

Effects of the AVIANCA Aircrash on Disaster Workers

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Seventy-eight emergency workers at the AVIANCA aircrash at Cove Neck, New York, filled out questionnaires dealing with their reactions to the disaster. The number of fatalities witnessed was strongly predictive of number of symptoms, while the proportion of injured dealt with who survived was negatively correlated with number of symptoms. Cognitive variables were related to the distress measures. Contrary to hypothesis, disaster training was unrelated to the distress measures, even when training was rated as effective.

In January 1990, an AVIANCA aircraft crashed at Cove Neck, a relatively unpopulated section of Long Island. Seventy of the passengers died, and most of the remaining sustained injuries. The sense of loss and waste in the community was intensified by the news that the plane had crashed due to lack of fuel and communication difficulties with the tower about the fuel levels. Area hospitals were over-burdened.

This study looked at the reactions to the disaster by emergency workers who were associated with North Shore Hospital, one of the main hospitals involved in the emergency. Subjects included the body handlers who actually searched for bodies at the site, the security personnel who maintained security at the site and who supervised the transport of the wounded and deceased, the physicians and nurses who worked at the site or in the emergency room on the bodies as they were brought in, and the mental health workers who worked with the injured and the families of the dead and injured. Subjects worked in teams, and for the most part described the

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disaster effort as well-organized and effective, but the conditions were difficult, since the crash occurred in a wooded area not close to roads. Triage decisions about who should be treated first at the site were described as particularly difficult. Workers put in as many as six days of extra work, and as many as three days without sleep.

A review (Gibbs, Drummond and Lachenmeyer 1993) of studies of the effects of disasters upon the workers themselves indicated that a variety of stress responses and actual psychopathology can result. Many reports were anecdotal, however; and few studies have attempted to identify which aspects of the disaster workers' experience are related to psychological distress. The following study used the Impact of Events Scale (IES), developed by Horowitz, Wilner, and Alvarez (1979), and a symptom check list to investigate which aspects of the AVIANCA disaster workers' experience correlated with psychological distress.

Hartsough (1985) outlined the sources of stress on workers as: Event Stressors, particularly contact with death and dismemberment; Occupational Stressors, such as working long hours, or insufficient training; and Organizational Stressors, such as low pay or interagency conflict. This study focused on examining the effects of event and occupational stressors on emergency workers.

Among occupational stressors, Hartsough emphasizes the effect of long hours of physically demanding work; hypotheses of the study were that workers who put in more hours of overtime on the disaster would show more distress, and that those who worked more hours without sleep would show more distress. Other hypotheses about occupational stress were formed about disaster training. Weisaeth (1989) studied the aftermath of an explosion in a Norwegian paint factory, and reported that a high level of disaster training was correlated with adaptive disaster behavior. It was hypothesized that workers who had received disaster training would show less distress and that those who rated their disaster training as more effective would show less distress.

Reviews of the effects of disasters on psychological functioning stress the importance of the degree of terror and horror in the situation, especially when it involves death (e.g., Baum and Davidson 1985; Hartsough 1985). More recently, Quevillon, Yutzenka and Jacobs (1991) found that working as a body handler in a disaster was one of the strongest predictors of negative emotional consequences. It was hypothesized in this study that workers who dealt with a larger number of victims would show more distress, although as more of these victims survived, less distress would be reported. Workers

who witnessed fatalities would show more distress, and the more fatalities, the more distress.

The role of cognitive variables in mediating between disaster and psychological distress has not been studied sufficiently. Janoff-Bulman and Frieze (1983) have provided one cognitive theory that psychopathology results from victimization because basic assumptions about the world are affected. In line with this theory, the study looked at whether subjects' belief in a just world had changed, and whether their sense of being personally vulnerable had changed. It was hypothesized that changes in these assumptions would correlate with the extent of distress experienced by workers.

Looking at another cognitive variable which has not been investigated, it was hypothesized that distress would relate to the triggering of memory of past personal losses for emergency workers. In addition, it was hypothesized that those who experienced their efforts as more effective would show less distress.

Method

Subjects

One hundred fifty questionnaires were distributed to emergency workers who participated in the AVIANCA crash. Of these, 78 were returned, for a return rate of 52 percent. Respondents included 22 physicians, 24 nurses, 12 security personnel, 13 body handlers on the scene, 7 mental health workers, and one subject who omitted a job description. An attempt to obtain as subjects police who had been involved was unsuccessful.

Of the group, 45 were male and 33 female. Most females were nurses or mental health workers. Mean age was 36.67 (SD 9.44). Years of education ranged from 12 to 25, with a mean of 15.58 (SD 6.34). Of the sample, 64 percent were married.

Measures

Impact of Event Scale (IES)

The IES (Horowitz et al. 1979; Horowitz 1982) was developed to examine an individual's response to stressful events, and it has become a standard measure for investigating stress response. Horowitz (1982) theorized that individuals respond to stress with two reactions, intrusion and avoidance. The scale contains intrusion items (e.g., I thought about it when I didn't mean to) and avoidance items (e.g., I tried not to think about it). Horowitz et al. (1979) reported an internal consistency for the scale of .78 for Intrusion and .82 for Avoidance. Test-retest reliability for a sample of 25 over a one-week period was .87 for the total scale. Horowitz, Krupnick,

Kaltreider, Wilner, Leong, and Marmar (1981) asked clinicians to judge scores as low, medium or high. High scores, judged by the clinicians to be those above 19, indicated clinical concern for the respondent, with evaluation or treatment clearly warranted.

Symptom Scale

For the purposes of brevity and to tailor the items to the nature of the trauma, the authors developed their own list of possible symptoms. Items included behavioral changes (e.g., eating, sleeping, drinking alcoholic beverages, using prescription and non-prescription medications), and emotional changes (feelings of depression, confusion, fear, worry, and anger). Number of Symptoms was totaled over the list, and used as an indicator of distress.

Questions about Disaster Experience

After the demographic questions, and before the distress measures, subjects were asked about their preparation for and experience of the disaster. Questions asked about workers' predisaster training and about how many extra hours of work and hours without sleep had occurred. Workers were also asked about their belief in a just and meaningful world, sense of personal vulnerability, and memory of past losses. Questions about the number of injured, number that survived, and fatalities dealt with were placed at the end of the questionnaire to avoid contaminating responses to the distress measures.

Procedure

Questionnaires were distributed three weeks after the air crash, and were returned in the period between one month and three months after the crash. When possible, questionnaires were sent directly to individuals known to be involved in the disaster effort. These included emergency room personnel, nurses and physicians on duty the day of the disaster. For security personnel, emergency workers on the scene, and mental health workers, where no lists of individuals were available, questionnaires were distributed through the individual in charge of that group.

Subjects were informed on the cover sheet that their responses were anonymous and confidential, and that they could obtain results upon request.

Results

Comparisons between occupational groups of subjects on the distress measures yielded few differences, and subsamples were combined for the purposes of further analyses.

The mean score for workers on the Intrusion measure was 12.149 (SD 5.80); the mean score on Avoidance was 12.155 (SD 5.80), with a mean Total score of 24.329 (SD 11.138). The range of scores was from 3 to 53. Table 1 shows the scores in comparison with other samples of stressed groups. Fifty-six percent of the group scored 20 or higher, in the "high" range described by Horowitz et al. (1981).

On the list of symptoms subjects attributed to the disaster work, 38 percent checked at least one symptom, and the mean number checked was 1.04 (SD 2.03), with a range from 0 to 9. The symptoms noted by the largest percentages of subjects were depression (18.3%), changes in sleeping habits (18.1%), worries (15.3%), fears (13.7%), and anger (9.9%). Total IES and Number of Symptoms correlated .574 ($N = 64$), $p < .0005$.

Table 2 shows correlations between demographic variables and the measures of psychological distress. Age did not correlate with distress, but females showed more distress than males on Avoidance and Number of Symptoms. More educated individuals tended to score lower on Avoidance.

Table 1. Impact of Event Scores for the AVIANCA Sample, as Compared to Scores from Other Samples Identified by the Authors

Mean	Sample	N
24.3	AVIANCA sample	70
7.4	Soldiers prepared for combat but who have not fought (Schwarzwald, Solomon, Weisenberg, & Mukulincer 1987)	88
9.8	Medical students confronted with first cadaver (Horowitz et al. 1979)	69
14.7	Accident victims in Norwegian hospital (Malt 1988)	103
21.6	Flood victims forced to relocate (Steinglass & Gerrity 1990)	76
22.9	Individuals experiencing recent loss of a parent (Horowitz et al. 1979)	36
23.4	Victims of traumatic injury, such as accidents or attack (Landsman et al. 1990)	137
27.8	Victims of a tornado forced to relocate (Steinglass & Gerrity 1990)	33
31.9	Soldiers with combat stress reaction (Schwarzwald et al. 1990)	382
40.0	Male veterans diagnosed with PTSD (Frank, Kosten, Giller, & Dan 1988)	34
48.9	Psychiatric patients after homicide of family member (Rynearson & McCreery 1993)	18

Table 3 shows the correlations obtained between event stress measures and psychological distress. The only aspect of event stress that correlated with the IES was number of families dealt with. The more families dealt with, the higher the score on Intrusion. As hypothesized, the more fatalities dealt with, the higher the Number of Symptoms, and the more survivors the

Table 2. Correlations between Demographic Variables and Distress Measures

	Age	Gender	Education
Intrusion (N)	.022 (73)	-.227 (74)	-.096 (62)
Avoidance (N)	.016 (70)	-.244* (71)	-.277* (60)
Total IES (N)	.018 (69)	-.242* (70)	-.198 (59)
Number of Symptoms (N)	-.010 (69)	-.245* (70)	-.078 (59)

*indicates $p < .05$

Table 3. Correlations between Event Stress and Distress Measures

	Number Injured	Number Survived	Fatalities	Number Fatalities	Number** Families
Intrusion (N)	.154 (53)	-.129 (50)	.099 (70)	.115 (40)	.361** (51)
Avoidance (N)	.099 (52)	-.156 (49)	.039 (67)	.144 (40)	.193 (48)
Total IES (N)	.129 (52)	.143 (49)	.008 (39)	.138 (39)	.294* (47)
Number of Symptoms (N)	.206 (50)	-.368** (48)	.233 (67)	.455** (38)	.155 (47)

* $p < .05$

** $p < .01$

worker dealt with, the fewer Number of Symptoms shown. Contrary to prediction, the number of injured dealt with, and whether or not fatalities were viewed, did not correlate with the measures of psychological distress.

No significant correlations between the questions about occupational stress and psychological distress were obtained. That is, neither extra hours on the job, hours without sleep, whether training occurred, or the effectiveness of training, correlated significantly with any of the three distress measures. Correlations tended to be around zero.

Table 4 shows the correlations between cognitions and distress measures. Those workers who reported that the events stirred up more memories of their own past losses showed more distress on both the IES and the Number of Symptoms. Subjects who described themselves as experiencing a greater loss of belief in a just and meaningful world, and subjects who felt the experience increased a greater sense of personal vulnerability scored higher on the IES. Ratings of own effectiveness did not correlate with the distress measures.

Table 4. Correlations between Cognitions and Distress Measures

	Belief in Just World	Personally Vulnerable	Memory of Losses
Total IES (N)	.291 (69)	.486** (70)	.467** (70)
Number of Symptoms (N)	.009 (69)	.167 (70)	.340** (99)

* $p < .05$

** $p < .005$

Discussion

Scores on the Impact of Events Scale indicated that over half of the sample showed "high" levels of stress, requiring evaluation or treatment, as defined by Horowitz et al. (1981). The mean amount of distress experienced by disaster workers, as shown by their IES scores, was by no means comparable to psychiatric samples with PTSD, but was very comparable to the amount of distress experienced by disaster victims themselves, for example, those forced to relocate after a flood or tornado, or those experiencing a traumatic injury.

One of the limitations of the study is the heterogeneous nature of the sample, from physicians to body handlers. Comparisons between occupa-

tional subsamples showed few differences, however, and there are some advantages to being able to make inferences to the more general population of emergency workers. The heterogeneous nature of the sample does mean that findings regarding education and gender are not easily interpretable, because of the confounding of these variables with occupational role. For instance, females showed higher IES scores, but since most females in the group were nurses, it may have been that special features of that occupational role accounted for the finding.

Some aspects of event stress, as hypothesized, were correlated with Number of Symptoms. In particular, number of fatalities dealt with was correlated with more symptoms, and number of survivors dealt with was correlated with fewer symptoms. These findings underline the issue of exposure to death and dismemberment, as discussed by Hartsough (1985) and others. It is also possible that dealing with survivors allows workers a greater sense of efficacy.

This inference about efficacy was not supported by findings related to workers' perceived effectiveness; perceived effectiveness did not correlate with measures of distress. It is disturbing that disaster training apparently also did not impact on workers' adjustment to the stress. Even when workers' ratings of the effectiveness of their disaster training were used as the measure, there was no relationship with distress.

The lack of relationship between occupational stressors and distress in this study is consistent with the report of Gibbs et al. (1993) that few studies of disaster workers showed an impact of occupational stress.

As noted, there was some support for the Janoff-Bulman and Frieze (1983) theory that psychopathology occurs in victims because their basic cognitive assumptions about the world and the self have been violated. Those workers who stated their belief in a just and meaningful world had been more violated, and those who felt their sense of personal vulnerability had been more affected showed higher IES scores.

An interesting finding was the strong correlation between scores on the IES and the triggering of memories of past personal losses. Psychologists know little of how past and current stressors are linked to produce distress, but individual's perceptions of similarities between situations are probably one link. Recency and intensity of one's own loss are probably also relevant. The variable of memory triggers needs further investigation.

In general, the effect of cognitive variables on disaster reactions needs more investigation. The strong showing of cognitive variables in this study, as compared with the variables dealing with the actual stress experience,

supports Lazarus's (1966) long-held contention that stress must be studied in the context of appraisal of that stress.

The lack of relationship between training and post-disaster symptoms, combined with the strong relationship between exposure to fatalities and symptoms, suggests that stress inoculation in training needs improvement. Myers (1991) advocated that disaster workers be exposed to video presentations of disaster similar to what they might encounter. Even graphic videos of disaster do not, however, prepare workers for the sounds and smells they will encounter.

In addition, disaster planners might use the findings of this study to help identify emergency workers who are at risk for later reactions. In particular, individuals with recent losses might be prepared for how to deal with recurrences of painful feelings. Post-disaster interventions need to address the belief systems of workers, to help them deal with their sense of personal vulnerability and loss of belief in a just world.

Limitations of the study include the variability in distribution of the measure, some receiving the questionnaire directly and some through a supervisor. This could have exacerbated the problem of all surveys, that motivation affects who returns the questionnaire. Thus, those who responded may have been those who were more concerned and more distressed. Weisaeth (1989) reported, on the other hand, that nonrespondents to a disaster study when followed up proved to be more disturbed than respondents. The return rate (52%) in the present study was relatively high for a survey. There was a variable length of time, between one and three months, between receipt of the questionnaires from subjects. Studies do not always show a clear relationship between length of time and amount of subject distress, however (Gibbs 1989), and this amount of time difference may not have been important to the findings.

Conclusions

The findings support a growing body of research that indicates negative emotional consequences for disaster workers, with over half showing high levels of distress on the IES. The findings supported the importance of the event as a stressor, particularly number of fatalities dealt with, rather than aspects of occupational stress like number of hours worked. While some findings suggested workers' sense of efficacy might ameliorate stress effects, the lack of relationship between disaster training and distress was disturbing, and suggests a re-examination of the kind of training provided to disaster workers. Further research is warranted on the mediation of cognitive variables between disaster and distress.

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