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ARTICLE

Beyond 'stampedes': Towards a new psychology of crowd crush disasters

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Abstract

The Bethnal Green tube shelter disaster, in which 173 people died, is a significant event in both history and psychology. While notions of 'panic' and 'stampede' have been discredited in contemporary psychology and disaster research as explanations for crowd crushes, Bethnal Green has been put forward as the exception that proves the rule. Alternative explanations for crushing disasters focus on mismanagement and physical factors, and lack a psychology. We analysed 85 witness statements from the Bethnal Green tragedy to develop a new psychological account of crowd disasters. Contrary to the established view of the Bethnal Green disaster as caused by widespread public overreaction to the sound of rockets, our analysis suggests that public perceptions were contextually calibrated to a situation of genuine threat; that only a small minority misperceived the sound; and that therefore, this cannot account for the surge behaviour in the majority. We develop a new model, in which crowd flight behaviour in response to threat is normatively structured rather than uncontrolled, and in which crowd density combines with both limited information on obstruction and normatively expected ingress behaviour to create a crushing disaster.

KEYWORDS

crowd behaviour, crowd crush, crowd flight, stampedes

INTRODUCTION

Crowd disasters are important social, political and psychological phenomena that result in injuries, deaths, economic disruption and personal distress (de Almeida & von Schreeb, 2019; Robson, 2019). They can occur without malicious intent when large numbers of people gather (e.g. religious festivals, music festivals and sporting events).

Recent crowd disasters demonstrate the urgency of understanding these potentially deadly incidents. For example, 22 people died at a crush at a football match in Cameroon (BBC, 2022), 45 deaths occurred at a religious festival in Israel (Estrin, 2021), and 10 people died at the Astroworld music festival in Texas (Guardian, 2021). The persistence of these incidents, despite advances in crowd dynamics (Fruin, 1993; Helbing & Mukerji, 2012; Still, 2014) and the refutation of 'mass panic' psychological explanations of crowd behaviour in emergencies (Gantt & Gantt, 2012; Quarantelli, 2001), indicates a gap in our understanding. This paper addresses this gap by using archive data to analyse behaviour and experiences in the 1943 Bethnal Green tube shelter disaster, a key historical crowd event which like many such events is often characterized as a 'stampede' induced by mass panic (Clark, 2020; Skoulding, 2019).

Unpacking crowd disasters

Crowd disasters are often problematically labelled 'stampedes' (de Almeida & von Schreeb, 2019). The term conflates three things: (1) collective flight from a perceived threat, (2) collective running towards a goal (e.g. festival stage surges) and (3) crowd crushes and collapses (Alluri et al., 2017). In doing so, the term obscures the cause of deaths through inaccurate description of people's behaviour. Fruin (1993) suggests compressive asphyxiation is the cause of 'virtually all crowd [disaster] deaths' (p. 5), not running and trampling as implied by the term 'stampede'.

Furthermore, the term 'stampede' presumes a faulty animalistic crowd psychology which relieves crowd members of rational thought and controlled behaviour (Cocking, 2013). Stampedes are often explained as caused by 'mass panic' (Helbing et al., 2000; Littlejohn, 2017; Perring, 2017; Salamati & Rahimi-Movaghar, 2016). However, mass panic has been discredited as a general explanation for behaviour in emergencies (Quarantelli, 2001). First, the concept of 'panic' suggests that behaviour is an overreaction; but in an emergency, when information may be limited, it is not always clear what the criteria are for reasonable behaviour or how one can measure it (Sime, 1990). As such 'mass panic' is a decontextualized explanation that ignores subjective perceptions. Second, studies of egress behaviour in both genuine emergencies (Bartolucci et al., 2021) and false alarms (Barr et al., 2022) find that the uncontrolled competitive behaviour that 'panic' theory would predict is rare. Instead of abandoning social norms, socially structured behaviour is common (Drury, 2018; Johnson, 1988). Third, the concept of 'mass panic' suggests that supposed unreasonable fears spread uncritically through crowds, through a process of 'contagion', in line with the notion that people are more suggestible in collective settings than when alone (Le Bon, 1895/1968, see Bendersky, 2007). However, field and experimental studies both demonstrate there are group boundaries to the spread of emotions and behaviour, suggesting discrimination even for supposedly automatic responses (Reicher, 1984; Van Der Schalk et al., 2011).

Contemporary explanations of both flight and crushing disasters from outside psychology focus on physical features of the setting (e.g. narrow exits; Chertkoff & Kushigian, 1999) and mismanagement (de Almeida & von Schreeb, 2019; Still, 2014). Contemporary social-psychological research on both flight (Drury et al., 2009) and potential crush incidents (Alnabulsi & Drury, 2014; Drury et al., 2015) has largely focused only on how cooperation in the crowd has mitigated or prevented fatalities. But focusing on mismanagement in explaining fatalities or on cooperation in preventing fatalities leaves a gap in understanding the social psychology of crowd disasters, when things do go badly wrong. Without such analysis, discredited 'mass panic' accounts still fill the void. Thus despite 'mass panic' being repeatedly discredited in the social sciences (Gantt & Gantt, 2012; Quarantelli, 2001), the use of the term persists (de Almeida & von Schreeb, 2019; Haghani et al., 2019; Templeton et al., 2015). Some authors who

otherwise contribute to the critiques cite exceptional examples where 'mass panic' is given as the cause of crowd crushes (Helbing & Mukerji, 2012; Jones et al., 2006). These examples serve as 'exceptions that prove the rule', serving to maintain the notion that 'mass panic' causes crowd disasters. There is therefore a need for a new psychology of crowd crushes.

Context of the present study

The Bethnal Green underground ('tube') shelter disaster occurred on 3 March 1943 and was the worst civilian disaster in Britain during World War II. The event has also become a byword for how a 'stampede' induced by 'mass panic' can cause a crowd disaster (Clark, 2020; Skoulding, 2019). Even where the 'panic' account has been challenged (Butler, 2015; Fountain, 2012), no psychological alternative has been put in its place.

Here, we outline a timeline to help the reader with some basic facts for the event. The timeline is based upon the report from the original governmental inquiry into the disaster, known as The Dunne Report (Dunne, 1943). After the timeline, we outline the rationale for the study.

London Underground railway ('tube') stations were routinely used as air-raid shelters in the UK throughout the second world war (Merrill, 2016). When an air raid siren sounded at 20:17 on 3 March 1943, between 500 and 600 people were already in Bethnal Green underground station, the only deep underground shelter in the borough. From 20:17 to 20:27, 1500 people are estimated to have entered the shelter, with hundreds more unable to enter (Dunne, 1943). Some came directly from their homes, some came from cinemas, others arrived on buses which disgorged directly outside the shelter in short succession. This confluence created an extremely dense crowd attempting to enter the shelter.

Dunne stated 'the trouble started at 20:27 precisely' (1943, p. 12). The precision of this start point relates to the recorded firing of British anti-aircraft guns. Dunne reported that public misperception of this rocket fire as German bombs caused a crowd surge. At around the same time, a woman and child fell on the third from bottom step, on a 19-step stairway with poor lighting, uneven steps and no central handrail. This fall, at the front of a dense crowd of several hundred, caused those behind to fall in turn which obstructed further ingress to the shelter. The interlocked mass of bodies congested the stairs in such a way that extrication from neither the top nor the bottom of the stairs was possible. Despite the jam, several hundred people continued to attempt entry, and extrication of the seriously injured was not possible until 20:45 (Dunne, 1943). The crush continued for many hours, as extricating people was not complete until 23:45.

One hundred and seventy-three people died in the crush—27 men, 84 women and 62 children. A further 62 were injured and detained in hospital, 30 of whom were discharged within a week (Butler, 2015).

Following Alluri et al.'s (2017) differentiation between crowd flight and crowd crush, we consider the time from the air raid sounding (20:17) until the beginning of the crush (20:27 as cited by Dunne, 1943) to be the crowd flight stage, characterized by collective running towards perceived safety. The time from the beginning of the crush (ostensibly 20:27) until rescue efforts began to take effect (around 20:45) constitutes the crowd crush stage. This stage was characterized by dense crowds in and around the shelter entrance and involved both slow movement and surges. However, some people continued running to the shelter after the main crowd flight stage.

Despite attributing the crush largely to public misperception of the sound of British rockets, Dunne also equivocates, stating 'either as a result of this pressure from behind or by an unlucky coincidence simultaneously with the pressure reaching the people immediately behind her, a woman, said to have been holding or leading a child, fell on the third step from the bottom' (1943, p. 10). One aspect of our analysis questions the precise sequence leading to the disaster.

The tension in explanations for the disaster was evident from early on, in both Dunne's report and elsewhere. Dunne's official report proposed a psychological explanation, citing the crowd's 'loss of self-control' after the supposed misperception (1943, p. 33). Dunne also acknowledged that poor conditions in the shelter entrance (low light levels, uneven steps and lack of central handrail) contributed to the disaster, but denied that it could have been prevented by management foresight. As such, the 'psychological' explanation was given causal primacy.

However, this 'psychological' conclusion contradicted first-hand accounts (Butler, 2015), which denied that shelter users panicked. The coroner's inquest stated that deaths were not caused by a 'stampede' but by asphyxiation (Butler, 2015; Fountain, 2012). A civil court case (Baker v. Bethnal Green Corporation, 1945) found the poor shelter conditions to be a primary factor in the disaster.

Despite the rejection of 'mass panic' as an explanation, the disaster has been subject to persistent misrepresentation in both the mass media (BBC, 2016; Clark, 2020; Holmes, 2018) and academia as an exceptional stampede incident induced by 'mass panic' (Bourke, 2006; Jones et al., 2006; Merrill, 2016; Moshenska, 2010; Wessely, 2005, 2018). But if 'panic' is not the explanation for the disaster, and if explanations for crowd disasters around mismanagement lack a psychology, what *is* the psychology of the Bethnal Green disaster and similar events?

In the present study, we apply two central criticisms of 'mass panic' explanations to this 'exceptional' incident to develop an alternative framework. First, we address the criticism that 'mass panic' theory provides a decontextualized explanation, by recontextualizing the incident, in line with a range of contemporary models suggesting how a recent history of previous incidents can increase risk perceptions (Johnson & Tversky, 1983; Kilburn et al., 2011; Lichtenstein et al., 1978; Makhija & Stewart, 2002; Tversky & Kahneman, 1973; Wormwood et al., 2016), particularly when these incidents are seen as relevant to 'us' (Barr et al., 2022; Spears, 2010). We therefore explore the extent to which a changing context of genuine incidents informed people's perceptions of risk during the disaster.

Second, we address the criticism that 'mass panic' theory incorrectly claims that people abandon social norms. Crucially, there is evidence that adherence to social norms can be part of the explanation for fatalities in some instances of crowd flight; thus, Donald and Canter (1992) showed how fatalities occurred in the King's Cross underground fire largely through victims behaving in routine ways (such as using familiar exits to try to escape). We therefore explored the extent to which social norms informed flight behaviours in the Bethnal Green tube shelter disaster.

A significant factor in the persistence of the 'mass panic' explanation is the fact that no German bombs fell on Bethnal Green that night. German bombers were bombing London that night; however, the nearest bomb fell 2 miles away in a neighbouring borough (Butler, 2015). The supposed discrepancy between actual and perceived threat has been taken as evidence of mass irrationality, causing people to race impulsively for cover in the dark, resulting in the deadly crush (Jones et al., 2006). We therefore explore the extent to which misperceptions existed and consider their role in relation to fatalities.

In summary, our study asks four research questions; (1) To what extent did the context inform people's perceptions and behaviours during crowd flight? (2) To what extent did social norms inform behaviour during crowd flight? (3) To what extent were rockets misperceived as bombs and what was the significance of this in terms of fatalities? (4) What psychology was involved in the crush?

To answer these questions, we analysed participants' accounts of their perceptions and experiences using all 85 declassified transcripts from the original inquiry. We pay specific attention to evidence demonstrating the context of possible threat, (mis)perceptions of the sound and the role of social norms.

METHODS

Datasets

Several datasets were considered for the present analysis, including oral history interviews and written accounts from survivors gathered in 2013–2014 (Butler, 2015). We also considered interviewing the remaining survivors ourselves. However, considering that this data would be produced 70–80 years after an event when most survivors would have been young children, we decided to concentrate on the dataset most contemporaneous to the disaster which was the large corpus of transcripts of the original 1943 Dunne inquiry.

Our dataset comprises all 85 declassified transcripts (79 witnesses: 52 male, 26 female, one gender unknown) from the Dunne inquiry, 11–17 March 1943. The only inclusion criteria were inclusion in the Dunne

inquiry dataset of transcripts. As such, they were the most contemporaneous and detailed evidence of witnesses' experiences and behaviour available. Evidence was provided by a range of people involved with the disaster, including survivors, engineers, technical advisors, medical staff, shelter wardens, Air Raid Protection (A.R.P.) officers, managers, councillors, trade unionists and police officers. The total word count for the transcript evidence was 165,650, with an average of 1948 words per transcript.

Analytic approach and procedure

In Braun and Clarke's (2021) terms, our approach was closest to codebook approaches to thematic analysis (King & Brooks, 2018; Ritchie & Spencer, 1994). While researcher subjectivity inevitably influenced the development of themes, our approach was largely driven by a hypothetico-deductive approach that tested criticisms of and alternatives to 'mass panic' in this ostensibly exceptional incident. This constitutes a 'small q' approach to qualitative analysis (Kidder & Fine, 1987).

We scanned the original hard-copy transcripts available at The National Archives (HO 205/379). Each page was then converted to a Word document and errors corrected to enable word-search and copying and pasting. The documents were uploaded to NVivo and coded.

Our hybrid approach to coding (Rivas, 2012) involved both inductive and deductive analysis. Our selective coding approach to transcript analysis focused on particular time periods of interest: the period before people went to the shelter ('context'), the 'crowd flight' stage when people made their way to the shelter, the 'crowd crush' stage, which we defined as when people arrived at the shelter until people began to be extricated, and the 'rescue stage'. Over several iterations of splitting and merging, we developed themes from the child codes and sub-coded variations within the themes. Coding was carried out by one person, with discussion in regular meetings with the other authors to check for the reliability and coherence of themes.

We report the themes according to relevance to our research questions—for example, we were less interested in the rescue stage codes than the context, flight and crush codes so excluded them from our report. We also assessed the significance of each code by counting both the number of people who spoke about a particular code, noting their role as oversight or survivors and the number of references to the codes. This permitted us to explore variations within the themes we report. Three iterations of our codebook including the final iteration consisting of definitions of each child code are available in the OSF submission (https://osf.io/9862e/?view_only=bf2e73fc99c345b2a6822db96af44240).

Participant validation

We submitted our draft analysis to the Stairway to Heaven Memorial Trust, a group that represents survivors and families, for consultation. Two members of the group, including one of the survivors, reviewed the paper, made positive comments on our account and suggested helpful clarifications and amendments.

Ethics

Ethical approval for the study was obtained from University of Sussex's ethics committee (reference number ER/DSB24/1).

ANALYSIS

Here, we address our four research questions using key themes developed from our analysis. We illustrate the themes and variations within themes using quotes from witness transcripts (Table 1).

TABLE 1 Research questions, reported themes developed from analysis of witness transcripts and codes.

Research question	Key themes	Codes
1. To what extent did the context inform people's perceptions and behaviours during crowd flight?	Changes in German aerial bombardment tactics led to a change in shelter use	The Blitz The Lull Sudden raids
	Collective expectations of reprisal raid following British raids on Berlin	Shared expectations Attendance numbers Unfulfilled expectations
2. To what extent did social norms inform behaviour during crowd flight?	Urgent behaviour calibrated to threat signals	Precautionary principle Readiness Dynamic response
	Endurance of socially structured behaviour	Small group/family flight Arrangements to meet Helping the vulnerable
3. To what extent were rockets misperceived as bombs and what was the significance of this in terms of fatalities?	Limited and reasonable (mis) perceptions	Personal (mis)perceptions Secondary (mis)perceptions Perceptual features Novel location
	Normative nature of surges	Avoiding shrapnel Adhering to policy
	Significance of (mis)perceptions	Falling before rockets Multiple perspectives
4. What psychology was involved in the crush?	'Panic' as an effect not the cause of the crush	Crowd control attributions Shelter seekers attributions
	Underestimation of risk of crowding	Normative crowding Unimaginable disaster Absent threat communication
	Contextual sense making	Previously locked out
	Concern for others	Entering in formation Continuing attempts to enter

1. To what extent did the context inform people's perceptions and behaviours during crowd flight?

A key theme in witnesses' accounts of the role of wider context is how the *change in German aerial bombardment tactics led to a change in shelter use*.

After the 1940–1941 London blitz, a lull in German attacks saw a reduction in daily shelter use, from thousands to 200–300 in early 1943. UK Government policy responded to the lull by discouraging shelter use unless there was an attack (Mr Wilson, Councillor, HO 205/379). This policy resulted in changed shelter use. People no longer slept in the shelters (Sir Deedes, Chief Warden, HO 205/379). Rather than 'regular routine' use with gradual ingress, shelter use based on expectations of attacks meant ingress when there was an expected raid was more sudden (Mr Dunne, Inquiry Chairperson, HO 205/379), increasing congestion (Sir Deedes, Chief Warden HO 205/379). Mr Jolly affirms Dunne's summation of this change:

Q. Putting it quite generally, the method of using the shelter then has to some extent changed since the blitz because during the blitz people had formed a regular habit of being in the shelter by some specified hour, as soon as they could get there, and they came there night after night. It became a regular routine, whereas now you have to envisage the sudden desire on a large number of people to get access to the shelter.

A. Yes. (Mr Jolly, A.R.P. Controller, HO 205/379)

The second theme relevant to the role of context is that of *collective expectation of reprisal raids following British raids on Berlin*. This expectation was reported by 21 witnesses (both shelter users and shelter staff):

> the feeling in the mind of the public as the result of the recent raid on Berlin, every Tom, Dick and Harry was saying it, my wife said it, I said it I believe, we all said "we are going to get it tonight." That was said by most people
>
> (Mr JC Edwards, Councillor, HO 205/379)

That expectations of attack resulted in increased shelter use is borne out by attendance numbers. Two days before the Bethnal Green disaster, Britain launched a heavy bombing raid on Berlin. Eight hundred and fifty people used the shelter the following night, 2 March 1943 (Mr Jolly, A.R.P. Controller, HO 205/379). Comparing this to 200–300 average daily shelter users in January 1943 suggests that expectation of attack led to increased shelter use.

However, the reprisal did not come on 2 March. Instead, it came on 3 March, when 1500 people entered the shelter within 10 min of the air-raid warning (Mr Jolly, A.R.P. Controller, HO 205/379), with more unable to enter. The increased numbers of shelter seekers on 3 March suggests the unfulfilled expectation of reprisal on 2 March increased expectations of a reprisal raid and flight responses to warning signals on the 3rd, the night of the disaster.

The key point here is that the changed threat informed shelter use. Given the deaths in previous bombing raids and the recent British attack in Germany, ignoring signals of impending attack could prove extremely costly. Gaining access to life-saving shelter was extremely valuable and was affected by shared expectations of attack. Overall, the changed context arguably increased vigilance of possible signs of attack.

2. To what extent did social norms inform behaviour during crowd flight?

The calibration of likelihood of flight to realistic threat level suggested in the previous section was confirmed by witness statements outlining shelter-seeking behaviour on the night of the disaster. Most shelter seekers were at home when the warning sounded and left 'practically as soon as it was going' (Mrs Peel, Survivor, HO 205/379). Others were already on their way when the alert sounded, either as they had understood the standby warning on the radio as evidence that an alert was to be sounded (Mrs Barber, Survivor, HO 205/379) or because they would usually seek shelter around 8 pm when the shelters opened (Mr & Mrs Lawson, Survivors, HO 205/379).

Most shelter seekers reported running (e.g. Mrs A Bryant, Survivor, HO 205/379), while those that could not run hurried (Mrs Jones, Survivor, HO 205/379). Some walked the short distance between home and shelter (Mrs Brent, Survivor, HO 205/379). Others walked and then ran when they saw debris from rocket-fire dropping enroute to the shelter (Mr Johnson, Survivor, HO 205/379) or heard gunfire (Mr Myers, Survivor, HO 205/379). While there was some diversity in people's behaviour, there was a shared sense of the importance of urgency that seemed to reflect contextually relevant norms of shelter seeking calibrated to realistic threat perceptions:

> The crowd was coming along quite orderly, the same as they usually do when there is an air raid, or when a warning has gone.
>
> (Mr Johns, Survivor, HO205/379)

However, rather than selfish competition, the witness accounts suggested crowd flight was shaped by concern for others. The key theme here is the *endurance of socially structured behaviour*. Thus, the overwhelming majority of shelter seekers among the witnesses reported gathering their family members (e.g. Mr Johns, Survivor, HO 205/379) and seeking shelter together, taking care to protect vulnerable members (e.g. Mr Quorn, Survivor, HO 205/379). For example, Miss Bennet and her

mother were in a cinema closer to a different shelter. Miss Bennet reported that while most cinema patrons went to the closer shelter, she and her mother ran to Bethnal Green shelter. She explained their reasoning:

> Because we always go to the shelter when the warning goes. We always go to that shelter, and my mother was worried about my sister because she was expecting a baby this month and she was thinking more about her.
>
> (Miss Bennet, Survivor, HO 205/379)

We understand Miss Bennet's wording as illustrating the normality of actions: she 'always' went to that shelter. This was not a spur-of-the moment decision, but a tried and tested response to a mortal threat. The endurance of socially structured behaviour is evident in her mother's concern for her expectant sister. Their behaviour was socially structured, following norms that the family had established together within the context of the threat from reprisal air raids. However, given the 'wrong' choice of shelter, we cannot discount some form of dysexecutive behaviour executed automatically and without reflection, due to fear in a minority (Leach, 2012), as an alternative explanation for adherence to routine in this case.

Shelter seekers accounts overwhelmingly described urgently securing safety with loved ones. As such, our analysis suggests that crowd flight behaviour reflected social norms of socially structured, urgent, dynamic responses to contextually relevant stimuli, rather than competitive, impulsive or uncontrolled behaviour.

3. To what extent were rockets misperceived as bombs and what was the significance of this in terms of fatalities?

The key themes relevant to questions around the (mis)perceptions of British anti-aircraft rockets as German bombs refer to the *limited extent and reasonableness of misperceptions*, and *normative nature of surges*. Witness statements suggest that only a small minority misperceived anti-aircraft rockets as German bombs. Several shelter seekers reported others in the crowd misperceiving anti-aircraft rocket fire as a German bomb (Mrs Peel, Mrs A Bryant, Miss E Bryant, & Mr Nardone, Survivors, HO 205/379). However, only two witnesses reported personally misperceiving the sound as a German bomb (Mrs C Bryant & Miss Bennett, Survivors, HO 205/379). The limited extent of these misperceptions therefore cannot sufficiently explain collective behaviour across the fleeing crowd.

Others also reported novel features such as sparks and the rockets' novel location:

> this is the first time I have seen those sort of sparks coming up from the rocket guns, but they seemed to be very near as if they were in Victoria Park.
>
> (Mr Schleich, Warden, HO 205/379)

The novel perceptual features, and unexpected location, added to the ambiguity of the noise.

Many of the witnesses reported that crowd surges occurred after the rockets were fired. However, our analysis suggests that misperceptions were not necessary for surges to occur. Instead, safety-seeking surges occurred to avoid shrapnel from rocket fire.

Q. … owing to the strength of our barrage large numbers of people in the streets will be anxious to get off the streets as quickly as possible?

A. Yes, definitely. We have had several of the new barrage guntubes, the 4' 6' tube that goes up with a shell drop in the borough, several of those tubes. (Mr Jolly, A.R.P. Controller, HO 205/379)

Mr Jolly went on to state that a previous raid in January saw three anti-aircraft shells (not just guntubes) drop back to earth and explode, further endangering those who had not sought shelter. Superintendent

Hill (Police Officer, HO 205/379) reported that one anti-aircraft shell dropped half a mile from the shelter on the night of the disaster. While German bombs did not drop in the immediate area, British rockets and associated debris, did drop in the area, posing a danger to life. Indeed, Mr Johnson (Survivor, HO 205/379) reported shrapnel falling outside his house while making his way to the shelter.

Therefore, rocket fire was in itself a cause to surge towards the shelter, both because British gunfire was a reasonable guide to the proximity of German bombers and because debris from British gunfire posed a threat to people on the ground. Misperceptions were therefore unnecessary to cause people to surge towards shelter. Furthermore, it was government policy to discourage shelter seeking until an air raid was confirmed:

> It is the change of Government policy that we do not encourage them in the shelter until there is a Blitz and this may have contributed to this disaster.
>
> (Mr Wilson, Councillor, HO 205/379)

Our analysis suggests misperceptions of the noise as a threat were both limited and understandable. We now address the significance of these misperceptions to the initial fall and fatalities.

The significance of the rocket fire and surge for the initial fall and fatalities

In the enquiry, Dunne appeared to seek confirmation that a surge following rocket fire at 20:27 caused the disaster. In doing so, he discounted reports from PC Henderson, PC Hooper, PS Swindells, PC Stubbington, Sergeant Sonfield, Mr Wilson (Councillor) and Mrs Roe (Medical staff) that 'trouble' had already started within 5 min of the alert (by 20:22). These reports suggest the disaster started before the rockets were fired. Dunne's insistence on explaining the disaster according to the 20:27 start point arguably overemphasized the significance of rocket fire and downplayed other possible causal factors initiating the disaster.

Dunne (1943) reported that it was a matter of seconds between the initial fall and the staircase becoming completely congested. However, the crush continued for some time, with extrication impossible until around 20:45. Rather than one brief event with a single common experience, the crush encompassed multiple perspectives. Survivors therefore reported a variety of experiences depending on when they attempted to enter the shelter and where they were positioned. The majority of those with the prime vantage points to see the initial fall (Mrs Gerrard, Mrs Jones, & Mr Steadman, Miss Stocks, Mr Quorn, Survivors, HO 205/379) did not attribute it to a surge following rocket fire. Mr Steadman described seeing the initial fall from his viewpoint at the top of the second flight of stairs/landing. As such, he had the clearest view of the crush commencing:

Mr Steadman: All I can say, Sir is that I saw a woman fall.
Mr Dunne: Just pause there. Before she fell did you notice any sort of rush, any surge down the stairs?
Mr Steadman: No sir. (Mr Steadman, Survivor, HO 205/379)

The accounts of those within the crowd on the stairs, as the initial fall occurred, also suggest the initial fall occurred before any possible surge caused by the sound of rockets. For example, neither Mrs Hilditch (Survivor, the first casualty and last person to escape the crush) nor her daughter reported hearing any rockets before the initial fall. Misperceptions of German bombs were therefore not necessary to lead to the initial fall.

Many shelter seekers did report crowd surges following rocket fire. However, many of these witnesses reported crowd surges from outside the stairwell where they could not have witnessed the initial fall. These accounts often stated that the surges met an existing blockage again suggesting the initial fall and blockage occurred before rocket fire (Mrs Peel, Survivor, HO 205/379).

The continuous urgent ingress of the crowd into a dark uneven stairwell undoubtedly exacerbated the deadly situation. However, the evidence suggests that this did not occur because people misperceived British rockets as German bombs. Shelter policy encouraged flight towards the shelter during an air raid, regardless of any misperceptions. As such we argue that while some people did misperceive British rockets as German bombs the contribution that these misperceptions made to the fatalities was secondary rather than causal.

4. What psychology was involved in the crush?

The word 'panic' appeared several times in the witness statements. However, it was cited by 12 people with a role in crowd control or management (e.g. wardens, police officers, Air Raid Precaution officers, a councillor), but only six shelter seekers. Those with a crowd control role attributed panic to the shelter-seeking crowd but shelter seekers attributed panic to those with a crowd control role. Panic was therefore largely attributed to an outgroup, but was denied in relation to one's ingroup (cf. Fahy et al., 2012). For example, Mr Johns (Survivor, HO 205/379) suggested that the only panic was on the faces of the rescuers as they realized they could not extricate people from the crush. Another rescuer suggested that the perception that people were locked out of the shelter caused panic. Referring to his original statement to the police, PC Hooper re-evaluated his use of the term 'panic' to describe the crowd he attempted to clear at the start of the rescue operation as 'excited' concern for loved ones who were either in the shelter or in the crush:

> A. Yes sir, because they said 'My wife is down there' or 'My mother is down there' (PC Hooper, HO 205/379)

Therefore, 'panic' was described as an effect of the blockage, not a cause. If behaviour surrounding the crush was not driven by 'panic', what was the psychology?

Several witnesses reported difficulty entering the shelter as a result of the crowd gathered at the entrance. However, as Miss Bennet reported 'there has always been a little crowd of people gathered at the top of the tube since it has been a shelter' (Survivor, HO 205/379). Accordingly, this was not perceived to be a sign of danger. Many people reported the crowding at the top of the stairs as 'usual' (Mr Lawson, Survivor, HO 205/379). They were entering 'like they always do' (Mr Nardone HO 205/379). The normality of crowding at the shelter entrance was largely due to the shelter policy to discourage ingress until heavy gunfire, combined with shelter capacity, and the widespread expectation of deadly bombing raids. The shelter could accommodate 10,000 people; however, there were 50,000 in the borough (Mr Bridger, HO 205/379). Mr Jolly, the Air Raid Protection controller, reported 5000–6000 people could ingress in 15–20 minutes. Accommodating so many people in such a short period of time meant crowding was normal and not interpreted by witnesses as a sign of danger.

Furthermore, the true cause of the congestion on the stairs was almost unimaginable:

> I could see there was a crowd there, but I never imagined there was anything wrong. I just imagined there was a crowd of people going down the shelter. I did not think there was anything wrong, I could not see that far but I naturally thought the people were crowding down there and we would have to wait a little while till the crowd eased.
>
> (Mrs Ivy Brent, Survivor, HO 205/379)

Authoritative sources of information and practical help (wardens and police officers) were missing from their posts at the entrance to the shelter (Mr C Edwards, Warden, HO 205/379). Indeed, many witnesses reported animosity between shelter users and shelter management resulting from a lack of authority as well as perceptions of corruption (Mr Johns, Survivor, & Mr Gaites, Trade Unionist, HO 205/379). Therefore, shelter seekers lacked information necessary to understand the danger on the stairs.

Given the normality of crowding at the entrance and the absence of authoritative information, people made sense of the situation according to recent experiences. Eight witnesses recounted how the shelter staff had previously closed a large iron door, temporarily preventing full entry to the shelter. Mrs Rose Lewis reported the crowd using this information to make sense of the situation:

> I was standing there and there was a surge of people and people were calling out different things "Get a move on," "Hurry Up," "What has he done, shut the door?"
>
> (Mrs Lewis, Survivor and ex-warden, HO 205/379)

Perhaps, the most common theme throughout the transcripts was *people's concern for each other*. Behaviours structured by this concern for others were consistently reported in the crowd crush stage of the disaster. Families entered the shelter in formation, protecting their children (Mr Johns, Mrs Lawson, Survivors, HO 205/379). Where people did become separated, it was largely due to pressures within the dense crowd (Mrs C Bryant, Mrs Brown, Survivors, HO 205/379), rather than selfish competition.

In summary, normal, expected crowd density levels combined with both limited information on the obstruction and normatively expected ingress behaviour to create a crushing disaster. People were caught in the fatal crowd collapse and many continued moving forwards not out of a descent into panic, but rather due to the continuation of norms of shelter seeking and concern for loved ones.

DISCUSSION

The Bethnal Green underground shelter disaster of 1943 was not only a national tragedy, but has served as an emblem for the supposed dangers of 'panic' in crowds fleeing from threats. The idea that 'panic' in the crowd caused the deaths of 173 people was challenged from the outset, but the fact that alternative explanations for Bethnal Green and other crowd disasters—with their focus on mismanagement and physical features of the location (de Almeida & von Schreeb, 2019; Still, 2014)—lack a psychology has enabled the 'crowd panic' explanation to persist. This persistence has sustained a wider narrative that, while 'mass panic' is rare, it is still a genuine danger and indeed poses a greater threat than whatever people are trying to escape from.

The 'crowd panic' explanation for the Bethnal Green disaster is that local residents mistook the sound of British rockets for German bombs and therefore over-reacted; they surged to the steps of the shelter and lost behavioural control, causing the fatal crush (e.g. Clark, 2020). Our analysis problematized this account in three main ways.

First, misperception did not take place on the scale, or play the role, that is suggested in the 'panic' account. We found that some people within the crowd did indeed misperceive the British rockets as German bombs, but these misperceptions were not as unreasonable as might first appear. Many accounts suggested the rockets, or their placement, were novel, and therefore, the sound was ambiguous, increasing understandable (mis)perceptions (see also, Barr et al., 2022). As such we argue that, far from the notion of 'panic' theorists that collective threat leads to 'illusion or hallucination' (Eltinge, 1915, p. 55; Munson, 1921, p. 114), the (mis)perceptions evident in the case of a small number of people in the Bethnal Green crowd were grounded in, and proportionate to, the reality of threats posed by German bombers flying overhead.

In addition, the rockets themselves posed a danger to people below as shrapnel, splinters and rocket tubes fell back to earth. Indeed, Webb (2020) suggests as many as half of British civilian deaths were caused by British artillery rather than German bombs.

More importantly, given the evidence that only a small minority misperceived the sound, misperception cannot explain the surge of people towards the shelter. Several accounts suggested that some people shouted about their (mis)perceptions, leading others to take cover. In some cases, this reportedly led to surges towards the shelter. This suggests a role for social influence in mediating between misperceptions and collective surge behaviour. However, the overwhelming majority of witness statements

suggest that most people were already following contextually relevant norms of seeking shelter, rather than simply responding to these shouts.

Moreover, our analysis suggests that in the fleeing crowd as a whole, not just in the minority misperceiving British rockets as German bombs, perceptions and behaviours were contextually calibrated to a situation of genuine threat, rather than disproportionately anxious. The wider context of World War II made the threat of deadly bombing raids plausible. The disaster occurred during a period of reprisal raids, after a lull. A raid was expected, and this context led to a widespread reasonable belief among people in Bethnal Green that they would suffer a deadly reprisal raid. No bombs fell in Bethnal Green on 3rd March, but bombs were dropped just 2 miles away. The general pattern of reprisal raids and shelter policy required increased public vigilance and urgent shelter seeking, rather than routine, non-urgent shelter seeking.

Furthermore, the likelihood of a serious bombing raid increased the perceived costs of inaction. The deadly potential of not seeking shelter urgently during a bombing raid was clear to Bethnal Green residents, not least because of the January raid on London. Perceptions of risk reflected a genuine threat, and it is difficult to argue that they were an overreaction.

The second way that our evidence problematizes the 'panic' explanation is in terms of what people did when faced with the perceived threat. Our evidence suggests that behaviour was driven by social norms and relationships, rather than being uncontrolled (see also, Drury, 2018). Safety seeking was encouraged by authorities. The shared nature of the expectation of a bombing raid is likely to have added further weight to individual expectations, contributing to many people attempting to access the shelter in a short period of time. Norms of protecting the vulnerable, especially within family bonds, were also evident in witnesses' accounts of their flight behaviour. We found one apparent deviant case of a woman running for the shelter ahead of her husband and baby; however, this woman appears to have been pregnant and her early departure was understood to be a function of more limited mobility. She did not abandon her family—rather she was motivated by concern for her unborn child. Another possible deviant case was noted in Mrs Brent's account of a police officer stating 'every man for himself'. However, considering he was endangering his life to help others, we do not view this as evidence of selfish behaviour.

Crucially, the evidence suggests that public behaviour on the shelter steps was a continuation of that in the flight phase before people got to the shelter entrance. Rather than a qualitatively different psychological process of 'panic' explaining the exceptional tragedy, what stands out instead is both the ordinariness of the conditions and the continuity of the psychology: the crowdedness was expected, and people's behaviour was not uncontrolled but rather was shaped by shared expectations of the requirement to get into the shelter, plus concerns for loved ones. In the witness statements, references to 'panic' were a way of expressing alarm at the outcome of events, not a process causing them.

The third way that our evidence problematizes the 'panic' explanation for the Bethnal Green disaster is by suggesting that evidence for a causal link between the surge and the fall on the steps is weak. Those who were best placed to witness the initial fall denied any causal role for misperceptions or indeed surges. Those that misperceived rockets as bombs and complained of surges arrived at the shelter later were further from the entrance, and could not see the effect of any surge at the bottom of the stairway. We do not deny that surges took place, exacerbating the deadly situation on the stairwell, but it is unlikely they played the initial causal role implied by 'mass panic' explanations.

Towards a new psychology of crowd disasters

Our analysis is not simply a refutation of the 'panic' account of Bethnal Green, but in addition suggests an alternative psychological explanation for this event and in turn for other crowd crush disasters. In doing so, it combines existing psychological concepts with situational factors to suggest the basis of a novel model.

In the first place, research on behaviour in emergencies has demonstrated a clear pattern, whereby people often underestimate risk and disregard possible signals of danger (e.g. Atwood & Major, 2000; Kinsey et al., 2019; Tierney et al., 2001). However, in a context of recent genuine threat incidents, as in the Bethnal Green situation, people may come to believe they are *more* likely to encounter threats (e.g. Johnson & Tversky, 1983) and increase their level of vigilance, leading in some cases to 'false positives' (Wormwood et al., 2016), as happened for some of the shelter seekers. Our analysis is in line with this account, but suggests in addition that perceptions of risk in the context of collective attacks are not simply a matter of individual cognitive appraisals but are also a function of the relevance of the possible attack for 'us', (Barr et al., 2022; Spears, 2010), in this case the people in Bethnal Green. At Bethnal Green, the evidence of knowledge of reprisals and local vulnerability indicates the importance of local self-relevance for shelter seekers' judgements about risk.

Our analysis of flight behaviour at Bethnal Green is in line with previous research showing that flight in emergencies is typically structured by social norms (Johnson, 1988) and existing social relations (Feinberg & Johnson, 2001; Sime, 1983). Norms around the appropriateness of sheltering and the safety of loved ones help explain urgency. While it is certainly not new to suggest that social norms and social relations rather than mindless 'panic' shape flight behaviour in conditions of threat, what is new in the present analysis is an account of how these same psychological processes were operating as the crush happened. Just as Donald and Canter (1992) demonstrated how in an evacuation adherence to social norms (exit choice) in conjunction with limited information can lead to fatalities, we propose that normative flight behaviours combined with mismanagement can account for many crowd crush disasters.

Previous accounts from outside psychology of the causes of crowd disasters suggest that dangerous density is a function of failures of crowd safety management (e.g. Fruin, 1993; Helbing & Mukerji, 2012). We suggest there were the other key causal factors explaining the disaster at Bethnal Green. Our analysis is consistent with previous accounts of the causal role of the poor conditions of the stairway (Baker v. Bethnal Green Corporation, 1945), particularly the lack of central handrail, lack of light and uneven steps. Perhaps even more importantly, the wardens supposedly supervising entry were absent. There was no way of authoritatively communicating about issues on the stairway. As such, people entered a dark uneven stairway unaware of the unfolding crush they were unintentionally adding to.

In summary, therefore, we suggest that it is the combination of density with limited information on obstruction and normatively expected ingress behaviour that can lead to fatalities. Our analysis suggests potential components in a psychological model that should be tested in future research. This potential model is represented graphically in Figure 1 below. The behaviour of the crowd in moving and ultimately falling forward in a crowd collapse did not need to be driven by loss of control; it was simply a function of normatively expected ingress and concern to stay close to loved ones. In a context of high density and dangerous conditions, this normal behaviour was sufficient for the disaster (Figure 1).

Strengths and weaknesses

Well-known and recent crowd disasters—the Who concert crush 1979, Hillsborough 1989, Love Parade 2010, Hajj 2015, Astroworld 2021 and the 2022 Nigerian stadium crush (News Wires, 2022)—testify to the continued importance of the present research. Some may question the relevance of a World War II sheltering incident. However, the recent example of people sheltering in tube stations in Ukraine (Yaffa, 2022) demonstrates its contemporary significance.

It is important to acknowledge that our analysis suggests components for developing a psychological model for a particular type of crush disaster—'flight crush' disasters—where fleeing crowds are obstructed and crushing develops (Guardian, 2022). As such, the model may be limited in explaining psychological processes at work in other types of crush with different dynamics such as static or slow-moving crushes—for example, the 2015 Hajj disaster (Templeton & Drury, 2015)—or ingress crush disasters (e.g. the 2021 Astroworld disaster, [Guardian, 2021])—where flight is absent.

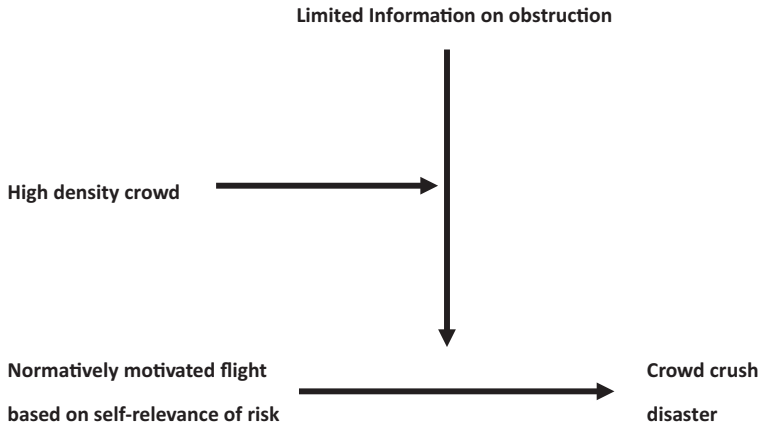

FIGURE 1 A psychological model of crowd crush disasters following flight.

An advantage of the present analysis is that it for the first time links contemporary social psychology theory to events that till now had been best understood in terms of failures of crowd safety management. This broadens the scope and relevance of social psychology, properly connecting the subdiscipline with phenomena that heretofore lacked a proper psychology, and introduces crowd safety professionals to the usefulness of this approach (see also Drury et al., 2015).

In terms of evidence, a strength of this paper is the use of a large corpus of original witness statements given to the Dunne inquiry in 1943. This has enabled an analysis that represents the experiences of those who were there at the time, with proximity to the event limiting the inevitable effects of memory distortions of an event that took place almost 80 years ago.

A further benefit of the present research is that it has served to make accessible and searchable versions of the witness statements publicly available for the first time, which means that future researchers can replicate this study or use the dataset to investigate other questions. For example, the archive could be used to investigate the psychology of the 'Blitz spirit', behaviour in the rescue effort, or the relationship between the authorities and the local community.

However, the reliance on original witness statements is also a limitation. It meant we had to rely on only the witnesses that were called by the Dunne inquiry. In addition to limiting the sample of statements analysed, it also limited the questions asked, which were for the purposes of legal enquiry, not for academic research. Moreover, like other studies of disasters, we did not have access to the experiences of those who died in the event. The fact that witnesses were speaking in a legal context means that they would have been orienting to issues of blame and defence, rather than simply reporting experiences and observations. Finally, this case study reporting an absence of 'panic' does not in itself falsify the 'mass panic' concept; there could still be counter-examples, given further observations (Popper, 1959).

Future research and recommendations

Our analysis suggests that social influence may have operated between the signals of a threat and what people did, but we did not have the data to examine this. Future research should examine ostensible emergencies in the present day, interviewing participants directly, to address this and other questions.

Further research could also broaden methodological approaches to include analysis of real-life behaviour from CCTV footage (see Philpot & Levine, 2022) or indeed fieldwork and virtual reality

experiments. Crushing disasters and other emergency events are inherently difficult to study, and ideally should be approached using a combination of data sources and methods.

Our approach allows us to make practical recommendations. Some of the recommendations that flow from the present analysis have been made before—for example that emergency planners and crowd safety managers should be familiar with the identities and norms of the community in question, that they should communicate with them to understand their needs, and they should try to build connections with them so that the community understand their advice and guidance as self-relevant (Drury et al., 2019). In addition, however, there is an acute need to understand and prevent crushing-type disasters. As Fruin (1993, p. 4) stated, 'Most crowd incidents exhibit a lack of front to back communication. People in the rear of the crowd press forward while those in front experience severe distress'. This basic physical–psychological condition of crowds means that those who are immersed in one part of a crowd cannot know unaided what the situation is in other parts of the crowd. It is the responsibility of those managing the event or the venue to monitor and limit numbers in a space to a safe level, and to communicate with the back of the crowd, not just the front, when density is becoming too great. Furthermore, information from the authorities becomes effective communication when there is trust with the public, and this needs to be a fundamental to emergency preparedness, not an add-on.

CONCLUSION

Our analysis of this supposedly exceptional crowd disaster where 'mass panic' was ostensibly responsible for the deaths of 173 people suggests that the psychology of the incident was far from exceptional. Rather than a loss of control, people acted reasonably according to social norms established in a context that required urgent action under circumstances with limited information. Misperceptions were not as widespread as previously implied. Where they did occur, they were largely reasonable and had a limited impact upon the disaster.

Multiple sources of crowd management failures were identified. These failures contributed to a context in which a crowd found themselves in mortal danger while seeking shelter from a bombing raid. This did not occur as a result of a pathological crowd psychology, but out of expected behaviours to urgently seek safety for themselves and their loved ones, under conditions of limited information, in a shelter unsuited to the urgent ingress of thousands of people in a short period of time.

AUTHOR CONTRIBUTIONS

Dermot Barr: Conceptualization; formal analysis; investigation; methodology; writing – original draft. **John Drury:** Conceptualization; funding acquisition; project administration; supervision; writing – review and editing. **Toby Butler:** Conceptualization; resources; writing – review and editing. **Sanjeedah Choudhury:** Data curation; visualization. **Fergus Neville:** Writing – review and editing.

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CONFLICT OF INTEREST STATEMENT

None to declare.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are openly available in the Open Science Foundation repository https://osf.io/9862e/?view_only=35bd8d4ef83d4835827128946d868e6c. Original records are available in the UK National Archives (HO 205/379).

OPEN RESEARCH BADGES

This article has earned an Open Data badge for making publicly available the digitally-shareable data necessary to reproduce the reported results. The data is available at https://osf.io/9862e/?view_only=35bd8d4ef83d4835827128946d868e6c.

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