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Brief Report

Stress Reactions in Disaster Victims Following the Bijlmermeer Plane Crash

Ingrid V. E. Carlier^{1,2} and Berthold P. R. Gersons¹

This article examined posttraumatic stress symptoms in a sample of disaster victims following the Bijlmermeer plane crash of October, 1992, in the Netherlands. Findings indicated that six months after the disaster 26% of the respondents were suffering from posttraumatic stress disorder (PTSD). The victims' PTSD was strongly associated with material damage and loss. The discussion of the results focuses on the distinction between normal and pathological stress reactions and the implications for disaster after-care.

KEY WORDS: PTSD; disaster victims; aftermath of Bijlmermeer plane crash; trauma.

"When the plane hit, it sent me crashing across my bedroom. When I came out of the bedroom, I saw that half of the apartment had been destroyed. I was scared to death, and I climbed downstairs over several different balconies. I saw people jumping off balconies in panic. Bewildered and alone, I wandered around outside. Later I heard the family with children living upstairs had not survived the crash. I blamed myself for not being able to save them. Months after the crash, I would still run out of the house in panic whenever I heard unexpected sounds like the garbage truck" (victim account of the Bijlmermeer plane crash).

Aflame and out of control, a Boeing 747 cargo jet crashed into two highrise apartment buildings in the Bijlmermeer, a suburb of Amsterdam in the Netherlands, on Sunday evening, October 4, 1992. It was a disaster with no warning, and in the first few hours little could be done. Not until a week later did Amsterdam and the rest of the country manage to oversee

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the calamity and give it a name: the Bijlmermeer plane crash (Gersons & Carlier, 1993).

The crash took 43 lives, including the 4 crew members in the plane. A large group of residents had to be rehoused, as their apartments had been destroyed or rendered unfit for habitation. The group included 350 to 400 households or 750 individuals, of whom 525 were adults and 225 were 0 to 19 years of age. In addition to material damage, some people had lost one or more family members in the disaster. A total of 25 families or households suffered fatalities, in some cases more than one.

Research has shown that psychological adjustment after plane crashes has a great deal in common with adjustment after other types of disasters. Typical stress reactions such as sleep or concentration problems, agitation and irritability are usually temporary and disappear within a few weeks after the disaster (Scrignor, 1984). Such symptoms are viewed as *normal reactions to an abnormal event*.

This article describes a study of posttraumatic stress symptoms in a sample of disaster victims six months after the Bijlmermeer plane crash. PTSD can be viewed as the most characteristic disorder which follows a traumatic event (Carlier & Gersons, 1995; Gersons & Carlier, 1992).

Method

Subjects

In cooperation with the Amsterdam Municipal Health Service, we approached by mail the residents of the most severely damaged apartment blocks and the adjacent buildings with a view of the disaster area (eyewitnesses). Under Dutch privacy legislation it was not possible to obtain names and addresses of all victims. We were also able to include those victims who were relocated due to apartment damage. One reason for including eyewitnesses was that, having seen and heard the disaster at a very close range, they too might exhibit psychological effects (Weisaeth, 1991). For practical reasons, only residents who spoke Dutch or English were selected. A minimum age of 18 was another requirement.

It is the authors' impression that the study sample experienced equal damage to that of the total affected population, and may therefore be regarded as representative. Yet, we do not have any specific information about how the sample resembled, or did not resemble, the population of interest. Nor have we an idea about the exact number of potential subjects who spoke Dutch or English.

The study assessed 136 victims with an average age of 35 (range 18–86, $SD = 12.6$); there were 57% males and 43% females. To facilitate matters for the victims, we interviewed them in their own homes. The 6-month time frame of the study was selected because that was the period needed to arrange for funding of the study, informative activities, and recruitment of respondents.

Instrument

The duration of the interview ranged from 1 to 1.5 hr. Diagnoses were established by means of the Structured Interview for PTSD (SI-PTSD) (Davidson, Smith, & Kudler, 1989; Davidson, Kudler, & Smith, 1990). SI-PTSD was translated into Dutch and adapted to operationalize DSM-III-R criteria for PTSD (the study was initiated prior to the introduction of DSM-IV) (American Psychiatric Association, 1987, 1994). SI-PTSD is designed not only to elicit information about the presence or absence of symptoms, but also to scale the severity of the experiencing of these symptoms from a current as well as a lifetime perspective. The SI-PTSD was used to rate each of the 17 DSM-III-R items on a scale of 0 to 4, where 0 is absence, 1 = minimal/mild, 2 = moderate, 3 = severe, and 4 = extremely severe. A minimum score of 2 on a particular item was required for that item to be considered as present in a diagnostic sense (see also Davidson et al., 1990). During the interview, we also gathered information regarding stressor experiences.

Results

Posttraumatic Stress Symptoms

In Table 1, percentages for the 17 separate PTSD symptoms are presented first. This concerns the current status of respondents, 6 months post-disaster.

Table 1 shows that the highest percentages pertained to the symptoms “emotionally upset” (52% of the re-experiencing group), followed by “hyperalertness” (40% of the hyperarousal group) and “intrusive thoughts” (39% of the re-experiencing group). On the whole, the “avoidance” symptom group had the lowest percentages, the “re-experiencing” group the highest, and the “hyperarousal” group was in between.

A total of 26% of the respondents qualified for the PTSD diagnosis 6 months after the disaster.

Table 1. Separate PTSD Symptoms and PTSD Diagnosis, 6 Months Postdisaster ($N = 136$)

PTSD-symptoms (DSM III-R)	%
B: Re-experiencing the disaster	
1-Intrusive thoughts	39
2-Nightmares	31
3-Flashbacks	31
4-Emotionally upset	52
C: Avoidance of memory of the disaster	
5-Avoidance of thoughts and feelings	27
6-Avoidance of places, activities	27
7-Psychogenic amnesia	9
8-Loss of interest	27
9-Detachment from others	28
10-Restricted affect	16
11-Foreshortened sense of future	15
D: Hyperarousal	
12-Sleep disturbances	32
13-Irritability	29
14-Difficulty concentrating	35
15-Hyperalertness	40
16-Increased startle	30
17-Physical reactivity	33
PTSD-diagnosis (DSM III-R)	26

Psychological Effects in Relation to Material Consequences

To describe the relation between the material consequences and the psychological effects of the disaster, we designed a *risk index*. Respondents were classified according to the extent to which they experienced stressors from the disaster. The risk index ranges from low (Index 1) to high (Index 4). Index 1, the fewest material consequences, included respondents who were not home at the time of the disaster and who did not (a) suffer any material damage or lose their home, and did not (b) lose any good friends or loved ones. Index 2 included respondents who were not home at the time of the disaster, but did suffer material damage and/or lose a loved one. Index 3 included respondents who were home at the time of the disaster but did not suffer any consequences. Last, Index 4, the most material consequences, included the respondents from the most severely affected apartments who were home at the time of the disaster and suffered one to three consequences. In addition to consequences (a) and (b), they may also have been injured themselves in the disaster (c). It should be noted

here that an additional index could have been formulated to contain respondents who lived in neighboring buildings, were home at the time of the disaster, and suffered one to three consequences. Since no respondents fell into this category, we did not include it.

Using regression analysis, we measured the extent to which the risk index predicted the PTSD diagnosis. Of the separate risk aspects, three appeared to have predictive value as regards PTSD: "lost a loved one," $F(1, 125) = 51.51, p < .001, R^2 = .29$; "suffering material damage or lost home" $F(2, 125) = 28.79, p < .05, R^2 = .32$. and "was home at time of disaster," $F(3, 124) = 21.90, p < .05, R^2 = .35$. We can thus conclude that PTSD also affected residents of neighboring buildings or tenants who were not injured themselves.

Finally, no correlation was observed between PTSD and gender, educational level, nationality or country of origin (Carlier, Van Uchelen, & Gersons, 1993).

Discussion

The most important conclusion that could be drawn 6 months following the plane crash was that 26% of the respondents were suffering from PTSD. In view of the problems described above in compiling a representative sample, however this number must be interpreted cautiously. On the other hand, the percentages of PTSD coincides with the figures in the literature. Kleber and Brom (1992) estimated that in general approximately 20% to 30% of victims develop PTSD after a disaster (see also Lundin, 1995; Smith & North, 1993). The enormous psychological impact of the Bijlmermeer plane crash is evident from the fact that some tenants of neighboring buildings with a view of the disaster area (eyewitnesses) were suffering from PTSD as well.

It was interesting to note that 10% of respondents who met the criteria for (acute) PTSD had recovered 6 months later without professional treatment. Posttraumatic stress reactions may thus be part of a process of natural adjustment to extreme stress.

On the other hand, the present study also showed that 44% of the respondents who did not satisfy the criteria for a full PTSD diagnosis did exhibit PTSD symptomatology. We do not know to what extent the reactions experienced have led to generalized functional impairments or adjustment difficulties. Persistence of PTSD symptomatology or subthreshold PTSD (Blank, 1993; Carlier & Gersons, 1995) over a lengthy period could mean that the amount of time needed to cope with repercussions of a disaster is presently being underestimated. In 1944, Lindemann assumed that

the mourning period manifested in psychological complaints such as dependency lasted from four to six weeks. Later research (Parkes, 1972) demonstrated that widows needed about five years on the average. It is therefore plausible that a similar underestimation of the persistence of stress reactions has occurred with regard to posttraumatic stress symptoms. If this is the case, it has certain implications for the nature of the care required. Victims should be informed about this possibility, and care should be oriented to dealing as effectively as possible with complaints over a far longer stretch of time.

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