

Survivors of U.S. Airline Accidents Shed Light on Post-accident Trauma

Many survivors felt that their tragedies were prolonged because the airlines were not in control of the post-accident situations for hours.

—

by

Carolyn V. Coarsey-Rader, Ph.D.
Washington State University
Spokane, Washington, U.S.

Airlines should prepare contingency plans to avoid causing unintended pain to survivors of aircraft accidents. A few weeks after an airline accident, for example, an unmarked package was delivered to the office of a man who had been a passenger on the aircraft and was killed on impact. His co-workers had received group counseling and had begun to adjust to his loss when the box arrived. Two secretaries opened the box, which contained his bloody clothes and charred brief case. Another co-worker, a survivor of the accident, said that this experience horrified and traumatized the entire office staff — from an interview with a passenger-survivor of an aircraft accident.

C.V.C-R.

There has been a lack of empirical data relating to passenger-survivors of airline accidents. Often far from home, survivors typically dispersed as soon as they could travel

(Williams, et al., 1988). Because of litigiousness often associated with airline accidents, personal information has usually been difficult to obtain. Thus, researchers have been hampered in conducting studies with a statistically significant sample.

In the absence of empirical data about psychological problems experienced by survivors of airline accidents, mental health professionals have responded to survivors' needs with information gleaned from survivors of non-aviation accidents (Black, 1987; Schuchter & Zisook, 1987; Bales, 1987; Butcher & Hatcher, 1988; Williams, et al., 1988; Jacobs, et al., 1990). Without data about the unique problems of airline-accident survivors, airlines and other agencies that assist survivors have had insufficient information to design post-accident procedures to prevent additional problems for

passenger-survivors and to help restore their sense of personal control and independence.

Following the 1977 runway collision of two Boeing 747s, which killed 580 passengers and crew members in Tenerife, Canary Islands, a doctoral student attempted to study the extent of distress experienced by the 64 passenger-survivors (Pearlberg, 1979). Cautious by their lawyers, most of the survivors refused to be interviewed; only eight agreed to participate in the study, which was conducted five months after the accident. Although the survivors had begun to reorganize their lives, "they were very different people than they had been before the crash" (Pearlberg, 1979).

Sloan (1988) studied survivors of a chartered airplane accident involving 30 male college basketball players and found that the survivors experienced high levels of stress initially, which decreased rapidly and leveled off over time.

Smith, et al., (1990), interviewed 62 surviving employees of a hotel that was struck by a military jet. More than half of the subjects met criteria for a psychiatric disorder following the disaster. Slagle, et al., (1990), reported the presence of intrusive, avoidant, depressive/anxious symptoms, and symptoms of post traumatic stress disorder (PTSD) in 37 respondents following a nonfatal military aircraft accident.

Brooks and McKinlay (1992) studied the mental health consequences of 66 persons who resided in Lockerbie, Scotland, after a Boeing 747 was exploded in flight by a terrorist bomb and the aircraft fell onto their village. Eleven of their fellow residents and all the aircraft's passengers and crew members were killed. The researchers found that of the 66 residents, 48 suffered from PTSD, 19 suffered from depression and 14 were diagnosed with more than one mental disorder after the accident.

Survivors Tell Their Stories

Three passenger-survivors were interviewed 23 months following the same aircraft accident. Following are their descriptions of the accident.

Survivor A

Age at Time of Accident: 60

Female

Survivor A said: I felt the plane vibrate ... I could hear the brakes being applied, but we were not stopping ... finally we stopped. I was alert and awake, my head was resting on my knees, my hands were dangling beside me. I was unable to speak, but I heard what was going on around me. I think I was trapped in the airplane for 90 minutes. I heard the rescue people saying "We've got three DOAs [dead-on-arrivals]." I could tell that the two people in front of me were probably who they were talking about ...

and me. I could not speak up to tell them I was alive. It became very warm in the airplane, although I do not remember being afraid. I could not understand why no one was helping me escape. I could not see the water seeping in. Finally, the rescue workers pulled me from the airplane. It could not have been more than five minutes before the airplane sank.

Survivor A was taken to a hospital and she was treated in the emergency room for an injury to her arm. She sustained permanent nerve damage to her left wrist. After approximately 12 hours in the emergency room, she was released to stay at a relative's house located in the city of the accident. The airline gave her money to buy personal items and clothes. She said that the amount was much more than what was needed. She said

Interviews Form Core of Psychological Study

Between November 1987 and September 1989, there were six fatal U.S. airline accidents in which there were passenger-survivors. The following study was based on interviews with 78 survivors of those six airline accidents.

The study had three major aims: to determine the level of distress experienced by the survivors interviewed; to determine any factors about the survivors and circumstances about the specific accidents that might predict mental health problems; and to determine any factors in the immediate post-accident environment that may have influenced the psychological outcome of the survivors.

The U.S. National Transportation Safety Board (NTSB) places on public docket in Washington, D.C., copies of all questionnaires that are returned by passenger-survivors of airline accidents that are investigated by the NTSB. The docket included 271 names and addresses of

survivors of the six accidents who were more than 18 years old and resided in the United States or Canada. These survivors were sent letters explaining the study and requesting an appointment for a telephone interview; 48 letters were returned with no forwarding addresses. Five survivors reported that they were too distressed psychologically to be interviewed and were receiving treatment from mental health professionals. Fourteen survivors agreed to be interviewed if their attorneys consented; five later refused on the advice of their attorneys. Seventy-nine survivors agreed to be interviewed, but one survivor was not available during the interview period.

The Diagnostic Interview Schedule/Disaster Supplement (DIS/DS) (Robins & Smith, 1983) was used to identify symptoms and to diagnose disorders associated with the survivors. The 100-page DIS questionnaire required a minimum of 90 minutes to complete. It was scored by computer and visual cues for determining symptomatology were not necessary; therefore the instrument was ideal for telephone interviews.

that she could not have been happier with the way the airline employees treated her.

Family and friends were very supportive. Although she was unable to work for 10 weeks, her employer compensated her and she received support from her co-workers in general. She described how she had become a celebrity. She has appeared on television and still is in touch with the rescue worker who pulled her from the sinking aircraft. He later visited her in the hospital. His children call her grandma. After her settlement with the airline, Survivor A was able to purchase a home for the first time.

When asked in the interview, "Can you think of anything positive that came out of the air disaster?" She answered "Yes. I bought a new house, I'm financially better off and I've made new friends." She went on to elaborate that following the accident she has been surprised

by many indications of how much people cared about her. ♦

C.V.C-R.

Survivor B

Age at Time of Accident: 41
Male

Survivor B said: It felt like a normal take off. We went up to take-off speed when suddenly there was a sound of deceleration, the sound of the engines decreased. Within a few seconds, brakes were applied ... the reverse thrusters were thrown. He (the pilot) went down the runway trying to stop the plane. I assumed we would abort takeoff, circle around and try again. Then I became concerned.

I heard elevated voices from the cockpit, even though the door was closed. By virtue of where I was sitting, I could hear, "We're going off ... We're not gonna make it!"

The DS was specifically designed to gather information about the individual's disaster experience, perception of the event, use of formal and informal support systems and behavioral response to the accident. Diagnoses were selected for their potential relevance to the airline accidents and were defined as follows:

PTSD. Exposure to an extreme stressor outside the range of usual human experience; re-experiencing the traumatic event via memories, dreams, flashbacks or distress at exposure to reminders; persistent avoidance of reminders of the trauma or numbing of general responsiveness; and increased arousal such as sleep disturbance, irritability, difficulty concentrating, hypervigilance, exaggerated startle response and psychologic reactivation at exposure to reminders of the trauma.

Major depression. Persistent (at least two weeks) mood disturbance and four of the following: sleep disturbance, changes in activity, loss of ability to experience pleasure and interests, feelings of worthlessness or guilt, difficulty in

concentrating, or preoccupation with death or a wish to die.

Somatization. Multiple physical complaints in multiple organ systems for which no organic cause can be found.

Generalized Anxiety. Unrealistic or excessive anxiety or worry about two or more life circumstances.

Substance Abuse Disorder. Alcohol abuse is defined as excessive consumption of alcohol, and social and health problems resulting from alcohol and alcohol dependence.

Drug abuse is defined as tolerance to drug effect, withdrawal symptoms, pathological use, and impairments in social or occupation because of drug use (Robins & Regier, 1990; Solomon, 1989; Robins & Smith, 1983).

Because levels of distress and the presence or absence of mental disorders in passenger-survivors of airline accidents has largely been undocumented (Frederick, 1981), the study

We could hear the noise of the floor of the plane ripping out beneath us — it did not rip open [the cabin floor], but you could feel it. The plane had made a horrible impact.

The stewardess in front got on the intercom telling everyone to keep their heads and shoulders down. There was a lot of screaming and commotion ... I remember sitting there thinking "... Gee whiz, what's it gonna feel like to die? This is real, you can't get out of it." I knew where I was sitting, the odds of surviving were not good.

The plane came to rest. There was an eerie moment of silence. The lights went out. The emergency floor lights came on. It was a surreal surrounding ... like something out of a horror movie. There was a light smoke coming up from the floor of the plane.

The plane had broken into three parts. As I looked back, I saw fog rising up behind us

where the plane had broken directly behind where we were sitting. I could not see behind this because of the lights and fog.

After the plane came to rest, it seemed like an eternity. A stewardess in the front started to shout "get out, get out." She reached over and threw the door open. That's where we really got into trouble. I remember standing in the doorway looking for a split second at the person in front of me looking down the chute. You could not see ... it was pitch black.

All of your senses said that you were still over land. When we hit bottom we found ourselves in the middle of the river ... a total shock. We were in water, jet fuel! We sucked in jet fuel when we hit the water!

The water was very cold. At least it was September, it must be like ice water in October or November. The rain was coming down,

design counted symptoms in addition to disorders (although a person may not have reported all of the symptoms necessary to meet the criteria for a full-blown mental disorder, the study aimed to learn as much as possible about all symptoms of each identified disorder). The date of onset and age of each symptom of the disorders identified in the study were obtained to gain information about each survivor's lifetime mental health history.

A Likert Scale (Appendix A), with five representing highest degree of satisfaction and one representing least amount of satisfaction, was used by the survivors to express their perceptions of post-disaster responses of the airlines, public safety personnel (firemen, paramedics and police) and hospital/clinic personnel.

Levels of mental distress resulting from the airline accidents were determined from the responses to the DIS. Means and standard deviations of number of symptoms of PTSD, depression, generalized anxiety and somatization were calculated for each accident. Data about individual survivors and their specific accident circumstances

were analyzed to determine potential predictors of psychological problems.

The telephone interviews occurred during a three-month period between 25 months and 46 months after the accidents. The average interview required two hours.

Following are descriptions of the six airline accidents:

- Nov. 15, 1987: The Continental Airlines DC-9 crashed at the Stapleton International Airport, Denver, Colorado, after a rapid rotation during takeoff. Both pilots, one flight attendant and 25 passengers sustained fatal injuries. Two flight attendants and 52 passengers survived, and there were 27 serious injuries. The accident was blamed on the captain's failure to properly deice the aircraft and the first officer's loss of control during a rapid rotation.
- April 28, 1988: The Aloha Airlines Boeing 737 underwent an explosive

there were no lights. I was looking back up at the image of the plane and treading water.

Again, fate or whatever, a part of the timber structure from the trestle had broken off at impact and as I was treading water, this telephone pole comes up and I put my arms around it. We got it stable in the water and hung on to it.

Two women came down behind us — one of them could not swim. She was panicked. Her daughter was with her. The daughter screamed "Mother cannot swim! Please help her!" Horrible screams, not only from them, but others as well. I was closest to her, so I went and grabbed her. She grabbed my arm and came over my back. I still had one hand on the trestle. I wound up being pulled underwater.

It seemed like an eternity I spent under the water. I remember struggling to try to get

back to the surface. My lungs felt like they would break. Someone else took her off of me. I was able to break ... to the surface. That was as bad as the plane crash!

The current was unbelievably strong. The tide was going out at the time. It was pushing us away from the plane. We thought that was wonderful. We still thought the plane would blow up. The water was covered with jet fuel ... all it would have taken is a spark. It would have gone up.

Strange some of the thoughts that go through your head. Someone said they were afraid of sharks and asked if they might be eaten by sharks. One guy said sharks or anything else could not live in this river!

Panic thoughts go through your head. This was my first real exposure to panic. I believe that panic is defined as a sudden unreasonably, overwhelming fear. That's what I felt.

decompression and structural failure during cruise at 24,000 feet (7,320 meters) en route to Honolulu, Hawaii. The cabin skin and structure — from the forward cabin entrance door and above the passenger floorline for 18 feet (5 meters) — separated from the aircraft. Of the 89 passengers and six crew members on the aircraft, one fatality was sustained when a flight attendant was blown from the aircraft. Seven passengers and one flight attendant received serious injuries. The accident was blamed on the airline's maintenance program, which failed to detect the disbonding and fatigue damage that led to the catastrophic failure.

- Aug. 31, 1988: The Delta Airlines Boeing 727 crashed shortly after liftoff at the Dallas-Fort Worth International Airport, Texas. Two of the seven crew members were fatally injured, and four crew members were seriously injured. Twelve of the 101 passengers were fatally injured and 22 were seriously

injured. The accident was blamed on inadequate cockpit discipline that allowed a takeoff with improperly configured wing flaps and slats, and the failure of a warning system that did not alert the crew to an improperly configured aircraft.

- Feb. 24, 1989: The United Airlines Boeing 747 underwent an explosive decompression after the forward cargo door opened during flight and a hole 10 feet by 20 feet (3 meters by 6 meters) was created in the fuselage. The aircraft was in a climb at about 22,000 feet (6,710 meters) when the event occurred and nine passengers were blown out the aircraft. Of the remaining 346 passengers and crew, five persons were seriously injured. The accident was blamed on a faulty switch or wiring in the door control system.
- July 19, 1989: The United Airlines DC-10 underwent a catastrophic failure of the tail-mounted engine during cruise

We drifted back on the river. At that point rescue crews were showing up on the river above the plane. We were able to get the people's attention on the tarmac or runway. They put the search light on us — they said that a boat was coming to pick us up.

We were within sight of a bridge within several hundred yards when a boat came by and [the boat operator] pulled up beside us and threw a big raft to us with the instructions "Don't try to get in." He told us to hold on to the side and said, "I will pull you around to the back of the boat and I will give you instructions on how to get in."

I remember starting to shiver uncontrollably at this point because of being in the water 45 minutes. My clothing felt like dead weight.

He pulled us around to the back of the boat. As luck would have it, the raft came around to the back. On the back was a catwalk. I was

in back of the boat and he asked me to hang on to the metal ramp and the raft. A gentleman across from me was holding on to the rope that he had used to pull us around and with the other hand he was holding on to the ramp. The Port Authority officer was explaining to us how to get on the boat step.

We were moving the women around so they could get in first. That moment someone started the engines and the boat started to move forward. The result was that we were pulled under the boat. I had let go of the raft

There was a lot of screaming and panic. The man across from me let out the most blood curdling scream I've ever heard and I hope I'll never hear again. All that was out of the water was his hand. He was under the boat. My hands were slippery. I couldn't hold on. I got drawn underneath the boat. I had visions — my gosh I've survived a plane crash, been under the water, now what a horrible way to

flight that led to the loss of the aircraft's three hydraulically powered flight controls. The flightcrew had extreme difficulty controlling the aircraft, which crashed during landing at Sioux Gateway Airport, Sioux City, Iowa. Of the 285 passengers and 11 crew members on the aircraft, 110 passengers and one flight attendant were fatally injured. Six crew members and 41 passengers were seriously injured. The accident was blamed on the airline's failure to detect a fatigue crack in an engine fan disk.

- Sept. 20, 1989: The USAir Boeing 737 underwent a runway overrun and rolled into Bowery Bay during a rejected takeoff at La Guardia Airport, Flushing, New York. Of the 57 passengers and six crew members on the aircraft, two passengers were fatally injured and three passengers were seriously injured. The accident was blamed on the captain's failure to reject the takeoff in a timely manner or to take sufficient control to continue the

takeoff, which was initiated with a mistrimmed rudder.

Of the 78 subjects, 38 (49 percent) were female, 40 (51 percent) were male and the mean age was 49 years. Sixty-two (79 percent) were employed at the time of the interview, 58 (74 percent) were married, 66 (85 percent) had three or more years of college education and 65 (83 percent) were white, not of Hispanic origin. Thirty-five (45 percent) of the subjects said that prior to the accident they flew approximately 20 or more flights per year and 72 (92 percent) said that they would fly again only when necessary. At the time of the interviews, 16 (21 percent) were still involved in litigation with airlines.

In the mental health literature about disasters, there are conflicting views about lasting effects. Some argue that mental health effects are widespread, deep, persistent and long lasting. Others argue that there are immediate widespread effects, but much of the reaction is non-persistent, is of short duration and is not behaviorally dysfunctional.

die — going under the propellers. I don't want to die this way in engine propellers.

In a split second, while I was under the boat, the engines were shut off. I came up on the front right-hand side of the boat. I was able to hold on to the [spray] rail. It was slick, slimy from barnacles. I could hardly hold on, but I knew that if I let go I would be sucked away. I worked my way to the back of the boat.

When they pulled me onto the back of the boat I was completely in shock. They took us to the terminal building. My wife was at the airport in the other city waiting for me. I called [my] home and talked to my older son. I told him the plane had crashed and they had pulled me out of the water. At that time I did not know how many people had died. I told him to call the airline, not to take no for an answer, to tell someone at the airline to find my wife and tell her I was alive. He did.

My wife was the first one to find out there were any survivors at all. She said they [the airline] had them upstairs at the conference room at the airport. They had told them that the plane had crashed and they did not know if there were any survivors. She said a girl walked in and asked for her [my wife] and said, "I have very good news. Your husband called and he said they are pulling people out of the river."

Today, sometimes I wake up and smell jet fuel. For weeks after [the accident] I felt like I reeked of jet fuel. One of the things that stays with you is jet fuel. The taste of jet fuel is still with me.

That, and that a plane could crash ... rip the bottom out, the bottom break up in pieces without igniting sparks that would cause an explosion. We were fortunate people. Those of us who survived it. ♦

Some say that there can be significant positive psychological effects.

In this study of 78 survivors, 54 (74 percent) said that the accident was very upsetting, seven (9 percent) found it somewhat upsetting and 13 (17 percent) said the accident was not upsetting. Thirty-nine (50 percent) said the accident had caused them a great deal of harm, while 38 (49 percent) said that the accident had not caused them much harm. Thirty-three (42 percent) said that they had recovered from the accident, 42 (54 percent) said that they had partially recovered and two (3 percent) said that they felt they had not recovered.

Forty-eight (62 percent) of the 78 survivors met criteria for a mental disorder; most had onset of symptoms following the accidents.

Thirty survivors (38 percent) met criteria for PTSD following the airline accident and 63 (80 percent) reported at least one symptom of PTSD following the accident. Although 19 (24 percent) survivors said that they had had a previous traumatic experience,

statistical analysis did not show that these survivors were more likely to suffer from PTSD than those for whom the accidents were their first traumatic experiences.

Twenty-six survivors (33 percent) met criteria for major depression with 36 (46 percent) of the survivors experiencing at least some symptoms of depression following the accident. Two persons had received a diagnosis of major depression prior to the accident, but neither of these survivors were diagnosed with major depression after the accident.

Nineteen (24 percent) displayed symptoms of generalized anxiety post-accident and six survivors (8 percent) were diagnosed with generalized anxiety. None of these survivors had received a diagnosis of generalized anxiety prior to the accident.

Eleven survivors (14 percent) met criteria for substance abuse, but only one of them had an onset date following the accident (this case involved a person who was prescribed medication).

(The preceding account by Survivor B was taken from a videotape; the information that follows is based on a telephone interview by the author with Survivor B.)

When passengers arrived at the terminal, there was no one there for 15-20 minutes. Then some airline employees arrived with coffee and blankets. The mayor of the city and news crews arrived. Medics came around and offered telephones. The survivor was taken to the hospital. He was admitted to the hospital but he was overlooked. Finally, after several hours in his wet clothes, with no shoes or socks, he identified himself as a plane crash survivor. The hospital employees apologized for having forgotten about him. After a brief examination, he was told by an airline employee to take a cab to a hotel where he showered and made arrangements to fly home. Because his clothes remained too wet to wear, airline employees provided him with a

sweatshirt and size 38 slacks to wear (he had indicated that his waist size was 34).

He still had no shoes or socks when he returned to the airline terminal. He was provided with a free breakfast but he was unable to eat it. He said that he was in a state of shock.

Airline representatives told him by telephone to take the shuttle bus to the airline office at the airport.

Unable to find the airline office, barefoot and holding his pants up, he stumbled into the office where the pilots of the airline check in and receive their flight plans.

Several of the employees and pilots immediately determined that he was a survivor of their company's accident from the previous night and began to assist him. They found him shoes to wear and pants that fit. They

Although none of the survivors received a diagnosis for somatization disorder, several persons displayed symptoms with onset dates following the accident. In addition to these disorders, which are frequently associated with trauma (Williams, et al., 1988), 20 survivors (26 percent) were diagnosed with phobia and 13 (17 percent) were diagnosed with dysthymia, a low-grade depression that persists for two years or longer.

In this sample of 78 survivors, the number of symptoms and presence of psychological disorders were compared with age, gender, flights per year, injury resulting in hospitalization, evacuation in water, threat of fire, traveling companion killed, witness to death and/or injury to others, and length of time before rescue.

In this sample, younger age was a predictor of post traumatic stress (PTS), which included some, but not all, the symptoms required to diagnose PTSD. Younger persons had more symptoms of PTS, and a statistically significant relationship was found between the full diagnosis of PTSD and younger age.

Death of a traveling companion was a predictor of more symptoms of major depression in the sample. Loss of a traveling companion accounted for a statistically significant increase in symptoms of major depression. Seven survivors lost a loved one or friend in the accident, with one survivor losing both of her young sons.

Water evacuation was a predictor in the sample of more symptoms of generalized anxiety, somatization and major depression. Evacuation in water accounted for statistically significant increases in symptoms of generalized anxiety, somatization and major depression. Of the eight survivors interviewed from the accident involving water rescue, five were left for several minutes in a cold, dark river where swift tidal waters presented the additional threat of drowning; at least one survivor was temporarily trapped in a sinking section of the aircraft.

Some factors, which have been identified as predictors of mental health problems in other studies, were identified in the sample. Thirty-one survivors saw another person injured or killed,

insisted that he relax on the sofa until time for his flight.

There was no one to escort him to his flight. Security stopped him and wanted to see some identification. He had none; his wallet was lost. He finally cleared security, only to board the wrong flight. Finally, he boarded a flight for home.

The following night he collapsed. A neighbor who was a physician was called to his home. Recognizing his symptoms of stress, the doctor recommended medical care at once.

Under psychiatric care, taking sleeping pills and medication for his emotional state and medication to help him fly, he continued his job as an international marketing executive. For one year, his wife accompanied him on

several trips to help him overcome his fear of flying, as a result of the accident. Finally, a year after the accident, he was forced to resign and start his own business where flying would be at a minimum.

Despite having been a very well-paid executive his entire career, now at age 42 he had to tell his son that he could not go to the college of his choice; his income had been cut by 50 percent.

He was still bothered by nightmares, flashbacks and depression; his medical bills, including psychiatric treatment, had been paid for one year. After he settled with the airline's insurance company, he stopped receiving psychiatric care, because he could no longer afford it. He could not get medical insurance because he had seen a psychiatrist following the crash. ♦

C.V.C-R.

and 31 reported injuries that had resulted in their own hospitalization. Some survivors reported frightening rescues, and others described narrow escapes from fire. Nevertheless, these survivors did not report significantly more symptoms of psychological problems than survivors who did not have similar experiences.

Family and Friends Cited as Critical to Recovery

Survivors were asked what helped them most in coping in the aftermath of the accident. Forty-one (54 percent) cited family and friends. Their symptoms were compared to those of survivors who cited God, time, psychotherapist, exercise and other resources. The comparison indicated no significant difference between those who cited friends and family as major sources of support and those who cited other ways of coping.

To learn more about social support, survivors were asked if they had always had persons to

go to for advice, persons they trusted, persons who gave them comfort and persons who would always side with them. Analysis revealed that persons answering “yes” to those questions did not display fewer symptoms than those who answered “no.”

Fifty-one (65 percent) of the survivors said that their relationships with friends and families had changed since the accidents. These people had significantly more symptoms of major depression, PTSD and somatization. Many survivors complained that family members did not understand their distress. Three survivors were divorced from their respective spouses following the accidents. Many survivors described feeling abandoned by their best friends.

Twenty-seven survivors (35 percent) said that they had received immediate mental health counseling or support at the airport, hospital or hotel. These survivors displayed significantly more symptoms of PTSD than those for whom mental health assistance was not available. Caution should be taken in interpreting these data. It is likely that persons who

Survivor C

Age at Time of Accident: 32

Female

Survivor C said: I was the head nurse of a unit at a hospital, I was rushing home because Hurricane Hugo was headed for my hometown. This was the return portion of my first trip on an airplane. Seated near mid-cabin of coach, I felt that the initial engine sounds were normal. Then suddenly the lights went down and I knew that we would crash. We were weaving off to the side and I held my friend’s hand. There was total silence ... no announcement about what was happening. I held my friends hand and said, “We are crashing aren’t we?” I was resigned to die.

We were on a roller coaster ride. I felt it when we hit We smashed ... then total silence. It was totally quiet for seconds. The cabin went black. I thought that I had died. I

could not sense myself. I fussed at God. “Where are you?” I said. “There’s no tunnel, no bright light!” Suddenly some lights came on. I knew that I had lived. I did not know that we were in the water.

I stood up and opened the window exit and stepped out on the wing. I slid directly into the water. I thought that I would drown. I broke my tailbone in the fall. My friend saw me and jumped into the water after me with a seat cushion to help both of us stay afloat. The water was cold and it was dark. I regretted leaving my family to die this way.

We stayed in the water a long time. We encouraged a girl from Finland, who was very upset, to have faith. I told her that she was in America now and that Americans know how to treat victims. I told her that she would see that regardless of what had happened —

reported symptoms were those who had experiences that would result in longer-lasting problems regardless of whether they had received mental health assistance or not in the first few hours after the accidents. Survivors' comments about mental health assistance were positive and in cases where it was not available, several survivors expressed regret about its absence.

Statistical analysis of the number of symptoms associated with each accident revealed that no single airline performed post-accident better or worse than the others. Using the Likert Scale, analyses were performed to determine if there might be a relationship between survivor satisfaction with airline post-accident responses, increased number of symptoms and number of cases of mental disorders.

Data indicated that there was a relationship between the increased number of symptoms of PTSD, major depression, somatization, generalized anxiety and the dissatisfaction with the airlines' post-accident responses.

Survivors' dissatisfaction with post-accident responses was also associated with more cases of PTSD and major depression.

The 78 passenger-survivors in the study were not necessarily representative of all the survivors of these six airline accidents, but their interviews provided data that suggested that airline accidents, as do other technological disasters (Davidson, et al., 1982), had the propensity for producing long-lasting psychological effects. Consistent with studies involving other passenger-survivors of airline accidents, many of the survivors displayed evidence of psychopathology related to the accidents and some did not. PTSD and major depression were the two prevalent disorders.

Of the 78 survivors interviewed, 75 had full recall of their respective accidents and subsequent rescues. Of the 75, 64 (82 percent) indicated that they had been certain that they would die during the accidents or during the ensuing rescues. Although 30 met the diagnosis of PTSD, 26 met the diagnosis for major depression and 29 had two or more

we would be taken good care of, as soon as we were rescued.

We were then rescued by the "three stooges." We were picked up by a boat and taken into a terminal to be triaged by the paramedics. I was surprised that they had no tags for the triage operation. We were asked how we were, and who we were, over and over.

When we went into the building, I saw offices with telephones. I asked if I could go into an office to call my husband and children to tell them that I had survived. The police officers told me and my friend that we were too wet to be allowed into the executive offices. I went behind their backs and called anyway.

I was taken to a hospital and my friend was sent to a hotel. The nurses were great. After they treated me, they gave me some disposable [paper] scrubs to wear. I am overweight

so I put on double pants in case they split down the back.

I called an airline representative over the phone and asked someone to bring me some dry clothing. I also asked them to have someone escort me to the hotel. I asked for someone to please come help me. A male employee from the airline came in with male clothes and one small flight attendant skirt. I was still covered with jet fuel and the scrubs had ripped open, but there was nothing else for me to wear. The nurses were furious at the way the airline was treating me.

I then asked for the local Red Cross. The hospital administrator picked up the phone book, thumbed through it and said, "We have many chapters in this city. Which one did you want?"

The airline told me to take a cab to the hotel. The driver didn't speak English. I had been

diagnoses, 30 survivors had no diagnoses and most of them reported few, if any, symptoms following the accidents. Although understanding the differences in the psychological outcome for all of these survivors was beyond the scope of this study, the data did yield some clues as to differences in the survivors and the circumstances of the accidents in which they were involved.

Younger Survivors Reported More Symptoms

Younger survivors reported more symptoms of PTSD. This finding was in contrast to the Lockerbie accident (Brooks & McKinlay, 1992). The inconsistency of age as a predictor of psychological problems in disasters has been well documented (Raphael, 1986; Gibbs, 1989). There were many reasons why there could be differences in the results of the two studies; this study of 78 survivors found two that related to the sample.

In developmental psychology (Erickson, 1963), the later adolescent years are believed to provide the foundation for trust and belief that the world is a safe place and that one can trust others. Younger persons may suffer from damaged trust schemas that have far-reaching effects on their lives (McCann & Pearlman, 1990).

In this sample, many of the younger survivors cited their loss of belief in their own immortality as their biggest loss from the accidents, and described their loss of faith in technology and leaders of the aviation and airline industry. Researcher Janoff-Bulman (1985) describes the loss of belief in one's invulnerability to harm as one of the major losses associated with trauma. Indeed, the feelings of betrayal often experienced by survivors of airline accidents (Nance, 1986) may have been very damaging to younger persons in the sample.

Conversely, several survivors, 60 years and older, tended to view the accidents positively. One 65-year-old woman felt that she should have died instead of an infant who died in the

given a piece of paper by the airline representative to give to the front desk at the hotel. The photocopied paper explained that I was a plane crash victim and needed a room for the evening.

My broken tail bone was beginning to hurt when I got to the hotel. The doorman stopped me at the door of the hotel and asked me where I thought I was going. I had on paper scrubs, foam rubber slippers; he thought I was a bag lady. "Why are you here?" he said. "Where are your clothes?" He then wanted to know where my luggage and purse were. "They are in the river!" I shouted.

I felt violated. I was hungry. I had no clothes, no purse, no money. I began to scream. He would not let me into the hotel. People were looking at me. I shouted, "Where is the Red Cross? I've been in a plane crash and now I'm being violated!"

I finally got in and went up to the room. I found my friend in the room upstairs. She also had been given no dry clothes. I went into her room and saw that she was nude. A house detective saw me going into the room and he and a security guard stopped me. They thought that I was doing something illegal. We finally got them to leave us alone.

Later, the hotel manager came up to the room with a letter of apology and a letter giving us [a] free room for a future stay! A Red Cross representative finally came in. She was really nice.

A very well-dressed female airline representative came to our room. Her first words were, "Do you know what it's like to shop for people who you have never seen before?" She had bought all small sizes in ladies clothes and underwear, bikini underwear at that. Like the first airline representative she brought sweatshirts that read "I (heart) (the city of

same accident. Nevertheless, because she did not die, she felt that her future life was a bonus. Several persons in this age group shortened their workweeks or described plans for early retirements to spend more time with their families.

A second reason why older persons in this sample may have recovered faster than the older claimants of Lockerbie involved the difference in how their community was affected. Lindy, et al. (1981), in their studies of survivors, explained that one difference in the level of psychopathology associated with disaster pertained to loss of community. Usually, passenger-survivors of airline accidents returned to homes that were still standing, and their basic sources of food and shelter were not interrupted. Many of the survivors of Lockerbie lost their homes, and a large part of their community was destroyed; nearly all parts of their lives were interrupted for months and in some cases, years.

In this study, losses of friends or loved-ones in the same airline accident accounted for more symptoms of major depression in the survivors. In the Lockerbie study, Brooks & McKinlay (1992) found clear evidence that Lockerbie respondents who had lost a loved-one or friend had significantly more symptoms of psychological problems.

Water Evacuation Increased Psychological Distress

The increase in psychological symptoms for people who were in the water following the airline accident may in part be accounted for by the

degree of uncertainty and duration of threat to life (Myers, 1989). Some of the passengers who survived the plane crash found themselves in the water only to fear death by drowning or from the propeller of a rescue boat. Most of the survivors in the other accidents were able to walk, jump or run to escape danger. Even survivors whose rescues lasted up to four hours and parts of the aircraft had to be cut from around them were constantly reassured that there was no threat of fire or other dangers.

People citing family and friends as the most important resources in their recoveries did not have less symptoms of psychological problems than others. Similarly, in the Lockerbie sample of survivors (Brooks & McKinlay, 1992) it was found that people who were married did not have lower rates of severity of diagnoses of depression and PTSD than unmarried subjects. The complexity of assessing the variable social support during crisis is illustrated in studies by Gleser, et al., (1981) and Solomon (1987), which show that strong marital ties can exacerbate the negative psychological effects of disaster for female victims.

The findings that the social support of these 78 survivors appeared to decline following the accidents were also consistent with other disaster research.

Many survivors in this sample expressed concern about the burden that they had become to their families and friends following the accidents. Although the study of the psychological effects of trauma on the individuals and their social networks was still in its infancy (Carroll, et al., 1991), disruptions in the victim's family were often directly associated with the intense distress related to

the accident)." We found something to wear and got dressed. Early the following morning, we were driven to the bus station with \$50 each in our pockets. We were trying to get home before the hurricane hit. We had to stop along the way in another city because the hurricane rain and winds made it too difficult for the bus to continue. We didn't

have enough money to get a hotel room, so we spent the night in the bus station on the floor. When we arrived in our home city, the bus station had been blown away by Hugo. When I got home, I saw that the roof had been blown off my house. My house was all wet inside. I had no water and electricity, but my family was fine. ♦

the experiences of catastrophic events. Future studies of families of passenger-survivors may provide insight about why these natural support systems were not able to help reduce the distress experienced by these survivors.

Future studies should include a closer analysis of coping techniques. There is a growing body of evidence that suggests that people who have the ability to “make sense” of trauma and find a place for it experience fewer negative effects than those who struggle with these issues (Aldwin, 1993).

Future studies should evaluate individual coping techniques throughout the survivor’s entire recovery period. It has been suggested that coping techniques prevalent closely following trauma, may not remain the same through the entire recovery period (Horowitz, 1986). Coping techniques should also be more closely evaluated with attention to problem-solving, humor, religion or spirituality (Gibbs, 1989).

In many studies, exercise has been correlated with improvements in depressive conditions, self-esteem, sense of control, anxiety, cognitive functioning and general mood (Sachs & Buffone, 1984).

Passenger-survivors’ Experiences Identify Strengths and Weaknesses Of Post-accident Environments

Because the sample of 78 survivors is not representative of all survivors of the accidents who may have received counseling, generalizations should not be made about the effectiveness of the mental health assistance at the accident sites. Nevertheless, the data indicate that continued research is required to determine the best use of mental health resources immediately following accidents (Solomon, 1990). Additional research is required to understand

what happens to survivors who surrender to what they experience as being overwhelming danger, but do not die (Krystal, 1988).

Previous psychiatric history did not predict who of the 78 survivors would have more problems following the accidents. As McCann and Pearlman point out, “extreme failures of empathy in an unresponsive environment, which often occur in severe trauma, can produce fragmentation in a previously well-developed self” (1990). Despite the many confounding variables in the study, a salient fact was that many of the survivors had narrow escapes from death only to enter post-accident environments where they felt violated.

Many survivors felt that some personnel furthered their tragic experiences, which suggested that mental health professionals should team with the airline personnel who must assist survivors after an accident.

Many survivors praised rescue personnel for saving their lives. Nevertheless, there were some negative comments about their experiences during the immediate post-crash environment.

Following one of the airline accidents, for example, a 23-year-old survivor told of sitting in a holding area and waiting to board the next flight to his home. He was uninjured and therefore was released immediately to travel. He described numerous attempts to locate someone to talk to about his experience. As he waited for the next flight, he became upset and cried openly in full view of other passengers. Survivors and other passengers were upset by the lack of understanding that airline employees displayed.

Where structural damage occurred during flight, agents from the U.S. Federal Bureau of Investigation (FBI) investigated to determine if bombs had caused the accidents. Although the survivors expressed understanding that these personnel were carrying out their duties, they did not understand why the agents seemed to

***F**uture studies should evaluate individual coping techniques throughout the survivor’s entire recovery period.*

have so little understanding about the trauma that they had experienced.

In some cases, the survivors described making requests to use telephones in airport fire and police stations to contact their families to let them know that they were alive. Almost without exception survivors were told that the telephones were not for public use. Rules are necessary, but in crisis situations, personnel should be allowed to be flexible. More than one parent described the long-term psychological problems that occurred after children were led to believe that their parents were dead, when in fact they were hardly injured. A collect telephone call to a family shortly after rescue might have prevented some of these problems.

Most of the comments about hospitals/clinics and medical personnel were positive. For the most part, survivors described feeling well-cared for and being grateful to dedicated personnel. One survivor with a broken back was surprised when the surgeon who was attending his injuries asked for the name of someone he could contact to report that the survivor was alive and had an excellent prognosis. He was even more surprised when the surgeon made a long-distance telephone call from the operating room and conveyed the information to the survivor's family.

The most common complaint about medical treatment concerned the release of survivors without complete examinations. Many survivors learned that they were suffering from injuries that were not diagnosed by medical personnel immediately following the accidents.

In one case, a hospital resisted the requests of a husband and wife, both badly burned, who wanted to be in the same room. They had lost their best friends in the accident. Although the request was finally granted, the couple felt that the initial resistance was unnecessary.

Low scores for the airlines' post-disaster responses were correlated with significantly more symptoms of PTSD and major depression, somatization and generalized anxiety. In addition to more symptoms, diagnoses of PTSD and major depression were significantly higher where scores for airlines' post-disaster responses were low.

There were widely differing perceptions of the airlines' responses by survivors. Responses were largely based on interactions with individual airline employees. Survivors reported that some employees showed genuine sorrow for inconveniences and losses that were suffered by survivors, while other employees responded to survivors with hostility.

There were many examples where survivors suffered great losses, yet they had favorable impressions of the airline employees. For example, the survivor in her early 20s who lost both of her young sons in the same accident gave the airline a higher score than many who lost nothing tangible. She said that she could not blame the entire airline for the fact that the pilots, who were killed in the crash, made mistakes. Her relationship with the airline (insurance company settlement) was completed quickly and she was able to concentrate on recovering from brain damage that left her in a coma for several weeks. She had to relearn ordinary functions, such as speaking and walking. Airline employees looked in on her frequently during the months that she was in the hospital. They took her to church when she was able to leave the hospital for brief intervals and they sent cards and stuffed animals to cheer her.

Other survivors, whose losses were not as obvious, struggled for months or years before financial settlements were reached. Although the insurance companies were responsible for financial settlements, the survivors believed that the airlines were responsible for perceived injustices.

For the most part, survivors described feeling well-cared for and being grateful to dedicated personnel.

Survivors who ranked the airlines' post-accident responses as low gave examples of revictimization (Young, 1989) such as abandonments shortly after the accidents, lack of information available to survivors and their families, and difficulties in reclaiming personal belongings. Numerous survivors said that they were treated by airline employees as if they (the survivors) deserved their circumstances because they had chosen the accident flights.

Many researchers believe that technological disasters are the most difficult from which to recover because of the lack of control that survivors experience. In the aftermath of most disasters, bureaucracies become involved (Aldwin, 1993) and add to the lack of control experienced by survivors. Researchers who have studied disasters believe that the mental health effects of human-caused accidents are worse than disasters seen as "acts of God" (Davidson, et al., 1982). When there is a person to blame, some researchers believe that it is more difficult to rationalize the accident. In the study of 78 survivors, many of them felt that the airlines were not in control of the post-accident situations for several hours, which prolonged their own tragedies.

For many survivors, their feelings of helplessness began on the airplanes and continued after the survivors were on the ground (or in the water). Some survivors continued to experience these feelings for months or years. Advance planning for airline accidents is necessary, and must include coordination with mental health professionals to allow for comprehensive planning to assist passengers, their families and airline employees. Specific training should be given to all airline employees who interface with the public, and all employees who might be called upon to aid survivors of an airline accident. Contrary to what many people may believe, formal training in psychology is not necessary for people to give assistance in a crisis. Research suggests that

the basic human needs in crises are human warmth, compassion, validation of survivors' unfortunate experiences and basic amenities (blankets, clothing and food).

For many survivors, feelings of helplessness began on the airplanes and continued after the survivors were on the ground.

Although these 78 survivors were asked at the time of the interviews to recall events that occurred two, three and almost four years in the past, a recent study on reliability of delayed self-reports in disaster research (Norris & Kaniasty, 1992) found that reports for losses and social support were reliable. It should be noted that many of the survivors were satisfied with post-accident responses of the airlines and all other agencies involved. Some survivors reported few, if any, symptoms. Nevertheless, there is also the question of symptom exaggeration for secondary gain (Resnick, 1988), which cannot be answered by this study.

The study found high levels of symptomatology and formal psychiatric diagnoses of mental disorders that were the results of airline accidents. Despite the limited generalization of the sample to other passenger-survivors, these findings provide information that may be useful in understanding the trauma experienced by survivors of airline accidents. Moreover, the findings accentuate the need for further study of passenger-survivors to increase understanding of the special requirements necessary to return them to normal lives.

About the Author

Carolyn V. Coarsey-Rader received her Ph.D. in 1992 from the University of New Mexico in Albuquerque, N.M. in training and learning technologies with emphasis on psychology in the workplace. Prior to receiving her Ph.D., she was an employee of two major airlines and held various positions in passenger services and in-flight personnel. She also worked as an aviation broker in life, health and disability insurance.



She continues her research on passenger-survivors and is also studying the effects of secondary trauma on air safety investigators. She is currently employed as a clinical research associate for the Washington Institute for Mental Illness Research and Training at Washington State University in Spokane, Washington, U.S.

References

- Aldwin, C.M. "Coping with Traumatic Stress." *PTSD Quarterly* 4 (Summer 1993).
- Bales, J. "Northwest Airlines Sets Up Walk-in Counseling Centers." *APA Monitor* 8 (October 1987).
- Black, J. W. Jr. "The Libidinal Cocoon: A Nurturing Retreat for Families of Plane Crash Victims." *Hospital and Community Psychiatry* 38 (1987): 1322-1326.
- Brooks, N & McKinlay, W. "Mental Health Consequences of the Lockerbie Disaster." *Journal of Traumatic Stress* 5 (1992): 527-543.
- Butcher, J. N.; Hatcher, C. "The Neglected Entity in Air Disaster Planning." *American Psychologist* 43 (1988) 724-729.
- Carroll, E.M.; Foy, D.W.; Cannon, B.J.; Zureer, G. "Assessment Issues Involving the Families of Trauma Victims." *Journal of Traumatic Stress* 4 (1991): 25-40.
- Davidson, L. M.; Baum, A.; Collins, D. L. "Stress and Control-related Problems at Three Mile Island." *Journal of Applied Social Psychology* 12 (1982): 349-359.
- Erickson, E.H. *Childhood and Society*. 2d ed. New York, New York, United States: Norton, 1963.
- Frederick, C. J., ed. *Aircraft Accidents: Emergency Mental Health Problems*. U.S. Department of Health and Human Services (DHHS) Publication No. ADM81-956. 1981.
- Gibbs, M.S. "Factors in Victim that Mediate Between Disaster and Psychopathology: A Review." *Journal of Traumatic Stress* 2 (1989): 489-514.
- Gleser, G. C.; Green, B. L.; Winget, C. N. *Prolonged-psychosocial Effects of Disaster: A Study of Buffalo Creek*. New York, New York, United States: Academic Press, 1981.
- Horowitz, M.J. *Stress Response Syndromes*. 2d ed. Northvale, New Jersey, United States: Jason Aronson, 1986.
- Jacobs, G. A.; Quevillon, R. P.; Stricherz, M. "Lessons from the Aftermath of Flight 232. Practical Consideration for the Mental Health Profession's Response to Air Disasters." *American Psychologist* 45 (1990): 1329-1335.
- Janoff-Bulman, R. "The Aftermath of Victimization: Rebuilding Shattered Assumptions." In *Trauma and Its Wake: The Study and Treatment of Post Traumatic Stress Disorder*, edited by Figley, C.R. New York, New York, United States: Brunner/Mazel, 1985.
- Krystal, H. L. *Integration and Self-Healing: Affect, Trauma, Alexithymia*. Hillsdale: The Analytic Press Inc., 1988.
- Lindy, J.D.; Grace, M.C.; Green, B. "Survivors: Outreach to a Reluctant Population" *American Journal of Orthopsychiatry* 51 (1981): 468-478.
- McCann, I. L.; Pearlman, L. A. *Psychological Trauma and the Adult Survivor: Theory, Therapy*

and Transformation. New York, New York, United States: Brunner/Mazel, 1990.

Myers, D. G. "Mental Health and Disaster: Preventive Approaches to Intervention." In *Psychosocial Aspects of Disaster*, edited by Gist, R. and Lubin, B. New York, New York, United States: Wiley, 1989.

Nance, J. *Blind Trust*. New York, New York, United States: Morrow, 1986.

Norris, F.H.; Kaniasty, K. "Reliability of Delayed Self-reports in Disaster Research." *Journal of Traumatic Stress* 5 (1992): 575-588.

Pearlberg, M. "Trauma at Tenerife: The Psychic Aftershock of a Jet Disaster." *Human Behavior* April 1979: 49-50.

Raphael, B. *When Disaster Strikes*. New York, New York, United States: Basic, 1986.

Resnick, P.J. "Malingering of Post Traumatic Disorders." In *Clinical Assessment of Malingering and Deception*, edited by Rogers, A. London, England: Guilford, 1988.

Robins, L.N.; Regier, D.A. *Psychiatric Disorders in America*. New York, New York, United States: The Free Press, 1990.

Robins, L. N.; Smith, E. M. "Diagnostic Interview Schedule/Disaster Supplement." New York, New York, United States: Washington University School of Medicine, Department of Psychiatry, 1983.

Sachs, M.L.; Buffone, G., eds. *Running as Therapy*. Lincoln, Nebraska, United States: University of Nebraska Press, 1984.

Schuchter, S.; Zisook, S. "Group Intervention Following PSA Crash." *Psychiatric Medicine* 4 (1987): 93-101.

Slagle, D. A.; Reichman, M.; Rodenhauer, P.; Knoedler, D.; Davis, C.L. "Community Psychological Effects Following a Non-Fatal Aircraft Accident." *Aviation, Space & Environmental Medicine* 61 (1990): 879-886.

Sloan, P. "Post Traumatic Stress in Survivors of an Airplane Crash-landing. A Clinical Exploratory Research Intervention." *Journal of Traumatic Stress* 1 (1988): 211-229.

Smith, E. M.; North, C. S.; McCool, R. E.; Shea, J. M. "Acute Post-disaster Psychiatric Disorders: Identification of Persons at Risk." *American Journal of Psychiatry* 147 (1990): 202-206.

Solomon, S.D.; Maser, J.D. "Defining Terms and Instruments for Assessing Traumatic Stress." *Journal of Applied Social Psychology* 20 (1990): 1623-1631.

Solomon, S. D. "Social Involvement as a Mediator of Disaster-induced Stress." *Journal of Applied Social Psychology* 17 (1987): 1092-1112.

Solomon, S.D. "Evaluation and Research Issues in Assessing Disaster's Effects." In *Psychosocial Aspects of Disaster*, edited by Gist, R. and Lubin, B. New York, New York, United States: Wiley, 1989.

Williams, C. L.; Solomon, S. D.; Bartone, P. "Primary Prevention in Aircraft Disasters." *American Psychologist* 43 (1988): 730-739.

Young, M. A. "Crime, Violence and Terrorism." In *Psychosocial Aspects of Disaster*, edited by Gist, R. and Lubin, B. New York, New York, United States: Wiley, 1989.

Appendix A

Likert Scale for Evaluating Agency Post-Accident Response

Scale to be used for measuring degree of satisfaction with appropriate agencies' post-accident responses.

1 2 3 4 5

1. Agency did not fulfill expectations of survivor in any way.
2. Agency fulfilled expectations in some areas, but not others.
3. Agency fulfilled expectations, but did nothing beyond what was required.
4. Agency met expectations, and in some areas went beyond expectations.
5. Agency exceeded all expectations of the survivor.

A. Airline _____

B. Hospital _____

C. Rescue personnel _____

D. Other _____

(Place appropriate rating by agency to indicate overall evaluation of agency)

Aviation Statistics

Data Show Accidents by Phase of Flight

by
Editorial Staff

Data indicated that in 1992, 62 airline accidents occurred during eight different phases of flight: load, taxi, unload; takeoff; initial climb; climb; cruise; approach; flare, touchdown; and roll, according to a report published by the Douglas Aircraft Safety Data Analysis Office. The report, *Commercial Jet Transport Safety*

Statistics 1992, also said that no accidents occurred during descent (Figure 1).

Of these 62 accidents, 12 resulted in fatalities, and 26 resulted in hull losses. The majority of the hull-loss accidents occurred during approach; six of those 10 accidents

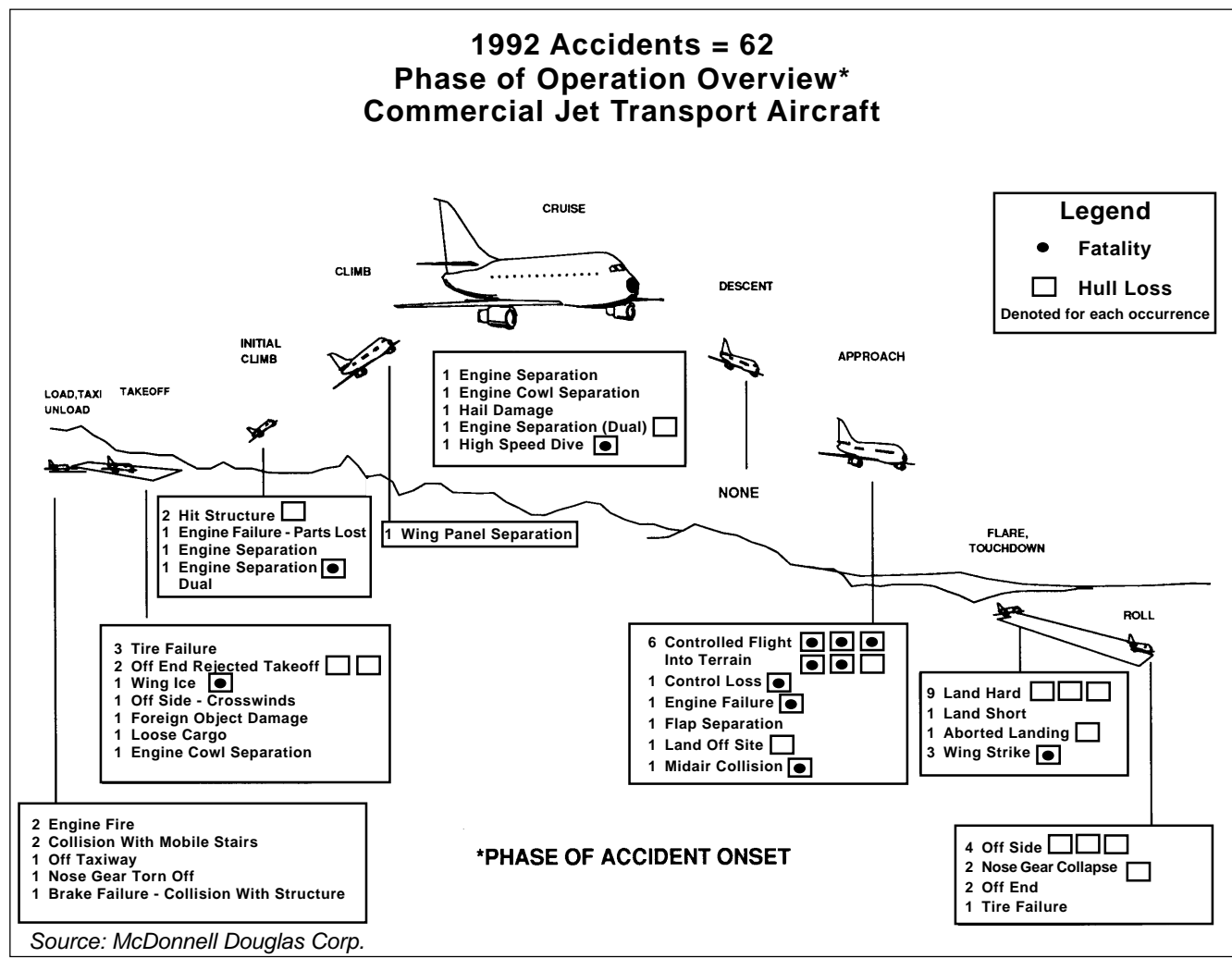


Figure 1

were classified as controlled-flight-into-terrain accidents.

The 62 accidents resulted in a rate of 4.68 accidents per 1 million departures for the year. For the five-year period 1988-1992, the rate was 4.34 accidents per million departures. Using the five-year rate, 68 accidents were forecasted for the year 2000 (Figure 2). The number of departures each year has increased since the 1970s; if the accident rate remains constant, the number of accidents will probably increase. If the number of accidents remains constant, the accident rate in the year 2000 will probably be lower than the 1992 rate.

In 1992, the hull-loss rate was 1.96 per million departures, slightly higher than the hull-loss rate for 1988-1992, which was 1.50 per million departures. Twenty-three hull-loss accidents

can be expected in the year 2000 if the rate of 1.5 per million is maintained (Figure 3, page 22). A continued rate of .98 fatal accidents per million departures (the rate for 1988-1992) would result in 16 fatal accidents in 2000. In 1992, 12 fatal accidents accounted for a rate of .91 fatal accidents per million departures (Figure 4, page 23).

Overall accident rates and counts did not include events resulting from turbulence that did not cause major damage to the aircraft, boarding and deboarding, push back, emergency evacuation, being hit by another vehicle, cabin operations, servicing, jet blast or a test flight. These types of events were addressed in a separate section of the analysis.

Data published in the report were compiled by the Douglas Aircraft Safety Data Analysis

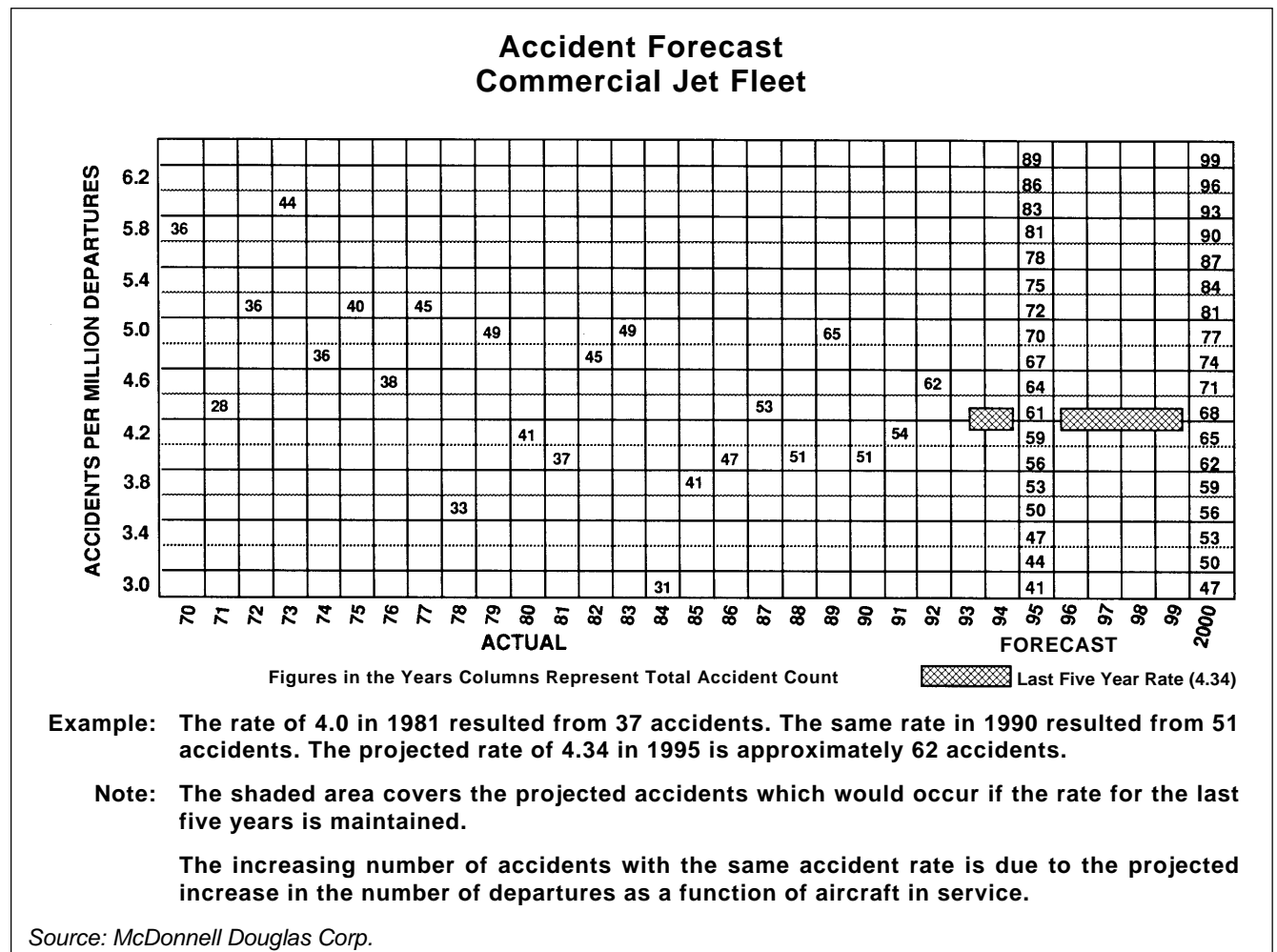


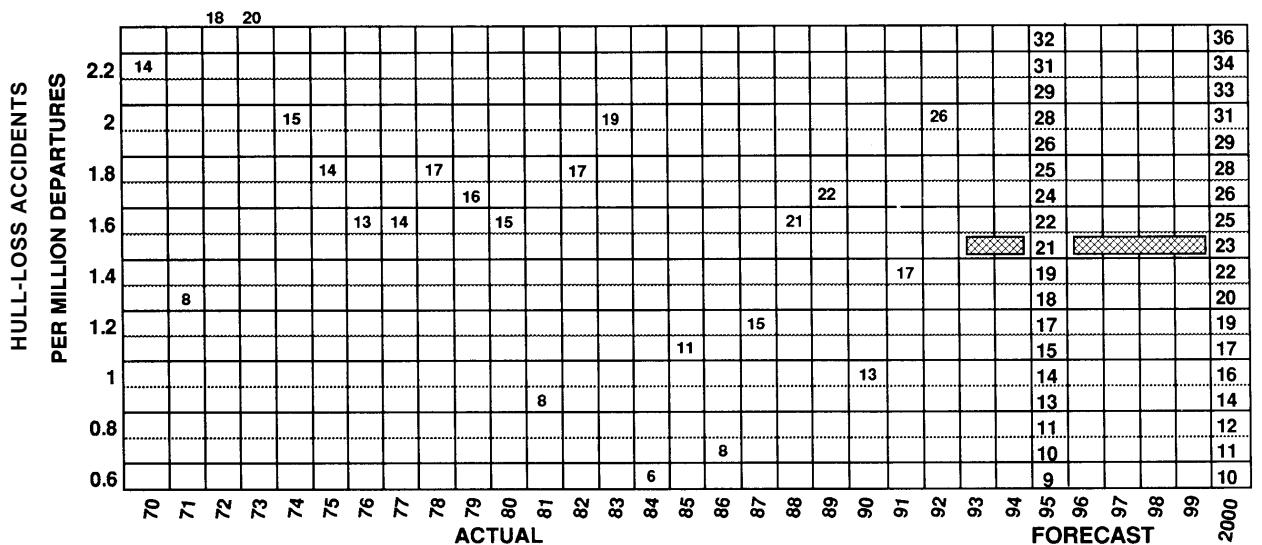
Figure 2

Office, Flight Standards and Safety Group, with statistics derived by McDonnell Douglas' Safety Information Service (SIS). SIS is a data base with information from sources such as the U.S. National Transportation Safety Board, the International Civil Aviation Organization, Airclaims Major Loss Record, the U.K. Civil Aviation Authority, Flight Safety Foundation and news services. Events were identified by the operator's national registry, not the accident location.

The following definitions were used:

- During an *aircraft accident*, the aircraft suffers substantial damage, or a person suffers death or serious injury as a result of being in or on the aircraft or by direct contact with the aircraft. To be considered an accident, the event must
- occur between the time the first person boards the aircraft with intention to fly and the time all persons have disembarked. Injuries or deaths not related to the aircraft's operation do not constitute an accident.
- When an aircraft sustains *substantial damage*, damage or structural failure diminishes the structural strength, performance or flight characteristics of the aircraft. The aircraft will need major repairs or replacement of the affected part.
- An injury is considered serious if it requires at least 48 hours of hospitalization (which begins within seven days of onset of the injury); results in a fracture of any bone (except fingers, toes and noses); produces laceration that

Hull-loss Accident Forecast Commercial Jet Fleet



Figures in the Years Columns Represent Total Accident Count Last Five Year Rate (1.50)

Example: The rate of 1.6 in 1976 resulted from 13 hull loss accidents. The same rate in 1988 resulted from 21 hull loss accidents. The projected rate of 1.5 in 1995 is approximately 21 hull loss accidents.

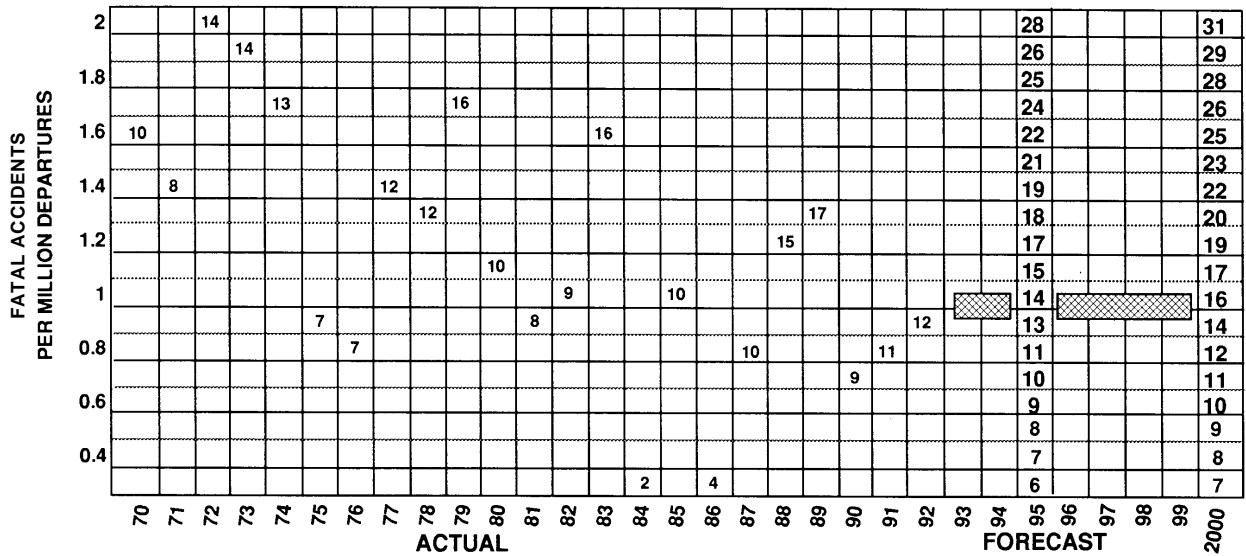
Note: The shaded area covers the projected hull loss accidents which would occur if the rate for the last five years is maintained.

The increasing number of hull loss accidents at the same accident rate is due to the projected increase in the number of departures as a function of aircraft in service.

Source: McDonnell Douglas Corp.

Figure 3

Fatal Accident Forecast Commercial Jet Fleet



Figures in the Years Columns Represent Total Accident Count

Last Five Year Rate (0.98)

Example: The rate of 0.8 in 1976 resulted from seven fatal accidents. The same rate in 1991 resulted from 11 fatal accidents. The projected rate of 0.98 in 1995 is approximately 14 fatal accidents.

Note: The shaded area includes the projected fatal accidents which would occur if the rate for the last five years is maintained.

The increasing number of fatal accidents at the same accident rate is due to the projected increase in the number of departures as a function of aircraft in service.

Source: McDonnell Douglas Corp.

Figure 4

causes severe hemorrhage, nerve, muscle or tendon damage; involves injury to an internal organ; and/or involves second or third degree burns over five percent of the body. If a passenger dies within 30 days as a result of injuries received during an aircraft accident, the injuries are considered fatal.

- A *hostile action* is a premeditated act that causes an accident, substantial damage and/or fatal and serious injuries.

- A *non-operational event* occurs when there is no intent for flight. ♦

This article was adapted from *Commercial Jet Transport Safety Statistics 1992*, published by Douglas Aircraft Co. Copies can be obtained from Safety Data Analysis Office, Flight Operations/Safety and Training, Douglas Aircraft Co., McDonnell Douglas Corp., 3855 Lakewood Blvd., Mail Code 94-12, Long Beach, CA 90846-0001 U.S.

Publications Received at FSF Jerry Lederer Aviation Safety Library

by
Editorial Staff

New Reference Materials

U.S. Federal Aviation Administration. Advisory Circular 90-93, *Operating Procedures for Airport Traffic Control Towers (ATCT) That Are not Operated by, or under Contract with, the United States (Non-federal)*. July 1993. 4 p.

This advisory circular (AC) recommends government publications and procedures for the operation and management of a non-federal ATCT (NFCT), including accident/incident reporting and record keeping. This AC provides guidance on the general responsibilities of the NFCT air traffic manager (ATM) and operational and procedural standards. It also lists facility directives, reports and forms used by ATCT personnel and minimum equipment needed at an ATCT facility. [Modified Purpose]

Reports

U.S. General Accounting Office (GAO). *Aviation Safety: Unresolved Issues Involving U.S.-Registered Aircraft*. Report to the Chairman, Subcommittee on Investigations and Oversight, Committee on Public Works and Transportation, U.S. House of Representatives. June 1993. 20 p. Includes bibliographical references. Available through the GAO**.

Keywords

1. Aeronautics — Safety Measures.
2. Airplanes — Inspection.
3. Airplanes — Registration and Transfer — United States.

Summary: This report addresses GAO concerns that the U.S. Federal Aviation Administration (FAA) may not adequately monitor

aircraft registered in the United States but operated by foreign carriers.

The GAO was asked to respond to three issues: first, does the FAA fulfill its commitment under international agreement to inspect U.S.-registered aircraft operated overseas by foreign carriers; second, does the FAA have a system to verify that foreign corporations owning U.S.-registered aircraft comply with the regulation that 60 percent of the aircraft's flight hours be conducted in the U.S.; and third, has the FAA adjusted registration fees for all U.S.-registered aircraft in response to legislative requirements?

The GAO identified 517 U.S.-registered aircraft operated between October 1989 and April 1992 by foreign carriers exclusively outside the United States with some being leased and operated by domestic carriers during this period. According to the report, the FAA did not inspect 168 of the 517 aircraft. For the remaining 359 aircraft, the FAA inspected nearly all those operated in the U.S. by domestic carriers, but rarely inspected the same aircraft while foreign carriers operated them outside the United States.

Current aircraft leasing trends make it difficult for the FAA to inspect U.S.-registered aircraft operated by foreign carriers because the FAA does not track the carriers' overseas operations. The GAO added that the FAA does not have an effective system to verify whether the 423 foreign corporations that own U.S.-registered aircraft are logging 60 percent of their flight hours in the U.S. The report said that since October 1991, the FAA has not sought verification of this requirement because it viewed this process as an administrative burden. The GAO found that the FAA's current US\$5 fee

for processing aircraft registration does not fully recover the cost of providing the registration processing service in accordance with the policy outlined in an Office of Management and Budget (OMB) circular.

In light of these findings, the GAO recommended that the Secretary of Transportation direct the FAA to require owners of U.S.-registered aircraft to notify the FAA when they change from a foreign to a U.S. lessee and identify the parties involved; develop a system to ensure that foreign corporations' U.S.-registered aircraft accumulate at least 60 percent of their flight hours in the United States; and accelerate implementation of the proposed rules for increasing aircraft registration fees. [Modified Results in Brief]

Rodgers, Mark D.; Duke, Duane A. *SATORI: Situation Assessment Through the Re-creation of Incidents*, Report No. DOT/FAA/AM-93/12. A special report prepared at the request of U.S. Federal Aviation Administration, Office of Aviation Medicine. July 1993. 6 p.; ill. Includes bibliographical references. Available through the National Technical Information Service*.

Keywords

1. Air Traffic Control — Data Processing.
2. Air Traffic Control — Simulation Methods.
3. Radar Air Traffic Control Systems.

Summary: This study uses an integrated computer/air traffic control display system that graphically recreates radar data recorded at en route air traffic control (ATC) facilities to evaluate the interaction between the various elements of displayed information, verbal interactions and the control actions taken by air traffic control specialists (ATCSs). ATC facilities record plan-view display (PVD) and continuous readout update display (CRD) data associated with the airspace under its control on a system analysis report (SAR) tape. This recorded radar data is then replayed on a controller scope and synchronized with tapes containing the associated verbal interactions between pilots and the controller.

The system, situational assessment through recreation of incidents (SATORI), allows the direct examination and determination of the circumstances in which operational errors (OE) occurred and the causal factors associated with the errors. Prior to the development of SATORI, the report said it was not possible for the quality assurance (QA) team investigating errors to review how the control situation was seen by the ATCS as the OE occurred. The purpose of SATORI is to display the ATC situation dynamics so that a more definitive determination of the factors involved in OEs becomes possible.

The report said that once SATORI is developed, it will be possible to accomplish the goals of evaluating system design, over-the-shoulder appraisals, training outcomes, procedures, airspace design and measuring controller performance. References and a SATORI glossary are also included. [Modified Introduction]

Nakagawara, Van B.; Wood, Kathryn J. *Aviation Accident Risk for Airmen with Aphakia and Artificial Lens Implants*, Report No. DOT/FAA/AM-93/11. A special report prepared at the request of U.S. Federal Aviation Administration, Office of Aviation Medicine. July 1993. 12 p.; ill. Includes bibliographical references. Available through the National Technical Information Service*.

Keywords

1. Aeronautics — United States — Accidents.
2. Air Pilots — Medical Examinations — United States.
3. Aphakia.
4. Intraocular Lenses.

Summary: As the number of older pilots has increased, the prevalence of visual impairment in the civil airman population has also increased. Many of these airmen have undergone corrective operations to remove cataractous lenses where a loss of transparency of the crystalline lens or its capsule is a source of visual impairment. Aphakia, a condition in which the crystalline lens has been extracted, is usually a result of the removal of a cataractous lens.

Artificial or intraocular lens implants (IOL) have been used to correct aphakia in airmen. Those airmen with aphakia and IOLs have been associated with higher aviation accident rates when compared to the total civil airman population.

This study analyzed the accident frequencies of these civil airmen for a four-year period (1982-1985). Medical records were evaluated for all certified airmen with aphakia and IOL implants during the study period and aviation accident and active airmen population data was obtained from FAA databases. According to the report, civil airmen 50 years of age and older had significantly higher accident rates than those airmen under 50. In addition, aphakia and IOL airmen had significantly higher accident rates than non-aphakic airmen. The study concludes that aphakia and IOL airmen 50 years of age and younger had significantly higher accident rates than non-aphakic airmen from the same age group. The report discussed aeromedical certification considerations based on the study's findings and recommends further avenues of investigation.

Tables of accident frequencies and references are included. [Modified abstract]

Schroeder, David J.; Broach, Dana; Young, Willie C. *Contribution of Personality to the Prediction of Success in Initial Air Traffic Control Specialist Training*. A special report prepared at the request of the Office of Aviation Medicine, U.S. Federal Aviation Administration. April 1993. 28 p.; ill. Includes bibliographical references. Available through the National Technical Information Service*.

Keywords

1. Air Traffic Controllers — Training of.
2. Air Traffic Controllers — Psychology.

Summary: Air traffic control specialists (ATCS) are occasionally described in terms of personality traits such as “stress tolerant” and “attentive to detail,” and this description is

sometimes extended to suggest that individuals with certain personality characteristics are attracted to specific occupations. Moreover, personality is cited as an explanation for occupational performance.

The theory that personality is related to occupational choice and performance was tested in this study to evaluate the utility of personality in predicting student success in the FAA's ATCS nonradar screen program.

Using personality inventory scores and cognitive aptitude measures of 723 men and 307 women at entry into the nonradar screen program, two basic research questions were addressed: do persons who enter the ATCS occupation differ from the general public with respect to general personality characteristics; and what personality characteristics, if any, predict who is likely to become a successful controller?

According to the report, a comparison of the controller's profile with that of a normative sample indicates both men and women controllers are more outgoing and had higher levels of excitement-seeking, expressed more positive emotions and were more conscientious than the normative samples. The report added that selected aspects of personality also demonstrated incremental validity over cognitive measure in the prediction of performance in the ATCS nonradar screen program. According to the report, small differences can have a significant influence in large-scale selection systems such as that for air traffic controllers. Given that the ATCS nonradar screen program costs about US\$10,000 per student to administer, with about 2,000 candidates entering the FAA academy each year, reduction of the failure rate by 30 controllers per 1,000 candidates would have resulted in a savings of \$600,000 per year of wasted training resources. The report includes tables of statistical profiles and references.

Books

Brownstein, Herbert S. *The Swoose: Odyssey of a B-17*. Washington, D.C., United States: Smithsonian Institution Press, 1993. 212 p.

32 p. of photographs. Includes bibliographical references and index.

Keywords

1. Swoose (Airplane)
2. World War, 1939-1945 — Aerial Operations, American.
3. World War, 1939-1945 — Campaigns — Pacific Area.

Summary: The book recounts the distinguished career of a B-17D, serial number 40-3097, during World War II.

As part of the 19th Bombardment Group, 40-3097 took part in the historic first trans-Pacific flight of bomber aircraft from the U.S. mainland to Hickam Field, Hawaii, on May 14, 1941, and later to Clark Field, Philippines.

When war with Japan seemed imminent, 40-3097 was transferred to Del Monte airfield,

574 miles southeast of Clark Field, and on Dec. 9, 1941, began its combat career with a raid on Japanese shipping. During the first 44 days of the war, operating from airfields in Java and Australia, 40-3097 and its counterparts in the 19th Bombardment Group shot down 50 enemy fighters and sank or damaged 60 ships. The aircraft soon established a reputation as a survivor.

After extensive refitting, 40-3097 was rechristened the Swoose after a popular 1940s song ("Alexander the Swoose, Half Swan-Half Goose"), because its hybrid construction borrowed a tail structure, rudder and elevators from other aircraft. The Swoose was later adopted as the staff aircraft of Gen. George H. Brett, commander of the U.S. Army in Australia, and became a primary transport for military dignitaries throughout the Pacific basin, including future U.S. president U.S. Navy Lt. Cmdr. Lyndon B. Johnson.

U.S. Federal Aviation Administration (FAA) Updated Reference Materials

Advisory Circulars (AC)

AC Number	Month/Year	Subject
33-2B	06/30/93	<i>Aircraft Engine Type Certification Handbook</i> (supersedes AC 33-2A, dated June 5, 1972).
91-53A	07/22/93	<i>Noise Abatement Departure Profiles</i> (cancels AC 91-53, dated Oct. 17, 1978).
150/5220-21	07/29/93	<i>Guide Specification for Lifts Used to Board Airline Passengers with Mobility Impairments</i> (change 1 replaces pages 5 and 6 dated Feb. 2, 1993).
183.29-1BB	07/07/93	<i>Designated Engineering Representatives</i> (cancels AC 183.29-1AA, dated Aug. 6, 1992).

U.S. Federal Aviation Regulations (FAR)

FAR Part 91	06/03/93	<i>General Operating and Flight Rules</i> (change 2, incorporating <i>Special Federal Aviation Regulation No.64, Special Flight Authorizations for Noise Restricted Aircraft</i> , effective Sept. 16, 1993).
-------------	----------	---

The Swoose also set a flight record between New Zealand and Honolulu: 23 hours 7 minutes. Upon transfer to the Panama Canal Zone in November 1942, General Brett and his Swoose were used to maintain good relations with countries in Latin America, and many dignitaries received aerial tours of Panama in the Swoose. Foreign service would end for the Swoose in October 1945 and, after eight months of domestic flying, it was decommissioned on Jan. 18, 1945. With other war surplus B-17s, The Swoose was put up for sale for \$13,750 by the War Assets Administration.

The Smithsonian Institution saved the Swoose from the scrap yard, and the aircraft is awaiting restoration at the Silver Hill annex of the

Smithsonian's Air and Space Museum, Washington, D.C.

Appendices include a list of the crews from the 19th Bombardment Group service history, a synthesized flight log of the Swoose from April 1941 to December 1953, notes and an index.♦

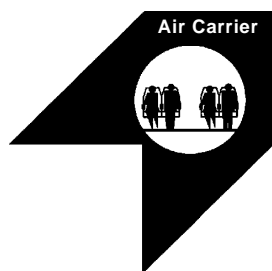
*U.S. Department Of Commerce
National Technical Information Service (NTIS)
Springfield, VA 22161 U.S.
Telephone: (703) 487-4780

**U.S. General Accounting Office (GAO)
Post Office Box 6012
Gaithersburg, MD 20877 U.S.
Telephone: (202) 275-6241

Accident/Incident Briefs

by
Editorial Staff

The following information provides an awareness of problems through which such occurrences may be prevented in the future. Accident/incident briefs are based on preliminary information from government agencies, aviation organizations, press information and other sources. This information may not be entirely accurate.



Steep Approach Ends in Water

Boeing 737. Substantial damage. Two minor injuries.

The aircraft approached the runway steeper and faster than normal at night and touched down with about 4,000 feet (1,220 meters) of

runway remaining. The speedbrakes were not deployed and the reverser systems were inhibited. The aircraft overran the runway and came to rest in a bay. Two crew members were slightly injured.

An inquiry determined that the flight crew disregarded procedures and did not arm or deploy the speedbrake/spoilers. According to the inquiry, the pilots were fatigued and distracted, displayed poor crew coordination and monitoring, and encountered an unexpected tailwind on landing.

False Fire Alarm Leads to Evacuation

BAe One-Eleven. No damage. Three serious injuries.

The aircraft with 81 passengers on board was ready for takeoff with brakes set and power applied when the left engine fire alarm sounded.

The fire extinguisher was activated, but the fire warning light remained on. Both engines

were shut down, and the captain ordered an evacuation. Only one slide on the left side was deployed and passengers evacuated over the wings, sliding from there to the ground. Three passengers were seriously injured during the evacuation.

An investigation determined that the fire alarm was false, caused by a failure in the detection system. An incident report noted that maintenance action had failed to detect the malfunction and that a previous flight crew failed to log the same occurrence involving the same engine the day before. The report cited the pilots for failing to query maintenance personnel about the delay in delivery of the aircraft and for giving an evacuation order that did not clearly identify the emergency exits to be used.



Icing Causes Control Loss in Commuter

BAe ATP. No damage. No injuries.

The twin-turboprop suffered a severe degradation of performance and propeller icing as it was climbing toward FL160 (16,000 feet [4,880 meters]). Vibration became so severe that flight instruments were partially unreadable.

The aircraft stalled, and an uncontrollable roll oscillation followed, with development of a high rate of descent, during which deicing boots were activated.

Control was regained after the aircraft lost 3,500 feet (1,067 meters) in altitude and emerged from clouds. None of the 59 passengers or four crew members was injured, and the flight continued uneventfully.

An inquiry determined there was a rapid accumulation of glaze ice, which was not evident to the crew, and there was difficulty in assessing visually the thickness of the ice on the wing leading edges from the flight deck and that the propeller vibration had disguised the onset of the stall.

Poor Weather Contributes to Ridge Crash

Embraer 110 Bandeirante. Aircraft destroyed. Two fatalities.

The twin-turboprop was on a cargo flight when the flight crew canceled an instrument flight rules (IFR) flight plan and elected to fly under visual flight rules (VFR) on a different route.

After about an hour of flight, the aircraft descended from 2,400 feet to 1,000 feet (732 meters to 305 meters) and was later seen at 600 feet (183 meters) in deteriorating weather. The aircraft crashed at dawn just below the summit of a 1,000-foot hill, five miles (8 kilometers) from the last visual sighting. Weather at the accident location was reported as fog and rain with strong surface winds.



Loss of Control Follows Fuel Exhaustion

Cessna 310. Aircraft destroyed. One fatality.

On final approach for a daylight landing, the aircraft suddenly yawed to the right at about

100 feet (30 meters) above ground level before it crashed. The pilot was killed.

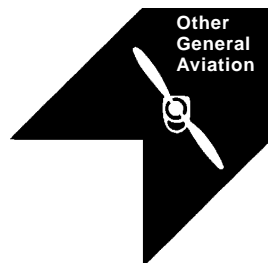
A subsequent investigation determined that the right engine had failed because of fuel exhaustion and that the aircraft stalled when the pilot failed to maintain directional control.

Loss of Situational Awareness Precipitates Fatal Spin

Cessna 425. Aircraft destroyed. Four fatalities.

The night business flight was routine until shortly before landing when the flight crew canceled their IFR flight plan and continued in instrument meteorological conditions (IMC) to their home base.

Witnesses said the aircraft entered a spin and crashed about four nautical miles (7 kilometers) from the airport. An investigation determined the probable cause of the crash was spatial disorientation, which caused the pilots to lose control of the aircraft at an altitude too low for recovery.



Fuel Exhaustion Forces Ditching

Piper PA-31 Navajo. Aircraft destroyed. Five fatalities.

The pilot informed air traffic control that he was descending from 6,000 feet (1,830 meters) for a straight-in approach because of a fuel shortage. About four minutes later, the pilot transmitted a Mayday distress call.

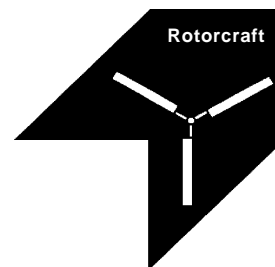
The twin-engine aircraft ditched in a lake about 8 miles (13 kilometers) south of the airport. About 20 minutes later, three survivors were found on an islet. Four passengers had evacuated from the sinking aircraft, but one drowned before reaching land. The pilot and four other passengers were killed. Both engines had suffered fuel exhaustion. The aircraft was on a pleasure flight.

Weather Forces Float Plane Down

Cessna 180. Substantial damage. One fatality and one serious injury.

The pilot of the float-equipped Cessna reported that he encountered reduced visibility and fog and attempted to land on a lake. The aircraft bounced in heavy swells and nosed over.

The pilot helped the passenger escape the sinking aircraft but became entangled in the seatbelt and harness. The pilot could not free himself and drowned.



Line Strike Snares Surveillance Flight

Hughes HS369D. Substantial damage. Four serious injuries.

The helicopter had been hired by a local police department and was engaged in a low-altitude surveillance mission when it struck power lines. The pilot and three police officers were seriously injured in the crash.

Weather at the time of the crash was reported as visual meteorological conditions (VMC).

Training Flights Collide in Fatal Mishap

Robinson R22. Cessna 152. Aircraft destroyed. Four fatalities.

The pilot of the helicopter was on an instrument rating checkride with a U.S. Federal Aviation Administration (FAA) examiner. The Cessna was on a training flight with a student pilot flying and an instructor in the right seat.

The helicopter was cleared for a low approach to runway 8, and the Cessna had been cleared for a touch-and-go landing on runway 9. Witnesses reported that the Cessna was on final approach to runway 9, and the Robinson was in a climbing left turn, just past the approach end of runway 8 at the time of the collision.

Weather at the time of the accident was reported as VMC with 25,000 feet (7,625 meters) thin overcast, 10 miles (16 kilometers) visibility and winds at three knots. ♦