



Passenger risk at the platform-train interface

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Executive summary

Introduction

The platform-train interface (PTI) gives rise to a risk unique to rail transport. This risk forms a significant proportion of the total risk faced by rail passengers, especially fatality risk.

Mindful of an increase in the number of accidents since 2005, the Operations Focus Group requested that RSSB undertake analysis into accidents occurring to passengers at the PTI.

PTI accidents are categorised in two distinct ways: Accidents occurring while boarding or alighting trains; or accidents occurring at the platform edge not during boarding or alighting.

Headlines

- PTI risk accounts for the largest proportion (38%) of passenger fatality risk. Accidents during boarding or alighting account for 9% of the fatality risk, while other accidents at the platform-train interface account for 29%; this is biggest single contributor to passenger fatality risk.
- PTI risk accounts for 20% of the total passenger risk as measured by fatalities and weighted injuries (FWI). Of this, 12% (6.4 FWI) occurs while getting on or off trains, and 8% (4.6 FWI) occurs while not boarding or alighting. Slips, trips and falls in other areas of the station account for the largest proportion of passenger FWI risk, at 46% (25.3 FWI). The total passenger risk is 54.4 FWI.
- There has been an increase in the number of accidents at the PTI since 2005/06, even when accounting for the increase seen in passenger journeys until 2009/10.
- There are many factors which affect the occurrence of accidents at the PTI. These factors overlap, making up a complex list of criteria that contribute to the accident rate.
 - There is a gender imbalance in the passengers involved in accidents at the PTI. This imbalance is different, depending on whether the passenger is boarding/alighting (where more females are involved, possibly due to footwear or propensity to report the accident), or not boarding/alighting (where more males are involved).
 - Intoxication has a large effect on the occurrence of accidents at the PTI, especially when the passenger is not boarding or alighting. The statistics indicate that males appear to have a generally higher level of risk from PTI accidents not due to boarding or alighting, even after taking into account that they are involved in more alcohol-related incidents overall.
 - Accident rates are higher during off-peak periods of the day or week. There is also a higher rate of accidents in summer. It is possible that there is an increased proportion of passengers travelling at these times who are less frequent users of the railway, such as tourists and other leisure travellers, and who are therefore less familiar with the unique risks associated with it.
 - The weather appears to have an effect on accidents while boarding or alighting, with a higher rate of accidents seen when the weather is wet and icy compared to when it is dry and not icy.
 - The harm from alighting accidents is high; they account for more than twice the harm of boarding accidents.

- There is much variation in accident rates between station and train operators, as well as individual stations and unit classes involved in accidents at the PTI.
- There is also variation in the types of accidents seen by passengers using trains with different door mechanisms.

Risk at the PTI is not limited to passengers. Members of the public, visiting stations for reasons other than travel (eg shopping, socialising, or meeting/seeing off passengers) are also affected by PTI-related risk.

RSSB's research continues in this area; the final results will be presented to the Operations Focus Group during 2011.

The rail industry is also taking steps to deal with these issues, including improving platform markings, implementing a slip, trip and fall toolkit, risk-assessing train dispatch plans, and fixing reflective strips to door edges and handles to increase visibility.

In addition, RED 28 focuses on the PTI issue, by featuring a dramatisation of an incident and suggestions to station operators on how to minimise the hazards.

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1 Introduction

1.1 Purpose

The platform-train interface (PTI) gives rise to a risk unique to rail transport. This risk forms a significant proportion of the total risk faced by rail passengers, especially fatality risk. Over the last few years, the number of accidents of this type has increased at greater rate than the number of passenger journeys. This has given cause for concern and so the Operations Focus Group (OFG) requested that RSSB undertake a special topic report into the possible factors causing accidents at the PTI. A greater understanding of the causal factors involved will provide the rail industry with the knowledge to help prevent some of these accidents, and to mitigate the consequences when they do occur.

The main factors on which the report focuses are the effects of time (including the time of day, week or year) and its effect on passengers, as well as the type of passengers involved. Other factors that are investigated include the weather conditions, the type of station and its operator, and the type of train and its operator.

1.2 Report scope

The report covers accidents occurring to passengers at the PTI. PTI accidents are categorised in two distinct ways:

- Accidents occurring while boarding or alighting trains (PTI (BA)).
- Accidents occurring at the platform edge not during boarding or alighting (PTI (not BA)).

The first category covers any injury to a passenger that happens while they are getting off or on a train. The second category covers all other events of passengers coming into contact with trains due to being too close to the platform edge, or falling from the platform. It includes incidents of persons falling onto the track and being subsequently struck by a train entering or leaving the station, and incidents where no train is present.

PTI accidents are distinguished from other slips, trips and falls around the station. To be a PTI-related injury, the incident must result in the passenger wholly or partially crossing the boundary between the platform and the track, or the platform and the train (if present).

1.3 Data

Unless otherwise stated, the data used in the report comes from the industry's Safety Management Information System (SMIS).

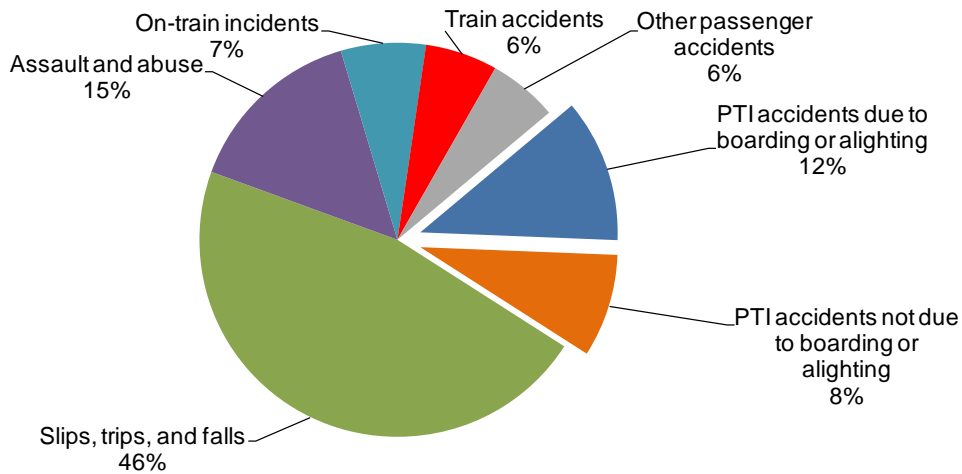
RSSB bases its safety performance analyses on the latest and most accurate information available at the time of production. We also continually update and revise previous years' data in the light of any new information. The data cut-off date for this report was 30 September 2010 for SMIS data.

2 Platform-train interface risk

2.1 Platform-train interface risk in context

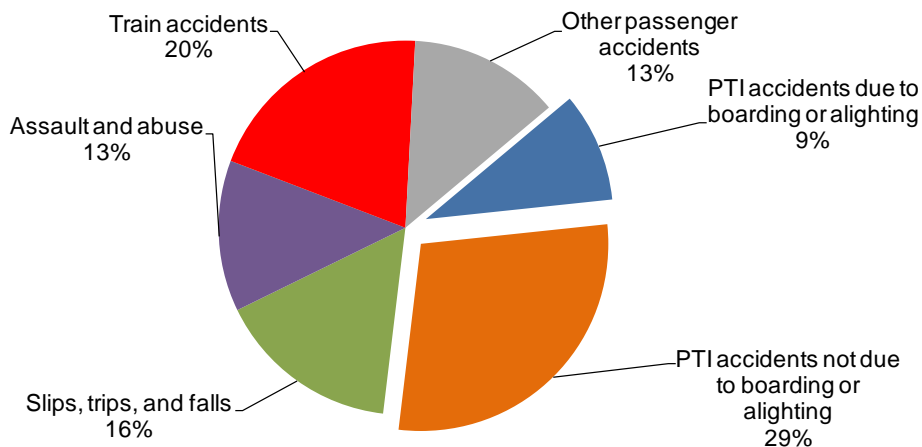
The passenger risk profile comprises accidents with a wide range of causes. While many types of risk are common with other public areas – eg slips, trips and falls, assault, bumping into other people or objects – some are specific to the railway. These include train accidents, accidents while getting on or off trains, and other accidents at the platform edge.

Chart 1. Passenger FWI risk by accident type: 54.4 FWI per year



Source: SRM v6

Chart 2. Passenger fatality risk by accident type: 11.3 fatalities per year

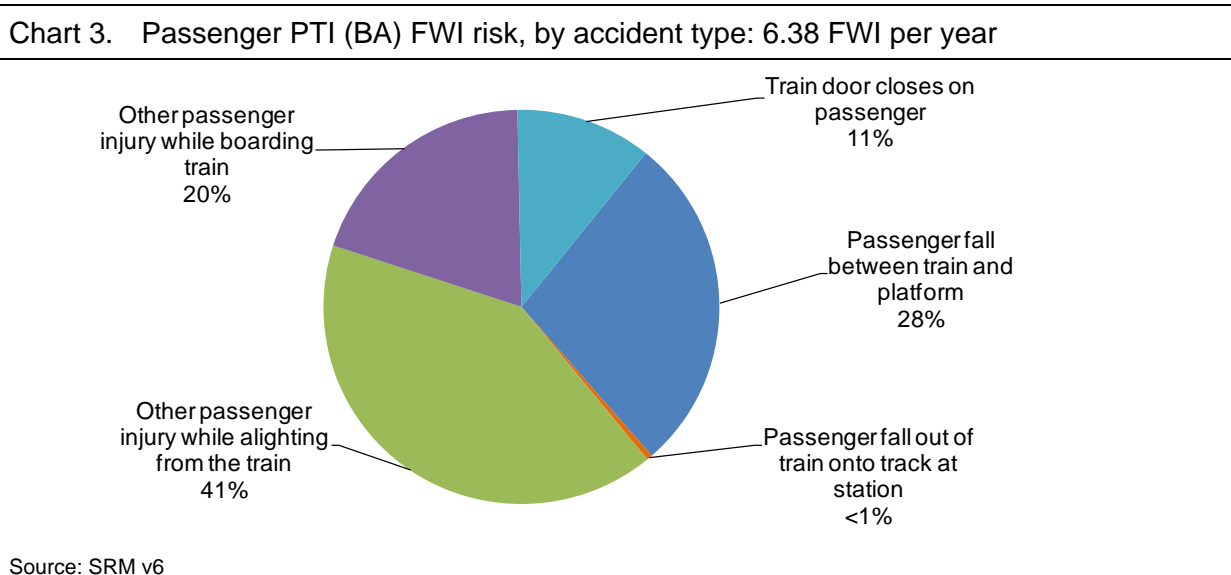


Source: SRM v6

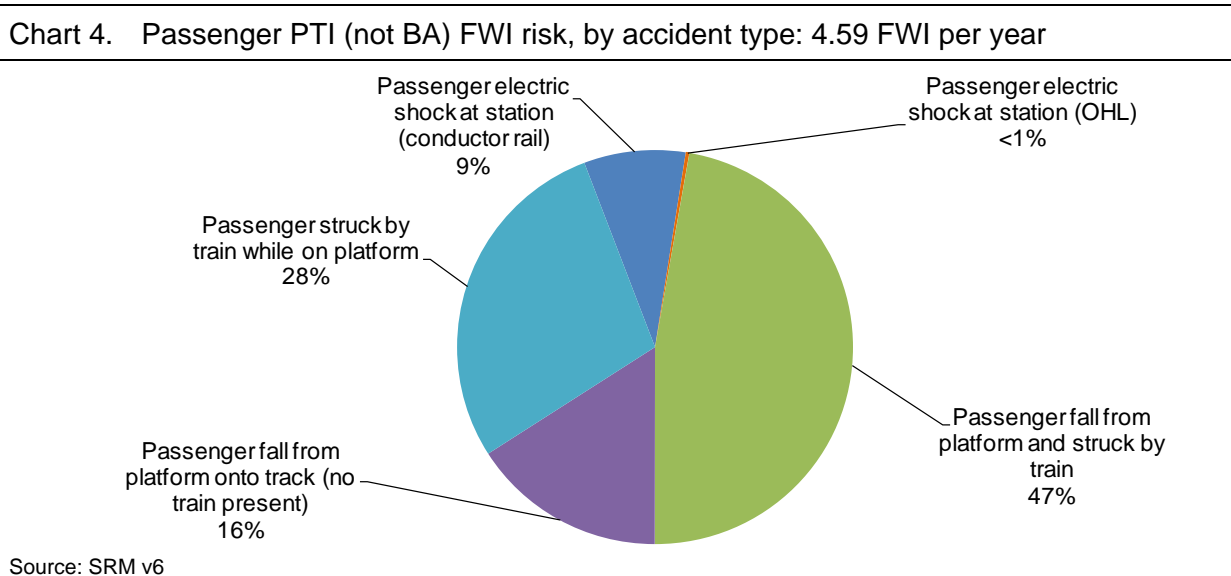
- Slips, trips and falls in stations account for the largest proportion of passenger FWI risk, at 46%. Passenger PTI accounts for the next largest proportion, at 20%. Of this, 12% occurs while getting on or off trains, and 8% occurs while not boarding or alighting.
- PTI risk accounts for the largest proportion of passenger fatality risk. Accidents during boarding or alighting account for 9% of the fatality risk, while other accidents at the platform train interface account for 29%; this is biggest single contributor to passenger fatality risk.

2.2 Hazardous events at the platform-train interface

The types of accidents that make up accidents at the PTI have varying consequences in terms of risk. These accident types are classified into hazardous events and are illustrated in the charts below.



- Nearly one-third of the PTI (BA) risk to passengers results from injuries involving some part of the passenger falling between the train and the platform; 11% of the risk occurs when the passenger comes into contact with the external doors. Other injuries while alighting from the train account for more than double the risk than other injuries while boarding the train.



- Most of the PTI (not BA) risk to passengers involves being struck by a train, either while standing too close to the platform edge or after falling onto the track. This explains the high fatality risk. Furthermore, the extended height of a fall on to the track, and the possibility of contact with the conductor rail on some parts of the network, will increase the probability of fatal consequences.

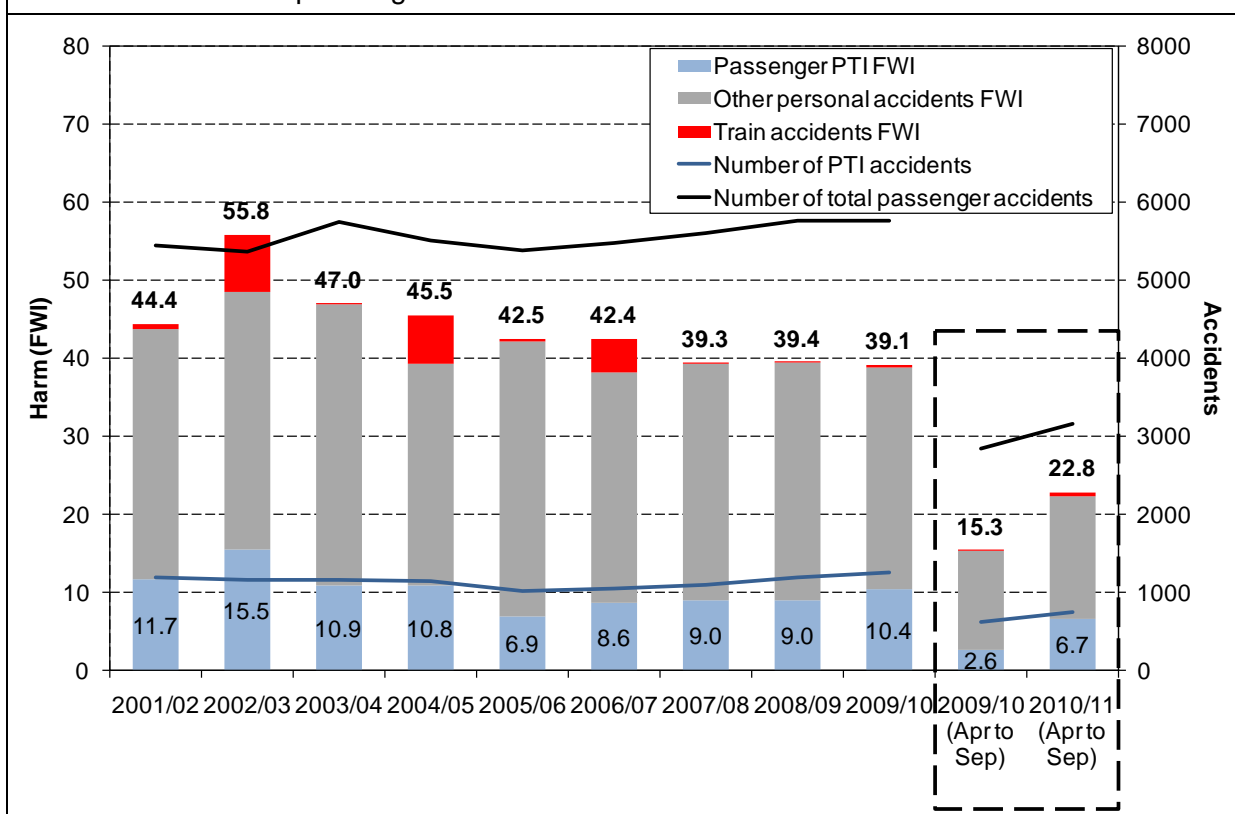
Platform-train interface risk

2.3 Trends in passenger harm at the platform train interface

2.3.1 Absolute trends

To look at how trends in passenger harm at the PTI have developed, they have been set in the context of overall trends in passenger harm. In the following chart, passenger FWI at the PTI is shown in blue, with other passenger personal accidents (ie those not occurring as a result of train accidents) shown in grey. The contribution from train accidents is shown in red. Also shown are the associated numbers of accidents for both PTI-related events and total events. The data is not normalised.

Chart 5. Trends in passenger FWI – overall and at the PTI



- Over the period 2002/03 to 2007/08, the total level of passenger FWI showed a reducing trend; since 2007/08 levels have stabilised.
- PTI-related FWI fell over the period 2002/03 to 2005/06, since when it has been rising.
- Since 2005/06, both the total number of reported accidents and the number that are PTI-related have been rising.

2.3.2 Normalised trends

Over the past decade, there has been a marked increase in the number of passenger journeys. The number peaked in 2008/09, which was 33% higher than in 2001/02. A fall occurred in 2009/10, due to the recent economic downturn, but more recently a growing trend has been seen once more.

The more people travel, the more injuries might be expected, all other things remaining constant. It is therefore useful to normalise accident data by usage, so that the real magnitude of any improvements (or deteriorations) can be seen. For accidents at the PTI, passenger journeys are a good normaliser.

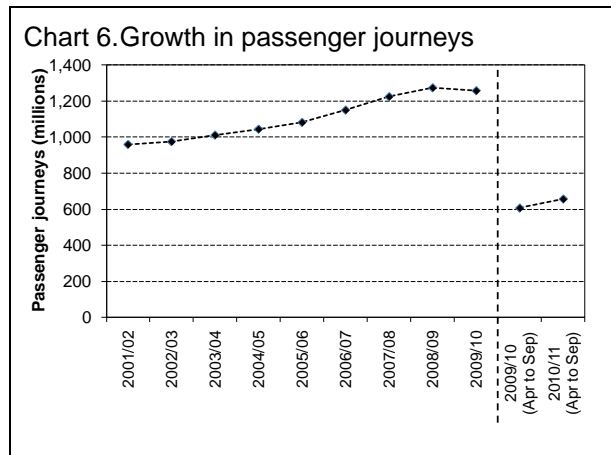
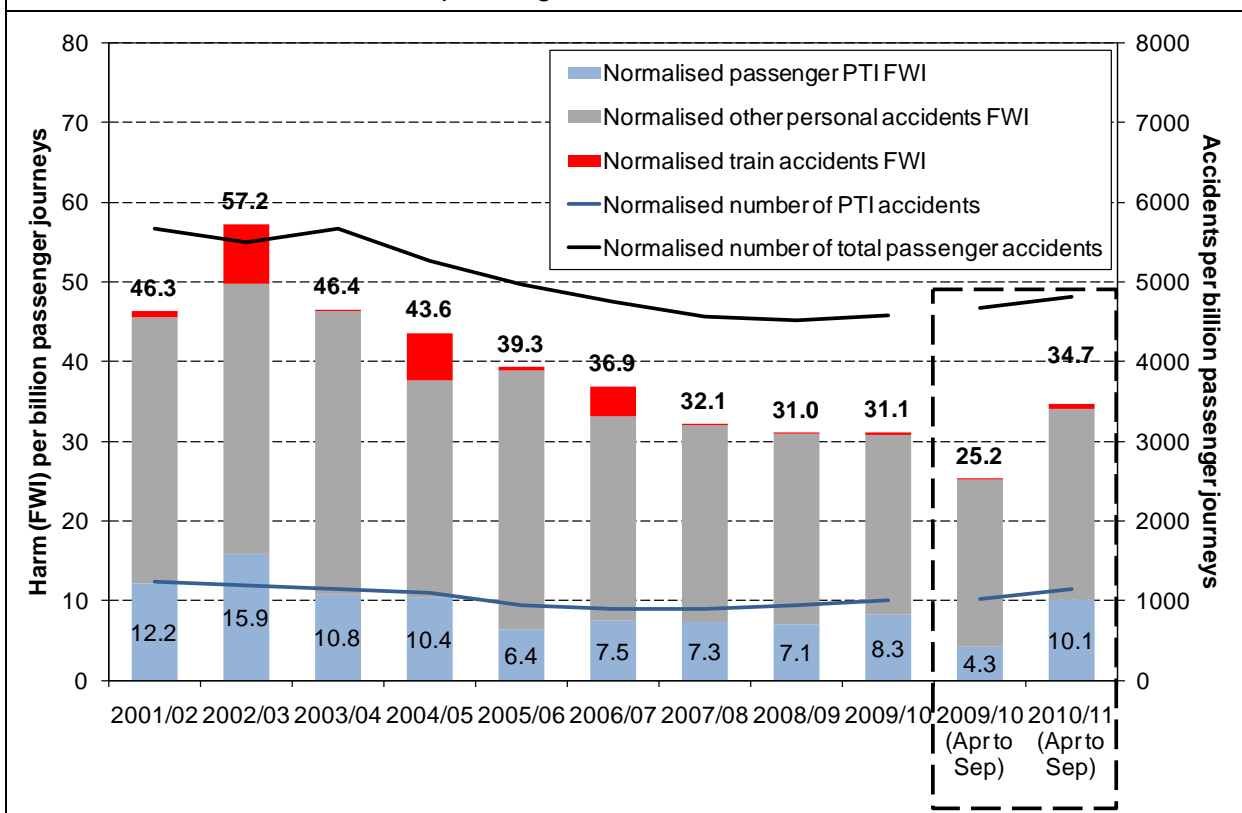


Chart 7. Normalised trends in passenger FWI – overall and at the PTI



- When passenger journeys are taken into account, the reduction in passenger harm is shown to be greater, with the exception of 2009/10 and first half of 2010/11. The trend in PTI-related harm has shown some reduction over the first half of the decade, but has started to show an increasing trend in more recent years.
- The normalised number of total passenger accidents also shows a generally reducing trend, until 2009/10. For the year 2009/10 and the first half of 2010/11 the trend has increased. The normalised number of PTI-related accidents has shown a flatter trend, again with recent increases.

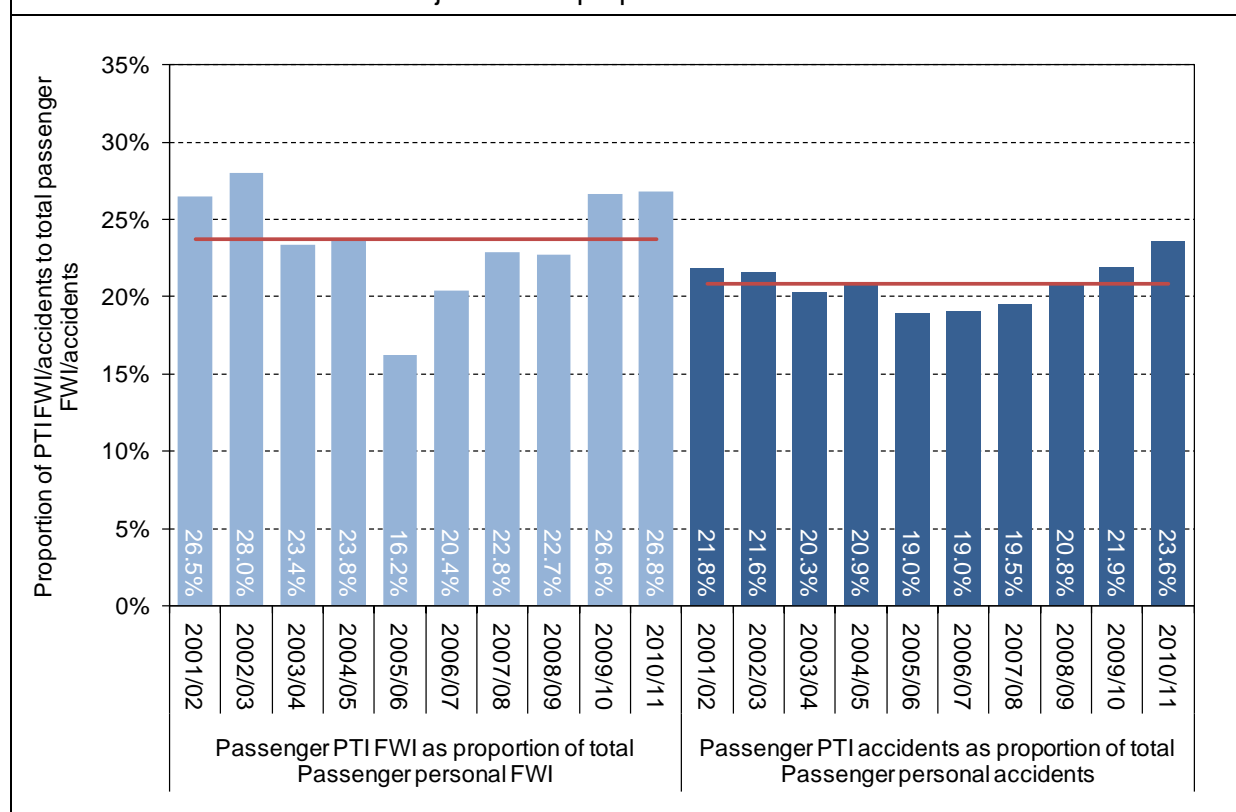
Platform-train interface risk

2.3.3 PTI related harm as a proportion of total harm

The previous sections showed that while the level of FWI related to total passenger harm has been generally falling, both for absolute and normalised values, the level of FWI for PTI-related harm has not shown the same reductions. The same is true for the trend in normalised number of accidents, for the two types.

The following chart looks at the proportional contribution that PTI-related harm makes to the overall level of passenger harm, both in terms of FWI and the numbers of accidents.

Chart 8. PTI accidents and injuries as a proportion of total



- Since 2001/02, PTI-related injuries have contributed 24% of the total level of FWI, on average. Recent proportions have been above average.
- Since 2001/02, PTI-related accidents have contributed 21% of the total number of accidents, on average. After a period of decreasing proportion, the trend has been rising since 2004/05, and is now above average for the period.
- The fact that the proportionate number of accidents is lower than the proportionate level of FWI indicates that PTI-related accidents have a slightly more serious outcome, on average, than other types of passenger injuries. This is not unexpected, given the nature of some types of PTI-related events, which carry a relatively high likelihood of serious consequences.

2.4 Managing system risk

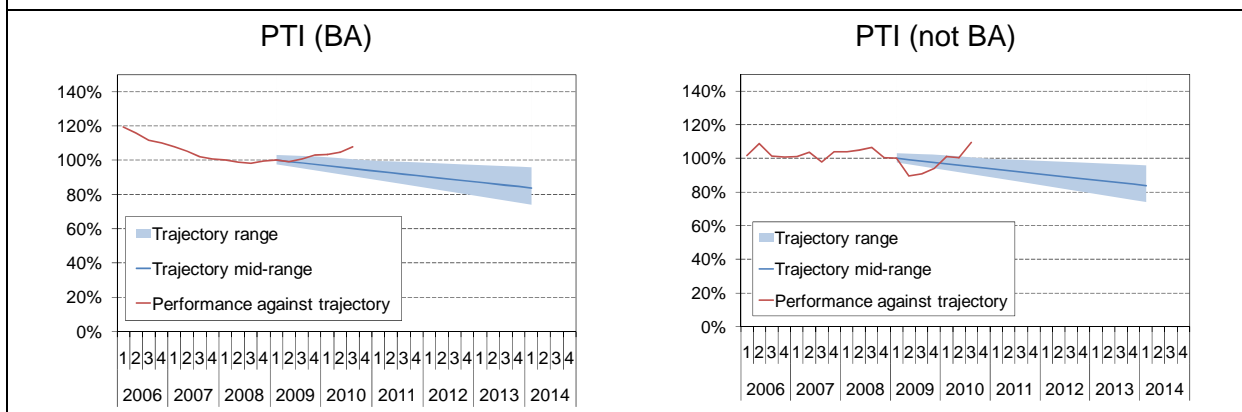
Planning is a key part of the industry's approach to safety management. Companies produce individual safety plans, detailing the activities and initiatives for the forthcoming period, and indicating the associated expected benefits. The overall expected benefit of industry planning is brought together in the Railway Strategic Safety Plan (SSP), which is based on the information in individual plans.

The current SSP covers the five-year period from April 2009 to March 2014 and defines a number of trajectories, each related to a particular aspect of system risk. Trajectories can be used as a way of illustrating expected changes in the level of risk as a result of the initiatives being undertaken or planned by the industry over the period covered by the SSP. Trajectories have, as their starting point, the level of risk as of April 2009, as estimated by SRMv6.

There is a specific trajectory related to risk to passengers at the platform-train interface. The SSP projects an improvement of around 16% is projected by the end of March 2014.

For some trajectories, two charts are used to review progress. This is done in those cases where the types of events that are covered by the trajectory fall into two distinct types, as in the case of PTI-related accidents.

Chart 9. Progress against trajectory related to passenger accidents at the platform-train interface



- A best estimate improvement of around 16% is projected by the end of March 2014.
- Based on the number and type of accidents that have occurred, performance at the end of September 2010 is above the SSP trajectory, for both PTI (BA) and PTI (not BA) accidents.

3 Trends in passenger injuries at the platform-train interface

3.1 Fatalities at the platform-train interface

3.1.1 Fatalities while boarding or alighting

There have been two passenger PTI (BA) fatalities since 2001/02, none have occurred since 2006/07.

- On 29 July 2001 at Clapham Junction, a male fell between the train and the platform while alighting from a train. He had opened the slam door after the train had started moving.
- On 13 February 2007 at Haddenham & Thame Parkway station, a male fell between a train and the platform while alighting.

3.1.2 Fatalities while not boarding or alighting

There have been 34 PTI (not BA) fatalities since 2001/02; three of these were to members of the public and 31 were to passengers. There were five fatalities up to the end of September 2010/11.¹

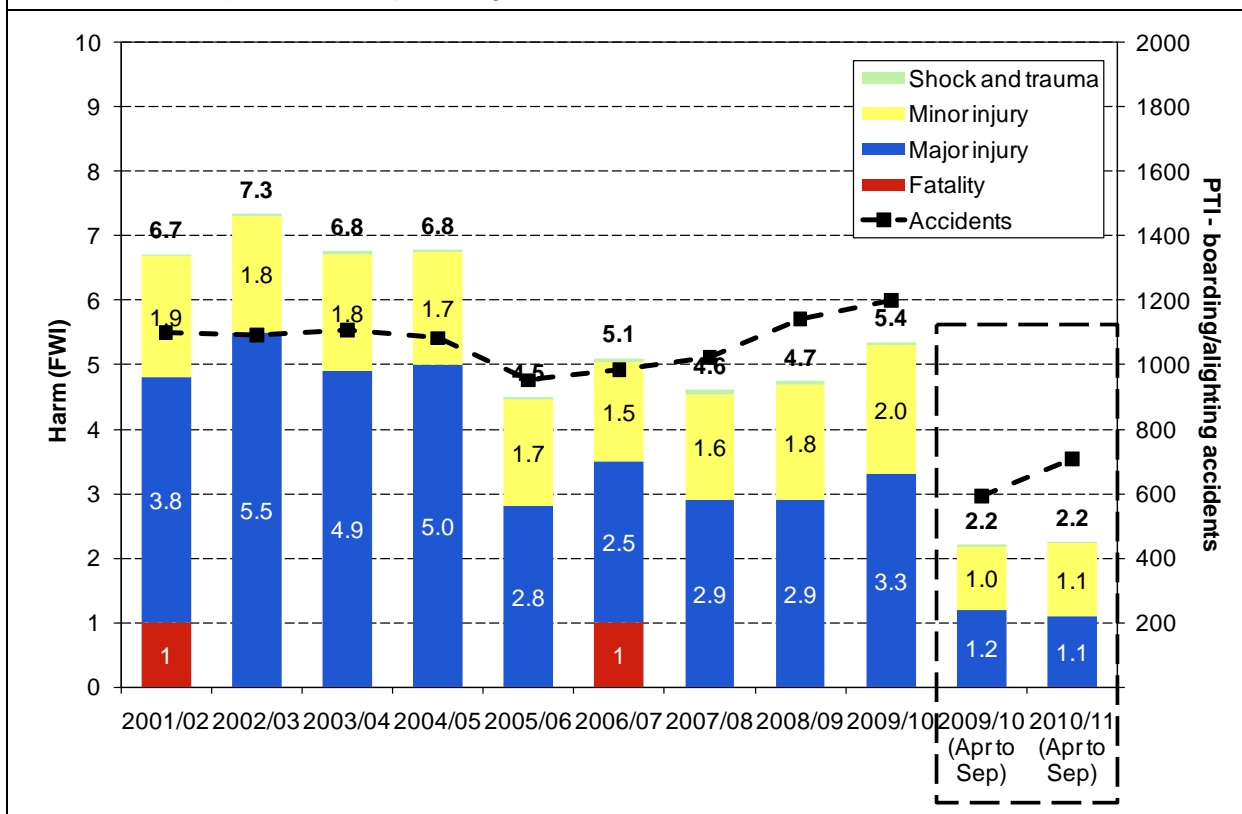
- On 5 June 2010 at Earlsfield station, a male fell on to the track and was electrocuted. The deceased was intoxicated and the platform was wet due to the weather.
- On 1 July 2010, a male was struck by an approaching train at Stansted Mountfichet; he had been standing too close to the platform edge.
- On 8 July 2010, an intoxicated male fell from the platform at Langley Green station and was struck by an oncoming train.
- On 23 July 2010 at Twickenham station, a male fell on to the track and was electrocuted.
- On 29 September 2010, an intoxicated male fell on to the track and was struck by a train at Sudbury & Harrow Road station.

Risk at the PTI is not limited to passengers. Members of the public, visiting stations for reasons other than travel (eg shopping, socialising, or meeting/seeing off passengers) are also affected by PTI-related risk. Since 2001/02, there have been four such fatalities to members of the public; details of these fatalities are given in Appendix 1, and some associated analyses are presented in sections 3.2 and 3.3.

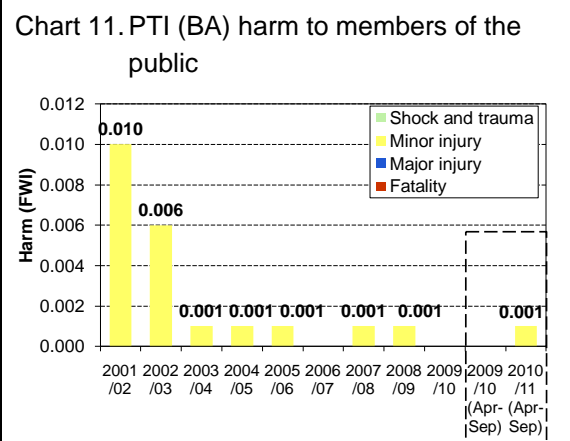
¹ At the time of the data cut-off for this report, the person who died at Stansted Mountfichet was categorised as a member of the public; this is reflected in the analysis throughout this report. New information has subsequently come to light and he has now been reclassified as a passenger.

3.2 Harm to passengers while boarding or alighting

Chart 10. PTI (BA) harm to passengers



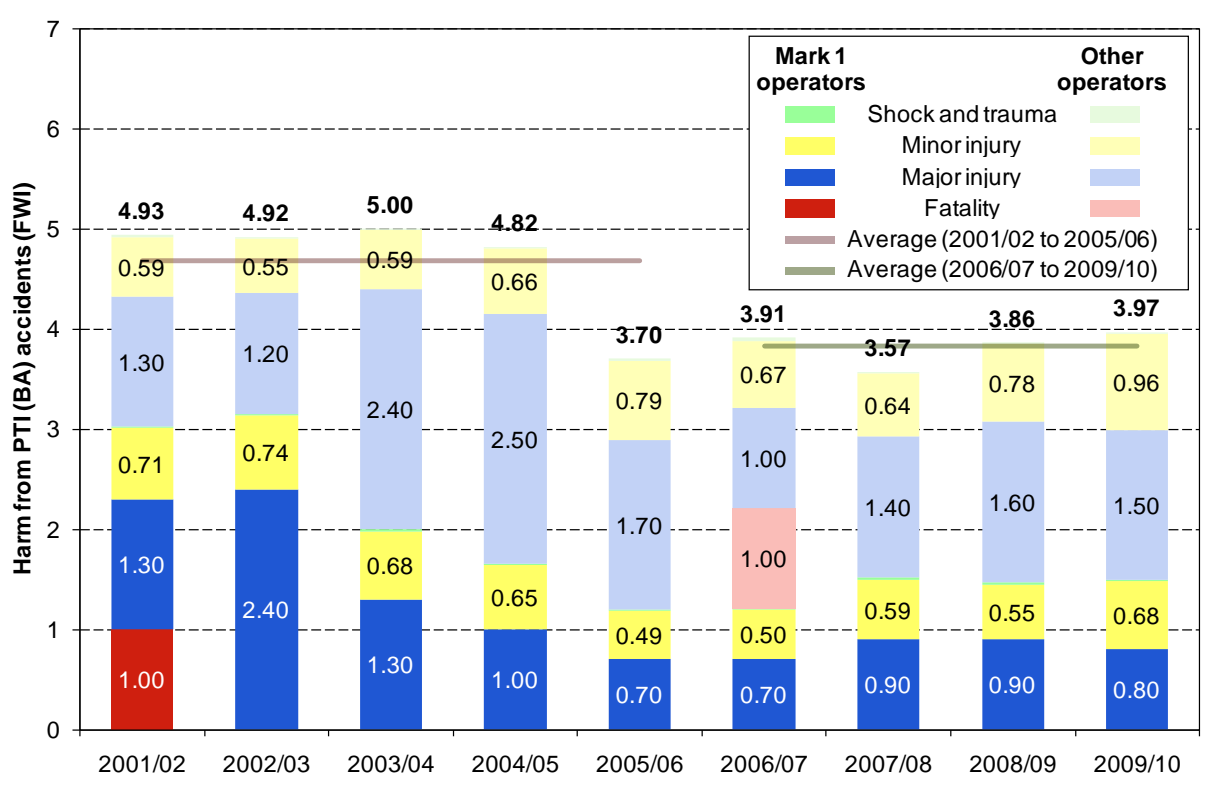
- There have been no PTI (BA) fatalities to passengers since 2006/07; most harm is in the form of major injuries.
- Although the level of harm has so far remained lower than the 2004/05 level, the annual total number of accidents has been increasing steadily since 2005/06. There were 1,199 accidents recorded in 2009/10, more than any other year in the analysis period. There were 709 accidents recorded in the first half of 2010/11, which suggests that this upward trend is continuing.
- There have been very few PTI (BA) accidents to members of the public 15 minor injuries since April 2001. The people involved are usually assisting a passenger in getting on or off a train.



Trends in passenger injuries

Mark 1 rolling stock, which features (typically) non-centrally locked slam doors, was gradually removed from service before the end of 2005/06. After this point there were no Mark 1 units in regular passenger service on the main line.

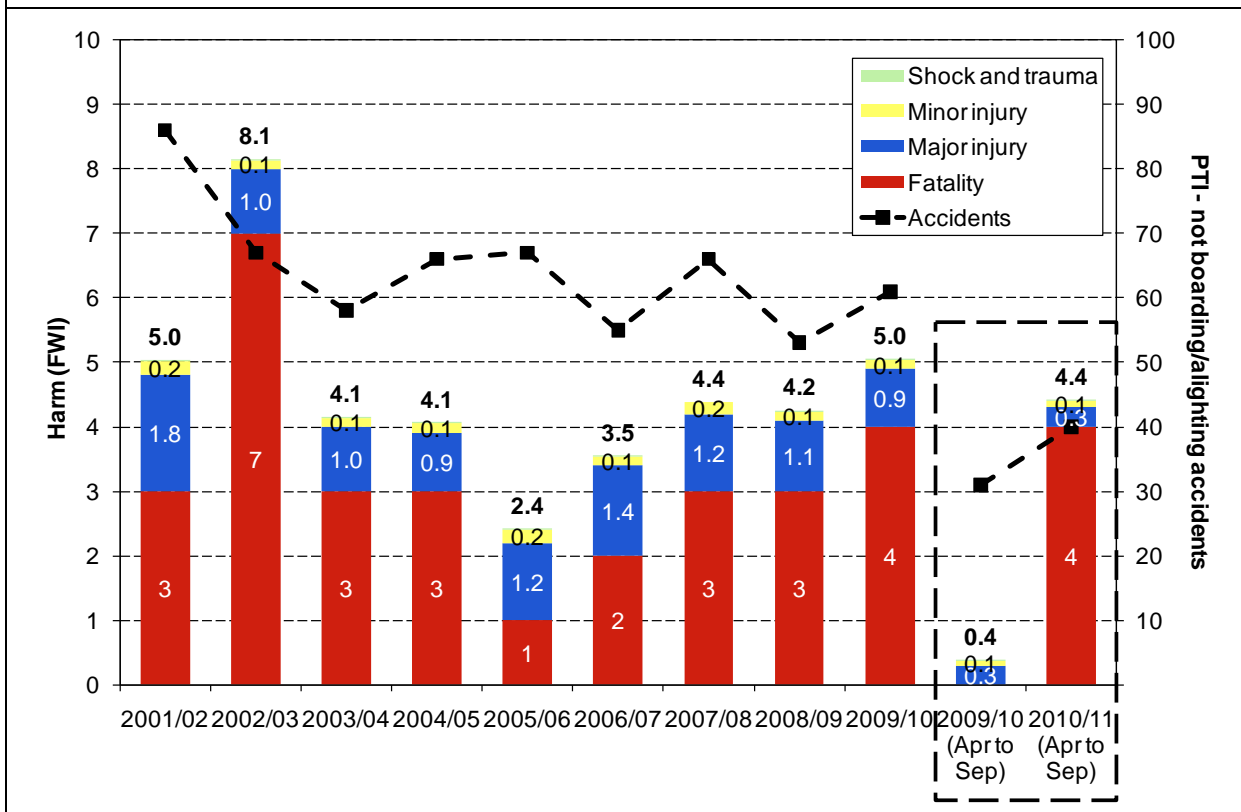
Chart 12. Harm from PTI (BA) accidents by operator type and injury degree



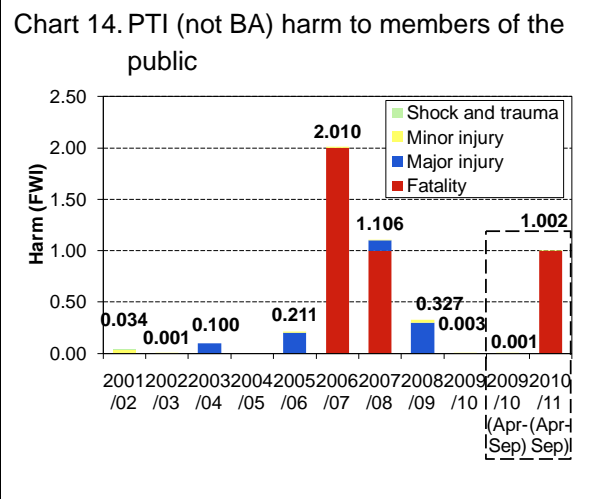
- The average amount of harm to passengers from PTI (BA) accidents was higher in the years that Mark 1 rolling stock was in service than in the years since the last units were removed.
- Much of the reduction in the average amount of harm was due to a decline in harm to passengers using trains run by operators of Mark 1 rolling stock (South West Trains, Southern, Southeastern and One Great Eastern).
- There were more major injuries to passengers using trains run by other operators in the years 2003/04 and 2004/05 than in other years. Much of the decrease in overall passenger harm between 2004/05 and 2005/06 was due to this high number of major injuries returning to a lower level.

3.3 Harm to passengers arising from accidents at the platform edge while not boarding or alighting

Chart 13. PTI (not BA) harm to passengers



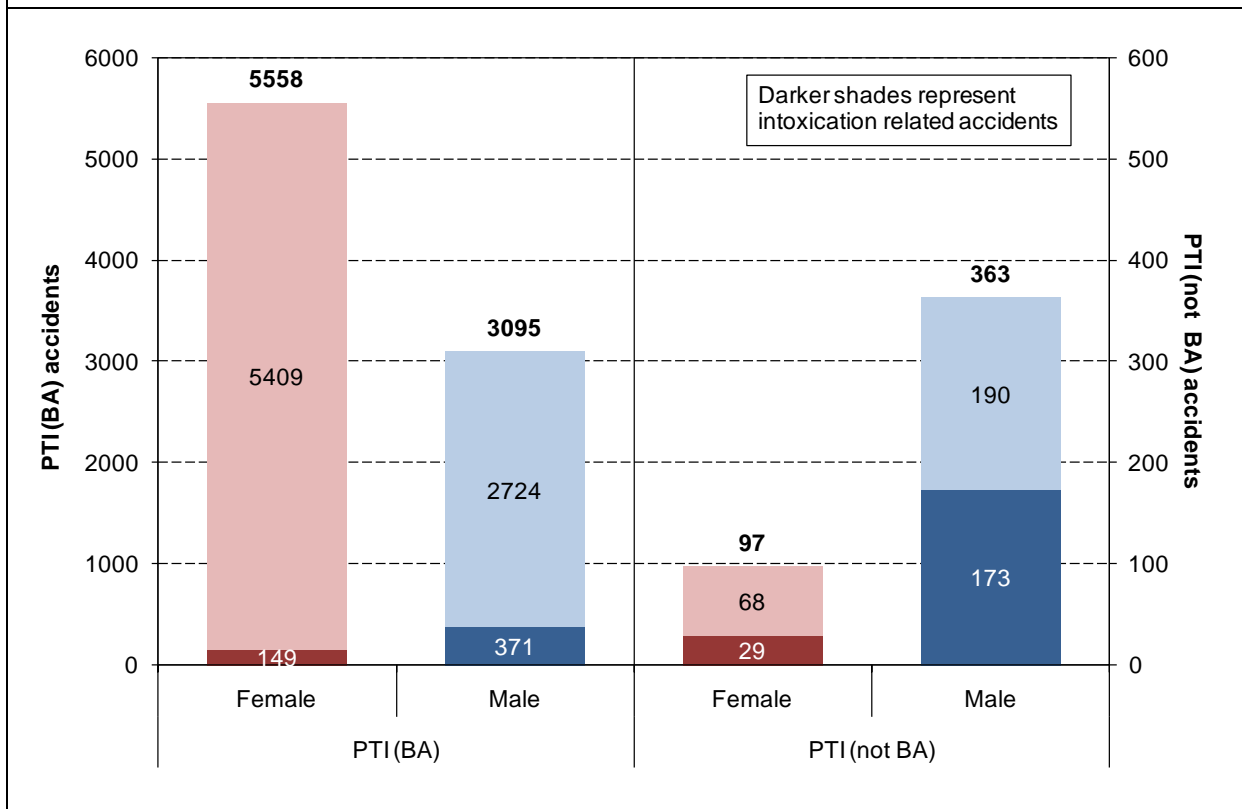
- The majority of risk from PTI (not BA) accidents is fatality risk. As the number of fatalities per year varies between one and five, a difference of just one fatality per year will make a large difference to the total harm.
- The influence of fatalities on total harm is seen especially when comparing harm in the first half of this year with the same period last year.
- There has been no discernable trend in major and minor injuries due to this type of accident in the last nine years. However, while the annual total number of accidents has remained lower than 2001/02, the fact that there were 40 accidents in the first half of 2010/11 suggests the year may see a relatively high total.
- There have been a number of PTI (not BA) accidents to members of the public (42 since April 2001). As with passengers, the level of harm to members of the public is much greater than when boarding or alighting; there have been four fatalities since April 2001.



4 Factors affecting passenger risk at the platform-train interface

4.1 Intoxication and gender

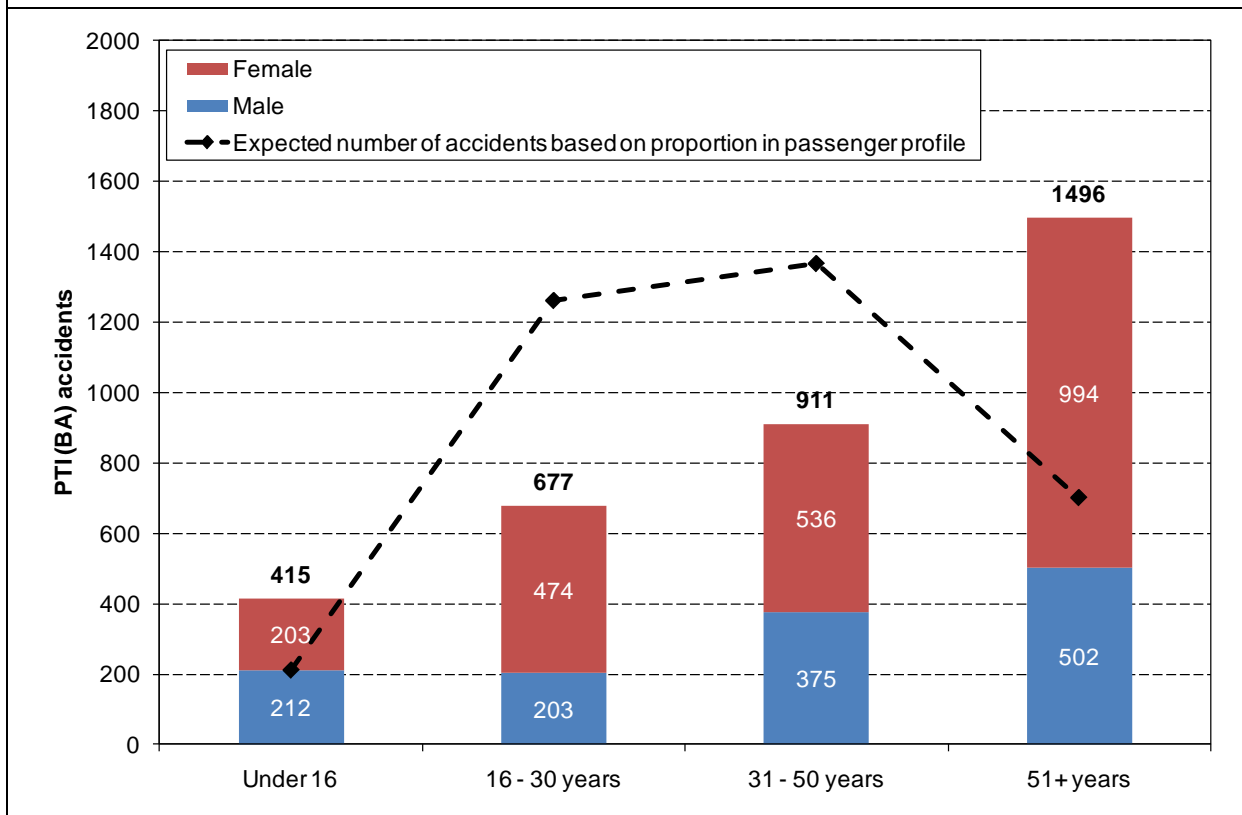
Chart 15. PTI accidents by gender and intoxication (2001-2010)



- More females than males are involved in PTI (BA) accidents at the PTI while boarding or alighting; around 64% of these accidents have occurred to females.
- Footwear could be one reason for this difference. It is also possible that females are more likely to report this type of incident.
- Far more males than females are involved in PTI (not BA) accidents; around 79% of these accidents have occurred to males.
- Intoxication accounts for a much larger proportion of this type of injury (44% compared with 6% of PTI (BA) accidents). The statistics indicate that males appear to have a higher level of risk from PTI (not BA) in general, even after taking into account that they are involved in more alcohol related incidents overall.

4.2 Age and gender

Chart 16. PTI (BA) accidents by age and gender (2001-2010)²

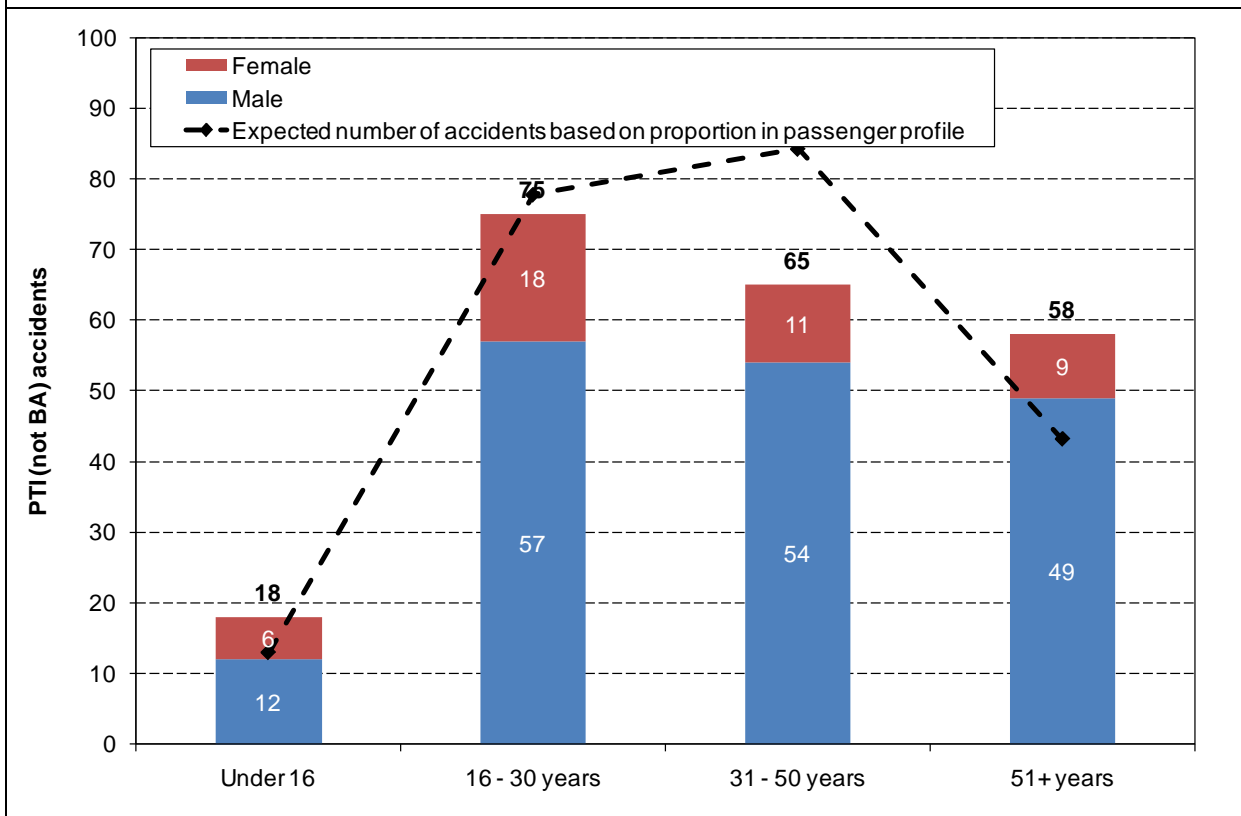


- Passenger age groups under the age of 16 and over the age of 51 are involved in a much higher number of accidents than would be expected when considering their representation in the passenger profile. These age groups include the elderly and the very young, who may be less steady on their feet. Passengers aged between 16 and 50 are involved in fewer accidents than would be expected when considering their representation in the passenger profile. This may be because they travel more frequently and are therefore more familiar with the railway network.
- It is also possible that reporting rates differ for different age groups; leisure passengers may be more likely to report injuries than time-pressed commuters and business passengers. Parents or older companions of younger travellers may be more likely to report an injury if it occurs to those in their care.
- The generally higher proportion of accidents occurring to females is not seen in accidents involving children under the age of 16. This could be because there are fewer differences between the footwear worn by males and females in this age group.

² Passenger profile proportions have been calculated from the passenger journeys information from the DfT *National Travel Survey* 2007 and 2008

Factors affecting passenger risk

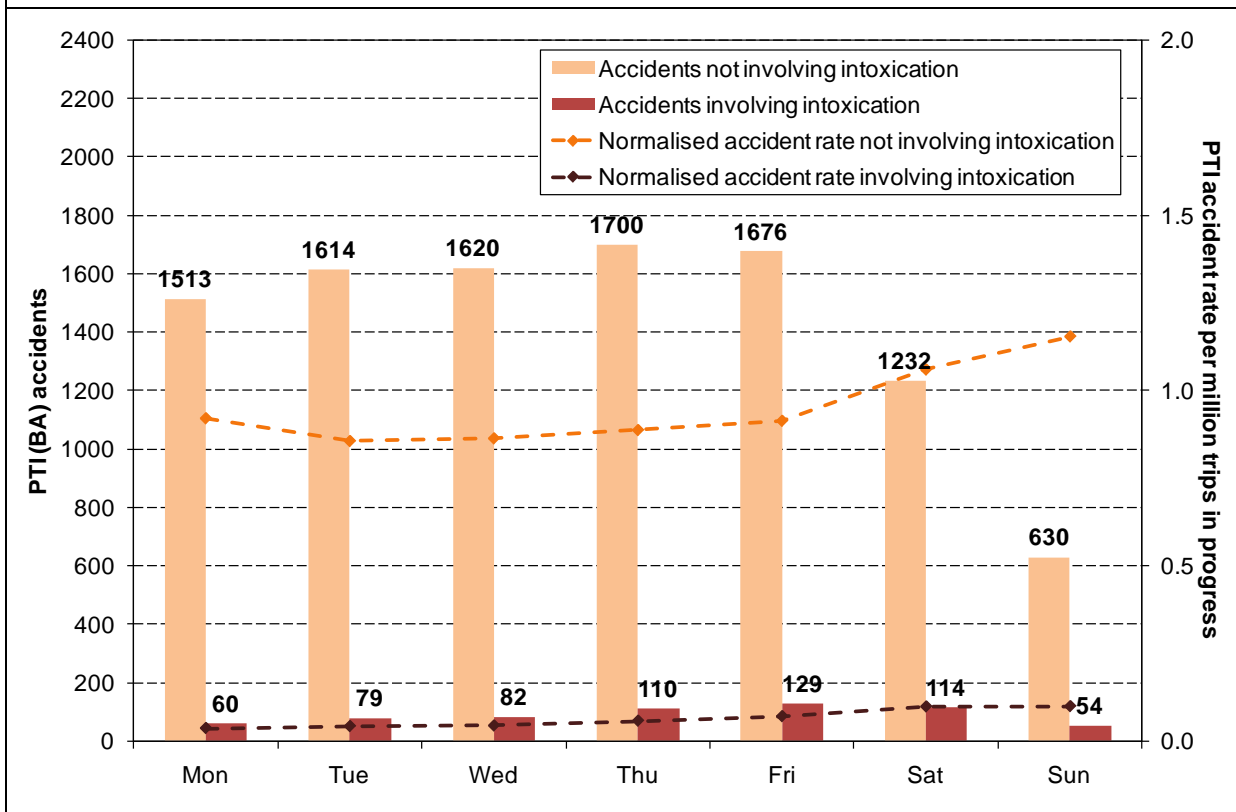
Chart 17. PTI (not BA) accidents by age and gender (2001-2010)



- As with boarding/alighting accidents, age groups containing the old and the young suffer more PTI (not BA) accidents, when considering their representation in the passenger profile, although the degree of disproportion is much less marked than with accidents while boarding or alighting.
- Unlike with boarding/alighting accidents, 16 to 30 year olds are involved in the highest number of accidents, although passengers aged between 16 and 50 are involved in fewer accidents than would be expected when considering their representation in the passenger profile.
- The high ratio of accidents occurring to males is seen in every age bracket, including those under-16 year olds.

4.3 Day of week and intoxication

Chart 18. PTI (BA) accidents, by day of week and intoxication (2001-2010)³



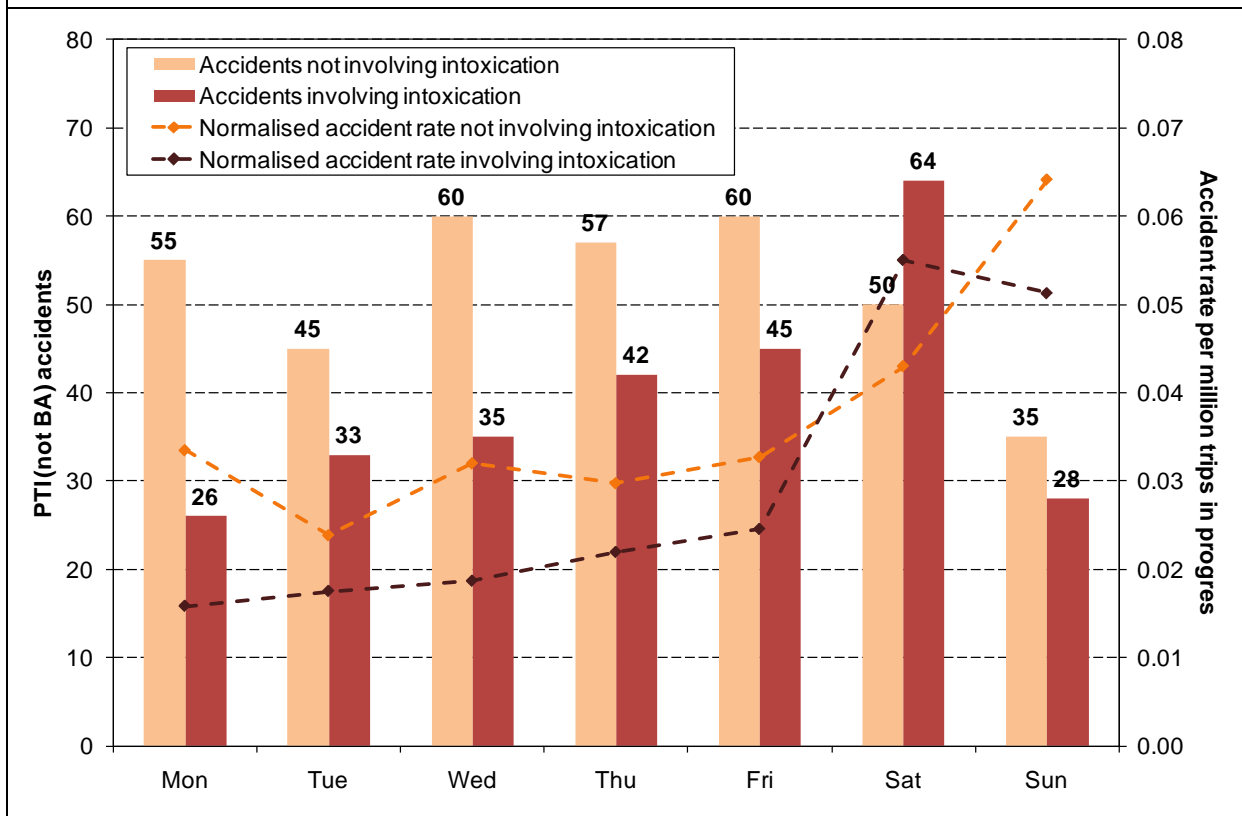
- The number of PTI (BA) accidents increases during the week, coinciding with a rise of accidents due to intoxication.
- When normalised by trips in progress⁴, the rate of accidents reported as involving intoxication increases during the week, this rate remains higher during the weekend.
- The number of accidents not reported as involving intoxication also increases during the week. However, when normalised, the accident rate is higher on Mondays and Fridays, and much higher during the weekend.
- It is possible that the higher rate of accidents on weekends is due to increase in leisure travellers at these times, who may be less frequent passengers and therefore less familiar with the railway network. There may also be differences in reporting levels as described in section 4.2.
- A likely reason for the lower number, but higher rate of accidents on Mondays is that around 10% are bank holidays; the passenger profile seen on these days will be similar to that seen on weekends.

³ Normalising data obtained from the DfT National Travel Survey.

⁴ 'Trips in progress' are only counted if the railway is the main mode of travel, around 5% of trips include a rail stage as a minor part of a longer journey and are therefore not counted.

Factors affecting passenger risk

Chart 19. PTI (not BA) accidents by day of week and intoxication (2001-2010)⁵

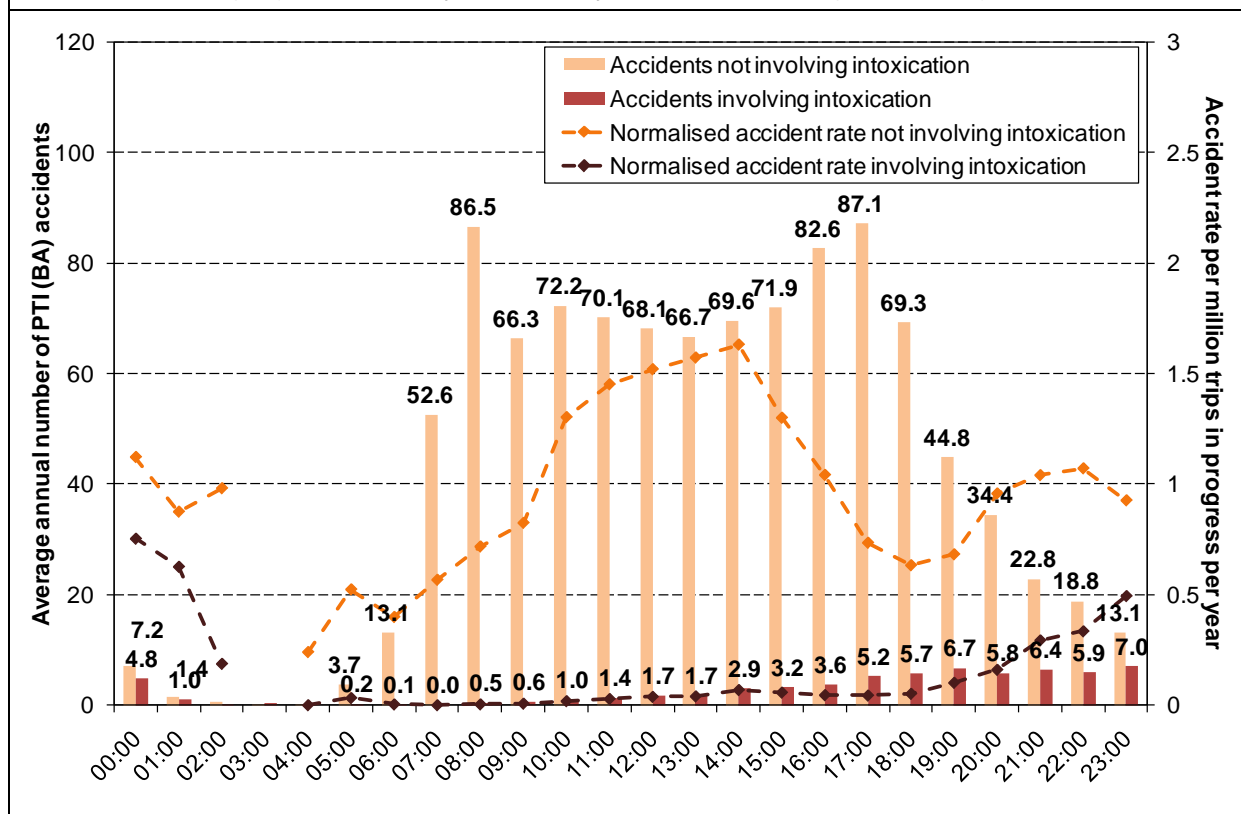


- As with accidents while boarding or alighting, PTI (not BA) accidents increase during the week. The increase is mainly due to the rise in intoxication-related accidents, which account for around a third of all PTI (not BA) accidents on a Monday, rising to a peak of more than half on a Saturday.
- Saturday has the highest total number of accidents due to the contribution made by intoxication related accidents, even though there are fewer passenger journeys overall.

⁵ Normalising data obtained from the DfT National Travel Survey.

4.4 Time of day and intoxication

Chart 20. PTI (BA) accidents by time of day and intoxication (2001-2010)⁶



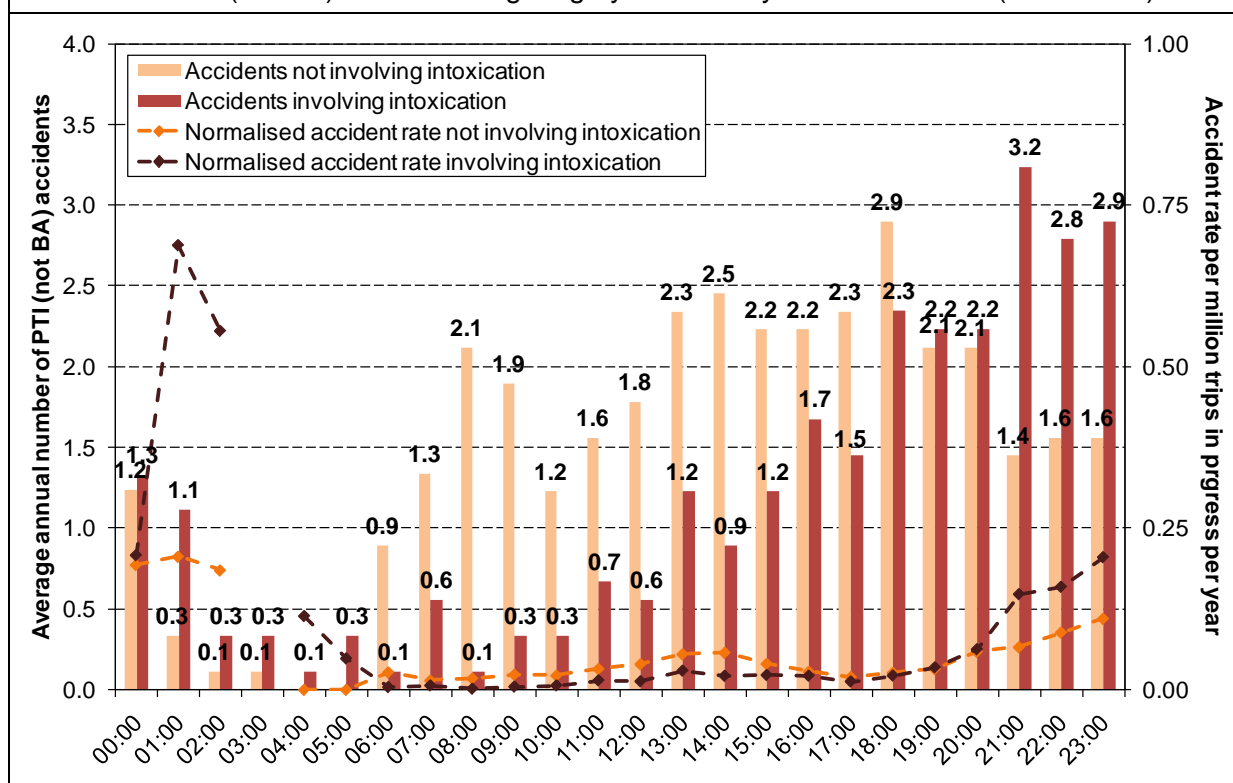
- The number PTI (BA) accidents involving intoxication rises during the day and peaks at around 23:00. During the three-hour period, 23:00 to 02:00 more than a quarter of reported accidents involve intoxication. The changes in the rate are more apparent when normalised by trips in progress.⁷
- Peak accident numbers not reported as involving intoxication coincide with peak travel times in the morning and afternoon, although when normalised by trips in progress, the rate is relatively low at these times.
- The rate of accidents not reported as involving intoxication is highest at off-peak travel times, during the middle part of the day and in the evening and night. Changes in the level of leisure travellers may be affecting the reported accident rate as suggested in section 4.3.

⁶ Normalising data obtained from the DfT National Travel Survey. The confidence in the data between 0200 and 0400 hrs is low, therefore this data has not been included in the chart.

⁷ As a 'trip' includes all stages of a journey (in the case of a rail journey, it would include getting to and from the station for example), the start and end times of rail stages are distorted. This means that it is likely that the peak travel times are more pronounced than they appear in the data. A trip cannot be counted across two days, so it is likely that there are inaccuracies in the normalised data around midnight.

Factors affecting passenger risk

Chart 21. PTI (not BA) accidents alighting by time of day and intoxication (2001-2010)⁸

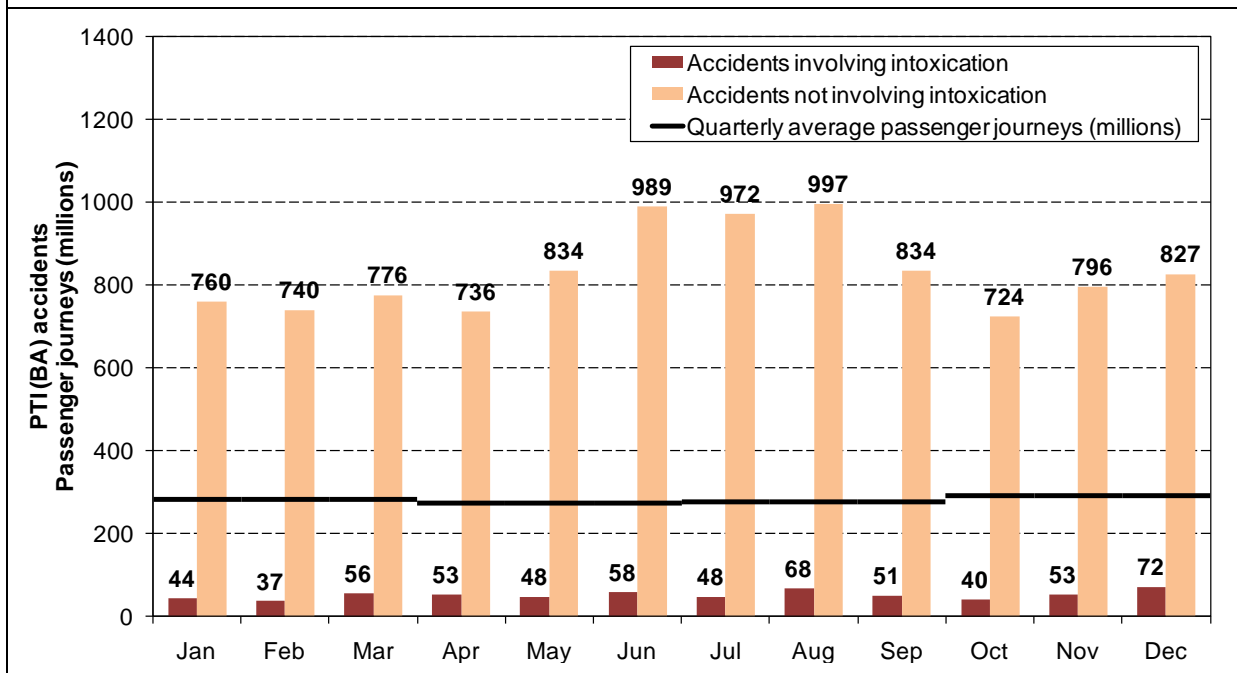


- The number of accidents involving intoxication rises during the day and peaks at 21:00, although it remains high until 02:00. The increasing trend is more apparent when normalised by trips in progress.
- Between 21:00 and 00:00, the number of intoxication-related accidents is around twice that of accidents not related to intoxication.
- The rate of accidents not reported as involving intoxication shows a similar pattern to those shown in Chart 20, the rate is highest at off-peak travel times, during the middle part of the day and in the evening and night

⁸ Normalising data obtained from the DfT National Travel Survey. The confidence in the data between 0200 and 0400 hrs is low, therefore this data has not been included in the chart.

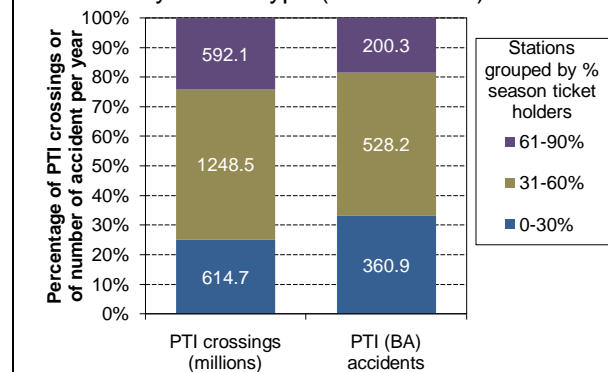
4.5 Month of year and intoxication

Chart 22. PTI (BA) accidents by month of year and intoxication (2001-2010⁹)



- It appears there is little seasonal variation in PTI (BA) accidents that involve intoxication.
- It is interesting that the highest numbers of PTI (BA) accidents are in summer, despite there being no increase in passenger journeys. This could be due to the type of passengers travelling, tourists, for example, who may be less frequent (and therefore less experienced) users of the railway.
- It is likely that stations used by a lower proportion of season ticket holders are ones used more by tourists or other less frequent travellers. Chart 23 shows that stations that are used by a lower proportion of season ticket holders account for a higher proportion of accidents.

Chart 23. PTI (BA) accidents and PTI crossings, by station type (2001-2010¹⁰)



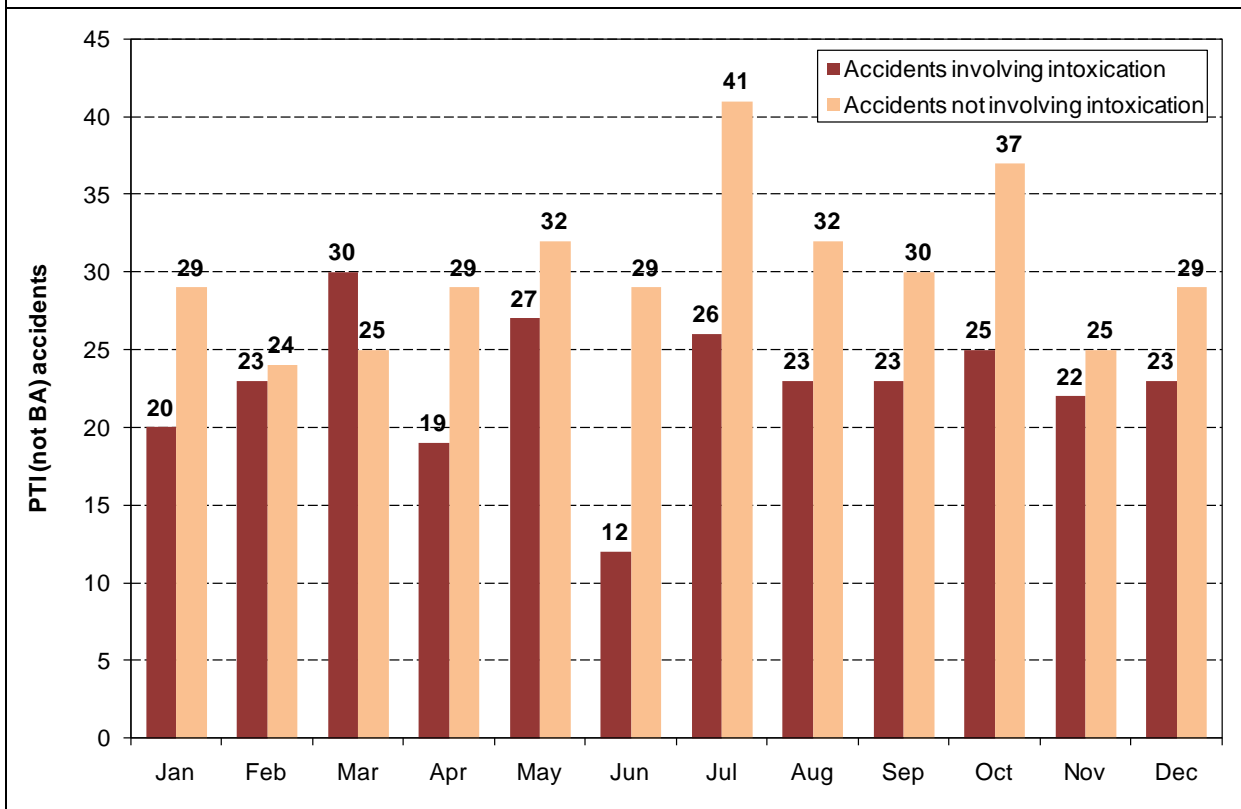
- Charts 18 to 22 appear to show a similar pattern of higher rates of accidents at off-peak travel times. This could be due to similarities in the passenger profile seen at these times.
- As suggested in sections 4.1 to 4.4, it is also possible that there is a difference in reporting rates between peak and off-peak travellers.

⁹ Quarterly average data covers the period from April 2002 to September 2010. Data obtained from National Rail Trends, ORR.

¹⁰ Station usage data obtained from ORR.

Factors affecting passenger risk

Chart 24. PTI (not BA) accidents by month of year and intoxication 2001-2010



- As with PTI (BA) accidents, there is little seasonal variation in PTI (not BA) accidents that involve intoxication.
- Again, the highest monthly total of accidents is in summer (July), however, so is the lowest (June).

4.6 Weather

The effect of weather was analysed by comparing the number of PTI accidents to the weather occurring on that day.

Incident data since 2001 was taken from SMIS for the urban counties of Greater London, Merseyside, West Midlands, Greater Manchester, Strathclyde and West Yorkshire as more than half of all incidents occurred in these six counties.¹¹ Weather also varies less across these counties as are they are relatively small, allowing weather data from the principal city to be used.¹²

Table 1. Rate of PTI accidents in different weather conditions, normalised by the number of days within sample areas (2001-2010)

Incidents/day	No ice	Ice
Dry	1.02	1.08
Wet	1.04	1.23

- Weather conditions appear to have a slight effect on the rate of PTI incidents. As shown in Table 1, there are more incidents occurring when the weather is wet and icy¹³, than when conditions are dry and ice-free. Overall, when the weather is bad (wet or icy) there is an increase in accident rate of nearly 5%, compared with good conditions (dry and no ice). When wet and icy conditions occur together, the increase in rate is around 20%.
- It appears that the effect that weather conditions have on the PTI accident rate is much lower than the effect it has on slips, trips and falls in stations (Table 2).

Table 2. Rate of slip, trip and fall accidents in different weather conditions in sample areas (2001-2010)

Incidents/day	No ice	Ice
Dry	2.67	3.57
Wet	3.18	4.47

- When the weather is bad (wet or icy) there is an increase in the slip, trip and fall rate of over 25% compared with good conditions. When wet and icy conditions occur together, the increase in rate is around 65%.

¹¹ Data from all six counties was and weighted according to the percentage of incidents occurring in each county out of the total and then aggregated.

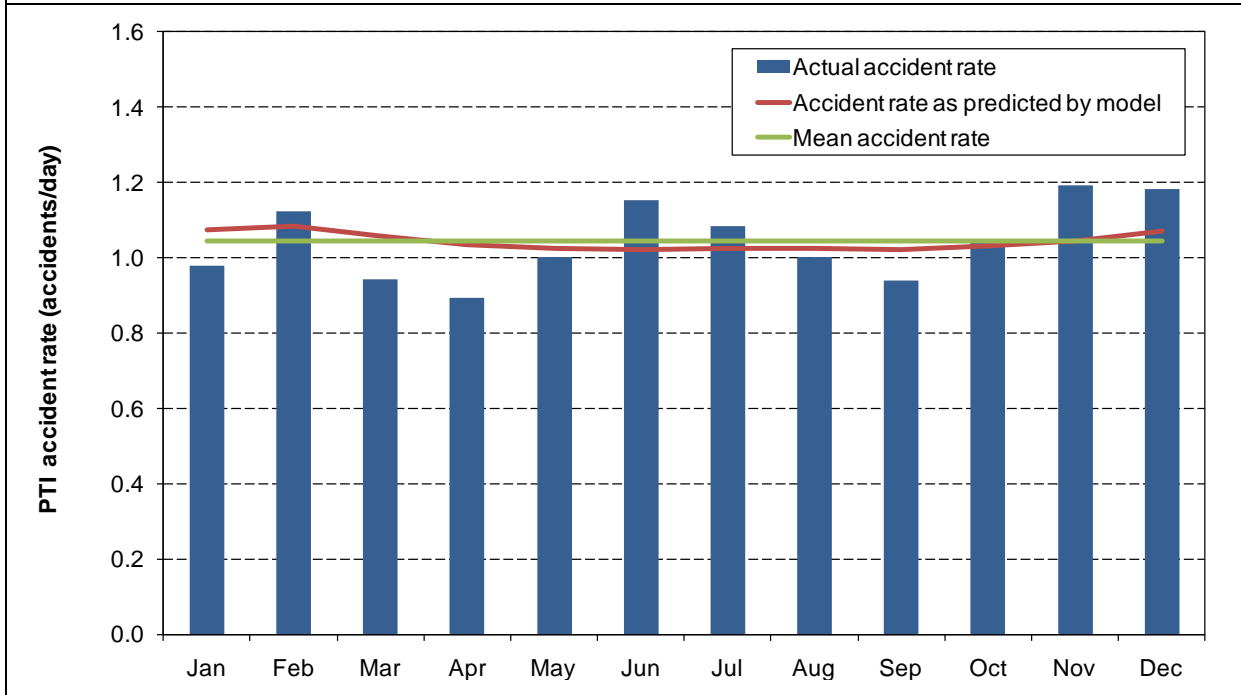
¹² Weather data from Weather Underground (www.wunderground.com)

¹³ Icy conditions are when temperatures fall below 1°C, allowing the possible formation of ice on the ground.

Factors affecting passenger risk

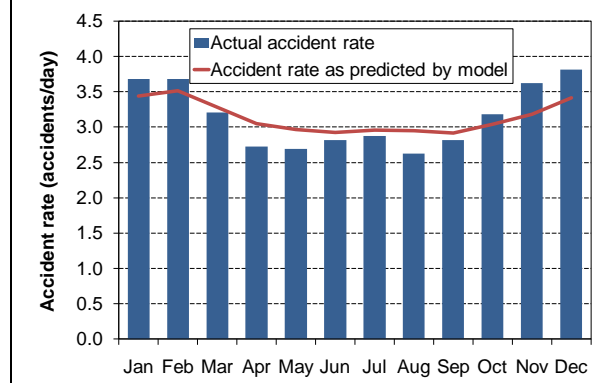
The monthly rate of incidents was predicted, using observed weather patterns and the ratios derived from Table 1.

Chart 25. PTI accidents by month with predicted rate using model based only on weather conditions (2001-2010)



- The model predicts an increase in accident rate in the winter months, although this increase is underestimated.
- The model does not predict the increase seen in the summer months. This suggests there are other factors which may have more of an effect on the rate of PTI accidents.
- Chart 26 shows how the model predicts slip, trip and fall accidents. The fact that the model is similar to the observed rate of accidents shows that slips, trips and falls are well correlated with weather conditions.

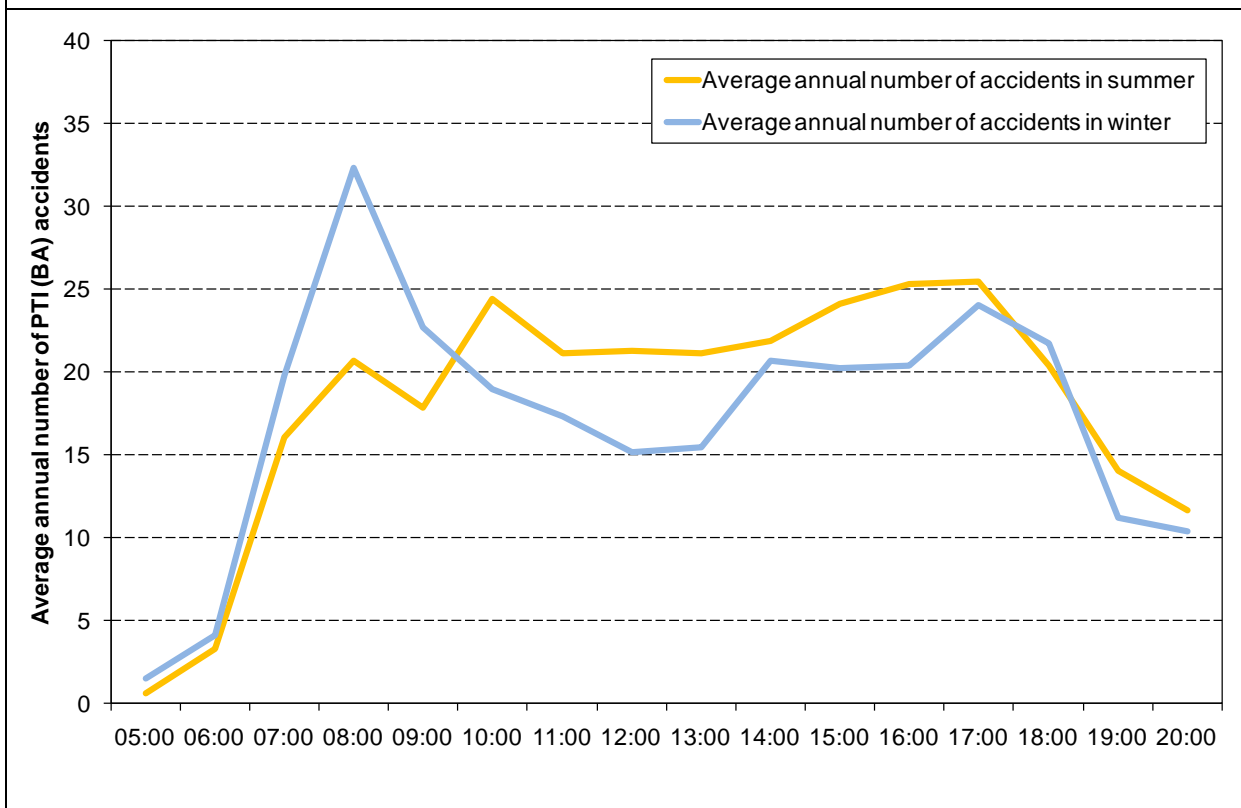
Chart 26. Slips, trips and falls by month with predicted rate using model based only on weather conditions (2001-2010)



4.7 Light conditions

It is possible that the amount of daylight while a passenger is boarding or alighting could affect the chances of an accident. One way to test for this is by looking at the accidents rate peaks seen during the peak hours of 08:00 and 17:00. In the winter months of December, January and February, these times will be significantly darker than in the summer months of June, July and August.

Chart 27. PTI (BA) accidents by time of day in winter and summer months (2001-2010)

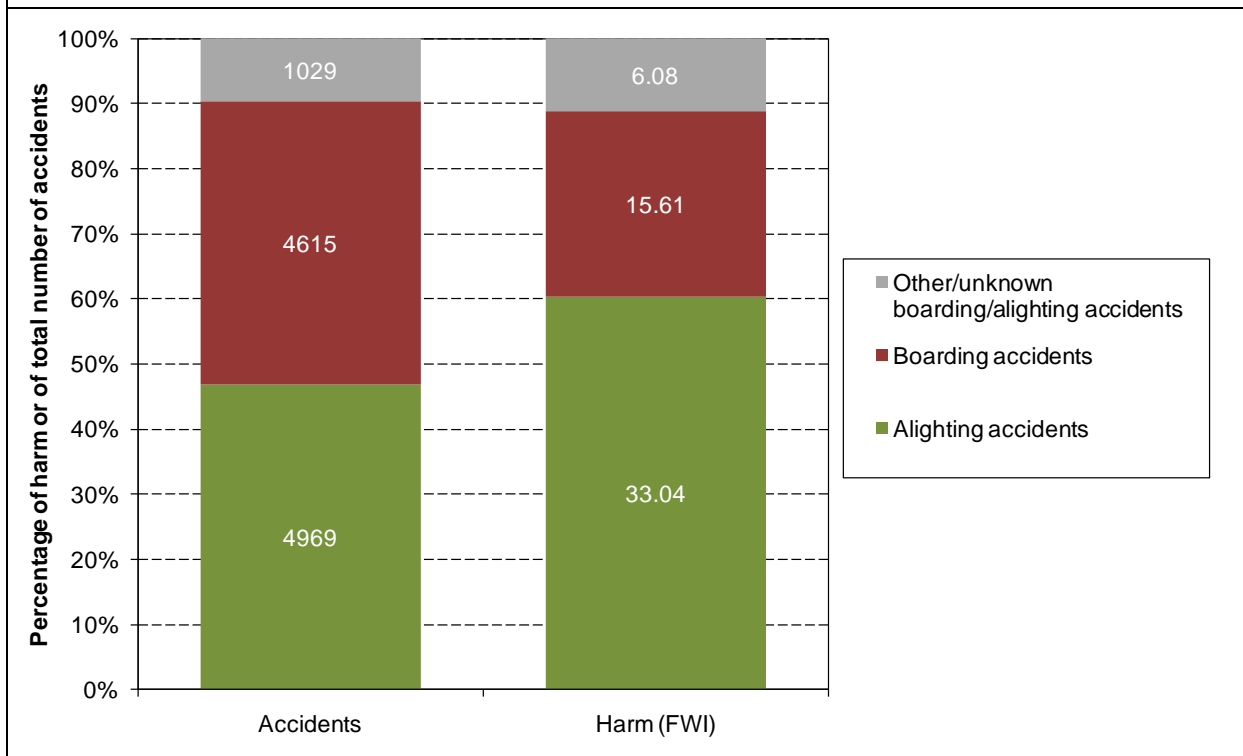


- In the winter months, there are peaks seen in the accident rate at 08:00 and at 17:00. This may be due to the lack of daylight at these times during the winter.
- In the summer months, the accident rate at 08:00 is much lower. However, the rate then increases at 10:00, remaining high until the evening. In the summer months, it is likely that there is a greater proportion of tourist travellers during the day time, than in the winter months.

Factors affecting passenger risk

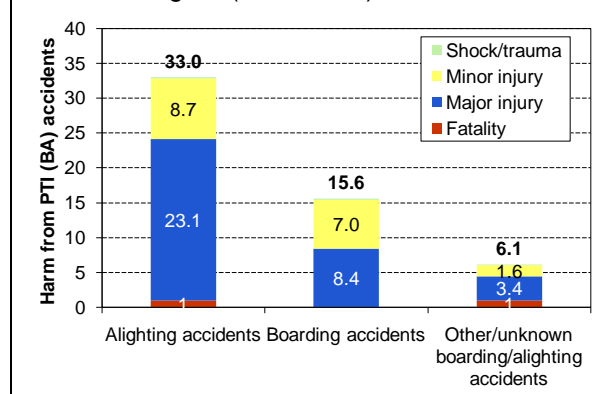
4.8 Boarding or alighting

Chart 28. PTI (BA) accidents (2001- 2010)



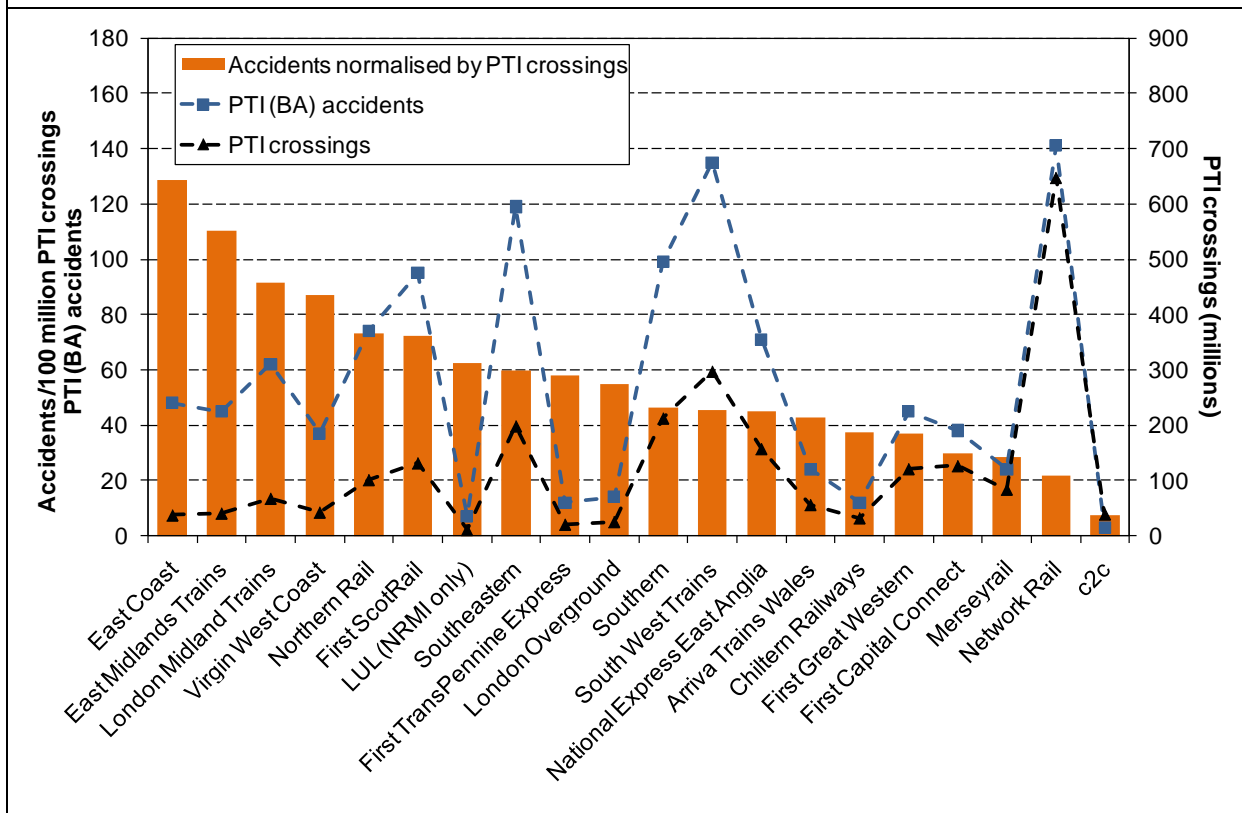
- There are slightly more PTI (BA) accidents while alighting from the train than while boarding the train. Alighting accidents account for 52% of the total (where boarding/alighting status is known).
- The harm from alighting accidents is disproportionately high; they account for more than twice the harm of boarding accidents. Falling from the train onto the platform may well be associated with a greater degree of risk than falling into the train, due to the distance involved, or the greater lack of something to get hold of to regain balance.
- Most of the harm from alighting accidents is in the form of major injuries.

Chart 29. Harm from PTI (BA) accidents by injury degree (2001-2010)



4.9 Station operators

Chart 30. PTI (BA) accidents by station operator (2008/09)¹⁴

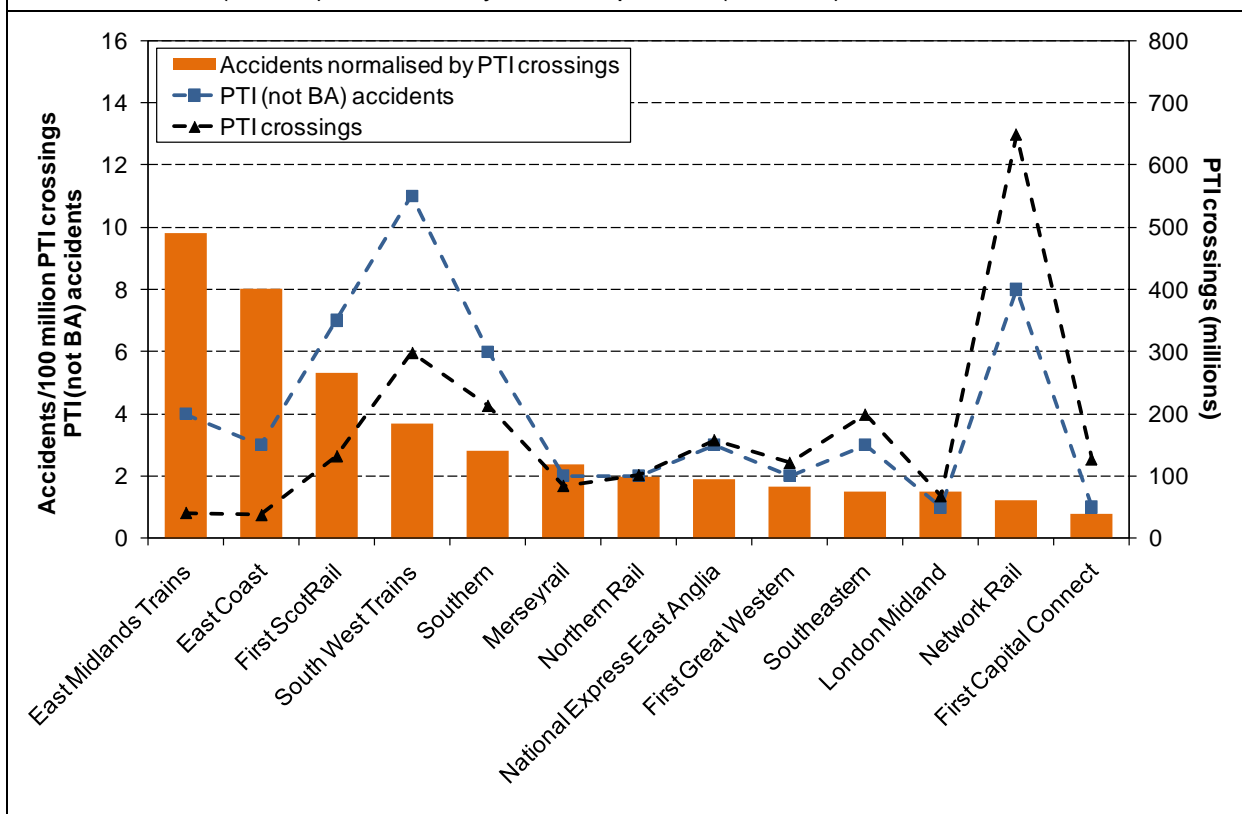


- The stations managed by East Coast, East Midlands Trains, London Midland Trains and Virgin West Coast have the highest rate of reported accidents when normalised by the number of PTI crossings (ie the number of passenger entries, exits and interchanges).
- The passenger profile and consequent reporting rates may vary between station operators.
- The stations with the highest numbers of PTI crossings consequently have the highest numbers of accidents, such as stations managed by Network Rail, South West Trains, Southeastern and Southern.

¹⁴ The number of accidents has been normalised by PTI crossings: the number of passenger station entries and exits, added to twice the number of passenger interchanges. This gives an indication as to the number of times the PTI has been crossed. The latest station usage data was obtained from ORR and was for the year 2008/09. Accident data for the same year was used in Chart 30 and Chart 31.

Factors affecting passenger risk

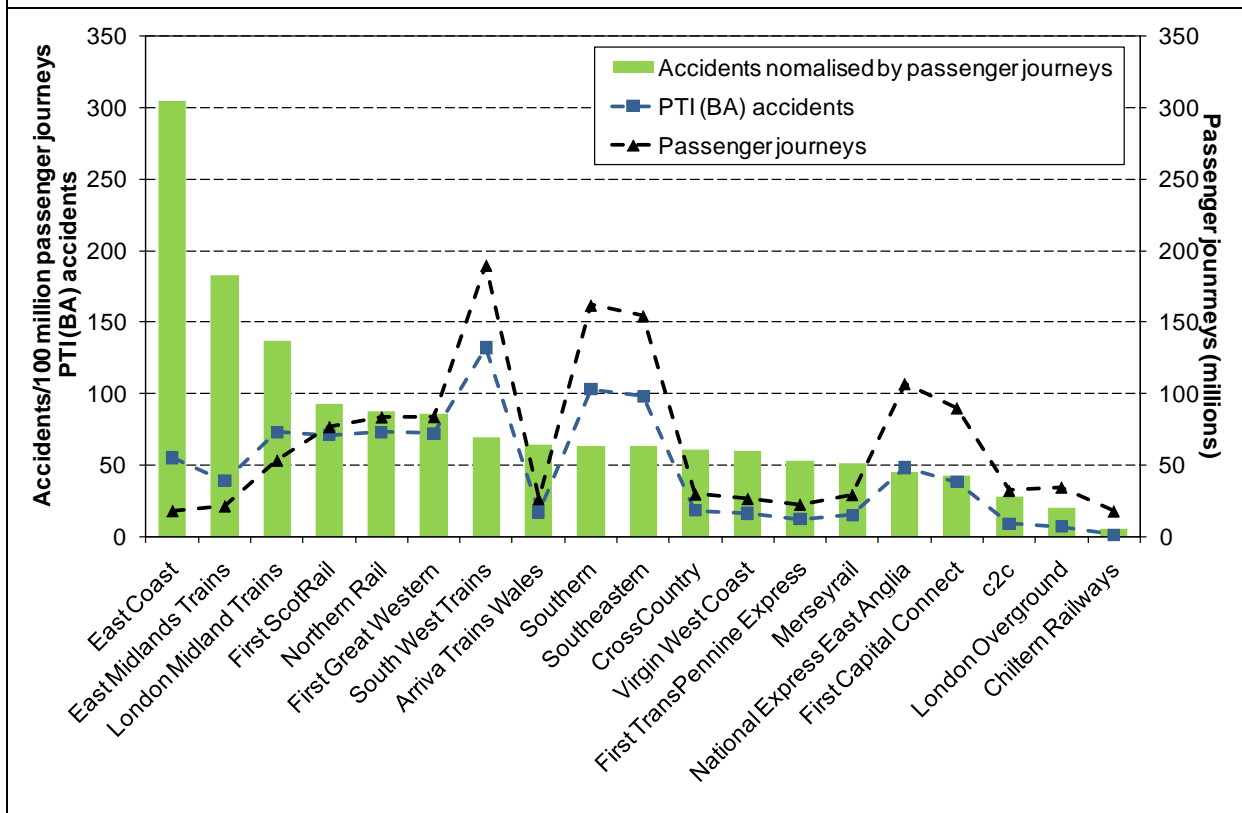
Chart 31. PTI (not BA) accidents by station operator (2008/09)



- After normalisation, East Midlands Trains, East Coast and First ScotRail have relatively high reported PTI (not BA) accident rates.

4.10 Train operators

Chart 32. PTI (BA) accidents by train operator (2009/10)



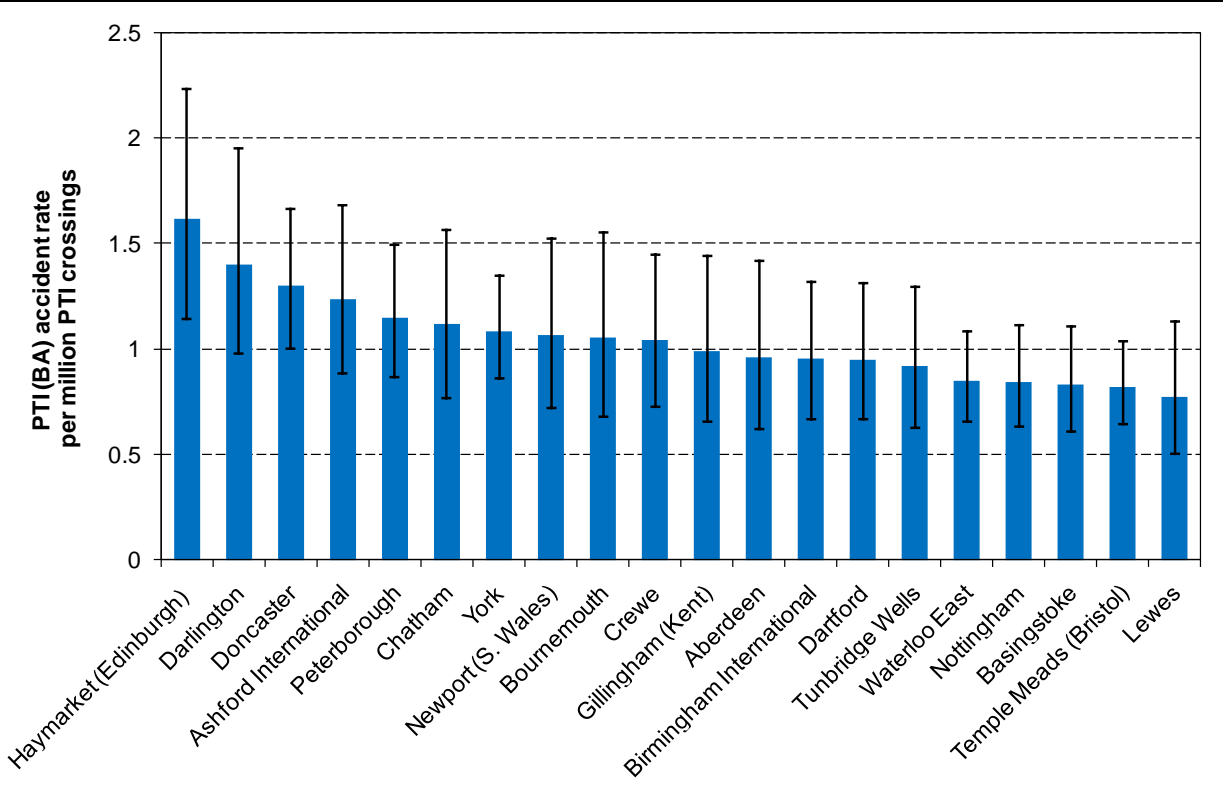
- East Coast Mainline and East Midlands Trains both have a relatively high rate of reported accidents when normalised by passenger journeys.
- The passenger profile and consequent reporting rates may vary between train operators.
- The train operators handling the most passengers, such as South West Trains, Southern and Southeastern, account for the highest number of accidents.

Factors affecting passenger risk

4.11 Station accident rates

In order to gain a better understanding of the accident rates in different stations, limits have to be put on the scope of the data used. For instance, a station used by few passengers, which may have had only one or two accidents in the past decade, could appear high on the list after normalisation. The next two charts illustrate the differences seen when using data filtered by either station usage, or the number of accidents per station. It should be noted that reporting rates vary between different areas and may affect the data.

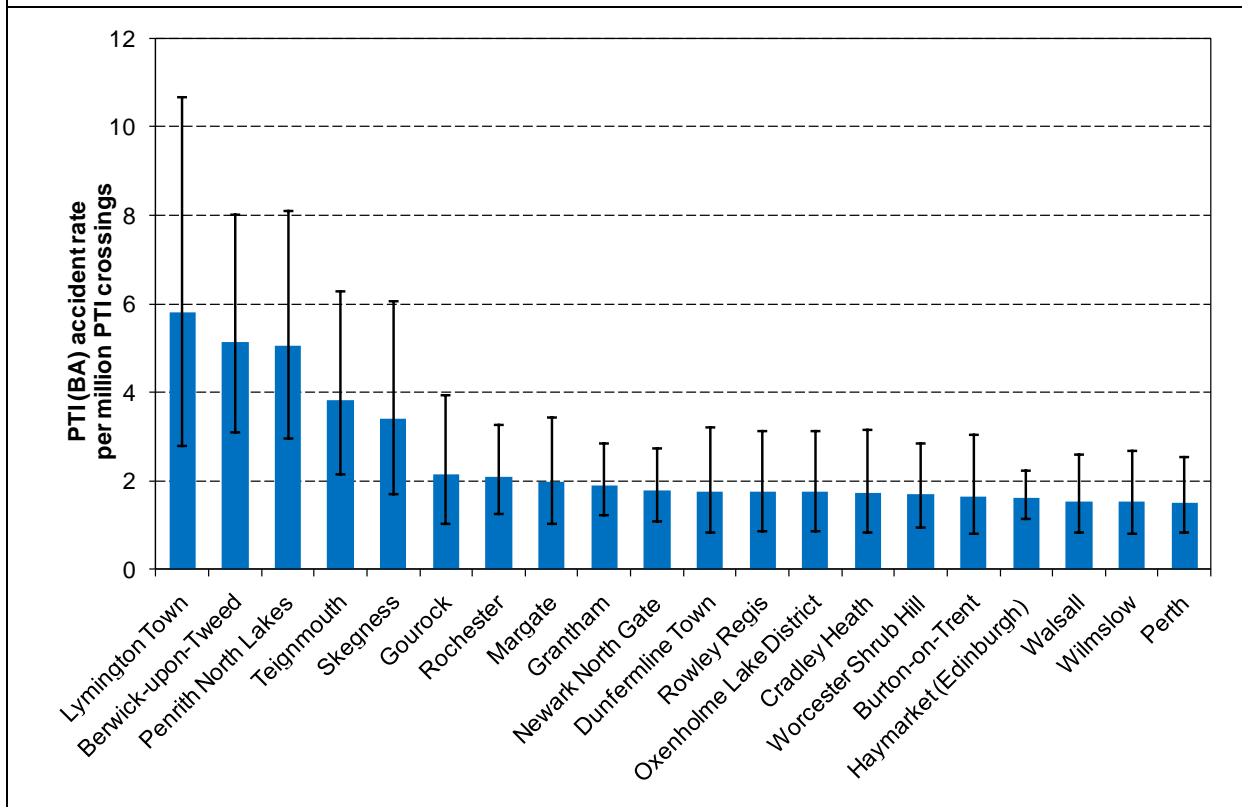
Chart 33. Stations by PTI (BA) accident rate (2001-2010), high usage stations only¹⁵



- When looking at stations with high numbers of PTI crossings, it appears that Edinburgh (Haymarket) has the highest accident rate.
- The confidence intervals are narrow enough to assume that many stations on this list have relatively high accident rates, and that the stations at the beginning of the list have a higher rate than those at the end. However, given more time and therefore more data, the exact order may change, and some stations especially those towards the end of the list could move outside the range of the chart.

¹⁵ Only stations in the top 200 in terms of PTI crossings are featured in this chart. The vertical error bars indicate 95% confidence intervals. The rates (2001-2010) are normalised by the number of PTI crossings (2008/09 data from ORR).

Chart 34. Stations by PTI (BA) accident rate (2001-2010), with highest numbers of accidents¹⁶



- A very different list emerges if only stations with higher accident numbers are considered, and some smaller stations enter consideration. However, it must be noted that the confidence intervals are relatively large. While the top five stations appear to have substantially high accident rates, the position in the chart of many of the rest of the stations will be affected by small variations in accident rate.
- This list contains many stations in leisure destinations such as the Lake District, the New Forest and seaside resorts. These stations may be used by less frequent, and therefore less experienced, travellers.

¹⁶ Only stations with 10 or more accidents in the last nine years are featured in this chart. There were 211 such stations. The error bars indicate 95% confidence intervals. The rates (from September 2001) are normalised by the number of PTI crossings (2008/09 data from ORR).

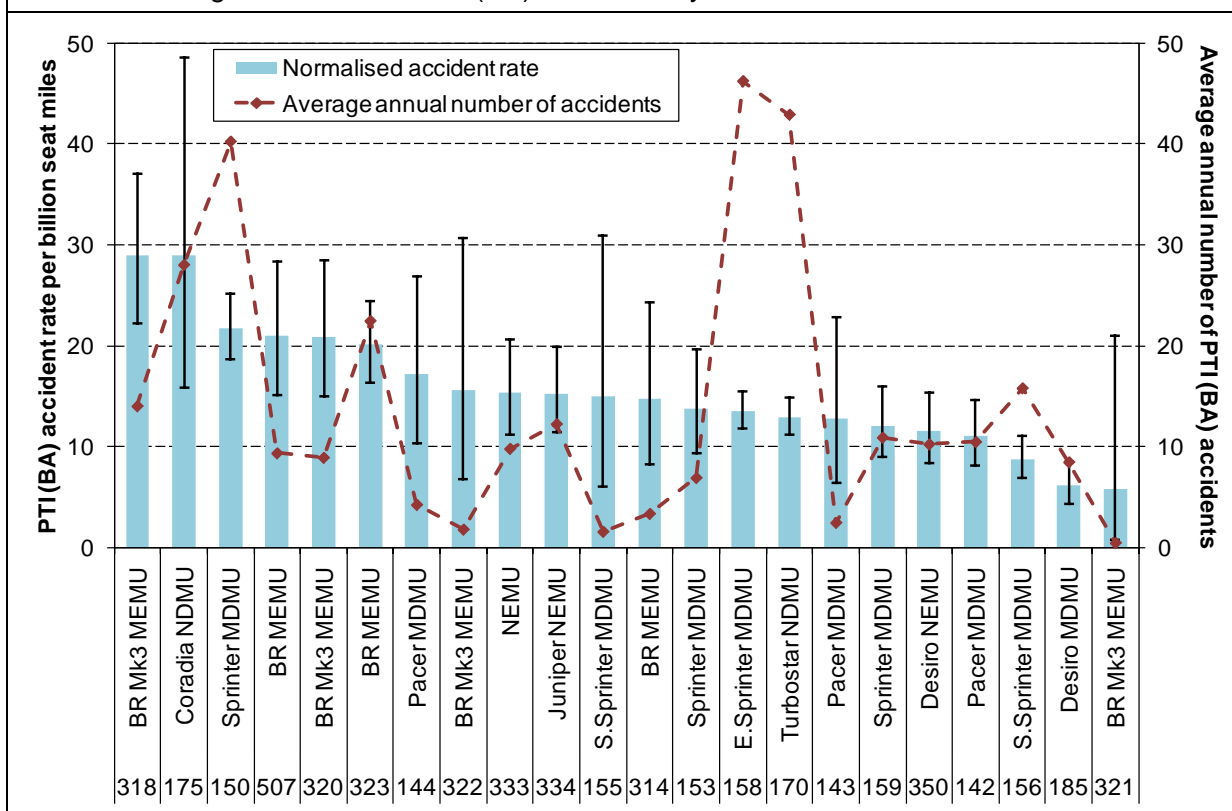
Factors affecting passenger risk

4.12 Unit class

4.12.1 Comparisons between different unit classes

As the exact number of PTI crossings made on each unit class is not known, this data has been normalised by seat mileage, which can provide an indication of usage. The data has then been grouped by the service types of regional, inter-city, and London & South East as they have different usage patterns and the number of stations served per mile. Variation in reporting rates between operators may affect the data.

Chart 35. Regional services: PTI (BA) accidents by unit class¹⁷ since 2006/07



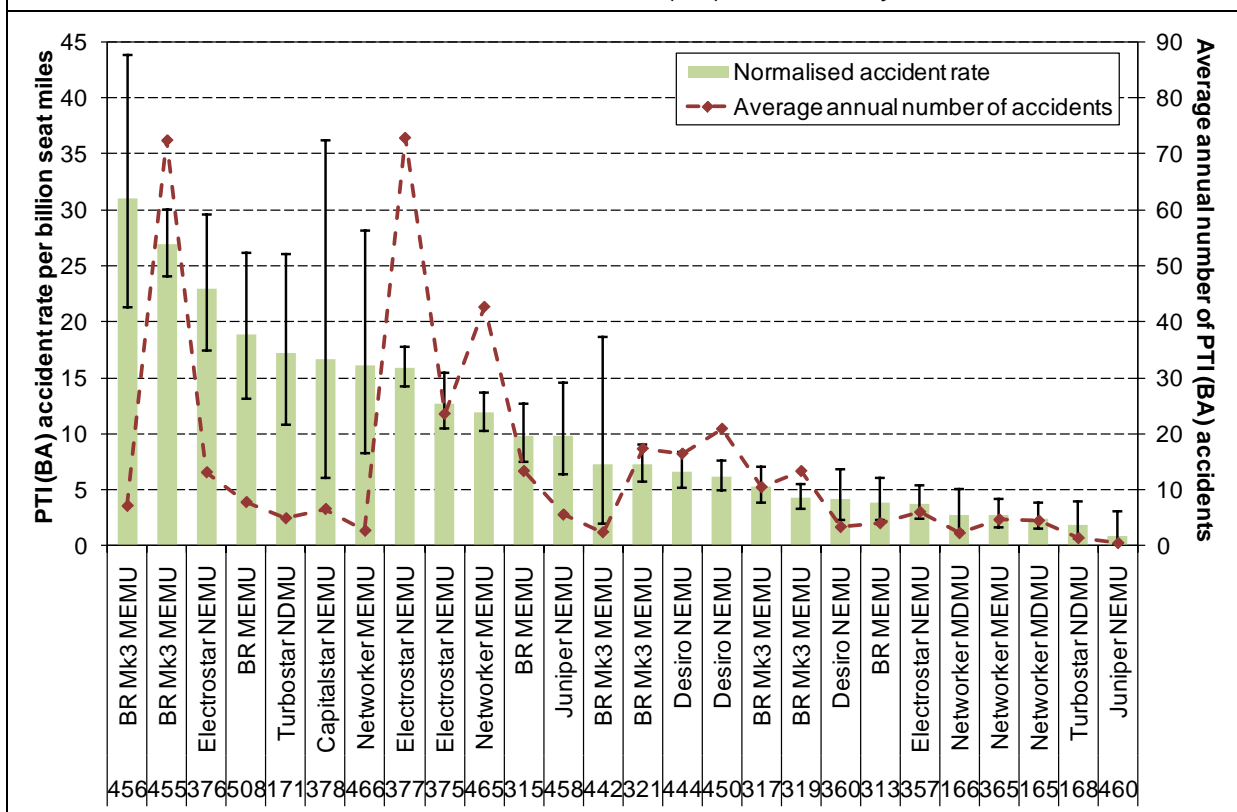
- It appears that the three unit classes used on regional services that have the lowest accident rates are Classes 321, 185 and 156. As only three Class 321 units are in use on regional services and there were only two accidents involving these units, the confidence in the position of this class on the chart is low.
- Classes 318 and 175 seem to have a high accident rate, although, as there was less normalising data available for Class 175s, there is less confidence of this rate.
- There appears to be no relation between the age of the unit¹⁸ and its accident rate.

¹⁷ Seat miles data has been obtained by combining unit miles data from Network Rail and ATOC together with unit capacities from *Traction Recognition* (2007) Colin J Marsden. The error bars indicate 95% confidence intervals.

¹⁸ The 'M' and the 'N' before DMU and EMU stand for 'Midlife' and 'New' respectively.

Factors affecting passenger risk

Chart 36. London and South East services: PTI (BA) accidents by unit class since 2006/07

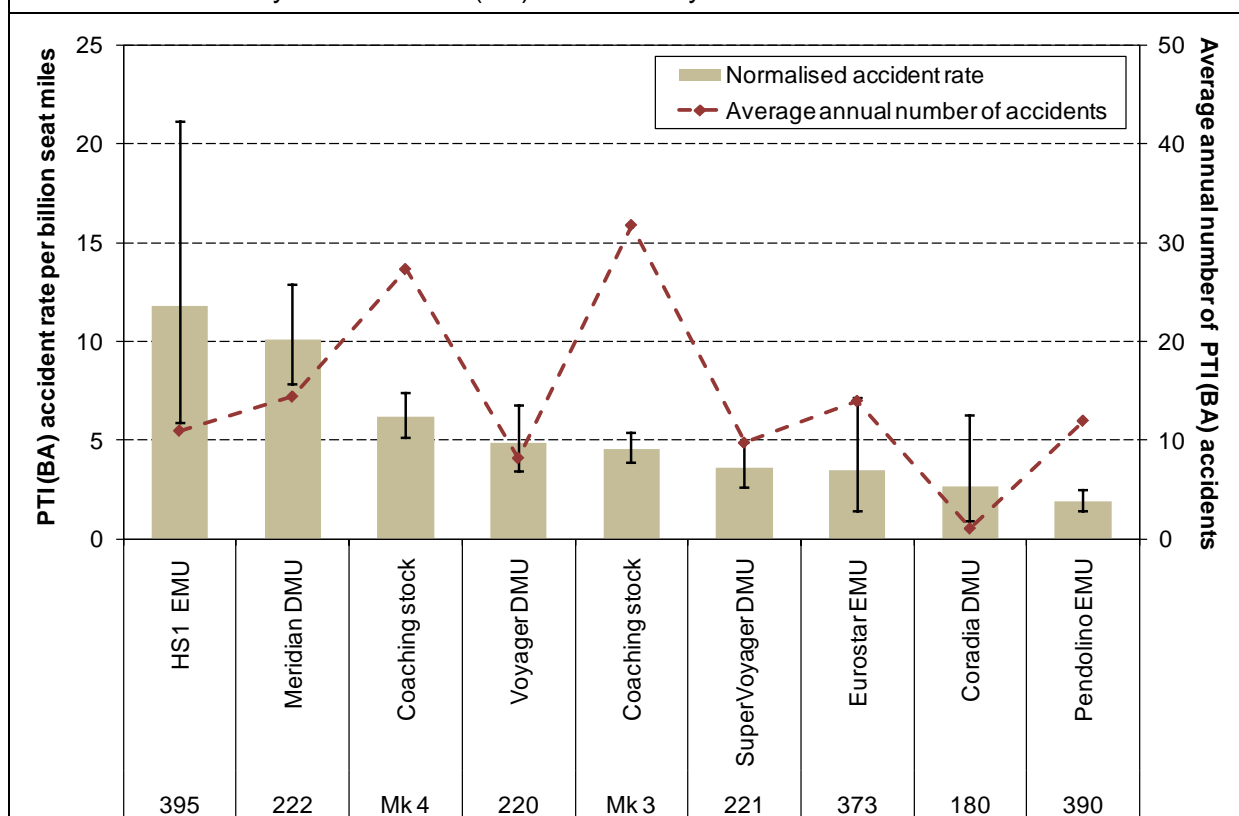


- Classes 460, 168, 165, 365 and 166 all appear to have low accident rates.
- The accident rate seen on Class 321 units is nearer the middle of the chart. There are 114 of these units in use on these London & South East services, which corresponds to a greater confidence level than the rate shown on Chart 35.
- It appears that Classes 456, 455 and 376 have high accident rates. The new Class 378 'Capitalstar' EMUs used on London Overground¹⁹ services also appear to have a higher accident rate, although as they were only introduced in July 2009, there is less confidence in the data.

¹⁹ An extra 10% was added to the seating capacity of Class 378s to take into account the larger standing capacity they have compared to other classes. The error bars indicate 95% confidence intervals.

Factors affecting passenger risk

Chart 37. Inter-city services: PTI (BA) accidents by unit class since 2006/07²⁰



- Class 395, 222 units and Mark 4 coaching stock appear to have high accident rates.
- The new Class 395 EMU has only been in service on High Speed 1 since June 2009, hence the wider confidence intervals associated with it. It is possible that new stock, such as this and the Class 378s used on London Overground, may have higher accident rates for a short period after introduction. Conceivably, as the public becomes used to their layout and method of operation etc, these rates may fall.

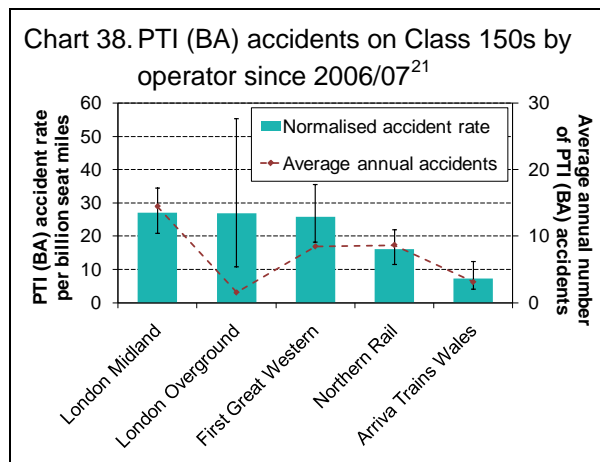
²⁰ A 'unit' of Mark 3 or 4 coaching stock was taken to be one coach. As their capacities vary greatly an average of intercity coaches was used. The error bars indicate 95% confidence intervals.

Factors affecting passenger risk

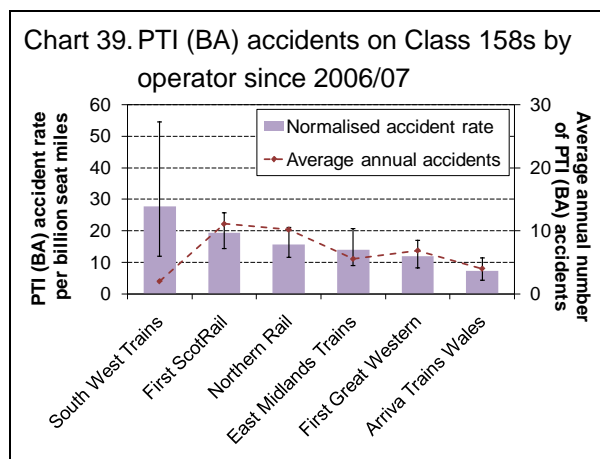
4.12.2 Comparisons between different operators of the same unit class

In order to confirm that the differences in accident rates seen on different unit classes are not all due to the differences in the way they are run, classes used by many different operators were compared.

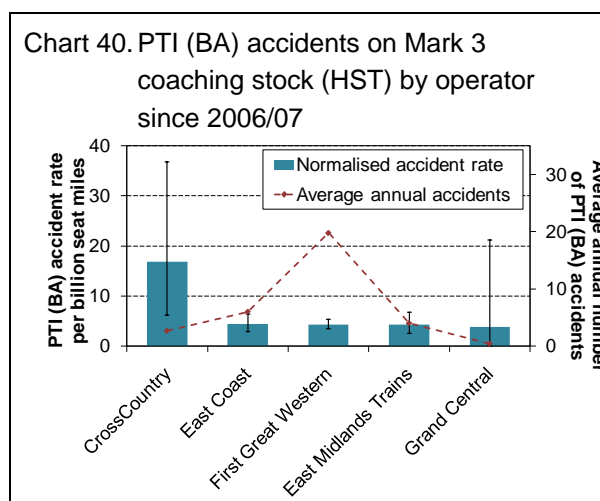
- Despite highly variable numbers of incidents, London Midland, London Overground and First Great Western all have similar normalised accident rates on Class 150 DMUs.
- London Overground has only been operating Class 150 units for a short period of time, therefore there is less confidence in the data.
- Northern Rail and Arriva Trains Wales have lower accident rates on Class 150 DMUs.



- There is more variation in normalised accident rates on Class 158 units than Class 150s.
- South West Trains has a higher accident rate, although it has only been operating Class 158s for a short period of time and therefore there is less confidence in the data.
- Arriva Trains Wales again has a low rate, it also has a low rate of accidents overall (see Chart 32).



- Most operators of Mark 3 coaching stock appear to have similar accident rates when normalised.
- CrossCountry has a higher accident rate, although it has only run for a short time, therefore there is less confidence in the data.

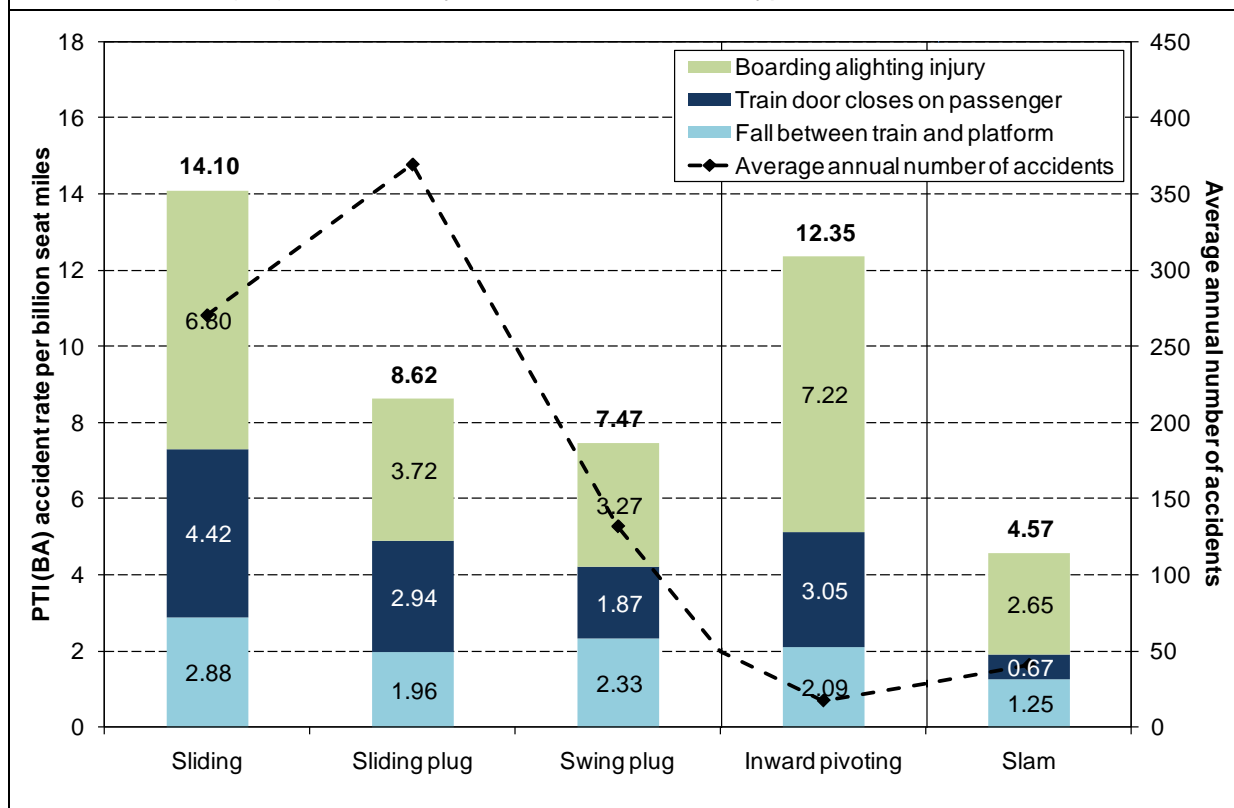


²¹ The error bars indicate 95% confidence intervals.

Factors affecting passenger risk

4.13 Unit door mechanism type

Chart 41. PTI (BA) accidents by unit door mechanism type since 2006/07



- It should be noted that, whereas sliding, sliding plug and swing plug doors can be found on units operating on all service types, inward pivoting and slam doors can only be found on units operating on regional (Class 142 and 143 'Pacers') and inter-city (Mark 3) services respectively. Therefore, the accident rates on trains with these types of doors must be considered separately, due to the variation in usage patterns and the number of stations served per mile.
- The rate of events where a passenger has fallen between the train and platform is relatively similar between door mechanism types. Events where passengers have been injured by closing doors appear to be more common on units with door mechanisms that are sliding, or sliding plug. Other injuries while boarding or alighting appear to occur at a higher rate on units using sliding doors.

5 Research and industry initiatives

Information about RSSB research and industry initiatives was obtained from research documents and company safety plans respectively. Similar projects and initiatives have been grouped together and grouped by whichever of the Four Es principles (consisting of *Education, Enabling, Engineering and Enforcement*) they relate to. This is shown in the table below:

Table 3. Examples of industry actions and research in relation to PTI risk grouped by the Four Es principles	
Education	<ul style="list-style-type: none"> • Risk assessment of train dispatch plans. • Implement slip trip and fall toolkit. • Improve passenger awareness of door closure procedures and other hazards. • Passenger information system improvements. • Identify risks at PTI. • Review of door closing times and door incidents. • PTI Risk research project. • Station safety seminar covering PTI risk.
Education, Enabling and Engineering	<ul style="list-style-type: none"> • Platform markings and improvements.
Education and Enforcement	<ul style="list-style-type: none"> • Train dispatch Rail Industry Standard.
Enforcement	<ul style="list-style-type: none"> • Intoxicated passenger identification
Enabling and Engineering	<ul style="list-style-type: none"> • Stepping distance review and controls. • Door modifications. • Reflective strips on door edges and door handles.

5.1 RSSB research

The following research projects covering station safety, specifically at the PTI have been undertaken and published:

T743 Improving the arrangements for train dispatch from stations

The research brief can be found at:

http://www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/research/T743_rb_final.pdf

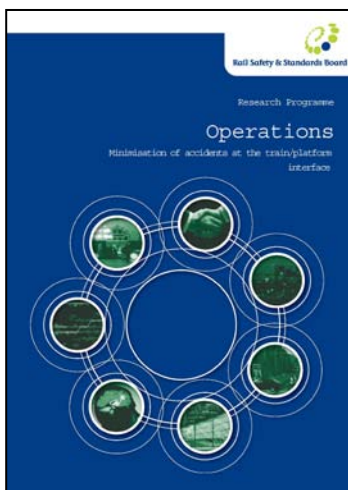
The full report can be found at:

http://www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/research/T743_rpt_final.pdf

A review of the current arrangements, considering risk and human factors, for train dispatch at stations.

Research and industry initiatives

T426 Minimisation of accidents at the PTI



The research investigated accidents that happen at the PTI, exploring the primary causes of such accidents, and the extent to which they can be reduced in number and severity. The project examined public (and staff) behaviours and made recommendations on how minor changes to operational procedures or designs could make cost-effective improvements.

The research brief can be found at:

http://www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/Research/T426_rb_final.pdf

The full report can be found at:

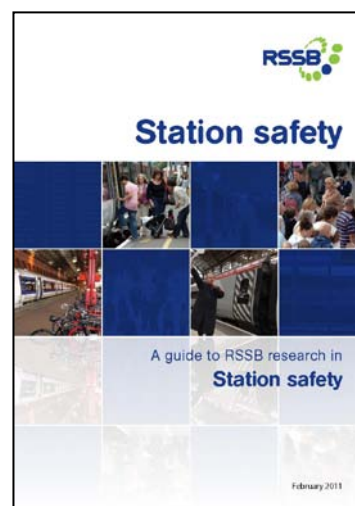
http://www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/research/T426_rpt_final.pdf

Station safety guide

A guide to RSSB's research in Station Safety was published in July 2009. An update should be available in early 2011. As well as covering slips, trips and falls, and PTI risk and mitigation actions, it covers related research into issues such as crowd management, tactile edges, wayfinding and signs, and how to deal with wintry conditions.

The current edition is available from RSSB or can be viewed on or downloaded from its website on the right hand side of the page at:

<http://www.rssb.co.uk/RESEARCH/Pages/PROGRAMMESCOPE.aspx>



Station safety seminar

A seminar was held in May 2009 to share research findings and good practice across industry regarding three key issues of station safety. It covered signage and wayfinding, platform-train interfaces, and crowding, which are three issues relating to station safety that both GB railways and London Underground manage on a daily basis.



The seminar presented findings from research conducted by London Underground and RSSB, in conjunction with industry partners, across these three different topic areas. The seminar provided an opportunity for interested parties across industry to discuss good practice relating to these common themes. For those who could not attend the seminar, a video of each of the presentations was produced and these can be viewed on the Opsweb website. The benefits of the event included making research available to a wide range of people and helping them with the implementation of good practice to improve safety and customer satisfaction.

http://www.rssb.co.uk/SiteCollectionDocuments/pdf/reports/Research/T862_rb_final.pdf

5.2 Rail Industry Standard: Train dispatch

The document RIS-3703-TOM Rail Industry Standard (RIS) for Passenger Train Dispatch and Platform Safety is written to provide a broad consideration of as many risks as feasible relating to train dispatch and sets out the operational requirements and the management of behaviour on station platforms.

Some of the activities considered in the RIS include:

- The development of the train dispatch process based on risk assessment
- Visibility to carry out a train safety check and monitoring during departure
- Staff roles and responsibilities
- Performance, review and error management
- Communication
- Promoting safe passenger behaviour
- Signage, posters and announcements

A RIS was published in June 2011 and is not mandatory unless or until an infrastructure manager or a railway undertaking specifies all or part of them in company procedures or contract conditions.

Concluding remarks

6 Concluding remarks

PTI risk accounts for the largest proportion of passenger fatality risk, and the second largest proportion of passenger FWI risk. Although most of the PTI FWI risk occurs while boarding or alighting, most of the PTI fatality risk occurs while not boarding or alighting the train.

There has been an increase in the number of accidents at the PTI since 2005/06, even when accounting for the increase seen in passenger journeys until 2009/10.

There are many factors which affect the occurrence of accidents at the PTI. These factors overlap, making up a complex list of criteria that contribute to the accident rate. This means some of the effect of a particular factor may be hidden by the effects of other factors.

The factors that can be shown to have an effect on the occurrence of accidents at the PTI include:

- Gender of the passenger
- Intoxication of the passenger
- Time of day or week that the journey is taking place
- The weather at the time of the journey
- Seasonal changes in the passengers demographic
- Whether the passenger was boarding or alighting the train
- The station and train operator
- The unit class and the type of door mechanism in use on each unit class

Risk at the PTI is not limited to passengers. Members of the public, visiting stations for reasons other than travel (eg shopping, socialising, or meeting/seeing off passengers) are also affected by PTI-related risk.

RSSB's research continues in this area; the final results will be presented to the Operations Focus Group during 2011. The rail industry is also taking steps to deal with these issues, including improving platform markings, implementing a slip, trip and fall toolkit, risk-assessing train dispatch plans, and fixing reflective strips to door edges and handles to increase visibility.

In addition, RED 28 focuses on the PTI issue, by featuring a dramatisation of an incident and suggestions on how to minimise the hazards.

Appendix 1. List of fatalities at the PTI

Passenger PTI (BA) fatalities

Year	Date/time	Location	Age	Intoxication	Gender	SRM precursor
2001/02	29/07/2001 18:14	Clapham Junction	48	No	Male	Passenger fall between train and platform other/unknown
2006/07	13/02/2007 23:42	Haddenham & Thame Parkway station	37	No	Male	Passenger fall between train and platform whilst alighting

Passenger PTI (not BA) fatalities

Year	Date/time	Location	Age	Intoxication	Gender	SRM precursor
2001/02	11/03/2002 19:33	Bootle New Strand	69	Yes	Male	Fall from platform and struck by train under influence of alcohol
2001/02	11/11/2001 14:40	Cricklewood	18	No	Female	Fall from platform and struck by train - general causes
2002/03	22/03/2003 19:57	Wivelsfield	43	Yes	Male	Struck by train due to standing too close to platform edge
2002/03	03/03/2003 18:51	Luton Airport Parkway station	60	No	Male	Fall from platform and struck by train - general causes
2002/03	13/08/2002 22:44	Bexhill	22	Yes	Male	Fall from platform and struck by train under influence of alcohol
2002/03	17/01/2003 13:26	Bickley rail staion	55	Yes	Male	Fall from platform and struck by train under influence of alcohol
2002/03	18/05/2002 14:00	Catford Rail station	19	No	Male	Struck by train due to standing too close to platform edge
2003/04	10/10/2003 21:38	Brockley Whins	17	Yes	Male	Fall from platform and struck by train under influence of alcohol
2003/04	23/08/2003 22:48	Woolwich Dockyard	26	Yes	Male	Electric shock at station (conductor rail)
2003/04	04/04/2003 21:35	Manor Park	51	No	Male	Fall from platform and struck by train - general causes
2004/05	07/01/2005 23:28	North Queensferry station	17	Yes	Male	Fall from platform and struck by train under influence of alcohol
2004/05	06/07/2004 00:40	Bushey station	20	Yes	Male	Electric shock at station (conductor rail)
2004/05	11/01/2005 18:48	Clapham Junction Station	43	Yes	Male	Struck by train due to standing too close to platform edge
2005/06	25/03/2006 01:44	Pembrey & Burry Port station	27	Yes	Female	Fall from platform and struck by train under influence of alcohol
2006/07	29/06/2006 16:55	Hersham station	40	No	Male	Electric shock at station (conductor rail)
2006/07	25/06/2006 23:55	Habrough	17	Yes	Female	Fall from platform and struck by train under influence of alcohol
2006/07	25/01/2007 15:57	Treorchy station	15	No	Male	Struck by train due to standing too close to platform edge
2007/08	21/11/2007 22:58	Glengarnock	26	Yes	Male	Fall from platform and struck by train under influence of alcohol
2007/08	25/02/2008 12:35	Hilsea station	22	Yes	Male	Struck by train due to standing too close to platform edge
2007/08	07/11/2007 14:52	Cambuslang	19	Yes	Male	Struck by train due to standing too close to platform edge
2008/09	18/02/2009 15:25	Whyteleafe	40	No	Male	Electric shock at station (conductor rail)
2008/09	04/10/2008 11:28	Seaforth and Litherland Station	88	No	Male	Fall from platform and struck by train - general causes
2008/09	23/02/2009 00:15	London Bridge	40	No	Male	Fall from platform and struck by train - general causes
2009/10	03/01/2010 20:13	Carshalton Beeches	52	Yes	Male	Fall from platform and struck by train under influence of alcohol
2009/10	11/11/2009 13:19	West Ealing station	32	No	Male	Struck by train due to standing too close to platform edge
2009/10	21/11/2009 23:53	Angmering	16	Yes	Female	Struck by train due to standing too close to platform edge
2009/10	30/01/2010 06:20	Streatham Station	23	No	Male	Electric shock at station (conductor rail)
2010/11	23/07/2010 18:23	Twickenham	55	No	Male	Electric shock at station (conductor rail)
2010/11	08/07/2010 15:05	Langley Green	42	Yes	Male	Fall from platform and struck by train under influence of alcohol
2010/11	05/06/2010 23:39	Earlsfield	43	Yes	Male	Electric shock at station (conductor rail)
2010/11	22/09/2010 22:18	Sudbury and Harrow Road	29	Yes	Male	Fall from platform and struck by train under influence of alcohol

Public PTI (not BA) fatalities

Year	Date/time	Location	Age	Intoxication	Gender	SRM precursor
2006/07	23/02/2007 23:00	Seven Kings	42	No	Male	MOP struck by train due to standing too close to platform edge
2006/07	11/01/2007 00:40	Gidea Park	33	Yes	Male	MOP struck by train due to standing too close to platform edge
2007/08	22/08/2007 22:04	Shoreham	16	No	Male	MOP struck by train due to standing too close to platform edge
2010/11	01/07/2010 22:49	Stansted Mountfitchet	28	Yes	Male	MOP struck by train due to standing too close to platform edge

Appendix 2. Definitions

Term	Definition
Shock and trauma	Class 1 shock can be due to witnessing a fatality or being involved in a collision, derailment or train fire without suffering a physical injury. Shock from other causes, such as verbal abuse, near misses and witnessing non-fatal assaults, is called Class 2.
Fatality	Including where death occurs within one year of an incident.
Hazardous event	An event with the potential to cause death or injury.
Major injury	This is as defined in RIDDOR 1995, and applies to passengers, staff and members of the public. It includes injuries such as fractures, amputations, loss of sight or those resulting in admittance to hospital for a period of over 24 hours.
Minor injury	This is defined as injuries to passengers, staff or members of the public that are not major injuries. Note that while shock is not classified as a minor injury in RIDDOR 1995, it has been included as such in the Safety Risk Model.
Passenger	A person travelling or intending to travel, whether or not in possession of a ticket. Passengers who are trespassing are not included – they are regarded as ‘Public’.
PTI crossings	The number of times the PTI has been crossed by passengers, used to normalise data when comparing station accident rates. The number of PTI crossings is the number of passenger station entries and exits, added to twice the number of passenger interchanges.
Public (members of)	Trespassers, persons on business and other persons who are not passengers or workforce members. This includes passengers who are trespassing (when crossing tracks between platforms, for example).
RIDDOR (Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, 1995)	This is a set of health and safety regulations that require any major injuries, illnesses or accidents occurring in the workplace to be formally reported to the enforcing authority. It defines major injuries and lists notifiable diseases - many of which can be occupational in origin. It also defines notifiable dangerous occurrences - such as explosions, structural collapse, electrical overloads and fires - where no injury occurs but subsequent investigations may be needed.
Safety Risk Model (SRM)	A quantitative representation of the safety risk that can result from the operation and maintenance of the GB rail network. It comprises 125 individual computer-based models, each representing a type of hazardous event (defined as an event or incident that has the potential to result in injuries or fatalities).
SMIS (Safety Management Information System)	This is a national database used by Railway Group members to record any safety related events that occur on the railway. SMIS data is accessible to all members, so that it may be used to analyse risk, predict trends and focus action on major areas of safety concern.
Strategic Safety Plan	This is a joint statement by the companies responsible for Britain’s mainline rail network setting out the agreed industry approach to managing safety. The 2009-14 plan was developed by bringing together commitments made by industry companies in their own individual safety plans, thus creating a linkage with the duty holder planning process.
Train accidents	In general, this refers to accidents occurring to trains and rolling stock, as reportable under RIDDOR 1995. However, non-RIDDOR reportable incidents that occur in yards, depots or sidings (such as shunting derailments that do not foul a running line) are also classed as ‘train accidents’.
Trip	A door-to-door journey including one or more ‘stages’ such as walk, train journey, walk.
Trespass	The term ‘trespass’ is defined as occurring when people go where they are never authorised to be, rather than where they behave inappropriately (either from error or violation) at places where they are allowed to be at certain times and under certain conditions (such as level crossings).

Term	Definition
Weighted injury	In this document, the numbers of major and minor injuries are weighted in recognition of their relatively less serious outcome in comparison to a fatality. The current weighting is 0.1 of a fatality for each major injury, 0.005 for each minor injury reportable under RIDDOR and for Class1 shock or trauma and 0.001 for non-reportable injuries or Class 2 shock or trauma. The combined measure is designated 'fatalities and weighted injuries' (FWI). The term FWI replaces 'equivalent fatalities', which was used previously within the industry.

Appendices

Appendix 3. Glossary

Acronym	Expansion
ATOC	Association of Train Operating Companies
DfT	Department for Transport
FWI	fatalities and weighted injuries
MDMU	midlife diesel multiple unit
MEMU	midlife electric multiple unit
NDMU	new diesel multiple unit
NEMU	new electric multiple unit
NRMI	Network Rail managed infrastructure
ORR	Office of Rail Regulation
PTI	Platform train interface
PTI (BA)	PTI accidents while boarding or alighting
PTI (not BA)	PTI accidents not while boarding or alighting
RIDDOR	Reporting of Injuries, Diseases and Dangerous Occurrences Regulations
RIS	rail industry standard
RSSB	Rail Safety and Standards Board (its legal name is now RSSB)
SMIS	Safety Management Information System
SRMv6	Safety Risk Model version 6
SSP	Strategic Safety Plan