bombing was so extensive that children may have discounted it or "tuned it out." It is also possible that excessive exposure to repetitive images is desensitizing (25, 26).

Our questions pertaining to broadcast media combined television and radio coverage. Both are popular with children, but there may be important differences in the children who choose one form over the other and in the impact of one form or the other. The two forms may be processed differently and may have different impact. Certainly, combining television and radio coverage in our assessment may have muted the effects of one or the other. We might expect audiovisual processing (associated with television exposure) to be more powerful than auditory processing alone (associated with radio exposure). Furthermore, it is unclear how pervasive bomb-related coverage was on radio stations popular with children.

The results underscore the importance of the child's reaction to media coverage relative to ex-

posure in predicting posttraumatic stress reactions. While this may be intuitive, we know of no other study that has examined the issue. Given that children with heightened emotional responses to incidents like this may expose themselves to greater media coverage, evaluating their reactions to coverage may be an important way to identify those in need. There was no relationship between increasing levels of media exposure and posttraumatic stress when reaction to the coverage was low. For those with moderate and intense reactions, posttraumatic stress increased with increased exposure to both broadcast and print media coverage. The relationship between symptomatology and reaction to media coverage may be bidirectional. Those with greater media exposure and stronger reactions to it are more likely to be symptomatic; those who are more symptomatic may have stronger reactions to media exposure and may be drawn to the media coverage to obtain information or maintain a heightened state of arousal.

As predicted, indirect interpersonal exposure was also related to posttraumatic stress. The interaction of reaction to print coverage and print exposure explained the most variance of the models we examined. It deserves further attention in future studies. Girls reported more print media exposure than did boys, and the relationship between print media exposure and posttraumatic stress was stronger for girls than for boys. In part, this may reflect the small sample size and the distribution across levels of exposure for boys, with few reporting high print media exposure. This finding may also reflect real differences between boys and girls in their amount of print media exposure and the variables that predict their reactions. Despite differences in exposure, boys and girls did not differ in intensity of posttraumatic stress symptomatology.

## Limitations

This study focused on posttraumatic stress reactions and made no attempt to establish diagnosis. In fact, it is unclear if media exposure alone qualifies as exposure for the purpose of establishing a diagnosis (27). In addition, endorsement of some PTSD symptoms may be normal following trauma exposure and does not necessarily imply diagnosis or pathology. The level of posttraumatic stress in this sample was low as would be expected in those not in the immediate vicinity of the disaster examined two years after the incident. In a subsample of the children who participated in this study, fewer than 20%

reported difficulty functioning because of the bombing and those who acknowledged functional impairment reported problems in only one environment—home, school, or other places (28). The extent to which our findings would generalize to other populations is unclear. The effects of media exposure would likely pale in comparison to other exposure factors in direct victims—those physically present at the site—and in those who develop clinically significant posttraumatic stress.

The variables used for media exposure and reactions to media coverage were developed for this study; their reliability and validity have not been established. We did not assess a number of factors, such as prior or subsequent trauma or preexisting psychiatric conditions, which might have influenced responses to queries about current reactions and retrospectively recalled reactions to media coverage and which might have influenced symptom development. In addition, other outcomes, fear for example, may be more appropriate measures for studies of indirect victims of terrorist assault. These issues warrant attention in future studies.

## CONCLUSIONS

The results of this investigation suggest that children, even those whose immediate safety is not in jeopardy, may have lingering reactions to incidents that threaten their security and to media coverage of such events. While concern about the influence of television on children's feelings, attitudes, and behavior has been widely proclaimed (25, 26, 29, 30), print coverage may have even greater impact on those who are exposed, or who expose themselves, to it. This investigation also suggests that posttraumatic stress reactions increase with increasing exposure to media coverage as reaction to that coverage intensifies. Our findings support the need for further study of the role of the media—broadcast and print—in the development and persistence of posttraumatic stress reactions in children following terrorist incidents.

It is important to address the concerns of children and to monitor their responses to major events and the ensuing media coverage. Individuals working with children should routinely assess exposure and reactions, even in those who reside outside an immediate disaster area and in situations where exposure may not be obvious. To that end, parents, primary care physicians, teachers, and counselors should be

taught to recognize posttraumatic stress and should be informed about the potential role of the media in the development, maintenance, and/or exacerbation of stress.

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