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# 'We Will Never Ever Forget ...'<sup>1</sup>: The Swissair Flight 111 Disaster and its Impact on Volunteers and Communities

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## **Abstract**

In collaboration with a Community Advisory Group we examined the impact of the 1998 Swissair Flight 111 disaster on volunteer responders and surrounding communities. We conducted qualitative interviews and administered a set of structured questionnaires to 13 volunteer disaster workers and conducted a focus group with community leaders. Community silence and limited help-seeking behaviour were typical reactions to the SA 111 disaster. The nature and duration of the disaster response efforts contributed to a probable 46 per cent PTSD rate in the community volunteers. Community-based, culturally appropriate follow-up, as well as the development of volunteer protocols for future disaster response efforts, are necessary to minimize long-term health impacts and to promote resilience among community residents and volunteers exposed to a major disaster.

## **Keywords**

*communities, disaster, PAR, PTSD, volunteers*

I think that it is so important for people to realize that even though it's over, for us that's lived it, it's never over, ever. We will all take this to our graves . . . And I think that that impact will always be with us; that impact of that night. I think 30 years from now when I'm an old woman, that I'll be able to taste the fuel. I'll be able to recall that taste in my mouth that night.

ON 2 SEPTEMBER 1998 at 10:31 pm Swissair Flight 111 (SA 111) crashed into the waters off the east coast of Canada. Residents of the small coastal communities in close proximity immediately responded by going to the site in their boats. Tragically, the SA 111 crash resulted in complete devastation of the aircraft and the loss of all 229 passengers and crew. Local communities were transformed from quiet hamlets into response, recovery and reception sites for large numbers of federal and provincial workers, grieving family members and international media. The rescue operation necessarily shifted to a long and intense recovery effort involving thousands of response personnel. The massive recovery efforts took place within and around the small coastal communities of the province of Nova Scotia surrounding the waters of St Margaret's and Mahone Bays. Residents of the communities were exposed to airplane debris, personal effects and in some cases human remains. The communities also received mourners from around the world. The daily presence of large numbers of response personnel and their equipment compounded the extensive and prolonged disruption of community life in the aftermath of the disaster.

Despite a growing body of disaster literature, little is known about: (a) the health impacts on volunteer responders, in particular those who are exposed to human remains; or (b) the impact on rural communities of the intensive presence of emergency measures and other disaster response personnel. In this article we report the preliminary findings of the SA 111 disaster study, *Learning from Experience*,<sup>2</sup> providing insight into the profound and prolonged disruption of community life and impact on volunteers. We provide descriptions of the response volunteers' experience of and reactions to the disaster as well as evidence that many of them experienced symptoms consistent

with post-traumatic stress disorder (PTSD). The impact on communities is discussed in terms of the occupation and redirection of community resources, perceived community silence in relation to the disaster and its impact and limited help-seeking behaviours. The investigation of individual volunteer experience and impact using both qualitative interviews and quantitative self-report measures provides a critical perspective on community impact that complements data at the community level.

## Background

Exposure to traumatic events such as those associated with the rescue and recovery efforts following a major disaster is known to have both short and long-term psychological, emotional and behavioural consequences (Bravo, Rubio-Stipec, Canino, Woodbury, & Ribera, 1990; Green, Lindy, Grace, Gleser, Leonard, Korol et al., 1990; Raphael, 1986; Sowder, 1985). For example, workers at the Gander aviation crash site were exposed to dismembered crash victims and were profoundly affected by their response efforts (Wright & Bartone, 1994). Consequences of disaster exposure include full-blown post-traumatic stress disorder (PTSD) (DSM-IV; American Psychiatric Association (APA), 1994) and less severe but more widespread stress reactions such as shock, anxiety, sleep disturbances and impaired personal relationships (Adams & Adams, 1984; McFarlane, 2000; Yates, Axsom, Bickman, & Howe, 1989). In an exhaustive examination of the disaster literature, Norris and colleagues (Norris, Friedman, Watson, Byrne, Diaz, & Kaniasty, 2002) identified empirical investigations of 160 distinct disaster samples. PTSD was the most commonly observed psychological problem, occurring in the majority of investigations (109 samples, 68%).

Not all individuals exposed to trauma, however, develop PTSD (see Stewart, 1996). Researchers have examined situational (e.g. type and length of exposure) and individual difference (e.g. personality) factors that may confer increased risk for or resiliency from PTSD given trauma exposure. With respect to situational factors, exposure to dead bodies is reportedly one of the most stressful aspects of disaster work (Ursano & McCarroll, 1990).

With respect to individual difference factors, certain anxiety-related personality factors (e.g. anxiety sensitivity or fear of anxiety; Peterson & Reiss, 1992) have been found to be elevated among those with PTSD and might serve as a vulnerability factor (e.g. Stewart, Conrod, Samoluk, Pihl, & Dongier, 2000; Taylor, Koch, & McNally, 1992). Another individual difference factor that might be associated with risk for or resiliency from PTSD symptoms following disaster exposure involves the types of coping strategies (Folkman & Lazarus, 1980) the individual employs in dealing with the disaster exposure (see review by Gibbs, 1989). For example, Smith (1996) found that avoidant coping was predictive of increased psychological distress, physical symptoms and negative affect in community members following the 1993 Midwest flood; active coping showed the reverse relationship suggesting it conferred resilience. Spurell and MacFarlane (1993) similarly showed that certain coping strategies were associated with PTSD among firefighters following a bush-fire in Australia.

Disasters can also have severe, but subtle, long-lasting psychological and sociological consequences on communities (Dembert, 2000) as well as on volunteers. Following an air disaster in Coventry, residents experienced high levels of distress despite the fact that they were not involved in response efforts (Chung, Chung, & Easthope, 2000). Lockerbie residents experienced high levels of panic, anxiety and depression (Brooks & McKinlay, 1992) as well as sub-clinical responses such as sleeplessness, loss of interest in work or previously enjoyed activities, disinterest in the family, being easily startled and being scared of the dark and of loud noises (Mitchell, 1993).

Despite the potential threat of long-term impact of disasters and disaster response efforts on communities, little research has been conducted on community effects or impacts on disaster volunteers (Chung, Farmer, Werrett, Easthope, & Chung, 2001; Raphael, 1986). In conducting research of this nature it is important not only to examine post-traumatic reactions that may unnecessarily pathologize communities, but also to investigate community resilience (Echterling & Wylie, 1999; Gist & Lubin, 1999). More research is required, particularly research that combines the

strengths of both qualitative and quantitative methods, that investigates both community impact and resilience providing insight into the lived experience of communities and volunteers. Such research can be useful to inform strategies to mobilize community resources while limiting long-term effects of disasters and disaster response efforts on response communities and volunteers exposed to major disasters.

## Methods

This study received ethical approval from an ethics review board at Dalhousie University. Studying disaster impact at the community level requires the examination of complex and dynamic individual, social and systemic interactions (Paton, 1997). A participatory action research (PAR) methodology (Green, George, Daniel, Frankish, Herbert, Bowie et al., 1995) with an ecological approach (Green, Richard, & Potvin, 1996; McLeroy, Bibeau, Steckler, & Glanz, 1988) was therefore chosen to examine the ways in which multiple levels of the community, individual, family, organizational and system influence and were influenced by the SA 111 disaster and response efforts. A PAR approach was used to minimize harm and to maximize relevance and utility to the study communities. A Community Advisory Group (CAG) was developed at the onset of this study to ensure that the interests, knowledge and expertise of community members were incorporated at all stages of the study from recruitment through data collection, interpretation, reporting and implementation. The CAG was comprised of 12 community members: three clergy, three mental health professionals, a community fire chief, a community volunteer, an Emergency Measures Coordinator, a Ground Search and Rescue Captain and two elected civic leaders from the affected communities. An interdisciplinary group of investigators used a mixed-methods design (Tashakkori & Teddlie, 1998) employing both qualitative and quantitative methods. The data sources for this article included interviews, a focus group interview and standardized self-report questionnaire data. A three-year pre and post analysis of health service utilization data of the affected and comparison coastal communities is also being conducted and will be reported

elsewhere (Weerasinghe, Stewart, Mitchell, & Russell, 2003).

### *Participants*

**Disaster volunteers** Two types of disaster volunteers completed the qualitative interviews and self-report questionnaires: recovery and instrumental volunteers. Seven recovery volunteers (two women; five men) were involved in collecting and cataloguing human remains, personal effects and/or airplane debris. They were active for between seven and 35 days. Six instrumental volunteers (all women) provided ongoing support to the response and recovery workers by orchestrating the identification and distribution of supplies or making and serving lunches to paid- and volunteer-recovery workers. They provided between eight and 73 days of service each. Eight of the 13 participants lived in the affected communities; the other five commuted to provide ground search and rescue support. The volunteers were, on average, 44.9 years old at the time of the interviews ( $SD = 8.6$  years; range = 27 to 60 years) with an average of 14.1 years of schooling ( $SD = 2.3$  years; range = 11 to 19 years). Two were single (never married), eight were married or cohabiting and two were separated or divorced. One individual failed to provide answers to any of the demographic questions, and one additional participant failed to provide information on employment status.

**CAG members** Participants for the focus group included four members of the CAG (two women; two men) all working in professional roles in relation to the disaster and the exposed communities. Due to the small sample size, further demographic information is not provided in order to keep confidential which CAG members participated in the focus group.

### *Community entry and engagement*

Between November 1998 and February 1999, the first author attended several meetings to discuss the research proposal with various representatives of federal, provincial and community agencies involved in the disaster response efforts, as well as the Provincial Steering Committee of the SA 111 disaster. In November 1999, after ongoing communications, community

linkages were made with members of local health regions that provided a critical connection with a local minister and a Royal Canadian Mounted Police officer, both of whom were active in the disaster response efforts and had witnessed the impact on their communities. These community members provided the co-investigators with a list of key community members who had been involved in the disaster response. In January 2000, 15 months after the disaster, the CAG was formed to inform and guide community entry, access, data collection, interpretation and dissemination. The CAG met approximately once every two months for the next two years, with additional special committee meetings to develop community information releases about the study to inform the communities of who the researchers were and why we were doing a research study (which was suggested by the CAG as a respectful approach), to review and provide feedback on all research instruments and to develop community mental health protocols for responding to research participants' potential needs for service and a support service brochure.

### *Purposeful sampling*

A recruitment strategy was designed to identify community participants from across the exposed communities surrounding Mahone and St Margaret's Bays' total population (combined total about 360,000). Inclusion criteria for the study were that participants be 19 years of age or older and involved as a volunteer in the disaster response efforts. We included individuals with different types of volunteer activity and degrees of exposure. Communities were originally informed about the nature and purpose of the study through two consecutive community information statements. Participant recruitment involved placing a recruitment notice in newspapers, as well as posters of the notice in visible community locations and church bulletins. A recruitment notice was also featured on a local television notice board. A snowball sampling approach was also attempted by providing CAG members and research participants with discrete research contact information cards to provide to potential participants. The recruitment strategy resulted in 13 participants. Eighteen potential participants contacted the research coordinator to arrange

an interview. Five potential participants did not complete interviews due to participant time constraints and 'no-shows'—reasons that were potentially exacerbated by the community silence about the disaster.

**Data collection** Five data collection sessions were conducted at Dalhousie University upon the participant's request, whereas the other eight data collection sessions took place in the communities, most in participants' homes. Data collection sessions lasted an average of 2.5 hours including the consent process, the interview and administration of the self-report measures. When the data collection session was complete, each participant was provided with a resource support pamphlet that described the potential adverse reactions to a disaster and provided contact information for local resources. All participants received a follow-up call from the research coordinator/interviewer approximately one week after the interview. This relatively informal call was designed to answer any questions about the study or community resources and to ensure that participants were not experiencing high levels of distress that might have been triggered by remembering and speaking about the disaster. Two of the participants requested resource information specific to their communities as they lived outside of the disaster communities, and three others mentioned that the interview had been helpful in processing their experience (many respondents had never before talked to anyone about their disaster experience).

### *Qualitative data*

**Semi-structured interviews with disaster response volunteers ( $n = 13$ )** The interview guide was a semi-structured interview drafted by the investigators and refined by the CAG members. It had 17 open-ended questions and detailed probes. The main domains for the guide included: initial experience of the disaster, role and involvement, exposure, health response, coping mechanisms, coping and resiliency and how the disaster affected the respondent's daily life and the community at large.

**Community Advisory Group consultation ( $n = 4$ )** A semi-structured interview guide with

seven open-ended questions was developed for the CAG consultation. The guide was designed to foster a group discussion to address: how the disaster has affected their communities, how communities coped, short and long-term community-level difficulties, unaddressed risks and concerns and the origin and impact of the observed community silence in relation to the SA 111 disaster.

**Qualitative data analysis** The volunteer data ( $n = 13$ ) were collected over a period of nine months between July 2001 and April 2002, approximately three years after the disaster occurred. The CAG focus group ( $n = 4$ ) was conducted in May 2002—3.5 years post-disaster. Volunteer interviews, as well as the CAG focus group, were recorded and transcribed; transcriptions were checked against the tapes for accuracy and were coded for anonymity. Data were managed with N-Vivo software (Richards, 1999). Interview and focus group transcripts were sent out to participants as a member check to ensure that individuals were able to address any concerns about anonymity. Transcripts were then analysed using a process of open coding in which initial codes were identified in the participants' own language. Key words and passages were thematically organized and reduced into analytic categories following a modified grounded theory approach (Glaser, 1992).

### *Quantitative measures*

Several standardized self-report questionnaires were administered to the volunteer responders at the time of the qualitative interviews. The 17-item Modified PTSD Symptoms Scale (MPSS; Falsetti, Resnick, Resick, & Kilpatrick, 1993) assessed frequency and severity of DSM-IV (APA, 1994) PTSD symptoms across four dimensions (intrusions, avoidance, numbing and arousal; see Stewart, Conrod, Pihl, & Dongier, 1999). Sample items are displayed in Table 1. MPSS ratings were made retrospectively for the two weeks after the recovery efforts ceased within the affected communities four months following the disaster date (i.e. Christmas/New Year 1998). The 16-item Anxiety Sensitivity Index (ASI; Peterson & Reiss, 1992) assessed levels of fear of anxiety. A situational version of the COPE (Carver, Scheier, & Weintraub, 1989) assessed the degree



to which the volunteers used each of 14 distinct coping strategies (e.g. active coping, acceptance, behavioural disengagement) when confronted with the disaster. Sample items from each scale are provided in Table 2. Finally, an author-compiled measure assessed participant demographic characteristics such as gender, age, years of schooling, marital status and current employment status.

**Findings**

The qualitative interview data describe the nature and duration of the SA 111 disaster, its impact on the communities, the extreme and enduring tasks of individual volunteer responders and multiple exposures. The quantitative measures emphasize the degree of distress that was described in the interview data and allow further exploration of issues regarding risk as well as coping and resilience. The focus group consultation data describe a large-scale disaster response effort with considerable impact that extends beyond the volunteers to the

communities at large. The findings are organized by themes emerging in the data. The emergent themes were community experience, volunteer experience, volunteer impact and community silence.

*Community experience*

When disaster strikes, energy and resources are mobilized to respond to the critical incident. Response workers move in and establish their centres of command and control. Adrenaline fuels the intense, around-the-clock activities of rescue and recovery efforts. All focus is on the event, on the disaster itself, with traditionally no attention paid to the surrounding environment or local population. The SA 111 disaster response workers did not consider their impact on local communities and the community members whose businesses, parking lots, roads, waterways, community centres and fire halls they occupied. A disaster response professional describes the singular focus of the SA 111 disaster response effort in the following excerpt:

*Table 1.* Percentage of respondents endorsing each item and mean (and SD) frequency and severity ratings from the Modified PTSD Symptoms Scale (MPSS)

<i>Subscale item</i>	<i>% Endorsing (n = 12)</i>	<i>Mean (SD) frequency (n = 12)</i>	<i>Mean (SD) severity (n = 13)</i>
<i>Intrusions subscale</i>	—	0.97 (0.90)	1.25 (1.42)
Intrusive thoughts	69	1.33 (1.07)	1.38 (1.50)
Nightmares	39*	0.58 (0.90)	1.00 (1.53)
Flashbacks	46*	0.83 (1.12)	1.15 (1.73)
Emotional reactivity	77*	1.25 (0.97)	1.62 (1.56)
Physiological reactivity	31	0.83 (1.34)	1.08 (1.61)
<i>Avoidance subscale</i>	—	0.58 (0.73)	1.00 (1.05)
Avoid thoughts of trauma	46	0.67 (0.78)	1.15 (1.28)
Avoid trauma reminders	39	0.58 (0.90)	1.23 (1.30)
Inability to recall trauma	31	0.50 (0.91)	0.62 (0.96)
<i>Numbing subscale</i>	—	0.71 (0.96)	0.71 (1.11)
Loss of interest	39	0.92 (1.31)	0.85 (1.52)
Detachment	53*	1.00 (1.13)	1.15 (1.46)
Restricted affect	15	0.42 (1.00)	0.54 (1.20)
Foreshortened future	23	0.50 (1.00)	0.31 (0.63)
<i>Arousal subscale</i>	—	0.77 (1.05)	0.75 (1.25)
Sleep disturbance	31	0.67 (1.16)	0.85 (1.46)
Increased irritability	23	0.58 (1.17)	0.62 (1.26)
Difficulty concentrating	46*	1.00 (1.28)	0.92 (1.61)
Hypervigilance	46	0.92 (1.08)	0.77 (1.30)
Excessive startle	31	0.67 (1.07)	0.62 (1.13)

*Notes:* Possible range for frequency scores = 0–3; possible range for severity scores = 0–4. Subscale means are item means

\**p* < 0.05; \*\**p* < 0.01; \*\*\**p* < 0.005 (two-tailed tests)

Table 2. Mean (and SD) COPE subscale scores ( $n = 13$ ) and correlations ( $r$ 's) between COPE subscales and frequency and severity of PTSD symptoms on the Modified PTSD Symptoms Scale (MPSS)

COPE Subscale (# items; sample item)	Mean (SD)	$r$ (MPSS—frequency) ( $n = 12$ )	$r$ (MPSS—severity) ( $n = 13$ )
Active coping (4 items; e.g. I took additional action to try to get rid of the problem)	2.77 (0.84)	-0.22	-0.27
Planning (4 items; e.g. I tried to come up with a strategy about what to do)	2.75 (0.92)	-0.25	-0.26
Suppression of competing activities (4 items; e.g. I put aside other activities in order to concentrate on this)	2.84 (0.80)	0.67*	0.64*
Restraint coping (4 items; e.g. I restrained myself from doing anything too quickly)	2.11 (0.73)	0.82***	0.76***
Seeking social support—instrumental (4 items; e.g. I tried to get advice from someone about what to do)	2.27 (0.62)	-0.24	-0.28
Seeking social support—emotional (4 items; e.g. I tried to get emotional support from friends or relatives)	2.50 (0.87)	0.06	-0.02
Positive reinterpretation and growth (e.g. I tried to grow as a person as a result of the experience)	3.31 (0.68)	0.20	0.20
Acceptance (3 items; e.g. I accepted that this has happened and that it can't be changed)	3.33 (0.61)	0.54	0.47
Denial (3 items; e.g. I said to myself 'This isn't real')	1.59 (0.82)	0.50	0.49
Turning to religion (3 items; e.g. I put my trust in God)	2.44 (1.12)	0.47	0.44
Focus on and venting of emotions (3 items; e.g. I let my feelings out)	2.46 (0.87)	0.31	0.29
Behavioural disengagement (3 items; e.g. I reduced the amount of effort that I put into solving the problem)	1.46 (0.71)	0.81***	0.53 <sup>t</sup>
Mental disengagement (3 items; e.g. I went to movies or watched TV to think about it less)	1.72 (0.55)	0.42	0.35
Alcohol-drug disengagement (1 item; i.e. I drank alcohol or took drugs to think about it less)	1.15 (0.38)	0.72**	0.77***

Notes: Means are item means (possible range = 1–4). <sup>t</sup> $p = 0.06$ ; \* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.005$  (two-tailed tests)

I was totally focused inward, focused on what was going on with the response. What do we have to do to support the response? What did the response want? And it was all response generated. There was no concept, or very little concept, of what was happening in the community and what effect it was having other than the fact that I knew that it was there. I knew we were taking community resources . . . I was not even considering the psychological effect on the community as to what was going to happen to them . . .

Two of the local communities were 'occupied', one by the disaster command centre, and the other by the Canadian military. These small coastal communities had populations prior to the response efforts of 70 and 250 respectively. The communities were directly affected by the

powerful combination of the invasion of the response workers into their communities and the enormous tragedy of the disaster itself, particularly for those who were exposed to human remains. Community members were faced with the terrible reality that a disaster had occurred off the shores of their communities and they mobilized rapidly for search and rescue. The communities were described as 'consumed' with the response and recovery efforts:

The community centre had been set up as a temporary morgue . . . the planes, the coast guard with the helicopters and just in this small community there were all the sirens and lights and plane noises and people and people in their boats and people talking. So it was like being at war. I think it was the next day



(day 2) or the day after that the army (500 members) actually arrived . . . army tents and army trucks and helicopters and boats . . . Even in the community as a whole (population 250) . . . they talk about the fact that the community centre was occupied. So therefore, the normal recreational programmes or social programmes were cancelled. So I mean how do we continue as a community in the midst of this as well?

I'd say consumed. Literally, the whole thrust of the community was around what was going on. . . . Everything was centred around, well I got to go to work but when I come home I'm going to do this because of the disaster. So everything in their daily lives was now circling around the response to the disaster.

Despite the intrusion and imposition of the disaster response efforts that affected the economic well-being of the fishers and business establishments, despite the shocking realization that there were no survivors to rescue and the unexpected exposure to a terrifyingly surreal debris field, community members did not seek help for their own distress. Nor, for the most part, did local people engage in the debriefing sessions that were initially provided to first responders and recovery workers. CAG members assert that this is a result of long-held cultural values and practices of self-sufficiency.

### *Volunteer experience*

Community volunteer firefighters, local fishermen and many of the coastal residents went out on the first night to rescue survivors. They were met with the extremely tragic and horrifying realities of the crash site and the grim reality that there was no one to rescue. Bodies were dismembered and the skin was often separated from the body, a phenomenon referred to as 'degloved':

When we were on the boat going out and we hit that debris field, there was, there was, human remains as far as the eye could see.

And then to see piles of debris piled by bags, garbage bags of body parts. And at that point, we only had two hooks and myself and another fisherman were the only people that were hauling up body parts. Everyone else kind of hid in the corner and kept to

themselves and they didn't want to deal with it . . .

Um, it [pause] it was beyond my experience to see humans in that condition. Ah, I think what struck me apart from the gruesomeness and the grotesqueness of it was the fragility of the human body . . . It can be extinguished that quickly and torn asunder that easily. Um, I won't talk about what I saw specifically in that manner. Um, out of respect more than anything and I don't want to, I don't want to revisit some of that.

This reference to not talking was a common refrain in volunteers' reflections on how they and others coped with the disaster.

Following the first night, community members volunteered in the response efforts as Recovery and as Instrumental volunteers. The Instrumental volunteers were dedicated to the response efforts and immersed in a disaster site for a prolonged period of time. Their role as Instrumental volunteers was critical to the well-being of the Recovery volunteers. They provided support and comfort while not intruding into the sphere of the Recovery volunteers, not breaching their code of silence. Instrumental volunteers identified and orchestrated the logistics of bringing enormous amounts of food and other resources into the community and providing for thousands of recovery workers on a daily basis:

It was over, it was close to over two million dollars worth of items . . . We arranged transport trucks and what not; people volunteering their time and people in the community loaded the trucks by hand. . . . Plus all the people in the community made food. And trucked that out there for days and days and days . . .

Recovery volunteers spent many long days working along the coastlines, being transported by helicopter to the many islands within the perimeter of the recovery efforts. These individuals were systematically searching for, tagging and transporting airplane debris, personal effects and/or human remains. Volunteers developed a code of silence about what they were seeing while working over their entire vacation periods as well as evenings and weekends:

We did shoreline recovery, we were being transported either to the islands or out to the other areas of the mainland if we came across debris while we were on the water, we'd, ah, we'd spend some time and pick that up. But the vast majority of it was, ah, doing sections of shoreline anywhere from a few kilometres to, ah, about 10 kilometres a day. There's 365 islands out there. And pretty well all of them were covered, as well as the shoreline on the [Community G] all the way up past [Community A]. [pause] So we, ah, we were responsible for, ah, picking up aircraft remains and human remains.

Volunteers and community members were exposed to many types of disaster stressors: the sights, sounds and smells of the crash, the media coverage, the bereaved, human remains, airplane debris and personal effects, thousands of response personnel and related vehicles and equipment, as well as the intrusion of international media. The communities were 'occupied' by Emergency Measures and official response workers. The lengthy invasion of communities and the intensity of the experience were often compared to war:

... that (fuel) smell was very strong and that, also that night, what I recall is the helicopters. It was like a war. Just, I've never been in a war but it was like a war. Helicopters were just all over the place. They were shining down on me . . . And there was also flares going all over the place. Like these flares that were hovering, um, lighting up the Bay.

Recovery volunteers had multiple exposures and experienced anxiety in searching for the remains of all 229 victims: men, women, children and infants. For some, the desire to find survivors persisted beyond a reasonable period of hopeful speculation. For some people finding clothes and personal effects was as disturbing as the remains themselves. The personal effects connected the tragedy to human beings, served to give the victims identity. The discovery of children's clothes and shoes was reported as particularly traumatic:

I took it out and finally got it untangled and it was just ah, it was just a little jumper. That might be blocked out a bit, actually it's kind of weird. I can't really picture it right now . . .

It was like the whole universe just closed right in on me and right in on that. And I was holding it up and I, oh shit. It just, it just stopped me.

International media poured into the small communities and installed huge satellite dishes that crowded the otherwise barren landscape while the bereaved arrived in busloads from around the world. Exposure to the bereaved was described in an extremely respectful and empathetic manner. The presence of the family members provided further impetus for some of the Recovery volunteers. They volunteered for tasks that they felt the families should not be involved in. They put themselves in the place of the family members, working on their behalf while attempting to shelter them from the grim realities of the crash site and debris field. However, the grief of the family members and the immediacy of the profound sense of loss that shadowed the communities affected both the Recovery and Instrumental volunteers:

... although you want to try and comfort them, any time that they've approached me in the beginning or were around, I didn't want to look into their eyes because I didn't, I didn't know, I didn't think I'd be able to hide that. But ah if they were all in one piece, that would have been different but ah, it was a mess. And to see someone that is wanting someone back that they loved and [pause] what can we give them?

Instrumental volunteers often worked long hours and stayed engaged for the duration of the response efforts. For the most part they were not directly exposed to human remains. They reported a sense of pride of accomplishment and for some personal growth in their experience of mobilizing resources and helping the disaster response workers. In contrast, Response volunteers who were either exposed, or repeatedly threatened with exposure, to human remains often felt a sense of failure that they could not help, that they had not rescued anyone and could not bring an intact corpse home to the bereaved. The recovery effort was so far beyond their experience that they found it difficult to express in words. These volunteers coped by focusing on the task and gaining strength from supporting the bereaved with a

respectful recovery of their loved one's remains. Individuals endured the horrors of the recovery work by focusing on the task exclusively, often to the point of exhaustion. They did not talk about what they were doing or seeing. The transcripts indicate that Recovery volunteers also coped through the voluntary and involuntary split between intellect and affect. This coping strategy despite its personal and social costs has been maintained for more than three years past the disaster by most of the individuals who were exposed to human remains:

I felt, I felt . . . [pause] drained. Ah, there was, there was a point that I reached which was an interesting experience: that I reached a point of saturation. Where if someone had slaughtered 10 children in front of me, it wouldn't have, it wouldn't have raised my heart rate. I would simply look at it and I, I couldn't go any further than I had gone emotionally. There was no more. There wasn't another level. I had reached the limit that I could endure and I think it was just psychologically protective. That it was to me, the analogy I would use is like a sponge. And I didn't know how much more I could take and then I reached a point where the sponge was full and the rest just washes off.

#### *Volunteer impact: qualitative data*

All respondents talked about being changed by their SA 111 involvement. For those community members who volunteered to support the response and recovery workers who were less exposed to human remains, the experience was often one of growth and personal satisfaction. For those who were directly involved in the recovery efforts and exposed to human remains, the effects have been profound. For one individual who obtained counselling, there has been a re-integration of intellect and affect and a renewed sense of wellness. For many, the trauma of the recovery work is enduring. For some the intensity of the experience, often identified as analogous to war experiences, was isolating and placed them at greater risk for emotional and social problems in the aftermath of the disaster and disaster response efforts. The dissociation or 'numbing', the silence and the isolation that enabled people to endure the extreme task of

recovery now presents a health risk to volunteers. Volunteers also spoke of the impact on others in their community or with whom they worked in the disaster response efforts. The disaster is not over for many volunteers and community members. Their lives have been changed and some are experiencing long-term effects. Community volunteers spoke of being overwhelmed, of isolating behaviours, depression and difficulty with relationships and work:

I appreciate life more than I did. Ah, but I find it very difficult to establish any kind of, ah, relationship with anybody. I simply have at this point which is nearly three years after the fact, ah, so much; I internalize anyway but I have so much that I deal with that and I can't put it into a shape or a form or I haven't been able to. It's just this stew of emotions without form that, ah, it makes it very hard for me to be around anybody.

#### *Volunteer impact: quantitative data*

*PTSD symptoms* According to the MPSS, 46 per cent of all volunteers met criteria for a likely PTSD diagnosis (DSM-IV; APA, 1994). The two most frequently endorsed symptoms were emotional reactivity to reminders of the disaster (endorsed by 77 per cent of the sample) and intrusive thoughts about the disaster (69 per cent endorsement)—both intrusions symptoms (see Table 1). The least frequently endorsed symptom was an inability to recall aspects of the disaster (endorsed by only 15 per cent of the sample; *cf.* Foa, Riggs, Dancu, & Rothbaum, 1993). Intrusion, arousal, numbing and avoidance symptoms did not differ in frequency of occurrence. In contrast, some types of PTSD symptoms were rated as more severe than others ( $F(2.50, 29/97) = 3.70, p < .05$ ). Intrusion symptoms were experienced as more severe than either numbing ( $t(12) = 2.57, p < .05$ ) or arousal ( $t(12) = 3.09, p < .01$ ) symptoms, with the severity of avoidance symptoms falling in-between. Thus, intrusion symptoms and avoidance symptoms (e.g. avoidance of thoughts of the trauma) were particular problems for our sample of disaster volunteers.

*Human remains exposure and PTSD development* Seven (54%) individuals

reported during the qualitative interview, that they had been exposed to human remains (5/7 recovery volunteers; 2/6 instrumental volunteers). Among those who were human remains-exposed, 71 per cent (5/7) were assigned a likely diagnosis of PTSD, whereas only 17 per cent (1/6) were assigned a likely diagnosis of PTSD among those who were spared such exposure ( $\chi^2(1) = 3.90, p < 0.05$ ).

*Length of exposure and PTSD symptoms* For the recovery volunteers, total number of days of exposure (obtained during the interview) was very strongly correlated with both frequency ( $r = 0.98, p < 0.001, n = 6$ ) and severity ( $r = 0.92, p < 0.005, n = 7$ ) of PTSD symptoms. In contrast, in the Instrumental volunteers, total number of days of exposure was not significantly correlated with either frequency ( $r = -0.40, NS, n = 6$ ) or severity ( $r = -0.51, NS, n = 6$ ) of PTSD symptoms. Thus, increased length of volunteer recovery work exposure was associated with more frequent and severe PTSD symptoms four months post-disaster, as retrospectively reported on the MPSS.

*Relations of anxiety sensitivity dimensions to PTSD symptoms* Since recent research suggests that anxiety sensitivity is composed of several distinct components, we scored the ASI according to three subscales: social, physical and psychological concerns (e.g. Stewart, Taylor, & Baker, 1997; Zvolensky, McNeil, Porter, & Stewart, 2001). Neither ASI Social Concerns nor ASI Physical Concerns were significantly related to PTSD symptom frequency ( $r$ 's = 0.19 and 0.10, NS) or severity ( $r$ 's = 0.16 and 0.00, NS). However, ASI Psychological Concerns was significantly positively associated with both frequency ( $r = 0.69, p = 0.01$ ) and severity ( $r = 0.60, p < 0.05$ ) of PTSD symptoms following disaster exposure. Thus, individuals who were highly fearful of losing control when experiencing anxiety (see Stewart et al., 1997) were most likely to experience frequent and severe PTSD symptoms.

*Coping strategies employed and relations to PTSD symptoms* According to the COPE, certain coping strategies were used more often than others by responders in dealing with the disaster ( $F(5.02, 60.24) = 13.11, p < 0.001$ ).

Acceptance and positive reinterpretation and growth were used more commonly in dealing with the disaster than any other coping strategy and alcohol-drug disengagement, behavioural disengagement, denial and mental disengagement were used less commonly than any of the other coping strategies (all  $p < 0.05$ ; see Table 2). Thus, overall, the sample was making more use of relatively healthy coping strategies (Carver et al., 1989)—a finding consistent with resilience. However, the correlational analyses revealed that greater use of behavioural disengagement, restraint coping, alcohol-drug disengagement and suppression of competing activities were significantly associated with more frequent and severe PTSD symptoms on the MPSS. Although planning, instrumental social support and active coping were all associated with decreased frequency and severity of PTSD symptoms, none of these relations proved statistically significant (see Table 2).

### *Community silence*

The CAG members also confirmed multiple layers of distress in their communities, as identified in the interviews and questionnaire data, in contrast to their reports that there has been no increase in demand for service at the two mental health clinics that serve their affected communities. The CAG identified that post-disaster distress has been masked by stoicism and proud community histories of autonomy and self-reliance fundamental to the culture. The traditional stoicism of local residents, the enduring stigma associated with mental health services and the lack of a proactive and innovative health response effort, all resulted in reluctance to speaking about the disaster and limited help-seeking behaviour despite the extreme and prolonged circumstances of this aviation disaster:

A general kind of belief system that if you were a strong community and a strong individual and a strong fisherman that you never put your needs in front. You don't ask for help. You just cope and to ask for help would be a burden on others and that would mean that you're weak.

I'm still asking the question: 'Did the community cope?' Did it cope by being lost in chaos or into themselves? ... a lot of the

coping was individual internalization of what was happening . . . you know I saw and was aware of silence and denial, drug use, other than alcohol.

Volunteers and community members developed a code of silence in order to deal with the extreme physical and emotional demands of the recovery task. Following the termination of the response efforts, the silence about what they had seen and done continued:

You just move on. You just move on. You don't talk about it . . . You know, you don't . . . you don't talk about it. You just move on. You just . . . How do you move on? You get back to normal. You go back to . . . I don't want to say things are . . . it's not normal. What we thought as normal is not. Um, that's not making any sense. You just, I want to say you block it out. You try not to think about it.

In the face of the disaster, in response to tragedy and massive loss of life and the now documented daily exposures of recovery workers, neither community leaders and health professionals, nor volunteers identified their needs in relation to the aftermath of the SA 111. However, CAG members confirm that residents are now starting to talk, three years after the disaster, about their distress through more traditional avenues such as the clergy:

I think that a lot of people didn't realize that they needed help. I would say that I probably in the past six months have made 16 referrals. I think a lot of this comes from what I now perceive is the fact that the issues are surfacing more now than they did in the immediate aftermath. Secondly is the fact that most people on the ground level would turn to somebody that they directly knew and could trust who is in a helping role.

## Discussion

The communities surrounding St Margaret's and Mahone Bays responded valiantly to the needs of emergency response teams and grieving family members. The gracious accommodation of the communities to the response efforts and the compassionate and selfless service of community volunteers have been described as the 'Spirit of Swissair 111'

(Morisset, 2002). The SA 111 disaster and the remaining memorial sites have changed the local response communities. It is important to honour the contribution of the communities at large and volunteers while respecting and acknowledging the powerful impact on those who witness and respond at times of disaster and human tragedy. We have attempted to begin to address the gap in awareness and understanding of volunteer- and community-level impacts following a major disaster using two sources of information (volunteer responders and CAG members) and two types of data (quantitative and qualitative). The investigation of individual volunteer experience and impact using both qualitative interviews and quantitative measures provided an important insight into community impact.

The reluctance to speak about the disaster reported by community volunteers and the community silence surrounding Swissair Flight 111 observed by the CAG members was also reported by community health professionals who were previously interviewed about the impact of the disaster (Mitchell, Townsend, & Schnare, in press). The observed silence might have been a reasonable, perhaps even necessary, reaction to the disaster response efforts presenting initially as community resilience and individual coping. The emerging community prohibition and anger to talking about the disaster and the lack of opportunity to process and integrate the emotional and mental impact of a trauma event may, however, be an indication of a response to trauma rather than a sign of resilience. Community volunteers and communities as a whole are experiencing the long-term impact of their proximity to the crash site and involvement in the recovery efforts but they are still not talking openly about the disaster. The silence may be a critical barrier to help seeking. In fact, the quantitative data clearly indicate that more avoidant types of coping (e.g. alcohol-drug disengagement, behavioural disengagement) are associated with greater levels of post-traumatic stress symptoms among the community volunteers.

Among response volunteers, those who had an opportunity to process their experience and to reintegrate their emotions after the disaster, reported lower levels of distress. The exception to the overall concern with unidentified stress



may be the instrumental volunteers who were not exposed to human remains and who in some cases experienced growth through their contributions to the response efforts. These individuals had less direct exposure, and were able to balance negative exposure with a sense of pride in their tremendous effort and abilities in assisting the response efforts.

Volunteer interviews depicted graphically the intensity and duration of the volunteers' multiple exposures, the difficult and morbid nature of their task and an indication of the short- and medium-term impacts on their emotional health, relationships, work and wellness. Given the types of traumatic exposure experienced by many of the volunteers during their disaster work, it is not surprising that both the qualitative and quantitative data provided evidence of high rates of PTSD reactions in the volunteer sample. In particular, both the questionnaires and the qualitative interviews with volunteers indicated that intrusion symptoms such as emotional reactivity to reminders of the event were very common reactions. The relatively high rate of occurrence of these cognitive re-experiencing symptoms, like intrusive thoughts about the disaster (as well as the exceedingly low rate of endorsement of forgetting aspects of the disaster experience), is not surprising when one considers the community context of the recovery environment. Many triggers exist in the community to remind volunteers frequently of the disaster—even well after the recovery efforts had ceased (e.g. memorial sites within two of the affected communities).

The individual-level data also revealed significant situational and individual difference predictors of post-traumatic stress symptoms. Consistent with previous findings that exposure to human remains is one of the most traumatizing aspects of airline disaster work (e.g. Ursano & McCarroll, 1990; Wright & Bartone, 1994), we found significantly higher rates of likely PTSD diagnoses four months after the disaster (as retrospectively reported on the MPSS) among those volunteers who were exposed to human remains relative to those not so exposed. We also found that, at least among the recovery volunteers, the length of post-disaster work was highly correlated with the degree of PTSD symptoms. This result is consistent with findings from studies of other types of trauma, that

various indices of trauma severity (e.g. length of exposure) are related to PTSD development (see review by Stewart, 1996). It should be cautioned that self-report measures of PTSD symptoms have been shown to under-estimate rates of PTSD when compared to clinician-administered structured interviews (see Foa et al., 1993). This suggests that the 46 per cent rate of possible PTSD diagnoses four months after the disaster date may under-estimate actual rates of PTSD experienced by the volunteers in our sample. Nonetheless, it is not known to what extent the retrospective assessment of PTSD symptoms many months after the disaster might have affected over- or under-reporting of symptoms on the MPSS.

With respect to individual difference factors, we found both personality and coping strategy correlated with increased levels of PTSD symptoms on the MPSS. Consistent with previous research suggesting a link between anxiety sensitivity and PTSD symptoms (e.g. Taylor, Koch, & McNally, 1992; Stewart, Conrod, Samoluk, Pihl, & Dongier, 2000), we found MPSS scores to be predicted by scores on the ASI (Peterson & Reiss, 1992). In fact, it was the psychological concerns component of anxiety sensitivity in particular that was associated with increased PTSD symptoms. Individuals with a tendency to fear losing control when anxious (e.g. those that worry that they are 'going crazy' when they feel very anxious) appeared particularly likely retrospectively to report experiencing frequent and severe PTSD symptoms four months following the onset of their disaster exposure.

With respect to coping strategy relations with PTSD symptoms, four specific coping strategies were significantly related to increased frequency and severity of PTSD symptoms: behavioural disengagement, restraint coping, alcohol-drug disengagement and suppression of competing activities. The finding that behavioural disengagement predicted increased PTSD symptoms in the present study adds to a growing literature that suggests that across a variety of situations, reducing one's effort to deal with the stressor is associated with increased emotional distress (e.g. Carver, Pozo, Harris, Noriega, Scheier, Robinson, Ketcham, Moffat, & Clark, 1993; Davidson, 2000; Gray & Hedge, 1999; Griffith, Cropley, & Steptoe, 1999; Ray, Weir, &



Jefferies, 1995). The present finding that disengaging through alcohol or drugs was associated with increased PTSD symptoms is consistent with much prior work that has established a link between PTSD and alcohol/drug abuse to cope (e.g. see review by Stewart, 1996). This particular study finding is discussed in more detail elsewhere (see Stewart, Mitchell, Weerasinghe, Loba, & Griffin, 2002).

Two coping strategies classified as problem-focused by Carver et al. (1989)—namely suppression of competing activities and restraint coping—were also significantly associated with increased PTSD symptoms in the present study. This finding serves to underline the point that not all problem-focused coping strategies are always adaptive in dealing with stress (*cf.* Carver et al., 1989). The finding that suppression of competing activities (i.e. the tendency to attend to the problem to the exclusion of other activities) was associated with increased PTSD symptoms is consistent with previous findings that this particular problem-focused coping strategy is at times associated with increased distress. This is particularly concerning because both the interviews and COPE questionnaire showed suppression of competing activities to be a commonly employed coping strategy for volunteers in coping with their disaster exposure. This is consistent with volunteer reports that they were not receiving relief from their disaster exposure through involvement in non-trauma-related activities. The present findings similarly suggest that restraint coping—or coping by holding oneself back—may not be a particularly adaptive manner for coping with the trauma of an airline disaster. It was surprising that none of the coping strategies were significantly associated with reduced PTSD symptoms. For example, although the participants as a whole made relatively frequent use of positive reinterpretation/growth and acceptance (as evidenced in both the questionnaires and the qualitative interviews), neither of these appeared to confer resilience from PTSD in the volunteers.

Unfortunately, disaster researchers have largely neglected community-level impacts among non-primary victims (Chung et al., 2001). Community-level impacts in turn have largely been unaddressed in the aftermath of the SA 111 disaster. The style of health services

delivery during and following the SA 111 disaster has been premised on a belief in community resiliency and has converged with community norms of self-reliance and stoicism. While the Nova Scotian coastal communities do have a tradition of coping with loss of life at sea, they are unaccustomed to dealing with the nature, magnitude and duration of events like the SA 111 disaster. What has been observed by the researchers and confirmed by CAG members is the emergence of a culture of silence around the disaster and the disaster's effects on individuals and communities. This silence, and in some cases silencing, may be a critical gauge of post-disaster trauma.

The SA 111 disaster and response efforts involved several levels of individual and community exposure over a sustained period of time posing a health risk to local residents whether they were actively or passively involved in the disaster response efforts. Given the enduring stigma about mental health services and the traditional stoicism of community members, a culturally sensitive response effort is required to assess and respond to the post-disaster health needs of the communities surrounding St Margaret's Bay and Mahone Bay with attention also given to the volunteers who live outside of these communities. The CAG and investigators are taking the findings of the study back to the communities in meetings with community leaders in order to promote the identification of community-based responses that are appropriate to the needs and context of the coastal communities and what steps, if any will be taken at the community level. The findings are also being used to inform the protocols of emergency response teams and pastoral care in the aftermath of disasters.

### *Limitations*

Despite the PAR approach to this study, the ongoing active involvement of CAG members and the investigators' prolonged engagement in the affected communities (3.5 years), recruitment into the study was much lower than anticipated. Due to the silence that has shrouded the disaster, a systematic and community-based strategy to recruit community volunteers yielded only 13 participants. Although we were able to identify a few situational and individual difference 'risk' factors for PTSD symptoms, the

statistical power associated with such a small sample is low meaning that some relations that are truly present may not have been detected (e.g. coping factors contributing to PTSD resilience). Moreover, the participants were not recruited from a random sample of volunteers and therefore may not be representative of the larger population of community volunteers involved in recovery and instrumental capacities. Collecting data several years post-disaster may also impact on validity of findings due to potential retrospective reporting biases. While a different approach to community entry and data collection (e.g. a random digit dialling survey administered in the first year after the disaster) may have resulted in a higher participation rate and may have yielded more data, it is also possible that the researchers may have been faced with the community code of silence regardless of research approach and that even less data or less reliable data may have been obtained.

### Conclusions

The CAG members' insider perspective and translation of complex pieces of cultural, historical, personal and community-specific knowledge throughout all phases of the research were essential to the identification of silence as a critical post-disaster phenomenon and to the interpretation of the individual and community-level impact within this context. Despite the challenges of recruitment and the limited number of research participants, the data provide evidence that the communities directly affected by the response and recovery efforts are experiencing ongoing effects from the SA 111 disaster.

While there is certainly a mixture of resilience and trauma observed in the communities affected by the SA 111 disaster, it is important to consider policy issues regarding the nature and duration of the 'occupation' of host communities in a disaster response effort. To what degree and for what time period should response efforts monopolize community infrastructure, community resources and limit the economic and social capital that may be required for communities to remain resilient in the aftermath of a major disaster? It is also critical to weigh the risk and benefits of involving community volunteers in efforts requiring

exposure to human remains, and to limit the length of such exposure given our observations on the relationship between exposure duration and PTSD symptoms. In future disasters when it is determined that no lives can be saved, and emergency response efforts shift from response to recovery, the presence and role of volunteers must be reconsidered in light of the long-term mental health risks associated with such tasks.

The *Learning from Experience* study has identified a local tradition of self-reliance, the enduring stigma of mental health services, individual stoicism and an emerging culture of silence around the SA 111 disaster. The community, cultural context of the SA 111 disaster should alert researchers, community leaders and health professionals that assuming or focusing on resilience in the aftermath of disaster, as recommended by Echterling and Wylie (1999) and Gist and Lubin (1999), without also attending to the potential of trauma may put communities and volunteers at risk for unidentified long-term impacts (see Dembert & Simmer, 2000). The findings of this study indicate the likelihood of high levels of post-disaster distress in community response volunteers and host communities and the need to track and respond, in a culturally sensitive manner, to volunteer and community-level impacts.

### Notes

1. Excerpt from an instrumental volunteer, involved in the disaster response efforts.
2. *Learning from Experience: Volunteer and Community Impact of the Swissair Flight 111 Disaster* was a four-year participatory action research project funded by the Canadian Social Sciences and Humanities Research Council. The interdisciplinary study employed both qualitative and quantitative methods utilizing open-ended individual and group interviews, standardized measures and population health data.

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