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Journal of Psychosomatic Research 60 (2006) 413–422

Journal of Psychosomatic Research

Psychosocial responses to environmental incidents: A review and a proposed typology

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Accepted 10 November 2005

Abstract

Objective: The objective of this review was to propose a typology for understanding the diversity of psychosocial reactions to environmental incidents. **Methodology:** The first section provides an introduction and background to the topic; we then attempt to provide a typology of psychosocial responses to environmental incidents. **Results:** Response to an environmental incident can be usefully considered in terms of the exposure, the response of the individual, the action of professionals, the response of the community, and the influence of the society in which the incident occurs. We reviewed each of these factors. **Conclusions:** By examining incidents in an ordered framework, we suggest that a more comprehensive understanding is possible. We also suggest some basic ways in which the psychosocial management of such difficult and diverse incidents could be improved.

Keywords: Environment; Disaster; Psychosocial; Symptoms; Toxic; Radiation

Introduction

The past few decades have seen increased attention given to environmental incidents, including industrial accidents (e.g., Bhopal and Seveso), nuclear accidents (e.g., Three Mile Island and Chernobyl), and war (namely, the Gulf War). At the same time, and perhaps not unrelated, there has been an increase in general environmental health concerns by populations living near toxic waste sites and an increase in perceived environmental hazards such as cellular phone sites or radio transmitters [1]. Most public, professional, and media discourses on the aftermath of environmental accidents are preoccupied with direct toxicological and chemical hazards [2]. Less attention has been given to what many consider to be ultimately the most serious consequence of environmental accidents: their psychosocial consequences. In this article, we attempt to draw together some of the relevant literature and propose a psychosocial typology for environmental incidents (see Table 1).

Psychosocial consequences result not only from the direct psychological effects of toxicological effects (analogous to the psychological consequences of physical illness) but also increasingly from their perceived impact and risk to health. Indeed, the impact of episodes in which there is no actual environmental hazard at all but only the perception of such a threat can be as damaging as those in which there is at least some chemical exposure [3]. These episodes tend to be overlooked and are often reported under the label of *mass psychogenic illness*—referring to a dramatic increase in similar symptoms among affected individuals. It is an unsatisfactory term but preferable to *mass hysteria* [4]. No terminology exists for the long-term effects of perceived exposures.

Changing labels

The explanations people make for symptoms vary between time, place, and culture. Today, people in Western societies usually assume that symptoms represent bodily as

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doi:10.1016/j.jpsychores.2005.11.008

Table 1
Outline of proposed typology

1. The exposure
a. Real or perceived
b. What is it?
c. Duration
d. Blame and attribution
2. Response of the individual
a. Behavioral change without obvious distress
b. Increased symptoms
i. Reattribution of background symptoms
ii. Symptoms caused indirectly by psychological distress
iii. Physiology of somatic symptoms
iv. Health perceptions
v. Conditioning
vi. Somatic attention and amplification
vii. Resistance to perceived psychologization
3. Iatrogenesis: action of professionals
4. Response of communities
5. Influence of society
a. Conspiracy and lack of trust in authority
b. Media

opposed to spiritual dysfunction. When they look for explanations for their symptoms, they are likewise less likely to accept religious or supernatural explanations and more likely to seek the causes of distress in the manmade environment [5,6].

There are many reasons why our knowledge of and concerns about the environment are more common now than at any time in history. One reason may be the rise in manmade chemicals, emissions, and technological disasters, as well as the "right to know" culture that has been sanctioned at the government and industry levels [7]. Another reason may be the rise of green politics in response to the perceived change in the environment [8]. A final reason may be the relatively recent ability in most legal systems to obtain redress or compensation for such exposures. The result is twofold: First, when people do develop symptoms, they are more likely to seek the causes of those symptoms in the manmade environment around them. Second, even if not immediately affected, the consequence may be an increased health fear in the future (e.g., risk of cancer or of reproductive fears).

People who feel ill need an explanation for their malaise; doctors can sometimes provide such an explanation but often cannot [9]. In those circumstances, when medicine fails to provide clear answers, people most often turn to their environment to provide an explanation. Although all objective indices of health improved during the 20th century, our perception of our health has declined. Surveys suggest that the modern individual feels less well and experiences more symptoms than in previous generations, something that has become known as the *paradox of health* [10]. Historian Edward Shorter [11] pointed out that the average American of the 1920s reported 0.8 episodes of serious acute illness per year but that this rate had increased to 2.1 in the early 1980s. Between 1957 and 1976, Americans experienced more decreased activity days, spent more time in bed, and experienced more symptoms [12].[1] The prevalence of symptoms (or at least our willingness to report them) seems to have increased during the later decades of the last century [13,14]. The greater people's concerns about the effects of modern life are (e.g., about household chemicals, dental amalgam, pesticides in food), the more likely they are to complain of symptoms in the preceding month, have medically unexplained illnesses, and be users of complementary medicine [1]. This latter study also showed that modern health worries are more frequent in those who are more highly educated.

One result of this heightened environmental awareness has been a gradual transformation of popular models of illness and disease [15]. The demons and spirits from earlier periods of our history have been replaced with beliefs that we as a society are oppressed by radiation, mystery gases, viruses, and toxins, all of which are invisible and some of which are as elusive as the demons of old. One can see this in the changing pattern of attributions given by patients with unexplained symptoms [6]. Many scientists now profess themselves to be baffled by the public anxieties expressed over the possible adverse effects of pesticides, not to mention genetically modified foods and cellular phones [16]—but these make sense in the light of public knowledge of manmade technological disasters such as Three Mile Island or Bhopal incidents.

We emphasize the importance of understanding the reporting of symptoms in the general population before considering the effect that an environmental disaster may have on symptoms. Somatic symptoms of both an acute and a chronic nature are common [17,18] and a discrete biomedical cause is often not found to account for these symptoms, even when they are presented to primary or secondary care [19]. However, there is clear evidence that certain factors increase the likelihood of symptom reporting, the most robust of these being the presence of psychological distress and female sex [20]. Additional factors that appear to increase symptom reporting include the lack of a stimulating environment [21] and cognitive influences such as the awareness of (and attention given to) an environmental hazard [22].

A proposed typology of psychosocial responses

We propose a typology of psychosocial responses, the purpose of which is to provide a framework to aid the understanding of the complex psychological, behavioral, and social responses to environmental incidents. We hope that it would prompt a wider analysis of potential problems in the aftermath of incidents (Table 1).

[1] There is no evidence that the United States is unique in this respect. A comparative survey found that Swedes were more likely to report symptoms than Americans! (Andersen R, Anderson O, et al., Perception of and response to symptoms of illness in Sweden and the United States. *Medical Care* 1968;6:18–30).

The exposure

Real or perceived

The typology begins with the exposure (i.e., the environmental incident), which may be real or perceived. There are many examples of outbreaks of illness in response to apparent toxic exposure for which there is no (or inadequate) toxicological explanation [3,23,24]. For example, the journal *Science* carried an interesting footnote some years ago, describing a sequence of events in a Tennessee town when a local inhabitant complained about minor illnesses affecting her and her family, which she blamed on local toxic chemicals. Gradually, more and more local inhabitants began to complain of similar symptoms. After a former health department official claimed that there was an old chemical waste dump in the area, a crisis atmosphere developed [25]. Then local congressman Al Gore later held hearings on the subject. Exhaustive local investigations revealed no evidence of environmental toxicity, but it was not until 1 year later that the authorities realized that they were misinformed on the site of the dump, which was actually some miles away. Gradually, the furore died down, but several local residents continued to believe that they have unusual health problems still attributed to the ghost dump [26].

These incidents are often known as *mass psychogenic illnesses*, and symptoms may be caused completely by perceived exposure. In these cases, the exposure is the (false) idea of contamination rather than a biologic agent. As might be expected, there are also examples of outbreaks being partially attributed to real exposure and partially to perceived exposure [27]. Research into mass psychogenic illness has shown the importance of social factors in the transmission of symptoms [3]. Hence, when 210 North Carolina schoolchildren became ill after having apparently been poisoned by a radiator boiler, transmission involved friend-to-friend contact within social cohorts [28]. Likewise, epidemic syncope was transmitted not to more psychological vulnerable subjects but simply along a cohesive social network [29]. Observing a friend becoming sick was the best predictor of susceptibility in another episode [30]. A substantial proportion (~20%) of episodes of mass psychogenic illness appear to last longer than 1 month [3], although it seems that most are short lived. As far as the typology is concerned, both real and perceived environmental exposures can be considered within its framework.

What is it?

It is essential to have information on the nature of an exposure in the analysis of an incident. This is not only for toxicological purposes but also because the perception of the risk influences the response of exposed individuals and involved professionals. There is a vast literature outlining factors that determine the perception of risk. However, once people have made these judgements, relatively limited attention has been given to how this affects them and how this process can be translated into the experience of symptoms. There are a number of "outrage" or "fright" factors that are associated with greater public anxiety, irrespective of the "scientific" assessment of risk [31–33] (see Table 2). We suggest that these factors also indicate a higher risk of long-term psychosocial adverse effects, although we acknowledge that recent work has countered the traditional view that manmade disasters necessarily have a greater impact on (psychological) health than natural disasters [34].

The context of risk is all important. The public has a low tolerance for radiation or chemical risks that are seen nonessential (e.g., nuclear power, nuclear waste, and pesticides) but a much higher tolerance for those with beneficial uses (e.g., X-rays and pharmaceuticals). An example of this is the extreme public dread of nuclear waste processing. One study asked lay respondents to record thoughts or images that came to mind when asked to think about an underground nuclear waste repository; by far, the most frequent associations were the repository's being "dangerous," "danger," "death," and "pollution" and, in contrast, only 2.5% of associations were positive [35].

Scientific experts and the public usually have differing perceptions of risk regarding radiation and chemicals [36]. This is illustrated by a study that compared how the lay public and experts (in this case, toxicologists) differed in their perception of risk; whereas toxicologists believed that the dose response of a chemical exposure was fundamentally important, lay people took the view that a chemical was either "safe" or "unsafe" [37]. The same study also indicated that behavior may be affected by people's risk perception, with 40% of lay respondents saying that they do everything they can to avoid contact with chemicals and chemical products in their daily lives; significantly more women than men endorsed this viewpoint.

Radiation incidents have the capacity to provoke particular public anxiety. There remain considerable misunderstanding and misperception of the adverse effects of one of the defining health disasters of the current generation, the Chernobyl explosion, largely because of a grossly exaggerated fear of the results of the radioactivity contam-

Table 2
Fright factors [32]

Risks that are manmade as opposed to natural
Risks that are seen as involuntary (e.g., pollution) as opposed to voluntary (e.g., smoking)
Risks that threaten a form of death, illness, or injury that arouses particular dread
Risks that damage identifiable rather than anonymous victims
Risks that are poorly understood by science
Risks that are subject to contradictory statements from responsible sources (or from the same source)
Risks that cause hidden or irreversible damage
Risks that pose a particular danger to children, pregnant women, or future generations
Risks that are inequitably distributed
Risks that are unfamiliar or novel

ination [38]. The Swedish Radiation Protection Institute and the World Health Organization have pointed out that the true health effects of the Chernobyl explosion were the initial deaths of the rescuers and a marked increase in childhood thyroid cancer but no increase in overall cancer incidence or mortality [38,39]. Nevertheless, there was massive social and political disruption to large areas of Belarus, Ukraine, and Russia, an increase in psychosomatic disorders [39], and widespread and chronic psychological consequences [40]. The psychobehavioral effects of the Chernobyl explosion extended well beyond the boundaries of the Soviet Union, such that a reduction in birth rates (and/or increase in abortion) was observed as far away as Italy [41] and Scandinavia [42].

The Goiania incident in Brazil involved children being accidentally exposed to a medical radiation source and resulted in several hundred casualties and four deaths. Over the next several days, 10% of the population (>100,000 people) sought medical checks and screening [43,44]. Of the first 60,000 people monitored after the incident, 8.3% presented with new-onset somatic symptoms, although none of these individuals was contaminated [44]. The socio-economic consequences of the incident were enormous, with considerable effects on local industries, agriculture, and tourism.

Duration

One reason why natural disasters may have a lesser association with long-term subjective health effects than technological/chemical disasters may relate to the differing time courses of the threats. There is genuine uncertainty about the long-term risks from technological threats or disasters; hence, it is difficult for experts to confirm or deny such fears, particularly when related to outcomes that occur endemically in affected communities anyway, such as cancer, miscarriage, and reproductive abnormalities. These "slow killers", or "Pandora's box" [45], such as food additives, pesticides, and radionucleotides, pose real demands for professionals and institutions in retaining public confidence and trust.

Blame and attribution

An exposure that is seen as involuntary is more likely to cause psychosocial distress than a voluntary exposure. We suggest that an organization that has previously shown minimal regard for employee or environmental safety may engender a greater psychosocial response in those exposed (or thought to be exposed) when an incident does occur. The continued, but disputed, legacy of Agent Orange may be a case in point [46]. Likewise, "contested causation" of the origin of symptoms, especially when those most affected and those allegedly responsible hold differing views, may impede recovery and rehabilitation. This is particularly relevant in the workplace setting [47], where there are disparities in the power relationships between workers and employers.

Response of the individual

Behavioral changes without obvious distress

These refer to changes in behavior that have been linked to environmental exposure without necessarily causing psychological distress (e.g., changes in abortion rates and/or birth rates after the Chernobyl disaster) [41,42].

Increased symptoms

In the aftermath of an incident, individuals may experience pronounced psychological symptoms such as anxiety, alterations in mood, and sleep disturbance [48]. Mothers with young children have been shown to be at particularly high risk of developing psychological symptoms [49]. Meanwhile, somatic symptoms may be caused by the direct effects of an agent, in which case specific characteristics of the incident such as the dispersal caused by environmental conditions are important, have been well documented by environmental scientists, and lie beyond the scope of this article. However, it is axiomatic that the etiology of somatic symptoms is multifactorial. Early childhood experience, the stigma of mental disorder, and putative psychological or personality variables all underlie the experience of both physical and psychological symptoms [50,51]. Thus, it follows that exposed individuals may develop somatic symptoms that are not directly attributable to the toxicity of the agent and rather are mediated through a range of mechanisms that we outline below.

Reattribution of background symptoms. It is now well established that experiencing somatic symptoms is the norm rather than the exception. General population surveys show that, in any 2-week period, up to 30% of the population complain of muscle aches and pains, 38% do of headache, 15% do of eye problems, and 14% do of skin problems [52,53]. We propose that after a toxic incident, people will continue to experience somatic symptoms at the same background rate as usual but may reattribute these to their exposure.

Symptoms caused indirectly by psychological distress. Psychological distress may be experienced after an environmental incident [49]. This is important as individuals who score high on measures of psychological distress also tend to report more physical symptoms in all situations. There are now considerable research showing that psychological distress is related to symptom reporting but not directly to organic disease [54,55]. Individuals who score high on measures of depression and anxiety consistently report more symptoms than those who score low on such measures [56,57].

Psychological distress can also influence how individuals perceive the state of the functioning of their body and health in general. This was illustrated in a study on how individuals perceived the functioning of their immune system [58]. Perception of immune function was unrelated

to various immune markers but closely related to mood and, in particular, feelings of fatigue or vigor.

Physiology of somatic symptoms. Sharpe and Bass [59] drew attention to the literature on the physiology of somatic discomfort. The importance of this approach is to remind professionals that, first, such factors as arousal, sleep disturbance, and anxiety all increase the experience of somatic symptoms and that, second, such symptoms are very much "in the body" and not "in the mind" [4,60].

Health perceptions. There are several aspects of environmental exposures that may increase the chance of perceptual bias and, in particular, the perception of danger [61]. Exposures arising from chemical disasters are involuntary, and this absence of choice plays an important role in increasing the symptomatic impact of exposure. In an experiment that illustrates this point, subjects were given three identical capsules containing inert material but were told that each capsule was coated in a different compound, each coating associated with a different perceived potential hazard. Subjects were randomly assigned to either being given a capsule or being allowed to choose which capsule to ingest. Reported symptomatic side effects (and despite all capsules actually being entirely inert, there were many side effects) were more than twice as likely to occur when a subject had no control over which capsule to swallow; hence, personal control of exposure determines not only perception of hazard but also the symptomatic consequences of exposure [45].

There is a complex relationship between environmental concerns and symptoms [62]. There is no doubt that being exposed to environmental hazards, such as chemicals, leads to increased fears and concerns [48]. This increase occurs whether the exposure is real or perceived—symptoms are increased as powerfully in those who think that they have been exposed to harmful agents as in those who actually have been so exposed [25,61,63–65]. These fears in turn lead to increased symptom reporting because those with more environmental concerns experience more symptoms [1], especially when exposed to real or perceived hazards. The strength of subjects' opinions on environmental matters was associated with symptom reporting in those exposed to a hazardous waste site but also in those who were not [63,66].

When activated by a situation, our beliefs guide the monitoring of somatic information to look for confirmatory evidence. People who experience more symptoms, for whatever reason, may have an increased level of concern about their environment as they look for explanations for their ill health. The consequence is a vicious circle linking exposure (whether real or perceived), beliefs, and symptoms. Thus, environmental fears and beliefs can be seen within the wider context of the firm link between a preoccupation with health and a reduced perception of health [67].

A recent example of this process in action is a study examining how people's worries about aspects of modern life affecting health influenced symptom reports after environmental pesticide spraying. This study found that higher levels of the subjects' modern health worries were associated with a higher number of symptoms later being attributed to the spray program as well as a belief that their children and pets health had been affected [68].

In several studies on Gulf War veterans, the self-reported exposure with the strongest association with symptoms is the belief that the veteran was exposed to chemical weapons, sarin and mustard agents, namely. This is an uncommon belief among service personnel but when found is always associated with an increased chance of symptom reporting, and usually dramatically so [69–72].

Conditioning. An abnormal smell is a striking feature of environmental incidents that appears to be associated with both acute and chronic psychosocial morbidity. The detection of an unusual odor is a frequent trigger for mass psychogenic illness [3]. The odors of cleaning chemicals [73], car exhaust fumes [74], unusual tasting tap water [75], and gas [76,77] have all been reported as triggering episodes of mass psychogenic illness. Some report that the stronger the reported odor, the greater the likelihood of susceptibility [78], although this was not replicated in an experimental model of sick building syndrome [79]. Data gathered after a railroad spill of metam sodium (a pesticide) in California showed that those who had perceived an odor scored higher on many subsequent measures of mental health dysfunction [48]. In general, objective measures of environmental odor do not correlate well with the symptomatic response [80]; neither is there compelling evidence that susceptible individuals have direct lower olfactory thresholds [81]. Instead, it may be the affective and cognitive response to the odor that mediates between perception and outcomes. For example, in one study [82], those who described the offending smell in benign terms were less likely to be affected than those who said that it was obnoxious. Individuals may use perceived strength and unpleasantness of smell as a heuristic device to determine toxicity.

Classic psychological paradigms can help us understand the crucial transition from acute to chronic symptoms, and a conditioning paradigm is certainly an attractive model for explaining why symptoms seem much more likely to develop after exposures involving odors [83,84]. For example, Van den Bergh et al. [85] described an experimental paradigm where they used CO_2-enriched air (which induces unpleasant somatic symptoms) as the unconditioned stimulus; they then coupled this with an unpleasant (but benign) odor as the conditioned stimulus. Once learning has occurred, the conditioned stimulus can produce the somatic symptoms without being coupled with the unconditioned stimulus. In this way, it is suggested that any set of symptoms (whatever the cause) can become associated with the conditioned stimulus of an odor, which is then

attributed to an environmental cause. In a further experiment, it proved possible to increase the symptoms experienced by priming subjects with adverse information about chemical pollution before carrying out the experiment [86]. Classic conditioning could explain the etiology of multiple chemical sensitivity [85,87], and there are preliminary reports of successful treatment of environmental sensitivity syndromes by behavior therapy [88,89]. The absence of extinction over time and the problem of symptoms in the absence of an odor have been used to criticize the conditioning hypothesis [90] but fail to take into account modern developments in cognitive psychology that emphasize the role of conscious thoughts and beliefs.

Somatic attention and amplification. The most promising psychological theories concerning somatic symptoms come from the literature on somatic attention. It suggests that some people are more disposed to focus on or attend to bodily sensations as levels of body consciousness (and general trait neuroticism) correlate with reporting of somatic symptoms [21,91]. It is also probable that the same factors that lower the threshold for experiencing symptoms (e.g., anxiety, stress or environmental fears) also lower that for reporting symptoms.

An alternative theory of somatic amplification proposes that some individuals have an increased tendency to amplify somatic sensations, presumably by either increased awareness or increased attention on symptoms [92]. However, this concept does not distinguish between awareness of symptoms (whether such individuals actually experience more) and attention to symptoms [91]. Likewise, suggestions that those who experience more somatic symptoms have either greater sensitivity to symptoms or lower pain thresholds have received mixed support [91].

Resistance to perceived psychologization. Attributions are not neutral. The victims of a virus, toxin, or pollutant are blameless—usually described as "innocent" victims. However, if the same symptoms are instead attributed to a psychological process or psychiatric disorder, then there would be substantial blame attached by society and guilt experienced by the individual. Depressive symptoms, unlike somatic symptoms, are seen as stigmatizing and to be socially disadvantageous [93]. Issues of guilt and blame play a large part in the popularity of the new environmental syndromes [94,95]. In a situation of uncertainty, there are many compelling psychological reasons why individuals should prefer environmental explanations for their ills.

Iatrogenesis: action of professionals

The medical profession can promote somatic distress in several ways. The manner in which professionals respond to an outbreak is an important component in determining whether an acute behavioral episode is self-limiting or spreads. The response of the medical authorities and emergency services can rapidly escalate an already tense situation. In report after report, the arrival of medical and emergency services, often wearing protective clothing, breathing devices, and so on, far from calming the situation down, adds to the casualty rate [65,78,96–98]. Equally, the erroneous perception by medical staff of the presence of infective cases has been suggested to reinforce apparent epidemics for which there is subsequently limited evidence of an infectious cause [99]. Another iatrogenic mechanism is via mistaken or misleading investigations. Several epidemics have been described in which faulty laboratory procedures led to subjects believing, erroneously, that they had been poisoned. The effects of such pseudopoisoning were indistinguishable from real incidents [100,101]. Such faulty or inappropriately reported investigations also strongly reinforce epidemics [102].

Many factors influence whether an episode will be short lived or give way to a more chronic manifestation. Those affected may reject professional reassurances, particularly if psychosocial etiologies are invoked [4,98]. Sometimes, professionals themselves become personally identified with an episode [103]. In his account of the rise of clinical ecology and multiple chemical sensitivity, Shorter [104] described how the activities of a few professionals played a central role in the spread of the new concepts, often in the face of professional opposition. Gradually, however, the panoply of medical activity—meetings, journals, societies, media activities, and so on—becomes irresistible.

Response of communities

The effects on a community are often underestimated or ignored after a disaster, with a tendency for the psychological effects on individuals to take precedence when incidents are analyzed [105]. However, the changes that take place in a community can be profound, be long lasting, and have significant impact on the individuals who make up that community. For example, financial compensation from the polluter can be perceived as inequitable and communities can depopulate within an alarmingly short period [106]. Communities can be stigmatized by their neighbors [107], with very real effects on the economic health of a community or even a region [44].

What is less clear is whether a community's response to a toxic incident can in itself be problematic. Could a community's ability to mobilize itself via pressure groups, self-help groups, and litigation help in the construction of a medical model to account for symptoms, even if this is contested by the medical establishment? Is it possible that a strongly cohesive community could act to increase distress via robust social networks and thereby increase symptomatic expression? Or is it more likely that a highly cooperative and networked community (i.e., one high in social capital) would respond to an environmental incident in a way that would reduce its constituents' distress and subsequent symptoms? We suggest that social capital may

be relevant in mediating a community's health response to environmental incident, although at present there is no research to support this.

Influence of society

Conspiracy and lack of trust in authority

In the story of "Gulf War Syndrome," official misjudgments and erroneous denials of possible exposures of US forces and UK forces played a pivotal role in fuelling distrust and disbelief and fuelled a range of internet-fed conspiracy theories. Most of the well-publicized environmental incidents associated with long-term morbidity, such as the Goiania radiation incident [108], Camelford [109], and the El-Al Amsterdam air crash [110], have been associated with disbelief and distrust of authority. It is striking that in all of these incidents, the authorities trusted with providing accurate information to the victims and rescue workers were unable to do so. In the El-Al Amsterdam air crash, it was several years after the accident before rumors about a dangerous cargo began to circulate. Unfortunately, the Dutch and Israeli governments were unable to provide a complete list of the plane's cargo, and conspiracy theories further blossomed when there was no sign of the plane's black box voice recorders [110]. Once the Dutch government had lost public trust, it was virtually impossible to regain, resulting in a high-profile public inquiry and undoubtedly adding to the burden of physical and psychological symptoms experienced by the victims.

Media

Nearly all who write on this topic draw attention at some stage to the role of the media, usually in unflattering terms. Media coverage, which instinctively follows a "good story," will favor the sensational over the mundane and will emphasize risk rather than reassurance [111–113]. Examples include the reporting of Chernobyl [114], silicone breast implants [115], toxic waste [64], electromagnetic radiation [116], keyboards [117], and visual display units [117,118]. The role of the media in reinforcing outbreaks of mass psychogenic episodes is also firmly established [119,120]. To draw attention to this phenomenon is not to criticize the media but to point out the inherent bias that informs the public's perception of environmental hazard.

It is naive to expect that media coverage of possible hazards will show balance. "Many in health make the mistake of assuming journalists are natural conscripts to public health campaigns" [121]. Not so. In a study on media reporting of chronic fatigue syndrome, many health journalists specifically said that "balance does not make a good story" [122]. They admitted an explicit prosufferer and antidoctor slant, the latter persona seen as a paternalistic defender of the status quo. Media accounts of chronic fatigue syndrome tended to favor organic over psychological explanations, in contrast to the professional articles analyzed. The media has no particular mechanisms, expertise, or indeed desire to resolve differences between experts and will instead prefer to simply report both sides of a debate, irrespective of the relative scientific merit and the weight of evidence of each case. Hence, the media will inevitably favor dissent and differences rather than consensus or quality and is more likely to report negative, trust-destroying stories than ones that enhance trust [123].

Conclusion

We acknowledge that the understanding of the psychosocial effects of environmental incidents is complex but have attempted to provide a framework in which to do so. It is only with a thorough knowledge of the factors that predispose, precipitate, and maintain people's experience of symptoms that predictions can be made about the effect of environmental incidents on these. We have considered in detail the roles that the exposure itself, the individual, the involved professionals, the community, and the society as a whole play in response to an incident and how these factors may influence the maintenance of symptoms. It is hoped that the typology can be used to help guide the assessment and analysis of environmental incidents by emphasizing the importance of different levels of response after an incident. It remains the case that most research in this area focus on high-profile incidents and are of mixed methodological quality [124]. A review of the literature highlights the need for high-quality prospective research into incidents of differing toxicological impact. The relative importance of various aspects of the typology could then be assessed empirically.

The message for those confronting the management of environmental incidents is to realize that it is not only the agent itself but also the idea of the agent that is potentially harmful. In other words, agents such as chemicals, viruses, pollution, and radioactivity are damaging in themselves and contagious as ideas. Strategies are needed to successfully communicate information about risk; guidance includes the acknowledgement of scientific uncertainty, the clear use of numbers to demonstrate risk, the avoidance of jargon, and a unified approach by involved professionals [125]. Our hope is that the adoption of these techniques would result in the reduction of somatic and psychological symptoms after environmental incidents.

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