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Long-Term Posttraumatic Stress in Survivors from Disasters and Major Accidents

FILIP ARNBERG



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Abstract

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Disasters and major accidents are a significant cause of distress worldwide. High levels of posttraumatic stress can become chronic after severe and prolonged psychological trauma, raising concerns about the extent of adverse long-term consequences after single events. The present thesis aimed to describe the course and burden of posttraumatic stress in survivors from a ferry disaster in the Baltic Sea, an airliner crash-landing in Gottröra, Sweden, and a bus accident involving Swedish 6th grade schoolchildren in Måbødalen, Norway.

The participants were surveyed 1 month to 4 years after the events and again after 14 to 20 years. The follow-up surveys included 33 ferry disaster survivors, 70 airline survivors, and 7 surviving schoolchildren with a comparison group from the same school ($n = 33$). Short- and long-term changes in posttraumatic stress were estimated separately in generalised regression models refined by linear splines. In-depth interviews were conducted with 22 ferry survivors 15 years after the disaster, including structured clinical interviews and thematic analysis of survivors' descriptions of consequences of the event and social support.

Approximately half of all survivors experienced significant posttraumatic stress at the initial assessments. Significant long-term distress was noted in one fourth of the ferry survivors and one sixth of the airline survivors. The bus crash was not associated with significant long-term posttraumatic stress. A poorer long-term outcome was noted in women and in bereaved survivors.

The thematic analysis revealed that long-term consequences not only included negative aspects but also positive ones, including personal growth and existential awareness. There was ample availability of social support, although the need for support extended over a period of several years. Barriers to support from significant others were described in detail by the survivors.

The results extend previous research by providing a comprehensive account of long-term consequences of disasters and major accidents in light of early reactions. The interviews provide some new insights into features of social support that warrant further study. Important future challenges include evaluating whether timely attention to survivors at risk for chronic distress and significant others can facilitate recovery.

Keywords: Posttraumatic stress disorder, Anxiety disorders, Transportation disasters, Motor vehicle accidents, Survivors, Children, Longitudinal studies

Filip Arnberg, Uppsala University, National Center for Disaster Psychiatry, Department of Neuroscience, Akademiska sjukhuset, SE-751 85 Uppsala, Sweden.

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To Liv, Edit, and Alexandra

List of Papers

This thesis is based on the following papers, which are referred to in the text by their Roman numerals.

- I Arnberg, F. K., Eriksson, N.-G., Hultman, C. M., & Lundin, T. (2011) Traumatic bereavement, acute dissociation, and posttraumatic stress: 14 years after the MS *Estonia* disaster. *Journal of Traumatic Stress*, 24(2):183–190
- II Arnberg, F. K., Hultman, C. M., Michel, P.-O., & Lundin, T. (submitted) Fifteen years after a ferry disaster: Clinical interviews and survivors' appraisals.
- III Arnberg, F. K., Michel, P.-O., & Lundin, T. (manuscript) Posttraumatic stress in survivors 1 month to 19 years after an airliner emergency landing.
- IV Arnberg, F. K., Rydelius, P.-A., & Lundin, T. (2011) A longitudinal follow-up of posttraumatic stress: From 9 months to 20 years after a major road traffic accident. *Child and Adolescent Psychiatry and Mental Health*, 5(8).

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Introduction

Disasters and major accidents are a global cause of injury, property damage, and distress. They require a supreme effort by individuals, communities, and societies, as well as challenge the individual's capacity for adaptation. Beyond causing death, injury, and vast destruction of property, such events lead to adverse mental health outcomes (e.g., Davidson & McFarlane, 2006). Nonetheless, most research on the consequences of disasters and major accidents concerns the first year or two after the event (Norris, 2006). To date, we know little about how many of the survivors that may suffer long-term distress after disasters and major accidents, and what characterises those at risk for chronic adverse sequelae.

Trauma and traumatic events

The Merriam-Webster dictionary defines trauma as (a) “an injury (as a wound) to living tissue”, (b) “a disordered psychic or behavioral state resulting from severe mental or emotional stress or physical injury”, and (c) “an emotional upset” (Trauma, n.d.). People commonly use the term trauma to describe the turmoil that follows from events that are typically highly distressing. Events such as disasters, rape, and military combat comprise prototypical traumatic events. In the realm of psychiatry and clinical psychology, however, no definition has been uniformly accepted (e.g., Elhai, Kashdan, & Frueh, 2005; McNally, 2003; Rosen & Lilienfeld, 2008).

In the past 20 years there has been a search for objective criteria that would distinguish certain events as traumatic in that they reliably produce a distinct set of disordered reactions conceptually related to the stress experience (Davidson & Foa, 1991). Today, such criteria, however, do not exist (Boals & Schuettler, 2009; Bodkin, Pope, Detke, & Hudson, 2007; Rosen & Lilienfeld, 2008). Instead, the notion that a common etiologic agent (i.e., a specific feature of traumatic events) can be described for the psychological distress experienced by emotionally upsetting events has generated considerable controversy and is still unresolved (Rosen & Lilienfeld, 2008; Spitzer, First, & Wakefield, 2007).

The most often used definition in psychiatry of a traumatic event is found in the Diagnostic and Statistical Manual for Mental Disorders (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000). This definition

includes not only features of the event but also the immediate reactions of the afflicted person: A traumatic event is when a person has “experienced, witnessed, or was confronted with an event or events that involved actual or threatened death or serious injury, or a threat to the physical integrity of self or others” and responded with “intense fear, helplessness, or horror” (DSM-IV-TR, 2000, p. 427).

Because of the failing endeavour to find what defines a traumatic event proper, the term potentially traumatic event has been used to emphasise the probabilistic nature of traumatisation (e.g., Darves-Bornoz et al., 2008; Norris, 1992). Regardless of the exact definition of trauma, there is a broad consensus that unexpected and precipitous exposure to life danger represents an emblematic characteristic of traumatic events (Spitzer et al., 2007).

Psychotraumatology research: an overview

Psychotraumatology is defined as the “*investigation and application of knowledge about the immediate and long-term psychosocial consequences of highly stressful events and the factors which affect those consequences*” (Figley, 1993, p. xvii). The origin of psychotraumatology is found in the 1900 B.C. work *Kunyus Papyrus* and the ancient Egyptian physicians’ reports of hysterical reactions (Figley, 1993). The scientific progress, however, has been unsteady, which has been aptly described in, for example, several dissertations (see Bergh Johannesson, 2010; Frans, 2003; Sveen, 2011). Nevertheless, there are some remarks that are relevant to the present thesis.

During the second half of the 19th century, systematic research started to accumulate with the neurologist Jean-Martin Charcot at La Salpêtrière Hospital in Paris, France, (van der Kolk, McFarlane, & Weisæth, 1996). Charcot’s work had considerable influence on later traumatologists, including his successor Pierre Janet and Sigmund Freud, who studied under Charcot at La Salpêtrière (Figley, 1993). At the turn of the century, however, the acclaim of Sigmund Freud contributed to the disappearance of investigations into the effect of external events on mental health once undertaken by Charcot and Janet (Weisæth, 2002; Wilson, 1994), perhaps being true especially in the USA where psychoanalysis received wider approval than in Europe.

During this time, findings that mainly concerned clinical samples were extrapolated to infer that the cause of psychopathology after stressful events was predisposing characteristics in the individual. As Wilson (1994) notes, the greatest impact of Freud’s work that dominated thinking in psychiatry until the end of the 1970s lay in the shift of paradigms from that of external event determinants to “a focus on fantasy and what he [Freud] termed the psychical reality of memory” (p. 687). The implications of this shift were “enormous because it made pre-morbid determinants a primary considera-

tion to the exclusion of the nature, magnitude and social-historical context in which traumatisation occurred” (Wilson, 1994, p. 687).

The study of clinical samples, however, is not sufficient to understand the effects of trauma. In contrast, the study of the effects of disasters and major accidents offers opportunities to understand the interplay of individual differences and event characteristics in predisposing adverse or favourable outcomes. An account of a pioneering endeavour in this branch is described in Weisæth (2002) regarding the Swiss psychiatrist Edouard Stierlin who found that 25% of the survivors suffered from posttraumatic sleep disturbances and nightmares in response to the Messina earthquake that killed 70,000 people in Italy 1907.

Research in psychotraumatology has proliferated in the past quarter of the 20th century (for reviews, see Neria, Nandi, & Galea, 2008; Norris, 2006). After a lapse of several decades, the thoughts of Stierlin and Charcot are gaining approval among clinicians and researchers. External events that threaten an individual’s physical integrity are again seen as potent factors that may produce adverse reactions in a majority of survivors, and may induce adverse mental health effects in individuals without psychopathological predispositions (Weisæth, 2002).

Conducting research on the effects of potentially traumatic events is associated with unique characteristics in that direct observations of posttraumatic distress through experimental paradigms are precluded for ethical and practical reasons. The occurrence of a large-scale traumatic event, however, is intrinsically random regarding individual-level factors.

The randomness and subsequent variation in exposure severity can strengthen the internal validity and may help to disentangle individual differences in posttraumatic reactions. These qualities, however, impose limitations on external validity. Difficulties arise when comparing the adverse effects across events because of the shifting characteristics of the events involved in such comparisons (North et al., 2005). In addition, comparisons are hampered by the lack of control over exposure characteristics (Galea, Nandi, & Vlahov, 2005) and extraneous factors such as additional adverse events, relocation, and interventions. In summary, the unpredictable nature of disasters and major accidents and the immediate aid needed by many survivors pose a formidable challenge to psychotraumatology.

Short-term consequences of traumatic events

Survivors from potentially traumatic events present with a wide range of distressing psychological and behavioural reactions. Acute reactions are ubiquitous, involving anxiety, depression, agitation, anger, despair, shock, withdrawal, conversion, and dissociation (e.g., Bryant & Harvey, 1997; Shalev, 2002). Within the first days after an event, the immediate reactions

are often replaced by traumatic stress reactions such as intrusions both day and night, effortful avoidance of reminders of the event, and hyperarousal (Davidson & McFarlane, 2006).

The survivors draw upon personal strengths and interpersonal support to cope with their distress. This dynamic, adaptive process is not pathological unless prolonged or disruptive of the individual's everyday life (Davidson & McFarlane, 2006; Green, Wilson, & Lindy, 1985). Rather, although a minority of survivors are overwhelmed by the burden of severe acute traumatic stress reactions, the almost universal expression of traumatic stress reactions suggests that these reactions are part of an adaptive process in moving from a mode of survival to adjustment and adaptation (Bryant, 2007; Shalev, 2002).

During the first weeks after a disaster, traumatic stress reactions will decline or even disappear for the majority of individuals (for a review, see Norris et al., 2002). However, the numerous individual, societal, and disaster-related factors involved admit to quite some variation in the length of this phase (e.g., Boscarino & Adams, 2009). If the early responses persist, however, they could be a prelude to posttraumatic stress.

Posttraumatic stress

Posttraumatic stress refers to a set of cognitive, emotional, and behavioural responses that are a result of experiencing a highly adverse event. The hallmark of posttraumatic stress is intrusions: sudden, involuntary, vivid recollections of the event that give the impression of re-experiencing the original trauma (DSM-IV-TR, 2000; Yehuda, 2002). Intrusions are triggered by reminders of the event, yet the reminders are not always consciously appraised. The adverse experience of the intrusion itself may therefore become augmented by the seemingly unpredictable nature of when they occur (Ehlers & Clark, 2000). In addition, intrusions during sleep are frequent (i.e., nightmares; Yehuda, 2002).

A second feature of posttraumatic stress is avoidance, which encompasses cognitive and behavioural efforts to avoid reminders of the event (e.g., persons and places, or thoughts and feelings). Avoidance also refers to emotional numbing, which is similar to aspects of depression and is indicated by loss of interest in daily activities, difficulty or inability to experience emotions, and experiencing a sense of a foreshortened future. A third feature is a state of autonomic hyperarousal, which manifests in an enhanced startle response, being overly nervous, jittery, and watchful and on guard in everyday situations despite the absence of a real threat (Davidson & Foa, 1991).

If persistent intrusions, avoidance, and hyperarousal cause significant distress and impairment in daily life, the individual meets the DSM-IV-TR (2000) criteria for posttraumatic stress disorder (PTSD). PTSD is a common

psychiatric disorder: The lifetime prevalence of PTSD has been estimated to 5.6% in Sweden (Frans, Rimmö, Åberg, & Fredrikson, 2005) and 6.8% in the USA (Kessler et al., 2005). In Europe, the lifetime prevalence of PTSD was found to be 1.9% although there was considerable heterogeneity among countries (Alonso et al., 2004; Darves-Bornoz et al., 2008; de Vries & Olff, 2009).

The presentation of severe posttraumatic stress is idiosyncratic and includes a range of negative emotions that are to some extent dependent on the survivor's particular appraisals. For example, danger leads to fear while violation of personal rules and unfairness leads to anger, and perceived loss leads to sadness (see Ehlers & Clark, 2000). In contrast, more severe posttraumatic stress may be related to an inability to identify and label emotions (Søndergaard & Theorell, 2004).

Neuroimaging studies have identified subcortical brain structures involved in PTSD. The studies suggest a functional relationship between the amygdala, ventromedial prefrontal cortex, and hippocampus (Rauch, Shin, & Phelps, 2006). Compared with control subjects, patients with PTSD exhibit a hyper-reactivity within the amygdala (e.g., Pissiota et al., 2002), an attenuated response within the ventromedial prefrontal cortex (Bremner et al., 1999), and a diminished recruitment of hippocampus when exposed to trauma-related stimuli (Shin et al., 2004). Alterations in the immune system have also been detected in traumatised individuals (Kendall-Tackett, 2009; Søndergaard, Hansson, & Theorell, 2004). Finally, one enduring neurophysiological theory has been that of aberrant negative feedback in the hypothalamic-pituitary-adrenal axis, which includes low concentrations of cortisol in people with PTSD. However, findings on this topic have not been consistent (see Bisson, 2007).

Why would posttraumatic stress become chronic?

Moderate levels of posttraumatic stress soon after an event are part of an adaptive process if the reactions subside in place of adjustment and adaptation (Shalev, 2002). Yet, empirical and theoretical accounts of posttraumatic stress attest that adverse reactions to traumatic events can become chronic. Long-term studies of Holocaust survivors and former prisoners of war in World War II suggest that about 50% developed chronic PTSD, as assessed several decades after the events (Yehuda, McFarlane, & Shalev, 1998; Yehuda et al., 2009). The National Comorbidity Survey assessed the course of PTSD retrospectively in a nationally representative sample of 5,877 individuals in the USA (Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). Although the remission rate was greatest during the first 12 months, it declined for as long as 6 years after symptom onset. Thereafter, the remission

rate was almost non-existent. PTSD failed to remit in somewhat more than one third of persons even after many years (Kessler et al., 1995).

Cognitive and behavioural theories of PTSD assert that intrusions and hyperarousal contribute to the establishment of cognitive processes and behavioural patterns that operate to avoid trauma-related stimuli (for a review, see Brewin & Holmes, 2003; Ehlers & Clark, 2000; Foa, Steketee, & Rothbaum, 1989). The avoidance prevents the mental processing of cognitions and emotions that are focal in maintaining the disorder (Ehlers & Clark, 2000; Foa et al., 1989). Consequently, if a maladaptive configuration of responses to trauma-related stimuli has been set, the accommodation of these responses would be unlikely without the processing of the core cognitions and emotions. The theories maintain that without a phase of roughly successful adaptation to new information, established avoidance strategies would prevent any significant changes in survivors with a high posttraumatic stress load solely by the passage of time.

A monozygotic co-twin control study using a fear conditioning and extinction protocol provides a parallel account on the mechanisms of persistent posttraumatic stress (Milad et al., 2008). The findings by Milad et al. suggest that retention of fear extinction of *de novo* conditioned responses is deficient in PTSD, and that this deficiency is acquired as a result of trauma leading to PTSD, rather than being a factor predisposing for PTSD. The compromised ability to remember that trauma-related stimuli are no longer a prelude to a life-threatening situation seems to be mediated by dysfunction in the brain structures that are involved in extinction learning (viz., the amygdala, the ventromedial prefrontal cortex and the hippocampus; Milad et al., 2009).

In summary, survivors with severe posttraumatic stress need not only to challenge the inclination to avoid distressing trauma-related stimuli in order to overcome their reactions. Rather, these survivors suffer a dual burden because of functional deficiencies in neural substrates involved in learning that trauma-related stimuli are no longer dangerous.

Long-term outcomes of large-scale traumatic events

The label *long-term* in research after traumatic events has been used in studies that vary from 1 to 60 years after the events. In this study long-term consequences will be referred to as consequences that are present more than six years after the event. This definition conforms to the findings by Kessler et al. (1995) that few individuals remit from PTSD after this point. It is acknowledged, however, that reactions that persist for several years may be appraised as *very* long-term consequences.

In past years sparse attention has been given to the long-term mental health in survivors, particularly in studying the progression of survivors' reactions over time. In Norris' (2006) review of disaster research methods

48% of all longitudinal studies on posttraumatic stress concerned only the first year after an event (p. 176). In all, 72% of the studies were cross-sectional and the use of longitudinal designs and representative samples had actually decreased over time (Norris, 2006). The timing of assessments is illustrated in Figure 1, for which data were gathered from two comprehensive reviews of research on posttraumatic stress after large-scale traumatic events (Galea, Nandi, & Vlahov, 2005; Norris et al., 2002), as well as 35 studies retrieved from the PubMed database in 2010, comprising a total of 85 studies from 61 disasters assessing posttraumatic stress in 132 groups of survivors. Not all short-term studies of large-scale traumatic events published after 2005 are included, although efforts have been made to identify extant long-term studies up to 2010 that assess posttraumatic stress.

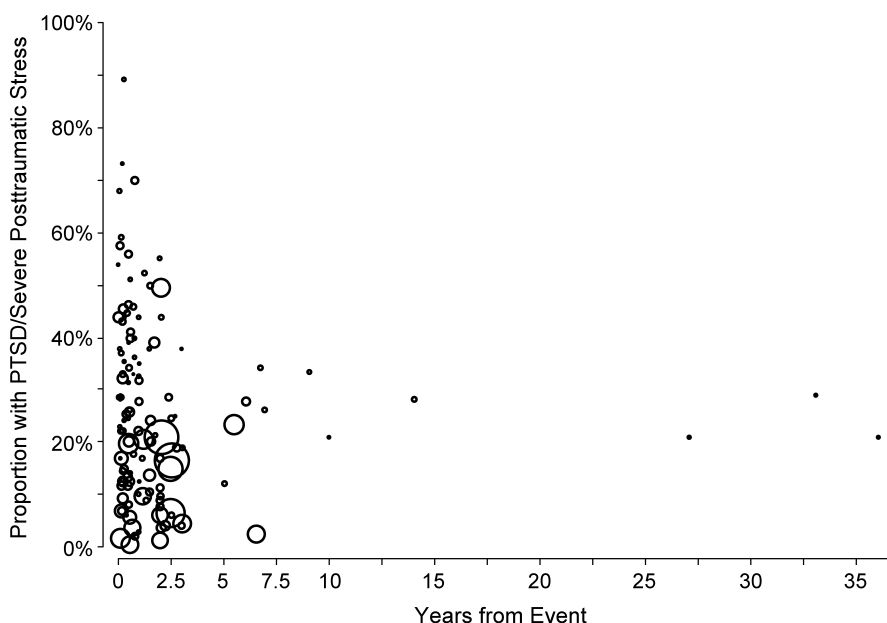


Figure 1. Timing of assessment for 85 studies from 61 large-scale traumatic events with posttraumatic stress disorder (PTSD) or significant posttraumatic stress as an outcome measure. Including both community and survivor samples. Size of circles indicates sample size.

The point prevalence estimates of long-term PTSD as assessed by clinical interviews or of significant posttraumatic stress assessed by self-report questionnaires have been similar across studies: 21% in survivors 10 years after the Piper Alpha oil platform disaster (Hull, Alexander, & Klein, 2002), 28% in victims 14 years after a flooding (Green et al., 1990), 21% in survivors 27 years after the North Sea oil rig disaster (including PTSD and subsyndromal

PTSD; Bøe, Holgersen, & Holen, 2011), and 21% in survivors 36 years after a mudslide (Favaro, Zaetta, Colombo, & Santonastaso, 2004).

A limitation with research on long-term effects is that several long-term studies have used a retrospective design (e.g., Briere & Elliott, 2000; Favaro et al., 2004; Lazaratou et al., 2008). Hence, there is limited data on how the course of chronic posttraumatic stress relates to levels of stress reactions during the first year after the event. Because people tend to underestimate past psychiatric problems (Simon & VonKorff, 1995), studies that rely on retrospective accounts may underestimate the actual number of participants recovering from PTSS. A recent study found a doubled lifetime prevalence of anxiety disorders in prospective studies as compared with retrospective studies (Moffitt et al., 2010). Another limitation is low response rates (Morgan, Scourfield, Williams, Jasper, & Lewis, 2003; see also Weisæth, 1989) or uncertainty concerning representation of the affected population in the sample (e.g., Favaro et al., 2004; Green et al., 1990).

Children

The progression from childhood through adolescence and into adulthood raises questions as to whether psychological development and maturation decrease or increase the risk of long-lasting posttraumatic stress in individuals who have experienced a single traumatic event in childhood (Morgan et al., 2003; Yule et al., 2000).

Between 5 and 8 years after the sinking of a cruise ship, a follow-up of survivors (age 11–17 years at disaster) found that 52% developed PTSD some time after the disaster (Yule et al., 2000), 90% of whom developed PTSD during the first 6 months. The duration of PTSD was more than 5 years in 26% of the cases and at follow-up while the point prevalence of PTSD was 34%. Similarly, Morgan et al. (2003) found that 33 years after a coal slag heap collapsed onto a primary school burying the schoolchildren, 29% of the now adult survivors (then aged 4–11 years) suffered from PTSD. Further, a study of adults who 17 years earlier survived a flooding as children found that 7% suffered from current PTSD and one third met the PTSD criteria 2 years after the event (Green et al., 1994). These findings suggest that posttraumatic stress can persist through adolescence and at least until early adulthood.

Indirectly affected children may also experience posttraumatic stress. In a study of 7th-grade children who experienced a bus crash on a school outing 39% of the children not directly involved in the crash reported moderate or severe acute stress reactions within the first week after the accident. After 9 months, however, only 6% of the same children reported moderate or severe posttraumatic stress (Milgram, Toubiana, Klingman, Raviv, & Goldstein, 1988). After 7 years, the directly affected children experienced more posttraumatic stress and exhibited more mental health help-seeking behaviour

than the indirectly affected children and a non-exposed control group, (Tyano et al., 1996). However, the directly exposed children did not differ from the indirectly exposed or controls in terms of general distress. The finding that the directly exposed children differed from the indirectly exposed children regarding posttraumatic stress, but not general distress, was also supported in a 33-year follow-up study of survivors from a mudslide (Morgan et al., 2003).

Risk and protective factors

Individual differences in responses to traumatic events may be influenced by pretraumatic, peritraumatic, or posttraumatic factors. Pretraumatic factors involve, among others, previous psychiatric history or history of traumatic events. Peritraumatic factors include various aspects of exposure severity while posttraumatic factors concern events and interactions that occur after the event.

Predictors of severe posttraumatic stress have been studied extensively (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). What predicts long-lasting posttraumatic stress, however, may differ from what predicts the development of more acute reactions (Schnurr, Lunney, & Sengupta, 2004). Pretraumatic factors associated with long-term posttraumatic stress include neuroticism (Bøe et al., 2011). Peritraumatic factors include dimensions of exposure severity such as fear of death, physical injury, loss of property (Briere & Elliott, 2000; Hull et al., 2002; Lundin & Jansson, 2007), or financial loss (Bland et al., 2005). Posttraumatic factors that have been found to increase the risk of long-term posttraumatic stress are high levels of traumatic stress immediately after the event, failure of early recovery (Holgersen, Bøe, Klockner, Weisæth, & Holen, 2010), and survivor guilt (Hull et al., 2002). In addition, gender is associated with long-term posttraumatic stress (Favaro et al., 2004; Green et al., 1990; Lundin & Jansson, 2007) and

Traumatic bereavement

One of the salient aspects of exposure to a disaster that affects subsequent health is traumatic bereavement of close relatives (Favaro et al., 2004; Green, Lindy, Grace, & Leonard, 1992), which impacts not only grief reactions but also posttraumatic stress reactions in the short term (Bergh Johannesson et al., 2009). Traumatic bereavement has been found to be associated with more severe long-term posttraumatic stress reactions after disasters, as seen in the follow-up after the dam collapse in Buffalo Creek (Green et al., 1992). It is not clear, however, whether traumatic bereavement increases the risk of reactions pertaining to posttraumatic stress: Dooley and

Gunn (1995) found that bereaved survivors and relatives from a ferry disaster were more likely to express depressive symptoms during the two years after the event compared with nonbereaved survivors, whereas the nonbereaved were more likely to express various forms of anxiety symptoms.

Acute dissociation

Dissociation describes a range of psychological processes that involve a "disruption in the usually integrated functions of consciousness, memory, identity, or perception of the environment" (DSM-IV-TR, 2000, p. 822). Acute, or peritraumatic, dissociation concerns disrupted awareness during or immediately after the traumatic event and was found to have the largest pooled association with posttraumatic stress in a meta-analysis by Ozer et al. (2003). However, a recent review concluded that the independent contribution of peritraumatic dissociation is small (van der Velden & Wittmann, 2008). Acute dissociation has been found to predict posttraumatic stress and PTSD after three months (Eriksson & Lundin, 1996; Ursano et al., 1999), but fails to predict PTSD severity 6 months (Holeva & Tarrier, 2001) or one year (Marshall & Schell, 2002) after a traumatic event. In contrast, high levels of posttraumatic stress within the first three days, and less recovery during the first three weeks, predicted adverse outcome decades after an oil platform disaster (Holgersen et al., 2010). Thus, acute dissociation during an event may be related to short-term but not to long-term posttraumatic stress.

Social support

Concerning factors associated with posttraumatic stress, those operating after the event are of special interest in that they can be subject to direct intervention with the goal of preventing or alleviating severe distress. Of the posttraumatic factors, social support is an important component of recovery from traumatic events according to two meta-analyses (Brewin et al., 2000; Ozer et al., 2003).

Social support can be formal in the sense that the support provider represents an organisation or agency. However, informal support from family, relatives, and friends is the most frequent source of support (Michel, Rosendal, Weisæth, & Heir, 2011), and is the type of support that will be addressed in this thesis. There are some important distinctions as to types of support. Social support can be distinguished as *social network*, defined by its size and density; *received support*, the frequency of support that one believes one has received; and *perceived support*, the support one believes is available if needed (Barrera, 1986). Others have labelled social network as *social integration* (Cohen, 2004) or *structural support* and its quality as *functional support* (Cohen & Wills, 1985). Importantly, survivors' perception of social support is related to a greater extent than their receipt of support to distress

and psychopathology (Kaniasty & Norris, 1992). This difference does not merely reflect a greater association because of method bias (Cutrona, 1989). Rather, perceptions of support bolster the appreciation of the individual's available coping resources (Thoits, 2011). Cohen and McKay (1984) categorise functional support into appraisal support and emotional support. Appraisal support involves that others help change one's appraisal of the stressor (i.e., from threatening to something that one can cope with) while in emotional support others help change one's appraisal of available coping resources (i.e., that one feels loved, cared for, esteemed, and valued).

A vast amount of research supports the importance of social support in the context of life stress and daily demands (see Cohen, 2004; House, Landis, & Umberson, 1988). Similarly, several studies have shown that social support is important after traumatic events (Brewin et al., 2000; Ozer et al., 2003). However, the meta-analyses by Brewin et al. and Ozer et al. do not include studies on disasters or major accidents but include studies on private events or combat veteran samples. The dissimilarities in the aftermath of such events versus high-profile traumatic events that are seen as fateful (e.g., disasters) may affect the provision and availability of social support (Kaniasty & Norris, 2009). Further, it is noteworthy that studies on the importance of support after large-scale events mainly concern community disasters where not only the survivors but also their significant others are afflicted (see Kaniasty & Norris, 1995; Kaniasty & Norris, 2009; Norris et al., 2002). Similarly, current influential theories on the role of social support after large-scale traumatic events give weight to deterioration of social resources because of the affliction or death of significant others (Hobfoll, 1989; Kaniasty & Norris, 1993). In summary, there is reason to believe that social support may differ in its importance or characteristics after large-scale traumas where the survivors' significant others are not directly exposed to the potentially traumatic event (Arnberg, Hultman, Michel, & Lundin, 2012).

Events in the thesis

The present thesis is based on three potentially traumatic events, each with unique characteristics. Nevertheless, some aspects were similar. The events received extensive media coverage in Sweden at the time of their occurrence and during memorial days. In addition, the direct and indirect victims were offered crisis support and further interventions.

In the following, the events and their aftermath are described. Unless noted otherwise, the information has been retrieved from official sources (Joint Accident Investigation Commission of Estonia, 1998; Swedish Accident Investigation Board, 1993; Swedish Disaster Medicine Study Organisation

[KAMEDO], 2010). Nevertheless, there may exist other views of what happened and of the exact numbers of affected.

Sinking of the MS *Estonia*

On a September night in 1994 in the Baltic Sea, the passenger ferry *Estonia* capsized and sank within approximately 35 minutes. On board were 186 crewmembers and 803 passengers, of whom 583 were Swedish residents. High winds of up to 23 m/s (52 mph) and seas as high as 7 m (33 ft) prevented rescue operations by other ships that arrived at the site shortly after the ferry sank. In the darkness of the night the survivors floated for several hours in life rafts and on top of overturned rafts or lifeboats. Some people fell off the rescue vessels and drowned; others succumbed to hypothermia—water temperature was 10 °C (50 °F)—before rescue helicopters arrived at daybreak. There were 137 who survived and 852 who perished. Ninety-two bodies were recovered from the water around the ferry and in life rafts. In addition, one survivor died during hospital care after rescue and two bodies were later found in the Gulf of Finland. There are 757 unidentified deaths and divers have observed approximately 130 bodies within the wreck.

Various forms of stress reactions were common among the survivors in the acute phase (Taiminen & Tuominen, 1996). The majority of survivors participated in a crisis group that held monthly meetings during the year following the event, and participated once or more in annual meetings during the next 10 years. The event fuelled a prolonged public debate concerning the cause of the disaster and whether to cover or salvage the ferry and the deceased. After 4 years a resolution was passed calling to preserve the peace of the tomb. Because the ship capsized in international water, however, divers from countries not obligated to comply with the resolution have since explored the sunken ferry. In addition, questions on the cause of the disaster have apparently not been resolved, as several parties have commissioned investigations in recent years to elucidate the principal cause of the tragedy.

Airliner emergency landing in Gottröra, Sweden

Shortly after a commercial passenger aircraft took off in December 1991 from Arlanda airport, Stockholm, Sweden in the early morning, ice broke off from the wings and caused both engines to fail within 78 seconds into the flight. The aircraft descended without engine power from an altitude of approximately 1 km (3,281 ft), through thick clouds, crashing into a field after trees tore off the right wing of the aircraft. On touchdown, 4 min after take-off, the aircraft body ruptured into three sections. The aircraft was evacuated swiftly and emergency services were on site within 30-60 minutes after the incident. All 123 passengers and 6 crewmembers survived. Eighty-one per-

sons were injured: Except for one spinal cord injury, the injuries sustained were mostly minor fractures, lacerations, and contusions.

School bus crash in Måbødalen, Norway

On August 15, 1988, a tour bus chartered for a school trip carrying Swedish sixth-graders from Kista, Sweden had a brake failure inside a tunnel on a serpentine road in Måbødalen, Norway. On board were 23 children 12 years old, nine parents, and a teacher with her spouse. The driver attempted to decelerate by forcing the bus against the tunnel wall, but at the tunnel opening, the bus crashed into a concrete arch. Eleven children survived, 12 children and four adults (three parents and the driver) died in the accident. Emergency services were on site ≥ 30 min after the incident. The majority of survivors had multiple injuries to the head, chest, abdomen, and limbs, but no permanent neurological damage was reported. The injured children regained physical mobility within months and resumed regular school attendance from one week to four months after the accident. Two children in the affected class did not participate in the school outing.

Acute support interventions were deployed by the Norwegian health care authorities (Winje & Ulvik, 1995). The families involved in the bus crash participated in a crisis intervention programme during the first week after the accident. Moreover, the passengers received psychological treatment during the first six months (on average) after the event (Winje & Ulvik, 1995). The psychological adjustment of the affected adults and families is described in a thesis (Winje, 1998). The municipality in Kista and the local church made efforts to support the victims and the community in the aftermath.

Aims

This thesis aimed to study the long-term psychological effects of the events described above, with a primary focus on posttraumatic stress. The aims were addressed in five specific research questions, detailed below:

1. What is the proportion of survivors who experience significant long-term posttraumatic stress?
2. Are sociodemographic factors, such as gender or age, associated with the trajectory or burden of posttraumatic stress?
3. Are peritraumatic factors such as traumatic bereavement or acute dissociation associated with the trajectory or burden of posttraumatic stress?
4. How do survivors appraise the long-term effects of their experiences from the event?
5. How do survivors perceive social support after a disaster?

Ethical considerations

There may ultimately be concerns about the appropriateness of surveying individuals who have been exposed to traumatic events. However, studies have not found any evidence suggesting that victims would fare worse because of participation in surveys on trauma-related experiences (Griffin, Resick, Waldrop, & Mechanic, 2003). Rather, most participants seem to appreciate the attention given to their experiences. Participants who do report distress in surveys or interview studies still feel that the participation is worthwhile (Ferrier-Auerbach, Erbes, & Polusny, 2009). Nonetheless, 1% of participants wanted assistance from a counsellor after participating in a telephone survey related to the World Trade Center terrorist attacks (Galea, Nandi, Stuber, et al., 2005). The participants in the present thesis were informed of the opportunity to contact the researchers, who were licensed psychologists and psychiatrists. The studies have been approved by the Regional Ethical Review Board in Uppsala, Sweden.

Methods

Procedure and participants

The studies reported here are naturalistic cohort studies of survivors from disasters and major accidents. Except for in paper II, where participants were interviewed in person, the participants have been administered paper and pencil surveys.

Papers I & II: Survivors from a ferry disaster

The study of the long-term effects of surviving a ferry disaster was a continuation of previous surveys during the first 3 years after the event (Eriksson & Lundin, 1996; Eriksson, 1997). In the first wave of surveys the 51 survivors of Swedish domicile from the ferry disaster were assessed 3 months after the event (response rate 82%), 1 year after (65%), and 3 years after (51%). Fourteen years after the event, addresses could be retrieved for 49 survivors, to whom a survey was mailed in 2008. Thirty-four (69%) of the survivors responded. One participant had not responded to any previous surveys, whereas 8 participants had responded to one, 12 participants to two, and 12 to all previous surveys. In total, 46 of the 51 Swedish survivors responded once or more. See Figure 2 for a flow chart of participation in papers I and II.

Paper II was based on face-to-face interviews. Participants were recruited in the 14-year survey where respondents were asked for consent to be contacted for interviews. Respondents who consented were invited 10 months later. The first author conducted all interviews within the subsequent five months (15 years after the disaster). Most interviews took place in the participant's own home while a few chose other settings (e.g., their office).

The interview included an initial set of questions about marital status, occupation, and other living conditions. These questions were followed by a section of open-ended questions, a break, and finally, a structured clinical interview. Thus, the interviewer was not aware of the participant's diagnostic status during the open-ended questions. Moreover, the interviewer was blind to the participants' survey responses. At the end of the interview, the participants were given the results from the structured clinical interview at their own discretion. They were encouraged to contact the investigators if they had any questions or needed advice.

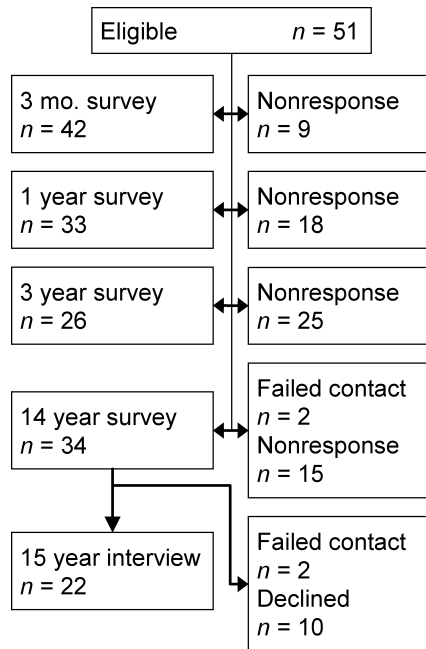


Figure 2. Flow chart of participation in papers I & II.

Twenty-five respondents in the survey at 14 years consented to an interview, but one individual later declined participation and two could not be reached. The final sample included 22 participants. The interview participants were more likely than nonparticipants to be male and to have experienced acute dissociation, as well as less likely to have been bereaved of a significant other in the disaster.

Paper III: Airliner emergency landing

Paper III extended a previous set of surveys where 106 of the 129 passengers and crew had been sent questionnaires on the following occasions during the first 2 years after the event: 1 month (83% responded), 4 months (64%), 14 months (71%), and 25 months (71%). Parts of the results have been published previously (Lundin & Ahnemark, 1998; KAMEDO, 1994). Nineteen years after the event, 9 persons had died and 22 could not be traced. Thus, 95 passengers were invited to participate in a mail survey and 70 (74%) responded.

Paper IV: School bus crash

This paper was a long-term follow-up of two previous assessments of 107 schoolchildren who were 12 years old at the time of the accident in 1988, including both the 11 directly affected schoolchildren and a comparison

group of the 96 indirectly affected schoolchildren (KAMEDO, 2011). All children in the sixth grade who were in school at one day approximately 9 months after the event were administered a questionnaire. Nearly four years after the event, the now ninth-graders were again administered a questionnaire in school. The directly affected children were not asked to participate because they were currently included in a comprehensive follow-up by the Haukeland hospital in Norway that had organised the acute crisis intervention (Winje & Ulvik, 1995).

In the survey 9 months after the accident, 102 (95%) children responded (55 boys and 47 girls). After nearly 4 years, 51 (48%) children responded (24 boys and 27 girls). Twenty years after the event, class lists that included all pupils in the sixth grade in 1988 were acquired. Current addresses could be retrieved for 101 of the former pupils (now 33 years of age). A survey was sent to these 101 pupils, of whom 40 (39%) responded (19 men and 21 women).

The participants were defined as either directly or indirectly affected by the incident. The directly affected participants were those who were involved in the bus crash on the school outing and the indirectly affected participants were all children of the same age in the affected school who did not participate in the school outing. Similar studies have determined no difference in posttraumatic stress between near-miss individuals (who were supposed to be at the site of the disaster but for some reason were not there) and those who were not supposed to be at the site and were not there (Milgram et al., 1988; Pynoos et al., 1987). Thus, the children in the affected class who did not participate in the school outing were included in the indirectly affected group. Accordingly, the directly affected group included 10 participants at 9 months, none at 4 years, and 7 at 20 years. The indirectly affected group included 96 participants at 9 months, 51 at 4 years, and 33 at 20 years.

Measures

Structured clinical interview

In paper II the Structured Clinical Interview for the Diagnostic and Statistical Manual, 4th edition, Axis I disorders (SCID-I; First, Spitzer, Gibbon, & Williams, 1997/1998) was used to assess current and lifetime disorders. Owing to time constraints, the modules included in the present study were anxiety disorders, mood disorders, and alcohol and substance abuse. PTSD was classified as subsyndromal PTSD if at least one avoidance symptom was endorsed and all other criteria were met (Norris & Slone, 2007; Stein, Walker, Hazen, & Forde, 1997). The interviewer was a licensed psychologist with additional training specific to SCID and with experience of using SCID in both research and clinical settings.

Posttraumatic stress

In paper III the Impact of Event Scale (IES; Horowitz, Wilner, & Alvarez, 1979) was used to assess posttraumatic stress in the surveys that took place in the first 3 years after each event. The IES is one of the most widely used measures of posttraumatic stress (Sundin & Horowitz, 2002). The scale contains 15 items, whereof 7 items probe intrusion reactions (e.g., *“I had waves of strong feelings about it”*) and 8 probe avoidance reactions (e.g., *“I stayed away from reminders of it”*) that pertain to a specific event. The respondent is asked to rate the frequency during the past 7 days for each item on a four-point scale from *never* to *always*. The responses are scored as 0, 1, 3 or 5 and a total score is achieved by summing all items (range 0–75).

The Impact of Event Scale–Revised (IES-R; Weiss, 1993; see Weiss & Marmar, 1997) was used in paper I and in the 19-year survey in paper III. The IES-R is an extension of the original IES and includes items that assess hyperarousal reactions. In addition, one intrusion item (*“I have trouble falling or staying asleep”*) was split into two: trouble falling asleep was assigned to the intrusion subset and trouble staying asleep to the hyperarousal subset. The IES-R is thus made up of 22 items: 8 items assess intrusion, 8 assess avoidance, and 6 items assess hyperarousal reactions. The version of the IES-R used here retained the scoring method of the IES (range 0–110). Note that a more recent version of the IES-R exists with a different scoring method (Weiss & Marmar, 1997; Weiss, 2004). The Swedish versions of the IES and IES-R have good psychometric properties (Sveen, Orwelius, et al., 2010) and have been validated against a structured clinical interview. A cut-off score of ≥ 25 on the IES and a cut-off score of ≥ 40 on the IES-R performed best in predicting cases of PTSD in burn patients (Sveen, Low, et al., 2010). The cut-off scores were used to determine cases with significant post-traumatic stress, as formal diagnosis cannot rely on self-report measures only.

General mental health

The 12-item version of the General Health Questionnaire (GHQ-12; Goldberg, 1972) is a screening device for identifying minor psychiatric disorders. The GHQ-12 comprises 6 items that focuses on inability to undertake normal functions (e.g., *“felt capable of making decisions about things”*) and 6 items on the appearance of new and distressing phenomena (e.g., *“felt constantly under strain”*). The respondents are asked to indicate whether they have experienced changes in these domains during the past few weeks, with response options ranging from *better than usual* to *much less than usual*. A total score is achieved by scoring the responses on a continuous scale (0–4) and calculating a sum score. The responses can also be scored as 0 for *better than* or *as usual* and 1 for *less* or *much less than usual*. The presence of three

or more items is then coded as decreased general mental health (Goldberg & Williams, 1988). The dichotomous scoring of the GHQ-12 is sensitive to short-term disorders but not enduring attributes of the respondent (Goldberg et al., 1997). The GHQ-12 is widely used in primary care settings to screen for current anxiety and mood disorders and is reliable and valid in community samples in different cultural contexts (Furukawa & Goldberg, 1999; Goldberg & Williams, 1988). The GHQ-12 is used by the Swedish National Institute of Public Health (2010) in their yearly national public health survey to estimate the proportion of individuals with poor mental health.

Adverse life events

A novel inventory was used to assess adverse life events in the long-term surveys. The participants were asked to indicate if and when they had experienced any negative life events and to rate the impact of each event on a four-point scale (*none, small, moderate, and great*). To this end, the inventory provides information on both the timing and the perceived importance of the events. The inventory contains 13 events (e.g., disaster, war, serious disease or injury to self or family member, divorce). The events were chosen from a revision undertaken by Hobson et al. (1998) of the widely used Social Readjustment Rating Scale (SRRS; Holmes & Rahe, 1967). In their study, a large US national sample rated the stressfulness of 51 major life events. The ratings were consistent across gender, income, and culture. Although the SRRS items are more specific than the present inventory, all items of the 20 most stressful events from the SRRS, except for imprisonment and infidelity, are covered by the inventory used in the present study.

In paper I a total score was calculated by summing the number of events that occurred after the ferry disaster and then rated as having a moderate/great impact (range 0–13). In paper IV the number of events with a moderate or great impact were summed, regardless of when they occurred. Further analysis implicated that a sum score of the impact ratings increased the performance of the scale (Perzon, 2011). Thus, in paper III a score of 1 to 4 was assigned according to the impact of the event (0 if the event had not occurred), and then a sum score was calculated (range 0–52).

Acute dissociation

In the survey 3 months after the ferry disaster acute dissociation was assessed using five discrete items (yes-no options) that map onto the symptom criteria for dissociation from acute stress disorder in the DSM (4th ed.; American Psychiatric Association, 1994). The participants were asked whether they had experienced any symptoms during or shortly after the event. In accordance with acute stress disorder criteria, three or more positive answers were regarded as indicative of acute dissociation.

Social support

A novel graphical assessment of social support (GASS) was administered in paper II. The participants were given an empty graph with an ordinate scale from 0–100% with the labels *none* and *maximum* and the years 1994 through 2009 on the abscissa. They were asked to illustrate with two lines their perception of availability of support and their need of support pertaining to the disaster. The distance of the lines from the abscissa was tabulated at 1-year intervals.

Because this is a novel attempt at assessing social support, comparisons were made with the Crisis Support Scale (CSS; Joseph, Andrews, Williams, & Yule, 1992) and the IES-R that were administered in the 14-year survey. The CSS measures perceptions of social support related to a specific event and performs well as a six-item measure of support (Joseph et al., 1992; Joseph, Yule, Williams, & Andrews, 1993). For these comparisons, two sum scores for the GASS were achieved by calculating the area under the curve for availability and need of support. The CSS was associated with the GASS for available support but not with the GASS for need of support. The IES-R was associated with GASS need but not with GASS availability. In summary, the GASS demonstrated satisfactory psychometric properties and face validity.

Open-ended questions

In paper II one open-ended question in the interview protocol asked about whether and how the disaster affected their lives today (e.g., “*in what way is the event affecting your life today?*”). Two questions on interpersonal processes across the 15 years after the event asked the participants to describe their experiences of support from significant others and from other sources (e.g., “*how did you perceive the support from others close to you?*”). Further probing was tailored to the participant’s response to obtain rich descriptions.

Psychological reactions

The questionnaires distributed at 9 months and 4 years were compiled based on a study of a school bus accident in Israel in 1985 (Milgram et al., 1988). The questionnaire includes (a) 19 dichotomous (yes/no) items covering psychological reactions during the preceding 3 weeks (e.g., “*I have had nightmares about the bus crash*”), (b) 4 items about social and professional support received, and (c) 16 items probing the participants’ interest in and preferences for future help. The 19 items on posttraumatic stress were derived from the clinical literature on posttraumatic stress and bereavement reactions in children (Milgram et al., 1988). Eight of the items were identical to the Child PTSD Reaction Index (Pynoos et al., 1987). In the present study, these

eight items were analysed as single items: nightmares, avoidance, fear, worry or anxiety, intrusions, concentration difficulties, sadness, and loss of interest in daily activities. In addition, one item assessing guilt was analysed (“*I have felt guilty about the injury or death of others*”).

Analysis

Papers I & III

A generalised linear model for correlated observations was used to assess the course of posttraumatic stress (Generalised Estimating Equations [GEE]; Liang & Zeger, 1986). Unlike standard procedures (i.e., analysis of variance), GEE uses all available observations instead of using only participants with complete data for all time points. Because the distributions of the outcome measures were positively skewed, a negative binomial with a log link function was employed. A first-order autoregressive correlation matrix was defined because proximal assessments were more correlated than distal assessments.

The regressions were refined by the use of linear splines (Fitzmaurice, Laird, & Ware, 2004), a method that is similar to the use of higher-order polynomials but is more fit to handle a situation “when the mean response increases (or decreases) rapidly for some duration and then more slowly thereafter (or vice versa)” (Fitzmaurice et al., 2004, p. 147). The idea of linear spline models is to divide the time axis into a series of segments and consider a model for the changes over time as comprised of piecewise linear trends, each segment having a different slope but joined at fixed times, referred to as knots. The use of splines made possible the assessment of long-term changes in posttraumatic stress separately from short-term changes. Time was divided into two segments, one slope for short-term changes and one for long-term changes. In paper I a knot at 1 year was chosen. In paper III, the knot was set to the 4-month assessment. Changes in posttraumatic stress between assessments are presented as percentages. The contrast estimates of predictors (i.e., estimated group differences) are presented as the standardised mean difference (Hedges’ *g*; Kline, 2004).

Paper II

In this study a concurrent mixed-methods design (Creswell & Zhang, 2009) was used. The proportions of cases according to the structured clinical interview were enumerated and their 95% confidence intervals (CIs) reported. The interviews were audiotaped and transcribed verbatim. The interviewer checked parts of the transcriptions against the tapes, which did not render any alterations in the transcriptions.

An inductive thematic analysis was performed at the semantic level (Boyatzis, 1998; Braun & Clarke, 2006). We reviewed the corpus for items relevant to social support and long-term consequences, yielding two data sets. All items could be included in both sets. The data sets were coded and collated into themes that were revised in a recursive process to attain consistency within and distinctiveness across themes. Data verification procedures included rich descriptions of the cases, reviewing and resolving disconfirming evidence, and an academic adviser's auditing. An independent coding of the social support segments of the transcriptions was performed by another author and any discrepancies were discussed and resolved. Identifying information in the participants' excerpts were altered in order to preserve confidentiality. NVivo Software v.7 (QSR International) was used for data storage, coding, and theme development.

Paper IV

The data from each individual had not been retained from the first two surveys. With only marginal totals available from these surveys, Wild & Seber's paired proportions test was used to assess changes in proportions of participants who endorsed having reactions (Wild & Seber, 1993). The paired proportion test renders a conservative estimate by using the lower bound of the concordance rate between the time points (i.e., the off-diagonal proportions in a two-by-two table).

Summary of results

Paper I

Fourteen years after the ferry disaster, the 33 participants (70% men) were 33–78 years of age (i.e., 19–64 years in 1994). The majority were married or cohabiting ($n = 21$; 64%). More than half were employed full-time ($n = 19$; 58%) and seven were retired.

The proportion of participants with significant posttraumatic stress after 3 months was 44%, 95% CI [27, 60], after 1 year 35% [18, 53], and after 3 years 38% [17, 58]. Nine out of 33 participants experienced significant posttraumatic stress after 14 years (27%, 95% CI [11, 43]). Seven participants with significant posttraumatic stress and two without suffered poor general mental health.

The analysis of the course of posttraumatic stress suggested that the reactions declined with an estimated -15% in the short-term and only minor long-term changes were found (estimated -4% , or -0.3% annually). Bereavement was not found to be associated with posttraumatic stress after 3 months, Hedges' $g = 0.15$, $p = .88$. However, whereas the nonbereaved participants experienced a decrease in posttraumatic stress reactions from 3 months to 1 year (est. -30%), no change was found in the trajectories of the bereaved participants. Although both groups displayed modest changes between 1 and 14 years, the trajectories diverged slightly between bereaved (est. 0.9% annually) and nonbereaved (est. -0.8% annually), $p = .012$. Contrast estimates indicated that the bereaved participants had higher posttraumatic stress after 14 years than the nonbereaved, $g = 1.0$, $p = .01$.

When acute dissociation was included instead of bereavement in the regression model, dissociation was associated with higher levels of posttraumatic stress after 3 months (as reported previously by Eriksson & Lundin, 1996). However, acute dissociation was not related to the level of posttraumatic stress in the subsequent assessments; nor was it related to short- or long-term changes, $p = .46$ and $p = .42$, respectively.

Paper II

The 22 participants were predominantly male and self-identified themselves as healthy. They reported no or only single episodes of extended sick leave

across their school years and adult life. Few had been unemployed for any longer period of time in adult years. Two participants were currently unemployed. Ten participants had experienced one or two additional events that fulfilled the DSM-IV PTSD A-criterion and one participant had experienced five events. Twenty participants indicated that the ferry disaster was the worst event they had experienced. Several survivors participated in a crisis group that held monthly meetings during the year following the event, and once or more in annual meetings during the next 10 years.

Long-term consequences

All cases of PTSD were associated with the ferry disaster; no case of pre-disaster PTSD was identified. The post-disaster incidence of full and subsyndromal PTSD was 45% (10/22), 95% CI [25.9, 66.2]. The prevalence of current full ($n = 1$) and subsyndromal ($n = 2$) PTSD was 14% [3.6, 32.8]. All cases with early onset reported an endpoint between 2 and 24 months after the event (mean = 14 months). Avoidance symptoms were the least noted symptom criteria and were, effectively, the threshold criterion for receiving a PTSD diagnosis. Current specific phobia was observed in three cases and a lifetime diagnosis of social phobia was noted in two, both with adolescent onset (before the disaster).

Eight cases of lifetime major depression and three cases with current depression were observed. Seven cases had a post-disaster onset. Five of the 10 participants with lifetime full or subsyndromal PTSD fulfilled criteria for a lifetime major depressive episode. There were four cases of previous alcohol abuse but no current cases. In one case the onset of alcohol abuse predated the disaster.

The cases with any pre-disaster disorder also developed a disorder after the disaster. Hence, the lifetime prevalence of any disorder was equal to the post-disaster incidence of 54.5% (12/22), 95% CI [33.8, 74.1]. The prevalence of any current axis I disorder, excluding subsyndromal PTSD, was 23% (5/22), 95% CI [8.8, 43.4]. Including subsyndromal PTSD yielded a current prevalence of 27% (6/22).

In the final model of the thematic analysis the main themes were, in order of decreasing salience in the narratives, (a) character change, (b) survivor identity, and (c) emotions (see Table 1). A greater appreciation of the frailty of life (existential awareness) was related to a sensitised appraisal of risk, which the participants viewed as both positive and negative. For example, “if you watch your footstep, you’re smart.” Negative views of risk assessment, in turn, were related to situational fears.

Table 1. *Themes in Participants' Appraisals of Long-Term Consequences*

Theme	Subtheme	n	Examples
Character change	Personal growth	12	"I trust myself more... I can handle diverse situations"
	Existential awareness	10	"Living in the present"; "grateful toward life"; "not bothered by petty things"; "be prepared! Anything can happen"
Survivor identity	Ascribed	8	"People around me sometimes see me more as someone who was aboard the ferry than as me"; "I keep a guard up, kind of, against outsiders. I don't see it as obvious that they have the right to know me"
	Used	5	"Turning my bad experience into something good for others"
Negative emotions	Sadness, sorrow; Frustration	9	"If this hadn't happened..."; "It's been shuffled back and forth all the time, and is always coming back – five years, ten years after"
	Situational fears	7	Travel by sea or air; stormy weather

Survivor identity involved that the participants were attributed with positive characteristics, such as strength and capability: "I carry a little bit of other people's fears and is seen as someone who can handle difficult situations." The participants themselves, however, often experienced difficulty with expressing such positive effects.

The event was still an emotional experience for nine of the participants. Frustration and irritation were related to the prolonged, and still ongoing, disputes about the cause of the disaster. Sadness and sorrow were related to bereavement, contemplating fate, and the repercussions of the event. In contrast to the structured clinical interview, only one participant explicitly reported consequences mapping directly onto posttraumatic stress (i.e., nightmares).

Social support

The availability of support was equal to or exceeded the need for support for all but two participants. On average, the need decreased rapidly during the first years after the disaster, although the majority of participants experienced an occasional need for support still after 15 years. Several participants recalled an increased need of support in 2004 and noted that it was because of the 10-year commemoration of the event and the 2004 Indian Ocean tsunami.

In the thematic analysis we found three themes: (a) levels of support, (b) sources of support, and (c) barriers to support. The majority of participants described that there had been, and still was, sufficient availability of support in relation to their needs. The family was a frequent source of social support; however, several expressed hesitation about seeking support from significant others, sometimes because of a perceived pressure from them to move on, "isn't it time for us to leave it behind, to let go?" or "it's so long ago now."

Five participants believed that if they would talk more about the event others would interpret their talking about the event as “being caught up in the event.” Other sources of support were therapists and colleagues, who “could provide an aid that my own family couldn’t really give.”

We found two main barriers to seeking and receiving support from significant others. The barriers seemed related to whether the participants’ family had suffered a loss in the disaster. For bereaved participants, the affliction of significant others was a barrier to support: “One’s own family may also be a part of the trauma, or part of the shock.” The distress in others could lead to reversed roles in the support transactions, which were associated with frustration, loneliness, or disappointment.

Although some participants without family bereavement also noted the affliction of significant others, they framed the barrier as mainly due to an experiential dissimilarity (i.e., the difference in experiences between survivors and others). If they noted others’ affliction, they pointed to the different experiences between themselves and family members. One excerpt summarises instances observed in several participants:

My family would have needed more support than what I needed because they had a very traumatic day—they didn’t know if I were dead or alive. And, in fact, I think that it [the event] hit them harder than it hit me.

Concerning the survivor meetings during the first year, one participant expressed, “we who were there [the survivors] understood what we had been through, and that was very important because no one else could understand what we had been through. For me it was really important to be there.”

A general observation was that the participants were agents in their recovery. For example, they described an active search for support and assessment of others’ capacity for offering support. We failed to detect reports that implied that the participants were merely passive recipients of support or in the recovery process. In essence, this is commonly referred to as problem-focused coping and appeared to underpin the participants’ retrospection.

Paper III

Nineteen years after the airliner crash-landing the 70 participants were on average 53 years ($SD = 11.3$) and were mostly married or cohabiting ($n = 45$; 64%). Several had completed higher education at college or university ($n = 40$; 57%) and the majority currently had employment or had retired from work ($n = 59$; 84%).

According to a GEE model of short- and long-term changes in posttraumatic stress, the average level of stress reactions were estimated to change from 1 to 4 months with -24% , $p < .001$. The change from 4 months to 19

years was estimated to -2.7% annually, amounting to -41% , $p < .001$. The model fit the data reasonably well; however, the actual scores showed a nominal increase from 4 months to 25 months. For a more detailed analysis, pairwise t tests were used to compare the change in scores from each previous assessment. Here, only the decreases from 1 month to 4 months and from 2 years to 19 years were statistically significant (both $ps < .001$).

When gender was included as a predictor, the average posttraumatic stress level at 1 month was lower for men than for women, Hedges' $g = 0.47$, $p = .018$. The two interaction terms for time and gender failed to detect any differences that were due to gender in the short- or long-term trajectories of posttraumatic stress, both $ps > .60$. Accordingly, men had lower levels of posttraumatic stress than women at 19 years, $g = .56$, $p = .031$. Age was not found to relate to either level or course of posttraumatic stress, both $ps = .9$.

We calculated the proportion of cases after 19 years according to the IES-R, rendering 11 participants with significant posttraumatic stress (16%, 95% CI [8.6, 25.7]). Further, there were 11 participants who had poor general mental health according to the GHQ-12. Notably, only one participant had both significant posttraumatic stress and poor general mental health, and the association between posttraumatic stress and general mental health was quite low, $r = .098$, $p = .42$.

Ancillary analyses

No association was found between the impact of adverse life events after 1991 and long-term posttraumatic stress, $r = -.001$, $p = .99$. A moderate association, however, was found with poor general mental health $r = .258$, $p = .031$.

Twenty-four participants (34%) had received treatment for mental health concerns and 13 (19%) for severe stress reactions. The median treatment length for severe stress reactions was 1.5 years. The participants who had received treatment for severe stress reactions had higher levels of posttraumatic stress on all assessments than those who had not (after 19 years, Hedges' $g = 0.92$, $p = .003$).

Paper IV

After 20 years, the majority of the 40 participants were currently employed ($n = 37$) and had a degree from high school ($n = 19$) or university ($n = 18$). Thirty-five participants were in a relationship and 15 had children. Educational, marital, and employment status were similar for the directly and indirectly affected.

In the total sample of sixth-graders stress reactions were prevalent 9 months after the bus crash, with sadness (69%) and avoidance (59%) being

highly represented in both directly and indirectly affected groups. Nightmares (60%) and feelings of guilt (50%) were frequent in directly affected participants. The frequency of sadness and avoidance decreased after 4 years in the indirectly exposed participants ($ps < .05$). After 20 years, the directly affected participants had a higher prevalence of posttraumatic stress ($p = .003$), but not decreased general mental health ($p = .14$) than the indirectly affected participants.

Twenty years later, 11 of 40 participants endorsed that they were still influenced by the accident, whereof seven were the directly affected participants. The 11 participants were asked to write down how they were influenced by the event and to regard both negative and positive consequences. Four of the 11 participants noted an increased influence of the event when they became parents. Two participants expressed survivor guilt, and three described that they had learned to appreciate life to a greater extent.

Discussion

Main findings

The present studies demonstrate that more than two thirds of the survivors recovered from initially high levels of posttraumatic stress reactions. Any changes in the levels of posttraumatic stress took place mainly during the first months or year after the event with relatively little change occurring thereafter. Traumatic bereavement had a negative long-term influence that was not evident shortly after the event on posttraumatic stress. Conversely, acute dissociation was related to short-term distress whereas no influence was found on long-term distress. Female gender was related to worse short- and long-term outcome.

Extending these findings, thematic analysis suggested that significant and similar others promoted recovery but that experiential dissimilarity and the emotional burden on significant others were major barriers in seeking their support. Further, the participants' descriptions of the psychological consequences implied a variation in the recovery process with long-term consequences not explicitly related to posttraumatic stress. Finally, not only were there adverse consequences present after decades but also present were frequent descriptions of profound positive consequences of surviving a harrowing disaster.

Posttraumatic stress

The long-term investigations suggest that the majority of survivors experience low levels of posttraumatic stress after many years. In paper I the point estimate of survivors who experienced significant long-term posttraumatic stress (27%) corresponds quite well to long-term studies of disaster survivors, in which point estimates of full and subsyndromal PTSD were found to range between 21 and 28% (Bøe, Holgersen, & Holen, 2010; Favaro et al., 2004; Green et al., 1992; Hull et al., 2002). The structured clinical interview in paper II, however, suggested that current full and subsyndromal PTSD were present in only 14% of the subsample of 22 participants 15 years after the ferry disaster.

The findings from paper III are particularly noteworthy owing to the circumstances of the emergency landing. The event presented a stressor with

little variation among survivors and mostly minor collateral stressors. Regarding pretraumatic factors, passengers taking a morning flight to a neighbouring Scandinavian country may consist of well-adjusted individuals. It may be reasonable to assume, then, that the estimates of posttraumatic stress in this sample of direct victims reflect the potential impact of a life-threatening event itself, in large part devoid of the adverse effects of collateral stressors. This may be reflected in the somewhat lower point estimate of 16% for survivors who experienced significant long-term posttraumatic stress as compared with the findings in paper I. The initial levels of posttraumatic stress in paper III correspond well to other, more severe aviation events with higher rates of mortality and physical injury (Birmes, Arrieu, Payen, Warner, & Schmitt, 1999; Gregg et al., 1995). In addition, the course of posttraumatic stress in the first set of assessments was highly similar to findings in a small sample of survivors from a plane crash without casualties (Sloan, 1988).

In paper III the decrease in posttraumatic stress levels was initially quite rapid. Yet, after an intermediate period without further change (4 months to 2 years) there was a reduction from 2 to 19 years. This pattern is unexpected according to cognitive and behavioural theories, which imply that a further reduction in the long term would be unlikely (Ehlers & Clark, 2000; Foa et al. 1989). Possibly, stressors that often follow from traumatic events (e.g., traumatic bereavement or physical injury) may be particularly important for long-term trajectories of distress. Such stressors may hinder long-term reductions in distress that would be more likely after exposure to a threat to life only. However, these findings need to be confirmed in other samples.

In paper IV adverse psychological reactions were found to be prevalent in both directly and indirectly affected children 9 months after the bus crash. After 4 years, there were indications of a recovery in half of the indirectly affected children in that 47% reported no upsetting thoughts about the event during the past year. Although the duration of exposure to a life-threatening event was limited, the bus crash featured characteristics noted to be especially harmful according to a meta-analysis of risk factors for posttraumatic stress in youth: high mortality rate, child proximity, personal loss, perceived threat, and distress (Furr, Comer, Edmunds, & Kendall, 2010). In light of these characteristics it seems promising that the directly affected participants reported mainly mild or moderate reactions after 20 years. Notably, there were accounts of a reinstatement of anxiety (Mineka & Zinbarg, 2006) during transition times in adulthood (e.g., becoming a parent).

Predictors of long-term posttraumatic stress

In paper I the overall levels of long-term posttraumatic stress showed quite modest change after the first 1 or 3 years. Thus an absence of diminution in

stress reactions for groups of survivors during the first years was associated with high levels of long-term stress. Traumatic bereavement was associated with such a course and, accordingly, a worse long-term outcome. In paper IV posttraumatic stress after 20 years was associated with an index of grief reactions. These findings suggest that bereavement is an important risk factor for prolonged posttraumatic stress. Even though complicated grief shares some properties with posttraumatic stress and depression, it is considered a distinct construct (Bonanno et al., 2007).

In contrast to the divergent trajectories that are due to bereavement, the course of posttraumatic stress did not differ across gender. However, women had initially higher posttraumatic stress and worse long-term outcome. Women tend to exhibit higher rates of PTSD after potentially traumatic events (e.g., Tolin & Foa, 2006). The findings in paper III suggest that the effect of gender is not caused by differences in trajectories of posttraumatic stress. Rather, the difference may lie in factors that influence the development of significant posttraumatic stress (e.g., peritraumatic responses; Fullerton et al., 2001). In paper III age was not related to long-term posttraumatic stress. The participants in paper IV were all 12 years old at the time of the event and none experienced significant levels of posttraumatic stress in the long-term assessment. These findings support a meta-analysis showing that variations in adult age may not be of importance, although younger adult age has sometimes been shown to predict lower levels of posttraumatic stress (Brewin et al., 2000).

Survivors' self-assessment

The findings from the in-depth interviews in paper II revealed that the survivors did not assign a central role to posttraumatic stress reactions or other psychiatric symptoms. Instead, their descriptions were related to changes in how they viewed themselves and how they were viewed by others. The event was seen as producing both positive and negative consequences. The positive consequences are consistent with components of posttraumatic growth (personal strength and appreciation of life; Tedeschi & Calhoun, 1996).

An initial attempt that used only the categories positive/negative yielded poor distinctiveness across categories. For example, appreciating the frailty of life was viewed as positive but also entailed greater alertness to potential risk, which in turn was associated with situational fears. This lack of distinction is found in the literature on the complexity of growth after trauma (see Helgeson, Reynolds, & Tomich, 2006; Zoellner & Maercker, 2006).

The different methods of data collection clearly illustrate different aspects of long-term effects of surviving a traumatic event. The participants might have downplayed the disclosure of emotional content in favour of structuring it around problem solving, as suggested in a content analysis of interviews

with Holocaust survivors (Suedfeld, Krell, Wiebe, & Steel, 1997). It could be that the survivor identity may have influenced the participants' recall and presentation during the interview. However, this pattern of presentation may be congruent with the actual accomplishments of the participants (Suedfeld et al., 1997). Regardless of the causes of this discrepancy, the findings from paper II are important in that they indicate that studies relying on a bottom-up approach may fail to account for important adverse consequences. In addition, the findings emphasize that there is more to long-term consequences of traumatic events than what is encompassed by psychiatric constructs (Ursano & Fullerton, 1997).

Social support

The course and characteristics of social support were examined by the use of a novel measure and analysis of open-ended questions. A somewhat unexpected finding was the persistence of needed support. It is noteworthy that there was a variation in this respect, with some participants illustrating practically no need at all for support. Because of the retrospective nature of the data and the novel assessment method, these findings should be viewed as preliminary and need to be confirmed in future studies. The long-term need may have been biased upwards by salient episodes of increased support such as during the 2004 tsunami, which had a large impact on the country as a whole (Bergh Johannesson et al., 2009). The average course of support, however, levelled approximately five years after the event. The prolonged need of support may suggest that although event-related distress dissipates within the first year or years for the majority of participants, even after some additional years the assimilation of trauma-related material is not completed.

The majority of participants noted that there was ample availability of informal social support, which is in accord with reports from other disasters (Arnberg & Melin, 2011; Kaniasty & Norris, 2009). Nevertheless, their accounts of barriers to support highlight areas where psychosocial interventions may prove particularly relevant (Brymer et al., 2006). Moreover, the apparent persistence of perceived need for support warrants further study.

Thoits (2011) discussed the distinction between significant others and similar others, defining similar others as persons with a stress experience similar to the survivor. This distinction is different from previous definitions of similar others, which included significant others who are comparable in social characteristics, attitudes, personality, or stress experience (Cohen & McKay, 1984). Thoits (2011) argued that this distinction is important in the context of social provisions after trauma. Incidentally, the data presented in the present study lend support to Thoits' (2011) account in that the stress experience was central to expressing experiential similarity, although experi-

ential dissimilarity appeared to be a less apparent barrier when bereavement was involved.

Thoits (2011) further supposed that emotional support would be rebuffed or prevented by persons, typically men adhering to traditional gender roles, who wish to shield a significant other from being upset on their behalf. The majority of survivors from the ferry disaster were men, and it may be that underlying gender roles increased the salience of barriers to support that pertain to the distress of others. Nevertheless, the findings on social support underline survivors' use of different sources of support (Michel et al., 2011).

Methodological considerations

The present study rests on the central assumption that the potentially traumatic events caused the participants to develop certain reactions of distress and that such an association remains decades after the event. The use of small cohorts with accompanying attrition that were assessed by self-report measures with a hiatus of at least 11 years between early and long-term assessments are features of these studies that pose threats to the validity of this assumption.

With naturalistic cohorts differences among participants on the relevant outcomes can be biased by unmeasured confounding factors. Statistical adjustment for potential confounding variables was precluded by the small samples. Critically, causal inferences cannot be made without caution because of the correlational designs with small samples.

Inherently limited by the number of survivors, the samples were quite small. Modest numbers of participants render uncertainty in the precision of estimated parameters. In addition, the nonresponse and attrition introduce possible bias. Overall, the comparisons of respondents and nonrespondents concerning prior posttraumatic stress did not show any marked differences. In paper II, however, there were indications of a selection bias.

The studies included an interval of at least 11 years between early and long-term assessment. Maturation of participants or changes in society during this time could have affected how participants respond to questions about their health. In particular, this possibility raises concerns about the negative finding on the long-term effect of acute dissociation in paper I. The differences between immediate and long-term distress may also pertain to other negative life events during this time, both directly and indirectly experienced. However, the associations between other adverse events and post-traumatic stress were small. Finally, also related to the intervals of assessment is the latency from the events to the first assessments (between 1 and 9 months), since any decreases in the participants' distress during the acute phase were unaccounted for (cf. Holgersen et al., 2010).

The items in the posttraumatic stress measures were keyed to the index event, which decreases the likelihood that distress caused by other events influenced the participants' ratings. However, several of the items in these measures correspond to features of depression and other anxiety conditions (see Spitzer et al., 2007; Yufik & Simms, 2010). This commonality means that a respondent's total score may not be devoid of the influence from other factors in addition to distress from the index event. Further, this lack of specificity could to some extent explain the discrepancy in the proportion of participants with significant posttraumatic stress in paper I and the proportion of cases with PTSD in paper II. The current prevalence of any disorder, including subsyndromal PTSD, in paper II was 27%, which is equal to the prevalence of significant stress reactions according to the self-report measure in paper I. Another possibility is that the transferability of cut-off scores from the validation sample (Sveen, Low, et al., 2010) to the present samples was compromised by spectrum bias. The discrepancy underscores the importance of not relying on self-report measures for diagnostic purposes (Boals & Schuettler, 2009).

The study procedures may have inflated the long-term scores on the measure of posttraumatic stress. Ethical standards require that a letter of consent be sent to participants before sending the survey. The first letter may have primed the participants to think more often than usual about the event. Because the IES-R assesses frequency of reactions during the past week, these assessments may have been inflated. A more recent version of the IES-R that includes ratings of distress had been developed at the time of the long-term surveys (Weiss, 2004). The later version was not used because it was considered essential to employ the same version of the measure in the long-term assessments as in the earlier surveys.

The potential bias associated with small samples, nonresponse, study procedures, and reliance on self-report measures may have inflated the long-term posttraumatic stress point estimates (Norris & Wind, 2009). Small sample size is associated with higher posttraumatic stress in previous studies after disasters (Norris, 2006). Nonresponse to surveys after disasters is associated with being less afflicted (Hussain, Weisæth, & Heir, 2009). However, higher levels of posttraumatic stress have also been linked to attrition and resistance to participation (Weisæth, 1989). Finally, no study includes prospectively assessed pre-disaster data and papers I to III do not include comparison groups, which restricts conclusions and calls for careful interpretations regarding the net effects of these events on survivors.

The main strength of this thesis pertains to the longitudinal data collection method, which provides a less biased comparison of short- and long-term reactions compared with retrospective approaches (Moffitt et al., 2010). The assessment of short- and long-term trajectories separately made possible an analysis of the progress of posttraumatic stress and the influence of predictors. This type of segmentation of posttraumatic stress is rarely seen despite

it being more consistent with theoretical accounts of posttraumatic stress (see Brewin & Holmes, 2003; Schnurr et al., 2004, Ursano & Fullerton, 1997). The assessment of social support, however, was retrospective and should be interpreted with caution (Norris & Kaniasty, 1992).

A second strength of these studies concerns the sample characteristics. The risk of experiencing different types of potentially traumatic events (e.g., interpersonal violence, military combat, or single traffic accidents) is dependent on sociodemographic and personal characteristics (Breslau, Davis, Andreski, & Peterson, 1991; Frans et al., 2005; Kessler et al., 1995). Thus, findings from studies that involve particular types of traumatic events may not be generalised readily to the general population (Dyster-Aas, 2006). In contrast, major accidents and disasters affect a more or less random selection of the general population. However, this may not be true for the sample from the ferry disaster because of the unforgiving circumstances of the event. Thus the estimates of distress and disorders are subject to less influence from the pre-event factors. Nevertheless, the findings may not generalise across diverse sociodemographic strata.

Implications and future research

As noted at the outset, the study of disasters and major accidents are accompanied with unique advantages and drawbacks, all of which affect the generalisability of the findings. The events in this study are highly different in their appearances. Yet, as evidenced across a range of events, the human reactions are much the same (Norris & Wind, 2009).

The distinction between centripetal and centrifugal events (Green et al., 1992; McFarlane & Norris, 2006) needs to be considered with regard to implications. The three events studied in this thesis are centrifugal in that the victims were temporarily congregated and could return to homes not afflicted by the event. Centripetal events, however, strike communities and inflict psychological wounds not only to those in the epicentre of the event but also to their significant others and to the community at large (McFarlane & Norris, 2006). This distinction is not often addressed in the literature and it is not known whether it can account for differences among traumatic events regarding their psychological toxicity. Thus, the results may not generalise to centripetal disasters. Furthermore, the application of the present findings to other events needs to take into account variations in event exposure severity (e.g., Bergh Johannesson, 2010) and survivor characteristics.

Some implications are suggested from these findings. The course of recovery suggests that interventions employed after major events may benefit from receiving a prolonged endorsement so as to correspond to the presumed trajectory of distress. After the 2004 Indian Ocean tsunami, municipal support centres were in operation during the first six months while only non-

governmental organisations provided support thereafter (Swedish National Board of Health and Welfare, 2006).

The findings on the barriers to social support and levels of support cannot be translated directly into implications for formalised, or arranged, social support. Formal social support does not necessarily produce the same effects as informal support and can even have negative effects on informal support (Helgeson, Cohen, Schulz, & Yasko, 2000). Current guidelines for psychosocial interventions after disasters and major incidents recommend that the survivors' social context is taken into account (e.g., Swedish National Board of Health and Welfare, 2008; Bisson & Takavoly, 2008). The findings from paper II provide support for this recommendation. Nevertheless, with the current guidelines being evidence-informed at best, important future challenges include evaluations of these guidelines.

Future studies on the epidemiology of disorders related to trauma are needed that use a longitudinal design, larger samples, and conduct multiple assessments over time. Separate analyses of short- and long-term trajectories may offer further insight into the process of recovery from traumatic events. Collecting data from population-based registries could be useful as proxy measures for pre-event characteristics of the participants. Such data might relax some of the constraints that are put on inferences from the results because of the naturalistic design that is obliged in this research field. Future studies would benefit from moving away from merely estimating the prevalence of disorders towards employing theory in order to develop and test hypotheses, and guide the design and analysis. This approach would be of benefit to our understanding of the mechanisms of the recovery process, which we know little about (Schnurr et al., 2004).

Conclusions

The present thesis examined the burden and trajectories of distress related to centrifugal disasters and major accidents. The main findings show that at least half of the survivors from potentially traumatic events experienced significant distress early after the event, although the delay of 1 to 9 months until the first assessments need to be considered in relation to these estimates. In accordance with the emerging literature on long-term effects, a consistent finding is that approximately three quarters or more of survivors recover over the long term.

The greater part of recovery appears to occur within the first months after the event given the absence of collateral stressors. A more protracted recovery, and somewhat lower rates of recovery, may be expected in the long term if the event was associated with bereavement.

The interviews with ferry disaster survivors provided a complementing account of long-term consequences. The survivors did not attribute a central

role to posttraumatic stress. Rather, they believed that the disaster entailed changes in their character and view of life. Their accounts, in principle, related to posttraumatic growth.

The interviews also provided preliminary findings on the prolonged need for social support. The barriers to support described by the participants fit well into existing theoretical accounts. These findings underscore the importance of the social context in the aftermath of disaster.

It is thus apparent that many survivors will adapt to the ensuing consequences of having experienced harrowing events. However, a minority of survivors struggle with this process and suffer from intrusive recollections, sleep difficulties, and nervousness. Further, they try to avoid reminders still after many years. Finally, consequences relating to the survivors' construal of their own character and identity may be lifelong. Yet, the accounts of disaster survivors also convey an impressive ability to transcend and transform experiences of horror and fear into narratives of agency, strength, and adaptation.

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Svensk sammanfattning

Allvarliga händelser som katastrofer eller stora olyckor har visat sig kunna leda till svår psykisk belastning på kort sikt, medan konsekvenserna på lång sikt är mindre belysta. Svåra posttraumatiska stressreaktioner kan bli beständiga efter händelser som övergrepp och krig. Likaledes ter det sig som att dessa reaktioner kan bli beständiga också efter händelser som katastrofer och stora olyckor. Denna avhandling syftar till att beskriva långvariga posttraumatiska stressreaktioner hos överlevande efter förlisningen av MS Estonia 1994, nödlandningen av ett passagerarflygplan i Gottröra 1991 samt efter en olycka med en skolbuss medförande en skolklass från årskurs sex i Kista.

De överlevande efter händelserna tillskickades enkäter mellan 1 månad till 4 år samt följdes upp efter 14 till 20 år. Uppföljningen besvarades av 33 av totalt 51 överlevande från färjekatastrofen, 70 av 129 från flygolyckan samt 7 av 11 överlevande från bussolyckan och 33 personer från parallellklasserna. Därutöver genomfördes personliga intervjuer med 22 överlevande 15 år efter färjekatastrofen.

Vid tidpunkten för de första enkäterna (efter 1–9 mån.) upplevde ungefär hälften av de överlevande betydande posttraumatisk stress. Reaktionerna kvarstod hos 27 % av de överlevande fjorton år efter färjekatastrofen och hos 16 % nitton år efter flygolyckan. Tjugo år efter bussolyckan upplevde de överlevande låga nivåer av posttraumatisk stress. Jämfört med andra överlevande återhämtade sig de förlustdrabbade i mindre grad under det första året och hade också svårare reaktioner efter många år. Kvinnor upplevde i genomsnitt svårare reaktioner än män.

Enligt de överlevande var konsekvenserna på lång sikt inte bara negativa utan i viss mån också positiva (t.ex. personlig mognad och livsbejakelse). De flesta intervjuade hade upplevt ett gott stöd från närstående. Dock kunde ett visst behov av stöd kvarstå i flera år efter händelsen. Många berättade om hinder för att söka stöd, t.ex. att den närstående var känslomässigt belastad.

Katastrofer och stora olyckor är förknippade med övergående stressreaktioner hos majoriteten av de överlevande, medan posttraumatisk stress kan kvarstå i många år för en mindre andel. Intervjuerna pekar på viktiga aspekter av socialt stöd att utforska vidare. Vidare forskning behövs för att bättre förstå den naturliga återhämtningen och hur insatser till överlevande och anhöriga kan minska risken för bestående posttraumatisk stress.

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