



Rail Safety & Standards Board

Research into the health and safety effects of crowding – a presentation to the RIAC public meeting - 2 November 2005.

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Health and safety effects of crowding



Background

For some time there has been a concern about crowding on stations and trains on the national rail network and the underground. The House of Commons Transport Select Committee reported on this issue in its 2002-3 session. In 2004 the Rail Safety and Standards Board (RSSB), the Rail Passenger Council (RPC) and the Corporation of London commissioned a research study to examine the health and safety effects of crowding. The first phase was to carry out a hazard identification study.



Aim of the research

- To establish an understanding of the health and safety issues that may arise as a result of crowding on main line and underground railways.
- Crowding both on trains and at stations was considered.
- A detailed information review was undertaken, including
 - an examination of available literature
 - analysis of various accident and incident records held by the industry and the safety regulator
 - a review of a range of Railway Safety Cases

Main findings - 1

This research was carried out by the Health and Safety Laboratory (HSL) after a full two-stage competitive tender process.

The literature review

- uncovered a number of studies from a variety of settings.
- found some crowding-related incidents in the incident databases examined.



Health and safety effects of crowding

Main findings - 2

It proved very difficult to provide a useful strict definition of crowding and overcrowding in terms of health and safety. Suggestions were:

	Industry	Passengers	RMT	HMRI	SRA
Intercity (long journeys)	Cannot shut the door	No spare seats	Flow of people restricted	Potential for harm as a result of the number of people	No spare seats
Commuter (short journeys)		No handholds or standing for >10-20 minutes			Standing passengers having less than 0.55m ² of space each
Stations	Standing the wrong side of the yellow line	Being shoved and pushed			



Health and safety effects of crowding

Parallel study into crowd management

At the same time we were working on a study into managing large events and perturbations at stations. This was undertaken by Davis Associates:

- This study collated details of all catastrophic crowding events world-wide since 1940, both in the transport and other sectors
- Produced further definitions of crowding which may help to understand the issues more fully
- One is a classic written definition, and the other a more visual representation which can be used to brief staff about what to expect
- We have produced a booklet on this work, copies of which are available this evening



Definition of crowding – 1

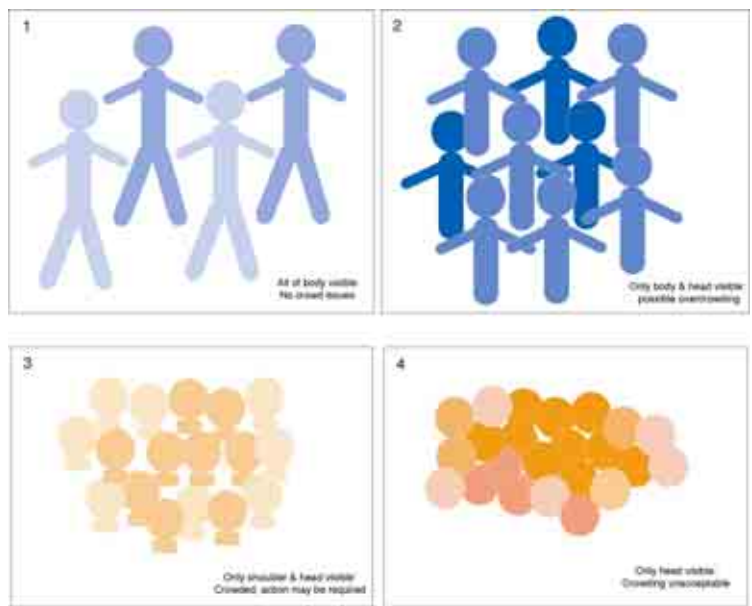
The objective elements include density and the available space, whereas the subjective elements include a perception of both the available space and the number of people present. Ideally a definition would include both elements.

Ref: *'Managing large events and perturbations at stations'*
Davis Associates / RSSB 2004



Definition of crowding - 2

Ref: - *'Managing large events and perturbations at stations'*





Main findings – 3

As part of the crowding study, crowding-related hazardous events were identified and ranked in terms of a qualitative estimation of risk.

Views came from

- An industry workshop
- A wide range of stakeholder groups

Overall health and safety effects identified from the evidence could be categorised under eight groupings, and these were ranked qualitatively.



Main findings - 4

- No significant omissions in the hazard identification were identified by any of the stakeholder groups.
- The top hazard groups which were identified and ranked were:

Hazard group	Rank
Slips, trips or falls in station area	1
Ill health	2
Assaults	3
Platform train interface	4
Evacuation	5
On train incidents	6
Other station area accidents	7
Train accidents	8

Main findings – 5

Quantified or semi-quantified crowding risk assessment?

- It was found that there is currently insufficient data to be able to carry out a meaningful quantified risk assessment for crowding.

Overall, crowding was found to be a factor in a number of hazards.

- However in context with the risk from other non-crowding related hazards on the railway, the risk associated with crowding is small.

However, the perception of risk from crowding appears higher, among the public and rail users

Main findings – 6

• As part of the T161 project, an extensive review of accidents involving crowds at buildings worldwide was carried out. Only two of the 36 cases from 1943 to 2004 involved transport infrastructure as such. They were:

- The 1943 Bethnal Green air raid shelter (173 dead) which happened to be at an underground station not in 'normal' use
- The 1999 Minsk accident where 2500 people fled from a hailstorm into a metro station and 53 people died on wet polished marble stairs.
- The absence, to date, of such events in 'normal' railway operations does not mean that the industry can be complacent

Recommendations - 1

•Management issues:

- How crowding is defined by the industry should be examined and developed to ensure consistency across the industry.
- The effectiveness of 'normal' risk control measures in a crowded environment should be examined.
- Incident recording of crowding related events should be examined, in particular the way they are recorded, to improve data accuracy.
- It should be considered whether a similar guide to the stations management leaflet should be produced for the management of on-train crowding.
- A review of how industry plans for, and becomes aware of special events should be carried out. Development of good practice guidance should be considered and measures that shift the risk should be examined.

Recommendations - 2

•Management issues

- Consideration should also be given to ways of encouraging passengers to utilise the current capacity better.

•Research issues

- All aspects of the management of and issues surrounding on-train crowding should be examined.
- Other than fainting, very little direct evidence of any health effects from crowding was found.
- No evidence was found in this work to suggest that crowding increases risk.

Next steps – future research

- We have drawn up a remit for a research study into crowding on trains – we would be interested to hear your views before we finalise this in mid November:
 - Evaluating techniques, including modelling and contingency planning, for managing crowded trains as a result of service disruption, local events or the sheer weight of rush hour traffic.
 - Research will be designed to examine incident recording of crowding related events, in particular how they are classified, to improve data, prepare the ground for recommended actions and gauge their effectiveness.

Next steps – future research details 1

- Building on the results of previous research, we will further examine how crowding is defined by the industry (particularly in the on-train environment) to ensure consistency
- Triggers for recognition of on-train crowding need to be further developed or refined.
- The effectiveness of 'normal' risk control measures in a crowded environment will be examined. In particular, many of the measures for safety risk may not be as effective in a crowded environment. For example, contrast on step edges or warning signs may not be visible or audible warnings may not easily be heard.
- Investigating issues of passenger comfort – including space, temperature and humidity

Next steps – future research details 2

- Incident recording of crowding related events will be examined, in particular its classification, to improve data accuracy. Complaints data will also be examined as this is a potential form of near miss reporting.
- A further review of how industry plans for, and becomes aware of special events will be carried out. This will examine the communication between all relevant parties and should include how possessions are planned and whether the possibility of special events is considered in this. Development of good practice guidance will be considered.

Next steps – future research details 3

- Many crowding measures employed appear to shift the risk to a different location, different operator or different transport system, rather than necessarily giving a net reduction in risk. Therefore the impact of crowding controls, such as preventing passengers boarding a crowded train, will be further examined.
- Under-utilisation of the space available on trains was identified as an issue across the network. This can result in parts of a carriage or certain carriages being crowded but with capacity elsewhere. Consideration will be given to ways of encouraging passengers to utilise the current capacity better.

Next steps – future research details 4

- Other than fainting, very little direct evidence of any health effects from crowding has so far been found. However, this is perceived to be a major issue by many stakeholders. Therefore, a detailed study focussing on health effects, whether physical or psychological, will be considered – if it is practical to obtain data.
- We are also scoping a separate but complementary piece of research into how the industry should manage the problem of trains stopped by break-down or other events, and where the ambient temperature is excessive. We have already had fruitful discussions with the Underground about their own work in this area, and will need to take into account the rise in the number of air-conditioned, sealed trains. We have already made contact with the Meteorological Office on the possible impact of climate change.

To summarise

- We have done two useful pieces of work on crowding and crowd management and will soon start research on train crowding and train temperatures. Your comments on the proposed remits would be welcomed – by November 14 please, to michael.woods@rssb.co.uk.
- Details of our work is available on our website www.rssb.co.uk, or you can have a free subscription to our e-newsletter: full details are on the website or in the packs on our stand here today
- We are more than happy to answer your questions about our research but the issue of why trains get crowded, problems at particular locations or routes and how to better match capacity to demand, is a matter for train operators, the network manager, regulators and funders!

The logo for the Rail Safety & Standards Board is positioned at the top of the page. It features a large, faint circular graphic on the left composed of light blue and grey dots. To the right of this is a smaller, more vibrant graphic consisting of a semi-circle of green dots, a solid dark blue circle, and several other green circles of varying sizes.

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