Protean nature of mass sociogenic illness
From possessed nuns to chemical and biological terrorism fears

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Background Episodes of mass sociogenic illness are becoming increasingly recognised as a significant health and social problem that is more common than is presently reported.

Aims To provide historical continuity with contemporary episodes of mass sociogenic illness in order to gain a broader transcultural and transhistorical understanding of this complex, protean phenomenon.

Method Literature survey to identify historical trends.

Results Mass sociogenic illness mirrors prominent social concerns, changing in relation to context and circumstance. Prior to 1900, reports are dominated by episodes of motor symptoms typified by dissociation, histrionics and psychomotor agitation incubated in an environment of preexisting tension. Twentieth-century reports feature anxiety symptoms that are triggered by sudden exposure to an anxiety-generating agent, most commonly an innocuous odour or food poisoning rumours. From the early 1980s to the present there has been an increasing presence of chemical and biological terrorism themes, climaxing in a sudden shift since the 11 September 2001 terrorist attacks in the USA.

Conclusions A broad understanding of the history of mass sociogenic illness and a knowledge of episode characteristics are useful in the more rapid recognition and treatment of outbreaks.

Declaration of interest None.

Mass sociogenic illness refers to the rapid spread of illness signs and symptoms affecting members of a cohesive group, originating from a nervous system disturbance involving excitation, loss or alteration of function, whereby physical complaints that are exhibited unconsciously have no corresponding organic aetiology. In the standard psychiatric nomenclature, mass sociogenic illness is subsumed under the general heading of ‘somatoform disorder’, subcategorised as ‘conversion disorder’ or ‘hysterical neurosis, conversion type’ (American Psychiatric Association, 1994).

THE MIDDLE AGES
Prior to the 20th century, most reports of mass sociogenic illness involved motor hysteria incubated by exposure to long-standing religious, academic or capitalist discipline. Between the 15th and 19th centuries, exceedingly strict Christian religious orders appeared in some European convents. Coupled with a popular belief in witches and demons, this situation triggered dozens of epidemic motor hysteria outbreaks among nuns, who were widely believed to have been demonically possessed. Episodes typically lasted months and in several instances were endured in a waxing and waning fashion for years. Histrionics and role-playing were a significant part of the syndrome. Young girls typically were coerced by elders into joining these socially isolating religious orders, practising rigid discipline in confined, all-female living quarters. Their plight included forced vows of chastity and poverty. Many endured bland near-starvation diets, repetitious prayer rituals and lengthy fasting intervals. Punishment for even minor transgression included flogging and incarceration. The hysterical fits appeared under the strictest administrators. Priests were summoned to exorcise the demons, and disliked individuals often were accused of casting spells and were banished, imprisoned or burned at the stake. Witchcraft accusations also were a way to settle social and political scores under the guise of religion and justice. These rebellious nuns used foul and blasphemous language and engaged in lewd behaviour: exposing genitalia, rubbing private parts or thrusting hips to denote mock intercourse (Calmeil, 1845; Garnier, 1845).
1895; Loredan, 1912). Community members often attended the spectacles in a daily theatre-like atmosphere while priests would try to exorcise the demons. An outbreak was recorded in the USA at an Ohio convent as recently as 1880 (Davy, 1880).

The number and descriptions of these complex episodes of demon possession in nunneries are remarkable. There are more than 100 books alone on the outbreaks at Loudun, France, between 1632 and 1634, where Father Urbain Grandier purportedly bewitched a convent into hysterical fits and was burned alive (Huxley, 1952; de Certeau, 1970). On rare occasions, nuns were executed for bewitching other members of their religious orders. In 1749, in one of the last recorded cases of its kind, abnormal movements and trance states affected the Unterzeil convent near Würzburg, Germany. Suspicions of witchcraft fell on a Sister Maria von Mossau who was beheaded (Robbins, 1966). Major convent outbreaks were recorded in Lyons in 1526, Wertet in 1530, Kintorp in 1552, Cologne and Flanders in 1560, Oderheim in 1577, Mons in 1583, Milan in 1590, Aix in 1609, Lille in 1613, Madrid in 1628, Chinon in 1640, Louviers in 1642, Auxonne in 1662 and Toulouse in 1681 (Calmeil, 1845; Madden 1857; Robbins, 1966). At Cambrai, France, in 1491 a group of nuns exhibited fits, yelped like dogs and foretold the future, and in Xante, Spain, in 1560 nuns ‘bleded like sheep, tore off their veils [and] had convulsions in church’ (Robbins, 1966: p. 393). At one French convent, ‘the nuns meowed together every day at a certain time for several hours together’ (Hecker, 1844: p. 127). During this period it was widely believed that humans could be possessed by certain animals considered to be potential demonic familiars, and in France cats were despised for this reason (Darnton, 1984), possibly explaining the ‘meowing nuns’. The recipe for these outbreaks seems to have long-standing anxiety, which engendered dissociation and hyper-suggestibility – with the content of their delusions reflecting the Zeitgeist.

In modern-day Malaysia, under similar conditions, outbreaks of motor hysteria affect adolescent Muslims sent by their parents or guardians to socially isolated all-female religious boarding schools. One episode in the remote state of Kelah affected 36 girls over a period of 5 years. Native healers (bomohs) were summoned intermittently to exorcise demons. Symptoms included crying fits, screaming, abnormal movements, possession states and histrionics. The battle with autocratic administrators climaxad in 1987 when, during an outbreak, the desperate girls took hostages at knife-point and demanded changes. No one was hurt and the girls, claiming impurity through possession, were not held legally accountable. The episode ended after an ex-Prime Minister met with the girls and oversaw their transfer to a liberal school (Bartholomew, 2000: pp. 192–193).

**THE 18th TO THE EARLY 20th CENTURY**

During the 18th, 19th and early 20th centuries and the realisation of the industrial revolution, harsh working conditions and weak or non-existent labour unions led to mass motor hysteria outbreaks in oppressive Western job settings, typically factories. Episodes were recorded in England, France, Germany, Italy and Russia and included convulsions (Franchini, 1847), abnormal movements (Bouzol, 1884) and neurological complaints (Schata low, 1819; Bekhtereff, 1914). The industrial revolution was notorious for child labour, low wages and appalling conditions. The first recorded outbreak in a job setting occurred in England at a Lancashire cotton mill in February 1787, involving violent convulsions and sensations of suffocation among one man and 23 female workers (St Clare, 1878). The episode occurred 2 years after Edmund Cartwright invented the power-loom, revolutionising the textile industry (Sirois, 1982). The absence of similar motor hysteria reports in Western countries during the second half of the 20th century may result from union gains and more rigorous occupational health and safety regulations. The disappearance of reports in the former Soviet Union may reflect the rise of anti-capitalist and, more recently, Western-type political systems (Bartholomew & Sirois, 2000).

During this same period strict academic discipline in many European schools, especially Germany, Switzerland and France, triggered outbreaks of motor hysteria involving convulsions (Armaingaud, 1879; Hagenbach, 1893), contractures (Regnard & Simon, 1887), trembling (Laquer, 1888; Wichmann, 1890) and laughing (Rembold, 1893). In 1893, a girls’ school in Basel, Switzerland, was affected by contagious shaking and convulsions involving female students who were unable to complete in-school written assignments. Symptoms subsided after school hours, relapsing only upon re-entering school grounds (Aemmer, 1893). In 1904, the same school reported a similar outbreak (Zollinger, 1906). At Gross-tinz, Germany, between 28 June and mid-October 1892, hand tremors affected the entire body and 820 victims exhibited altered consciousness and amnesia (Hirt, 1893). At a school in Chemnitz, Germany, in February 1906, arm and hand tremors in female elementary students appeared during their writing exercise hour. The symptoms began in two pupils but gradually spread to 21 females over 4 weeks (Schoedel, 1906). The pupils performed all other manual tasks normally, including gymnastics class. Electric shocks were administered to those affected, and during their writing period demanding drills in mental arithmetic were given; the symptoms ceased soon after.

Some school episodes during this period appear to have been relatively minor, short-lived and unrelated to academic discipline (Small, 1896), such as left arm paralysis in four girls at a London school in February 1907. A girl with infantile palsy of the left arm fractured her right arm. She returned to class several weeks later and ‘within a few days three children had lost the use of their left arms, and a fourth . . . had such severe pains in her left arm that she held it to the side and could not be persuaded to use it’ (Kerr, 1907: p. 32).

During the 20th century, epidemic hysteria episodes were dominated by environmental concerns over food, air and water quality, especially exaggerated or imaginary fears involving mysterious odours. Outbreaks had a rapid onset and recovery and involved anxiety hysteria. Unsubstantiated claims of strange odours and gassings were a common contemporary trigger of MSI outbreaks in schools (Philen et al., 1989; Selden, 1989; Cole, 1990; Krug, 1992; Taylor & Werbicki, 1993; Small et al., 1994). A typical incident occurred in August 1985, when 65 students and a teacher at a Singaporean secondary school were suddenly stricken with chills, headaches, nausea and breathlessness. A battery of environmental and medical tests were negative. The episode began when several pupils detected an unusual smell, and occurred amid a preexisting rumour that a gas had infiltrated the school from a nearby construction site. Investigators

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### CHEMICAL AND BIOLOGICAL WARFARE

During the 20th century, strategic concerns in the realm of warfare have included the use of biological and chemical weapons. These threats were particularly significant during the Second World War, when both sides developed and deployed such weapons.

<table>
<thead>
<tr>
<th>Event</th>
<th>Description</th>
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<tr>
<td>1939-1945</td>
<td>The Gulf War, during which chemical weapons were used, marked a significant shift in the use of such weapons. The United States and other nations developed biological weapons as a means to gain an advantage on the battlefield.</td>
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<td>1945</td>
<td>Japan's use of atomic weapons on Hiroshima and Nagasaki marked the end of World War II and the beginning of the nuclear age. This event also spurred the development of chemical and biological weapons.</td>
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<td>1973</td>
<td>The Yom Kippur War, fought between Israel and Arab nations, saw the use of chemical weapons for the first time in a modern conflict. This was a major setback for Israel and a turning point for the Arab nations.</td>
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### CHEMICAL TOXICITY

Chemical weapons can cause severe and often irreversible health effects. They are often used to create panic and confusion, which can lead to the use of other armed forces.

- **Gas:** Chlorine, phosgene, and mustard gas are the most commonly used chemical weapons. They can cause respiratory distress, skin irritation, and eye damage.
- **Agents:** Various chemical agents such as VX, sarin, and tabun are used to incapacitate or kill enemy forces.

### BIOLOGICAL WARFARE

Biological warfare is the use of biological agents to cause disease and death. These agents can be used to create panic and confusion, which can lead to the use of other armed forces.

- **Agent:** Anthrax, smallpox, and botulinum toxin are the most commonly used biological agents. They can cause severe disease and death.
- **Disease:** These agents can cause severe disease and death, and can spread rapidly through a population.

### CONCLUSION

The use of chemical and biological weapons in warfare has been a recurring theme throughout history. These weapons are effective in causing panic and confusion, which can lead to the use of other armed forces.

- **Recommendations:** It is essential to have a comprehensive plan in place to address the use of chemical and biological weapons in warfare. This includes the development of new technologies and the training of personnel to respond to such threats.
- **Future:** As technology advances, so too will the threats posed by chemical and biological weapons. It is essential to remain vigilant and prepared to respond to these threats.

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**Source:** Adapted from Michael Howard and John Moore, *Chemical and Biological Warfare: The Strategic and Biological Consequences of the Use of Chemical and Biological Weapons* (Yale University Press, 1986).
weapons are not science fiction, we are recreating the exact situations that existed in Kosovo or on the West Bank.

THE 21st CENTURY

The psychological impact of terrorism involves the overexaggerated response to a real or perceived terrorist threat. The 11 September attacks on the USA and the subsequent use of anthrax as a weapon have created a heightened state of anxiety and alertness. At a time when we are understandably preoccupied with the threat from biological and chemical terrorism, an awareness of the acute physiological disturbances that are associated with, and sometimes hard to distinguish from, that threat is more needed than ever. For instance, during the Persian Gulf war the first missile attack on Israel by Iraq was widely feared to contain chemical weapons. Although such fears were unfounded, about 40% of civilians in the immediate vicinity of the attack reported breathing problems (Carmeli et al., 1991).

The social, psychological and economic impact of mass sociogenic illness and associated anxiety may be as severe as that from confirmed attacks (Hyams et al., 2002). For instance, anthrax is not a very effective method for causing mass physical casualties, yet its mere presence can terrorise a nation and expend a high toll in human and financial resources. There have been reports of mass sociogenic illness related to such fears (Durbin & Vogt, 2001; Villanueva et al., 2001). In one incident a man sprayed a mysterious substance into a Maryland subway station, resulting in 35 persons being treated for nausea, headache and sore throats. The fluid later was identified as a relatively harmless window cleaner (Lellman, 2001). In the Los Angeles subway, a strange odour forced its temporary closure after many commuters reported feeling ill (Becerra & Malnic, 2001).

Over 2300 anthrax false alarms occurred during the first 2 weeks of October 2001 (Cable News Network special report, A. Brown, 16 October 2001), many involving sociogenic symptoms. In one case, a teacher and student reported minor forearm ‘chemical burns’ after opening a letter and discerning a powder in the air. Subsequent analysis revealed no foreign substance in the envelope (Lehman, 2001). There is a danger of responding to every incident in space suits and inadvertently amplifying psychological responses. Indeed, the US government may line the Washington, DC subway system with chemical warfare agent detectors, yet such devices tend to indicate false alarms. There were 4500 false positives in the Persian Gulf war – without a single confirmed attack. Installation of such alarms may cause disruptions to transport systems, creating more of an impact than an actual event (Wessely et al., 2001).

There is concern that after a chemical, biological or nuclear attack, public health facilities may be rapidly overwhelmed by the anxious and not just the medical and psychological casualties. Following the Brazilian ‘Goiania’ incident, where inadvertent exposure of radiation caused four deaths and several hundred casualties, about 10 000 people or 10% of the local population sought medical examinations (Petterson, 1998). Somatic symptoms are common in all populations and are more frequent under stressful conditions (Barsky & Borus, 1999). Although 39% of those exposed during the 1996 Sea Empress oil spill off Wales reported one or more symptoms, so also did 20% of the unexposed controls (Lyons et al., 1999). Uncertainty and fear after disasters commonly generate psychogenic symptoms such as hyperventilation, headache and nausea, which may be difficult to distinguish from the early stages of a chemical, biological or nuclear attack. About 4000 of a total 10 000 New York firefighters who have visited the site of the World Trade Center attacks have reported respiratory difficulties, dubbed ‘World Trade Center syndrome’. Many others who live and work near ground zero in lower Manhattan are reporting similar symptoms (shortness of breath, chest pressure and pain, coughing and general anxiety), despite the New York Health Department’s continuous monitoring of airborne contaminants by city, state and federal agencies, which continue to indicate contaminant levels below that which poses a public health threat (Price, 2001).

IS THERE A PREDISPOSITION TO MASS SOCIOCENIC ILLNESS

Scientists typically search for the causes of mass sociogenic illness by seeking abnormalities in those affected. Their conflicting and inconclusive findings are not surprising because episodes involve social realities and the consequences of beliefs. Investigators of modern-day outbreaks of mass sociogenic illness in school and job settings have used standardized personality tests to identify social, psychological and even physical characteristics, such as gender, in trying to tell why some members of the same group are affected whereas others are not. There is no consistent pattern. Thirty-five affected workers at a fish packaging plant scored higher than controls on the Eysenck Personality Inventory scale for extraversion (Smith et al., 1978), whereas 90 affected electronics assembly workers scored lower than those who were unafflicted. Goldberg associated absenteeism and mass sociogenic illness (Goldberg, 1973), but Cole (1990) did not. Some results suggest that those affected score higher on scales for paranoia (Goldberg, 1973), neuroticism (McEvedy et al., 1966; Moss & McEvedy, 1966) and hysterical traits (Knight et al., 1963), whereas others found no correlations (Olson, 1928; Olczak et al., 1971; Teoh et al., 1975; Tam et al., 1982). Gary Small and his colleagues link academic performance and becoming ill (Small et al., 1991), whereas Goh (1987) found no association. Small also correlated the death of a significant other during early childhood and being stricken with epidemic hysteria (Small & Nicholi, 1982), and yet this observation was not confirmed in another study by the same researcher (Small & Borus, 1983). Some investigators report that those affected have below-average IQs (Knight et al., 1965), whereas opposite impressions were given by others (Olson, 1928; Schuler & Parenton, 1943). It seems clear that there is no particular predisposition to mass sociogenic illness and it is a behavioural reaction that anyone can show in the right circumstances.

CONCLUSIONS

A prompt diagnosis of mass sociogenic illness is problematic because controversy often surrounds outbreaks and time is needed to analyse environmental and medical test results. It has been argued that rapidly dissipating, volatile airborne organic compounds (Black & Murray, 2000; Goode, 2000; Miller & Ashford, 2000), or a mixture of low levels of

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industrial air pollutants, coupled with incomplete environmental investigations (Faust & Brilliant, 1981), could have triggered short-lived symptoms erroneously attributed to mass sociogenic illness. Some researchers conclude that sick building syndrome is attributable, in whole or part, to polluted air (Bauer et al, 1992; Ryan & Morrow, 1992). Indeed, a cursory environmental probe leading to the diagnosis of mass sociogenic illness among a group of mostly female garment-makers in Puerto Rico was later traced to toxic fumes that had caused respiratory and degenerative diseases, and some deaths (Cruz, 1990). Hamilton concluded that ‘epidemic hysteria’ at a rayon plant in the 1930s was actually caused by carbon disulfide exposure (Hamilton, 1943). An outbreak of abdominal pain, nausea and vomiting at a British school in 1990 included classic features of mass sociogenic illness: a high female attack rate, rapid onset and recovery, hyperventilation and line of sight transmission. Tests later revealedcucumber pesticide contamination (Aldous et al, 1994).

It may be advisable to close the school or job site until negative results are returned. Closure also should assist in reducing anxiety levels, temporarily dispersing the group and limiting the potential spread of symptoms. This will allow time for investigators to determine, in depth, whether most or all of the eight characteristic features (a combination of symptoms and conditions) of mass sociogenic illness are present. These are: symptoms with no plausible organic basis; symptoms that are transient and benign; symptoms with rapid onset and recovery; occurrence in a segregated group; the presence of extraordinary anxiety; symptoms are spread via sight, sound or oral communication; this spread occurs down the age-scale, beginning in older or higher-status students; and there is a preponderance of female participants. The issue of diagnosis of mass sociogenic illness is contentious because it is often viewed as a diagnosis of exclusion. Yet mass sociogenic illness has distinct features, the confluence of which typically indicates the presence of psychogenic symptoms. Before air, food and water tests are returned, it is possible to make a preliminary diagnosis based on these eight criteria. Knowledge of the characteristic features of mass sociogenic illness, involving either motor or anxiety symptoms, appears useful in the rapid preliminary diagnosis and hence the potential treatment of outbreaks. Treatment of mass sociogenic illness involves identifying and eliminating or reducing the stress-related stimulus perceived.

No one is immune from mass sociogenic illness because humans continually construct reality and the perceived danger needs only to be plausible in order to gain acceptance within a particular group and generate anxiety. As we enter the 21st century, epidemic hysteria again will mirror the times, likely thriving on the fear and uncertainty from terrorist threats and environmental concerns. What new forms it will take and when these changes will appear are beyond our capacity to predict.

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CLINICAL IMPLICATIONS
- There has been a significant historical shift in the presentation of mass sociogenic illness.
- Anxiety-related phenomena are now more common than motor phenomena.
- Recent experiences of chemical and biological terrorism, and our general environmental fears, suggest that such episodes will remain common.

LIMITATIONS
- Literature review only.
- Secondary analysis of articles from many disciplines and cultures.
- Organic factors may have been overlooked in any single episode.

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POTENTIAL FOR MASS SOCIOGENIC ILLNESS


