

Establishing direct and contributory factors to the uncontrolled movement of Heavy Goods Vehicles (HGVs) during coupling and uncoupling

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Establishing direct and contributory factors to the uncontrolled movement of Heavy Goods Vehicles (HGVs) during coupling and uncoupling

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A number of fatal or major vehicle incidents are reported to the Health and Safety Executive and local authorities every year where heavy good vehicle drivers have been injured during the coupling and/or uncoupling of the tractor and the trailer unit. When coupling and uncoupling the trailer to and from the tractor unit, the parking brakes on both units should be applied to ensure that neither unit is able to move in an uncontrolled manner. Unintended movement is known as a vehicle runaway.

The study explored the factors that contribute to vehicle runaways using a multi-method approach, which included: i) conducting a literature search, ii) reviewing relevant incidents reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, iii) carrying out an online consultation survey of trade association members, and iv) conducting interviews with drivers, supervisors and manufacturers.

Failure to apply the cab handbrake and/or trailer parking brake was identified as the primary reason contributing to vehicle runaways. A combination of individual, job and organisational factors were identified as affecting drivers' behaviours, and particularly the extent to which the cab handbrake and/or trailer parking brake would be applied. Provision of easily accessible controls, physical solutions (e.g. interlocks, cab alarms), supervision and raising risk awareness were control measures identified that could help prevent vehicle runaways.

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KEY MESSAGES

- Failure to apply the cab handbrake and/or trailer parking brake was identified as the primary reason contributing to Heavy Good Vehicle (HGV) runaway incidents.
- Technical failures, such as the trailer parking brake not being properly engaged due to an under-utilisation of the park valve, and/or the braking system not being correctly installed, were also acknowledged as potential factors contributing to runaway incidents.
- A combination of individual, job and organisational factors were identified as affecting drivers' behaviours, and particularly the extent to which the cab handbrake and/or trailer parking brake would be applied.
- Distractions, complacency and the adoption of bad practices (e.g. relying on the emergency braking system), as well as a lack of technical knowledge and poor appreciation of risks (e.g. beliefs that the trailer parking brake is not necessary to prevent the cab-trailer configuration from moving) were perceived as contributing to failures in applying the cab handbrake and/or trailer parking brake.
- Job factors including i) being unable to locate the trailer parking brake when working with unfamiliar/hire trailers, and ii) difficulty in accessing the trailer parking brake due to loading bay design (e.g. as there is often limited space between parked trailers and/or between the loading bay aisles) were also identified as contributing factors.
- Dropping and picking up trailers at ports were perceived as discouraging the use of the trailer parking brake (e.g. due to trailers being parked closely together).
- Organisational factors such as time pressures, insufficient driver training, and a lack of understanding of the correct coupling and uncoupling procedures were also perceived as contributing to the extent to which drivers will use the cab handbrake or trailer parking brake.
- Effective means of preventing vehicle runaways included i) interlocks that automatically apply the trailer parking brake when the red airlines are disconnected, ii) automatic site systems (e.g. 'locking' trailer wheels), and iii) loading bays that slope downwards toward the loading ramp.
- Cab alarms that remind drivers to apply the handbrake were also perceived as helpful in preventing vehicle runaways particularly where an electronic voice box is used and distinct sounds alert drivers to different situations (e.g. applying the handbrake vs. switching lights off).
- Additional control measures that could help prevent vehicle runaway incidents include: i) positioning of the trailer parking brake in a location that is more easily accessible to drivers (e.g. near the airlines), ii) supervision and monitoring to ensure that trailer parking brakes are applied, iii) provision of driver training and refreshers to raise awareness of the risks and reinforce the importance of following safe coupling/uncoupling procedures, and iv) promoting a positive safety culture by challenging unsafe coupling/uncoupling practices.

EXECUTIVE SUMMARY

BACKGROUND

A number of fatal or major vehicle incidents are reported to the Health and Safety Executive (HSE) and local authorities every year where heavy good vehicle (HGV) drivers have been injured during the coupling and/or uncoupling of the tractor and the trailer unit. The stakeholders involved in HSE's Logistics Strategy have identified this topic as a key issue for industry to resolve in order to reduce the number of injuries, fatalities and vehicle/property damage.

HSE commissioned the Health and Safety Laboratory (HSL) to conduct a study exploring the factors contributing to incidents during coupling and/or uncoupling of the tractor and trailer unit. It is envisaged that existing guidance on the topic will be updated by industry stakeholders using, among other sources, the evidence gathered from the study.

RESEARCH AIM

The aim of the research is to identify the direct and contributory factors to incidents occurring to HGV and shunter¹ drivers during the coupling and/or uncoupling of the tractor and the trailer unit, and to suggest the most appropriate way to tackle this issue.

METHODOLOGY

A mixed method approach was adopted combining different data collection methods and sources. A brief desktop-based literature search was conducted in order to identify published studies that had specifically examined the factors that contribute to coupling/uncoupling incidents. No relevant studies were identified although a small selection of relevant documents (e.g. guidance, practitioner articles) was consulted on the topic. Further, incidents reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) were reviewed to identify the nature, frequency and the factors contributing to vehicle runaway incidents. A total of 72 incidents were identified where the injured person was struck by the uncontrolled movement of a HGV or lorry.

An online consultation survey was conducted and the views of 214 trade association members were obtained regarding the factors that contribute to vehicle runaways, and the effectiveness of vehicle and site systems for preventing these types of incidents. For survey populations of more than 50,000², a sample of 0.8 % respondents is required. The sample obtained was below this level however it was considered to be sufficient given the consultation nature of the survey, which was used as part of a multi-method approach. Of the 214 survey responses, 134 (62.6%) were from individuals who held managerial positions, 54 from HGV/shunter drivers (25.2%), and 26 (12.1%) from supervisors.

Additionally, interviews with drivers and supervisors were conducted across 4 organisations (2 parcel delivery and 2 haulage operators). A purposive sampling approach was adopted for the recruitment of organisations to take part in the study. Specifically, the sample was selected in a non-random and deliberative manner, choosing participants for their knowledge and experience in the topic as well as the particularity of their work context. A total of 15 interviews were conducted, 11 with drivers and 4 with supervisors. Telephone interviews were also conducted

¹ Shunter driving involves driving vehicles in company premises only rather than on public roads. Shunter drivers may also, however, hold a license to drive HGVs on the road.

² This is based on approximate numbers of newsletter readership across the respective trade associations.

with three types of manufacturers (1 truck manufacturer, 1 brake manufacturer and 1 interlock system manufacturer).

RESULTS

Factors contributing to vehicle runaways

The RIDDOR analysis showed that for the incidents meeting the database search criteria (N=72), failure to apply the cab handbrake and/or trailer parking brake was the primary reason contributing to vehicle runaway incidents. One of the research caveats was that there was insufficient information in the records to be able to determine the type of brake that had not been applied and the reasons for failing to do so. The RIDDOR analysis was complemented by the survey and the qualitative interviews and provided an insight into the aforementioned issues.

Just under half of the survey respondents (44%, N=84) believed that failure to apply the vehicle/cab parking brake was most likely to contribute to vehicle runaways, followed by distractions (e.g. talking to colleagues) (26% of respondents, N=49), and forgetting to apply the trailer parking brake (13% of respondents, N=24).

Findings from the interviews suggest that failure to apply the cab handbrake and/or trailer parking brake was consistently perceived as the primary reason contributing to vehicle runaways. Technical failures, such as the trailer parking brake not being properly engaged, were also acknowledged. A combination of individual, job and organisational factors were perceived as contributing to the extent to which the cab handbrake and/or trailer parking brake will be applied.

Individual factors included:

- Forgetting to apply the cab handbrake/trailer parking brake when distracted,
- Complacency and the adoption of bad practices, and
- Lack of technical knowledge and poor appreciation of risks.

Job factors included:

- Not being able to locate the trailer parking brake when working with hire/unfamiliar trailers,
- Difficulty in accessing the trailer parking brake due to limited space between parked trailers and/or between the loading bay aisles particularly among distribution centres,
- Certain site operations, such as ‘dropping and picking up’ trailers at ports discourage the use of the trailer parking brake (e.g. due to trailers being parked very closely).

Organisational factors included:

- Forgetting to apply the cab handbrake/trailer parking brake due to the perceived pace of work i.e. time pressures, and
- Insufficient driver training and a broader lack of understanding of the correct coupling and uncoupling procedures.

Systems for preventing vehicle runaways

Over half of the sample (52%) reported that audible or visual warning devices were the most effective system for preventing vehicle runaways, followed by interlocks (40%), and wheel chocks (23%). Drivers who indicated that they had either an audible or visual warning system in the cab (N=33) reported that they did not find the system distracting (N=29; 88% of driver sample). The majority of drivers indicated that their tractor unit and trailers did not have an

interlock system to automatically apply the parking brake (86%, N=37 and 74%, N=31 respectively). Among those drivers (N=17) that indicated that they had access to wheel chocks, 83% (N=10) reported that they used them ‘always’ and/or ‘sometimes’.

The findings from the interviews suggested that both interlocks and cab alarms were perceived as an effective means of preventing vehicle runaways. Having an ‘electronic voice’ (rather than a simple sounder) reminding the driver to apply the cab handbrake, and different sounds to indicate different functions that the driver had to attend to (apply handbrake versus switching lights off) were highlighted as particularly useful features. Automatic site systems (e.g. locking trailer wheels) and loading bays that slope downwards toward the loading ramp were also perceived as an effective means of preventing vehicle runaways.

Health and safety arrangements

Specific aspects of health and safety (H&S) arrangements or management (reporting, training provision and monitoring/supervision) were examined as these organisational factors may either encourage or discourage individual safety behaviours.

Driver training on the use of parking brakes

Among the driver sample, 64% (N=25) reported that they had received training in the use of trailer parking brakes whilst 26% (N=14) that they had not. Three of the four companies that took part in the study had annual driver refreshers in place. These were conducted by ‘driver coaches’ or assessors who would observe the drivers carry out different activities on the job. It was suggested that during these observations coaches would point out to drivers any incorrect practices, such as failing to apply the cab handbrake and trailer parking brake. Two companies indicated that they had given some form of training to drivers on using the interlocks on new trailers.

Reporting of vehicle runaways

Forty-eight percent of drivers (N=23) indicated that they had personally experienced a vehicle runaway. Among those, 43.5% (N=10) said that they had reported it. Two thirds of drivers (60.9%, N=14) indicated that the incident resulted in neither injury nor damage. The interview findings suggested that surveillance or site monitoring was perceived as facilitating the reporting of vehicle runaways or near misses. It was also suggested that drivers would not admit to making a mistake (such as forgetting to apply the trailer parking brake) for fear of the potential repercussions of doing so (e.g. going through a disciplinary). The consequences of not reporting a vehicle runaway appeared to vary across the sites that took part ranging from potential dismissal to the organisation failing to take any action in response to the incident or near miss.

H&S communication

Different types of H&S communications were identified across the four companies, including H&S meetings, newsletters, and toolbox talks. Communications specifically on vehicle runaways appeared to be reactive often in response to a related incident in the organisation. Annual driver refreshers conducted by three companies were reportedly used as opportunities to remind drivers of the need to follow safe coupling/uncoupling procedures.

Suggestions for improvement

Several suggestions were offered on how to improve the management of risks associated with vehicle runaways, including:

- Positioning the trailer parking brake towards the front of the trailer near the airlines to make it more accessible to drivers,
- Sites enforcing the use of trailer parking brakes (e.g. through spot checks and more site surveillance), and
- Improving driver awareness of the risks associated with failure to follow safe coupling/uncoupling procedures (through training for example).

Additional engineering solutions suggested (i.e. other than already existing systems, such as interlocks) involved having a system that would automatically apply the cab handbrake.

Implications

Human-centred design, such as positioning controls in a location that is easily accessible, physical solutions (e.g. interlocks, cab alarms) and provision of reminders are some suggested controls that organisations can implement to help prevent vehicle runaways, and guard against human error associated with lapses in concentration (due to distractions for example). Additionally, effective supervision to ensure coupling/uncoupling procedures are followed, promoting a positive safety culture (e.g. by encouraging the reporting of vehicle runaways or near misses, proactive H&S communication on risks involved), and driver training including refreshers can help guard against complacency and the development of bad practices over time. Loading bays that slope downwards toward the loading ramp may be an effective solution where workplace design may make it difficult or dangerous for drivers to access the trailer parking brake.

CONTENTS PAGE

1.	INTRODUCTION	1
1.1	Background	1
1.2	Research aim	2
1.3	Objectives	2
2.	METHODOLOGY	3
2.1	Brief desk-based Literature review	3
2.2	RIDDOR data	3
2.3	Consultation survey of trade association members	4
2.4	Qualitative interviews	4
2.5	CCTV data	5
3.	RESULTS	7
3.1	Factors contributing to vehicle runaways	7
3.2	Systems for preventing vehicle runaways	11
3.3	H&S arrangements	13
3.4	Suggestions for improvement	16
4.	IMPLICATIONS	17
5.	APPENDICES	19
5.1	Appendix 1: Survey development and data collection	19
5.2	Appendix 2: Survey question set	19
5.3	Appendix 3: Interview question set for drivers and supervisors	23
5.4	Appendix 4: Question set for manufacturers	24
5.5	Appendix 5: Graphs	25

1. INTRODUCTION

1.1 BACKGROUND

A number of fatal or major vehicle incidents are reported to the Health and Safety Executive (HSE) and local authorities every year where heavy good vehicle (HGV) drivers have been injured during the coupling and/or uncoupling of articulated goods vehicles. Articulated HGVs consist of a tractor unit (cab) and a trailer unit. A mechanical connection known as the fifth wheel connects the tractor unit and the trailer. Air and electrical connections are also made between the two (see Figure 1 below).

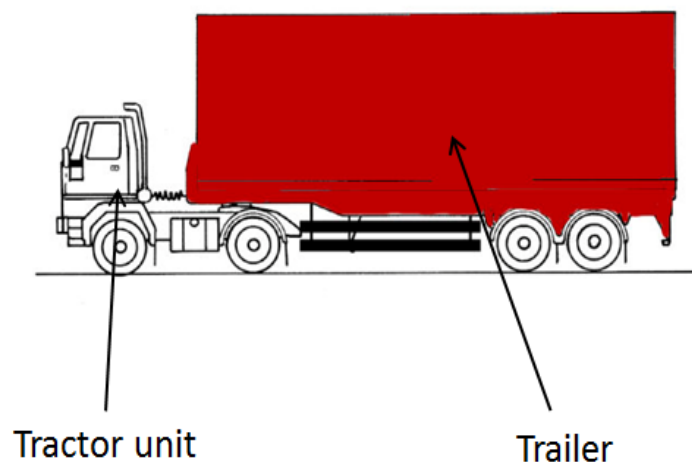


Figure 1 Trailer and tractor unit of an articulated heavy goods vehicle

The tractor unit and trailer have individual braking systems, both for operation while the vehicle is travelling (the service brakes), and when the vehicle is parked (the parking brakes). When coupling and uncoupling the trailer to and from the tractor unit, the parking brakes on both units should be applied to ensure that neither unit is able to move in an uncontrolled manner. Unintended movement is known as a vehicle runaway. The stakeholders involved in HSE's Logistics Strategy have identified this topic as a key issue for industry to resolve in order to reduce the number of fatalities and vehicle/property damage.

HSE commissioned the Health and Safety Laboratory (HSL) to conduct a study exploring the factors contributing to incidents during coupling and/or uncoupling of the tractor and trailer unit. It is envisaged that existing guidance on the topic will be updated by industry stakeholders using, among other sources, the evidence gathered from the study. The update will include areas where practices are not consistent across industry in particular the coupling and uncoupling of HGVs in ports³. From here on, the term 'vehicle runaways' will be used to describe accidents that happen during the course of coupling and/or uncoupling of the tractor and trailer unit.

³ For instance, applying the trailer parking brake is not common practice in the ports industry for safety reasons, whilst it does apply in all other industries.

1.2 RESEARCH AIM

The aim of the research is to identify the direct and contributory factors to accidents occurring to HGV and shunter⁴ drivers during the coupling and/or uncoupling of the tractor and the trailer unit and to suggest the most appropriate way to tackle this issue.

1.3 OBJECTIVES

In order to address this aim, a number of research objectives will be explored as follows:

1. To review previous research to identify factors already known to contribute to HGV drivers' incidents.
2. To analyse relevant data under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 2013 (RIDDOR) to identify the nature, frequency of incidents and factors implicated in the reported accidents.
3. To ascertain the effectiveness of systems currently used to prevent vehicle runaways by surveying trade association members.
4. To gather the views of brake and trailer manufacturers to identify the most appropriate position for a trailer parking brake and engineering solutions to tackle the problem.
5. To gather the views of HGV drivers and supervisors on vehicle runaways to identify human, organisational and design factors contributing to incidents and suggestions for improvement.
6. To obtain an objective explanation of the HGV drivers' current practice by monitoring vehicles movements (e.g. use of trailer parking brakes).

⁴ *Shunter driving involves driving vehicles in company premises only rather than on public roads. Shunter drivers may also, however, hold a license to drive HGVs on the road.*

2. METHODOLOGY

A mixed-method approach was used involving different methods of data collection (interviews, survey, and RIDDOR data) and various sources (brake and truck manufacturers, supervisors, HGV/shunter drivers, trade association members). The triangulation of views using different methods of data collection and sources would help provide a comprehensive understanding of the issue. Each of the different data collection methods and sources are outlined below.

2.1 BRIEF DESK-BASED LITERATURE REVIEW

A literature search was conducted in order to identify any previous research that had specifically examined the factors that contribute to vehicle runaways. A Google search was conducted using search terms, such as ‘vehicle runaways’, ‘coupling/uncoupling incidents’. There was a dearth of peer-reviewed studies that specifically examined the factors that may contribute to incidents associated with coupling/uncoupling. A small number of sources were identified (e.g. industry guidance, practitioner articles) that made some reference to factors that contribute to vehicle runaways. These are discussed, where relevant, in the ‘Implications’ section.

2.2 RIDDOR DATA

Records from the RIDDOR database were examined to identify the nature, frequency and the factors contributing to vehicle runaway incidents. In agreement with HSE, the search was restricted to incidents reported between 1 April 2001 and 20 March 2014 (N=2,469,883 records in total). Standard RIDDOR codes were used to identify reportable accidents where the injured person was struck by a moving vehicle (N=1,815 records). Additional search criteria were then applied to identify records where the incident involved a HGV and some form of uncontrolled vehicle movement, or that the injured person was coupling or uncoupling a trailer at the time of the accident. These criteria resulted in a total of 209 eligible records. From these, 72 records involved incidents where the injured person was struck by the uncontrolled movement of a HGV, and were thus retained for further review (see Figure 2). This involved extracting information, where available, including 1) the root cause of the accident (i.e. mechanical fault or human error), and 2) what task, if any, was performed at the time of the accident, in particular, whether the injured person was coupling/uncoupling a trailer.

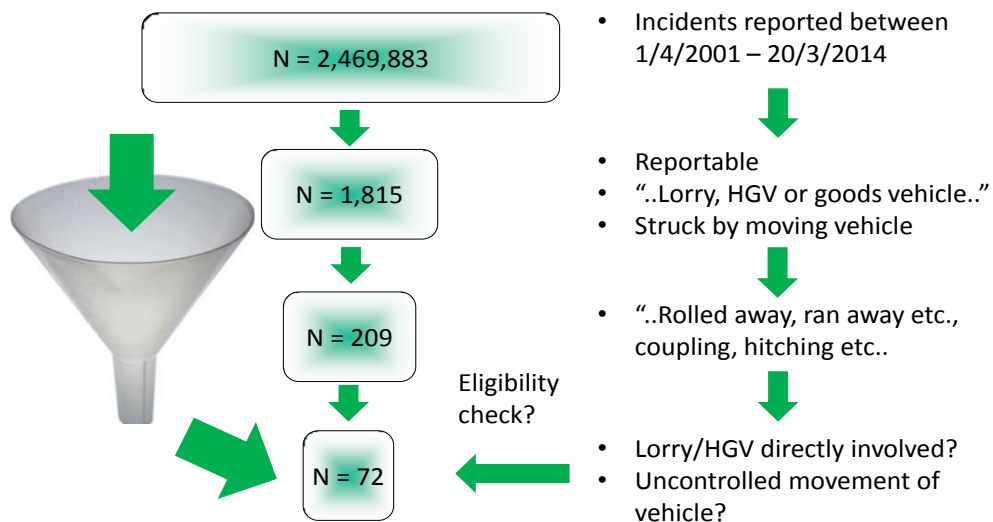


Figure 2 Summary of search criteria and number of eligible records returned

2.3 CONSULTATION SURVEY OF TRADE ASSOCIATION MEMBERS

An online survey was designed to examine the factors that contribute to vehicle runaways, and the effectiveness of both vehicle as well as site systems for preventing these types of incidents. The survey was specifically designed to capture the views of HGV and shunter drivers, supervisors, and managers in the road haulage industry.

Members of the Road Haulage Association (RHA), the Freight Transport Association (FTA), the United Road Transport Association (URTU), and the Society of Motor Manufacturers and Traders (SMMT) were invited to take part in the survey through their respective Association/Society's newsletters. The survey was also distributed to members of the Ports Skills and Safety as a means of capturing the views of drivers in the ports industry. The survey ran between September and October 2014. More information on the survey development and data collection can be found in Appendix 1. A copy of the survey questions can be found in Appendix 2.

2.3.1 Survey sample

A total of 214 survey responses were obtained. Of those, 134 responses (62.6%) were from individuals who held managerial positions, 54 from HGV/shunter drivers⁵ (25.2%), and 26 (12.1%) from supervisors. For survey populations in excess of 50,000⁶, a sample of 0.8% is required⁷. The sample obtained was below this level however the purpose was to obtain a consultation-based sample. For the purposes of consultation, and in the context of a multi-method approach, the number of responses obtained was deemed sufficient.

The majority of respondents (71.5%) were employed in medium (between 50 and 249 employees) and large (over 250 employees) organisations (22.7% and 48.8% respectively). Among the drivers in the sample, 39 (73.6%) were employed by one company, 8 worked for an agency (15.1%) and 6 indicated that they worked for two or more companies as and when needed (11.3%). Twelve drivers (23%) indicated that they 'drop off or pick up' from ports. The majority of drivers (N=42; 89%) indicated that they were not self-employed.

Participants had been in their current role for an average of 13.7 years. The drivers in the sample had an average of 22.8 years of experience as an HGV or shunter driver (the range of experience in the driver sample was 1 year to 51 years).

2.3.2 Data analysis

Statistical analysis was carried out using Stata version 13.0. The analyses included the generation of descriptive statistics (i.e. percentages, and means) for key variables of interest.

2.4 QUALITATIVE INTERVIEWS

2.4.1 Interviews with drivers and supervisors

The interviews with drivers and supervisors explored: i) the factors that contribute to vehicle runaways, ii) the perceived effectiveness of vehicle and/or site systems for the prevention of vehicle runaways, and iii) suggested solutions. Specific aspects of health and safety (H&S) management, namely reporting of incidents or near misses, training provision and

⁵ Of the 54 drivers that responded to the survey, 2 indicated that they were a shunter driver. For this reason, responses from HGV and shunter drivers are reported collectively.

⁶ This is based on approximate numbers of newsletter readership across the respective trade associations.

⁷ Rea, L. and Parker, R. (1992). *Designing and conducting survey research: A comprehensive guide*. San Francisco: Jossey-Bass.

monitoring/supervision (regarding the use of trailer parking brakes in particular) were also explored.

A purposive sampling approach was adopted for the recruitment of organisations taking part in the study. A purposive sample is a sample selected in a non-random and deliberative manner, choosing participants for their knowledge and experience in the topic as well as the particularity of their work context (Ritchie and Lewis, 2003)⁸. Consistent with this, the interviews were conducted across 4 different sites, of which 2 were haulage operators, and 2 were parcel delivery companies. The contact details for the 2 parcel delivery companies were supplied to the HSL research team by HSE, whilst the details for the remaining 2 companies were obtained from the team's own industry contacts.

A total of 15 face-to-face interviews were conducted in September and October 2014. Of those, 11 were with HGV/shunter drivers and 4 with supervisors. Of the 11 driver interviews, 6 were with HGV drivers, 3 with shunter drivers, and 2 with drivers that were employed as HGV drivers but they also carried out shunting activities in their respective companies.

2.4.2 Interviews with manufacturers

The manufacturer interviews were conducted in October 2014. A total of 3 telephone interviews were carried out: 1 with a truck manufacturer, 1 with a brake manufacturer and 1 with an interlock system manufacturer. Two of the participants held managerial engineering roles in their respective organisations, and one participant was an engineer involved in the testing of braking systems. The interviews explored manufacturers' views regarding the factors that contribute to vehicle runaways, the effectiveness of current vehicle systems (such as cab alarms, interlocks) in preventing runaways, as well as particular vehicle and/or site features that may discourage the use of trailer parking brakes.

The contact details for the interviews were provided by the SMMT who approached manufacturers to volunteer for the interviews. A total of four manufacturers volunteered to take part. Three of the four volunteers were available to take part in an interview.

2.4.3 Development of interview topic guides

Three interview topic guides were developed: one for the interviews with drivers, one for supervisors (see Appendix 3), and a third one for the manufacturer interviews (see Appendix 4). The topic guides were developed in consultation with the HSE customer, HSE's Economic and Social Analysis Unit (ESAU) and the industry working group.

2.4.4 Analysis of interviews

The qualitative data was analysed thematically using Framework, a systematic approach to data management and analysis (Ritchie and Lewis, 2003) that was developed by the National Centre for Social Research. Framework involves a number of stages that enable the identification of recurrent themes reflecting the range of experiences and views, as well as any similarities and differences in participants' accounts.

2.5 CCTV DATA

One of the research objectives (Objective 6) was to examine HGV drivers' current practice in the use of trailer parking brakes by monitoring vehicle movements using CCTV footage. A

⁸ Ritchie, J. and Lewis, J. (2003). *Qualitative research practice: A guide for social science students and researchers*. London: Sage.

review of CCTV footage by the HSL research team from two companies identified that the cameras were not suitably positioned to view driver behaviour during coupling/uncoupling. Despite efforts by both the HSL research team and one of the working group members, it was not possible to identify suitable CCTV footage for inclusion in the study.

3. RESULTS

3.1 FACTORS CONTRIBUTING TO VEHICLE RUNAWAYS

This section brings together the findings from the RIDDOR data analysis, the survey and the interviews regarding the factors that contribute to vehicle runaways. Such factors often refer to individual (e.g. competence, attention, risk perception), job (e.g. design of equipment, procedures, working conditions) and organisational and management (H&S culture, work planning, communications) characteristics that influence H&S behaviour at work (HSE, 2009)⁹.

3.1.1 RIDDOR data

Table 1 presents the findings from the analysis of the 72 RIDDOR records that were identified as eligible for inclusion. It can be seen that failure to apply either the cab handbrake or trailer parking brake was a contributing factor in 30 (42%) of the 72 incidents (i.e. there was specific mention in the incident description that the cab handbrake or trailer parking brake had not been applied). However, there was insufficient information available from the records to consistently determine the type of brake that had not been applied and the reasons why. For the remaining 42 (58%) cases, it was not possible to ascertain the factor(s) that contributed to the incident from the information available, and were therefore assigned in the ‘other/unknown’ category.

The analysis also showed that different types of activities were undertaken at the time of the incident, including coupling/uncoupling a trailer (13%, N=9 cases), and carrying out some form of inspection or repair on the vehicle (13%, N=9 cases). In 38 (53%) cases, the task being undertaken by the injured person at the time of the accident could not be ascertained from the information available (see Table 1).

Table 1 Descriptive summary of eligible RIDDOR records (N=72)

<i>Injury severity</i>	<i>Contributing factor to accident</i>	<i>Activity undertaken at time of incident</i>
Fatal: 8	Failed to apply brake: 30	Coupling/uncoupling: 9
Major: 30	Other/unknown: 42	Inspection/repair: 9
Over-3-day/Over-7-day (post Sept 2011): 32		Loading/unloading: 9
Injury to member of general public: 2		Communicating with third party: 3
		Directing: 2
		Opening/closing gate: 2
		Other/unknown: 38

3.1.2 Survey results

The survey results showed that just under half of the sample (44%, N=84) believed that failure to apply the vehicle/cab parking brake was the most likely contribution to vehicle runaways, followed by distractions (e.g. talking to colleagues) (26% of respondents, N=49). Forgetting to apply the trailer parking brake and believing that applying parking brakes is not necessary was reported as contributing to vehicle runaways by 13% (N=24) and 10% (N=20) of respondents respectively (see Figure 3).

⁹ HSE (2009). *Reducing error and influencing behaviour*.
http://www.hseni.gov.uk/hsg_48_reducing_error_and_influencing_behaviour.pdf

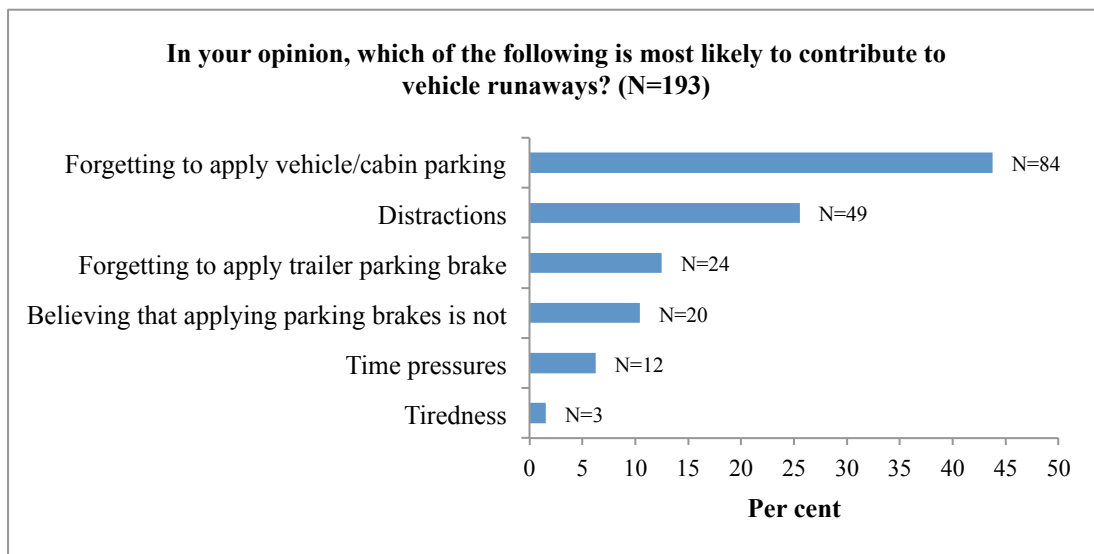


Figure 3 Summary of responses on factors that are most likely to contribute to vehicle runaways

A similar pattern was identified when looking at the responses by job role. Specifically, forgetting to apply the vehicle /cab parking brake was the most frequently reported factor contributing to vehicle runaways among HGV/shunter drivers (35.2%, N=19), managers (42.5%, N=57), and supervisors (30.7%, N=8), followed by distractions (24.1% of drivers, 22.4% of managers, and 23.1% of supervisors) (see Figure 6 in Appendix 5).

3.1.3 Interview findings

A recurrent finding that emerged from the interviews with drivers, supervisors and manufacturers was that **failure to apply the cab’s handbrake and/or the trailer’s parking brake** was perceived to be the primary reason contributing to vehicle runaways. Although less frequently mentioned, technical ‘failures’ were also acknowledged as a potential factor contributing to vehicle runaway incidents. For instance, one manufacturer mentioned that if the trailer parking brake valves are under-utilised then it may not be possible to fully engage the parking brake. The manufacturer in question mentioned that he had come across a vehicle runaway incident where this issue had been identified. Additionally, the possibility that the braking system may not have been installed correctly was also mentioned.

The prevalent view among the drivers in the sample was that they applied the cab handbrake and/or trailer parking brake during coupling/uncoupling. However, there was a perception that these practices were not consistently used across the industry. A number of factors were identified as to why drivers may fail to apply the cab handbrake and/or trailer parking brake. These factors were grouped into individual, job and organisational factors, and are discussed below.

3.1.3.1 Individual factors

Distractions emerged as a prevalent reason for failing to apply the cab handbrake or trailer parking brake from the interviews with both drivers and supervisors. It was discussed that drivers have a ‘set’ routine (i.e. steps that they follow) when coupling/uncoupling trailers and that it is very easy to miss a step, such as forgetting to apply the cab handbrake, when they are distracted (e.g. interrupted by a colleague during the coupling/uncoupling procedure).

“That is important; distraction. If you’re disconnecting and connecting your trailer and somebody comes along and started talking to you, it’s very easy to forget to do these little things, put the parking brake on and even lower your legs.” (Interview 2, driver)

Another reason as to why drivers may fail to apply the cab handbrake and/or trailer parking brake related to **complacency and the adoption of poor practices over time**. For instance, laziness and/or complacency was a frequently cited reason as to why drivers may ‘pull the red’¹⁰ airlines (i.e. emergency brake), which was a practice that was perceived to be common across the industry. It was explained that drivers may not always be willing to walk down the rear of the trailer (where trailer parking brakes are often located) to apply the parking brake. There was a perception that such ‘bad practices’ may be perpetuated over time particularly among drivers who had not experienced a vehicle runaway incident.

“It’s common practice. Because when you see a driver now, is he takes the line off, the red line off the trailer, the brakes on that trailer go on. It’s automatic. It’s a dead man’s trailer [...] until you put that red airline on and make it live, it’s dead. So it made people lazy. They didn’t have to bother...” (Interview 3, driver)

Failure to apply the cab handbrake or trailer parking brake was often attributed to **lack of technical knowledge and poor appreciation of risks**. There was a perception among manufacturers that drivers lack technical knowledge regarding how the braking systems work. For instance, ‘pulling the red airline’ was often attributed to drivers’ incorrect beliefs that doing so would be sufficient in preventing the cab and/or trailer from moving, and thus, applying the trailer parking brake is not perceived to be necessary.

“One is the expectation that when they pull the red line off, which is the air line that actually supplies air to the trailer, there is an emergency function and when they pull the red line off they know it applies the service brake so they have this idea there’s no need to apply the parking brake.” (Interview 2, manufacturer)

One driver, who ‘picked up and dropped off’ trailers in yards as well as ports, felt that there was no need to use the trailer parking brake because disconnecting the red airline would ‘lock’ the brakes and the trailer would not move. Another driver stressed the importance of applying both the cab handbrake and/or trailer parking brake even when parked on flat ground; it was suggested that drivers often believe that the risks of the cab/vehicle running away are minimised when parked on flat surfaces.

3.1.3.2 Job factors

Not being able to locate the trailer parking brake was another, albeit less frequently mentioned, reason for failing to apply the trailer parking brake. One supervisor for instance commented that sometimes parking brakes are not located in ‘an obvious place’ particularly with hire (i.e. not the company’s own) trailers and thus drivers may not be able to readily find them. In these cases, drivers would opt to ‘pull the red airline’ rather than try to locate the parking brake. This view was also expressed by some drivers:

¹⁰ *There are two airlines between the tractor unit and the trailer. One airline, red in colour and generally known as the ‘red line’, functions as a breakaway cable to bring the trailer to a halt if the fifth wheel coupling fails (i.e. if the vehicle is in transit and the tractor unit and trailer separate). It is relatively common for drivers to ‘pull the red line’ or ‘drop the red line’ (which applies the trailer brakes) when parking the vehicle, and rely on this in preference to applying the trailer parking brake. However, if the parking brake is not applied, when the airlines are reconnected during coupling of the trailer, the brakes will release when there is sufficient air pressure in the system. If the cab brake has not been applied, the combination is likely to roll if it is not on level ground.*

“The awkward thing is finding them [the parking brakes] sometimes because they’re from different makes of trailers in different areas. I notice a lot of them now, you know, we said earlier about the laziness because it’s easier to just to take the red line off rather than walk to the back and find the...” (Interview 14, driver)

Similarly, one manufacturer commented that the location of the trailer parking brake may differ across different trailers (e.g. headboard, side, front or halfway down trailer) and may be difficult for drivers to locate particularly where a company uses a mix of different trailers.

It was also suggested that **loading bay design** may discourage drivers from applying the trailer parking brake. One manufacturer mentioned that some loading bays particularly in regional distribution centres may make it difficult for drivers to access the trailer parking brake due to limited space/gaps between parked trailers and/or between the loading bay aisles.

“I think some of the loading bays associated with regional distribution centres make it difficult for the driver to use his parking brake controls. There’s not a lot of gap between trailers when they’re parked on loading bays and sometimes there are other items of equipment between the aisles of loading bays or between the bays themselves that actually make it difficult for the driver to get down between the trailers to apply the brake.” (Interview 2, manufacturer)

Finally, it was mentioned that certain **site operations**, such as ‘picking up’ or ‘dropping’ trailers at ports discourage the use of trailer parking brakes. For instance, one supervisor discussed that when dropping trailers in the yard drivers are expected to use the trailer parking brake but not when doing so in ports. This is because the trailers are parked so closely together it was perceived to be a H&S risk for drivers to try to ‘squeeze’ between trailers to apply or release the parking brake.

3.1.3.3 Organisational factors

Rushing / time pressures were a commonly cited reason as to why drivers may fail to apply the cab handbrake and/or trailer parking brake. There was a perception that ‘run times’ in some companies are very quick so that drivers may rush to get things done and as a result they can miss out a step in the coupling/uncoupling procedure (i.e. forget to apply the trailer parking brake). In addition to ‘run times’, it was acknowledged that drivers may forget to apply the cab handbrake/or trailer parking brakes particularly when rushing to finish work at the end of their shift.

“Pressure, not so much here because there’s enough time on the duties, and stuff, but within some companies the run times are very quick so you’re having to rush to get things done, when you rush, things get forgotten [...]” (Interview 10, driver)

Insufficient training was also acknowledged as a factor contributing to failures to apply the cab handbrake or trailer parking brake and to a broader lack of understanding of the correct coupling and uncoupling procedures. For instance, two drivers provided examples where they had to show drivers how to uncouple trailers. There was a perception that younger/inexperienced drivers may be particularly prone to accidents. Consistent with this, one driver believed that the Class 1 driver training did not sufficiently prepare drivers for the ‘realities’ of the job. Similarly, one view expressed by manufacturers was that training did not sufficiently ‘drill into’ drivers the risks involved from solely relying on the truck’s emergency braking system and the importance of applying the cab handbrake and trailer parking brake.

“Firstly, there must be an element of poor training, has the driver been properly trained and does he fully understand what the consequences are of actually not doing what he should be doing? Because a lot of drivers don’t fully understand the way that the truck and trailer

configuration works and if they don't fully understand that they won't appreciate some of the dangers that are involved.” (Interview 3, manufacturer)

3.2 SYSTEMS FOR PREVENTING VEHICLE RUNAWAYS

This section summarises the survey results and interview findings regarding the different types of systems (e.g. audible or visual warning devices, interlocks) that are available to prevent vehicle runaways, and their perceived effectiveness.

3.2.1 Survey results

The majority of respondents in the sample (68%, N=131) believed that vehicle runaways were a risk at the sites that they visited or worked at. However, 65% (N=125) also believed that these risks were managed effectively. This pattern was also observed when responses were broken down by job role (see Figure 7 in Appendix 5).

Interestingly, however, 50% of respondents (N=90) reported that sites did not have any specific arrangements in place to control vehicle runaways. Just under a third of the sample (29%) reported that the sites that they visit or work at have road bumps, 22% indicated that loading bay clamps are provided whilst 14% reported that there were ‘other’ arrangements in place (see Figure 4). These included vehicle key control systems, wheel chocks, interlocks, and audits/routine checks on the application of handbrakes.

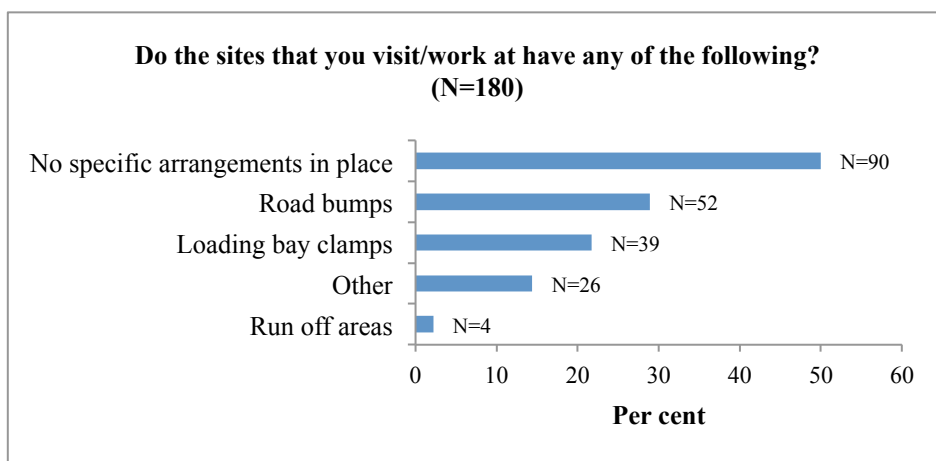


Figure 4 Summary of responses on availability of systems at sites

Among different types of sites (e.g. ports, distribution centres, retail units), 44% of respondents (N=88) reported that distribution centres control vehicle runaways the best, whilst just under a third of the sample (31%, N=63) could not respond to this question (i.e. provided a ‘don’t know’ response) (see Figure 8 in Appendix 5). Respondents were also asked to indicate the types of systems that were most effective in preventing vehicle runaways. Approximately half of the sample (52%) reported that audible or visual warning devices were the most effective followed by interlocks (40%), and wheel chocks (23%) (see Figure 5).

Drivers were asked to indicate whether their vehicles had an audible or visual warning system and interlock, as well as the extent to which they had access to wheel chocks at the sites that they visited. Approximately two thirds of drivers in the sample (77%, N=33) indicated that there was an audible or visual warning system in their cab. Among those, 88% (N=29) indicated that they did not find the audible/visual warning system in their cab distracting. Further, the majority of drivers indicated that their tractor unit and trailers did not have an interlock system to

automatically apply the parking brake (86%, N=37 and 74%, N=31 respectively). Finally, over half of the drivers (61%, N=26) reported that they did not have access to wheel chocks at the sites that they visited. Among those that indicated that they had access to wheel chocks (N=17), 83% (N=10) reported that they used them ‘always’ and/or ‘sometimes’.

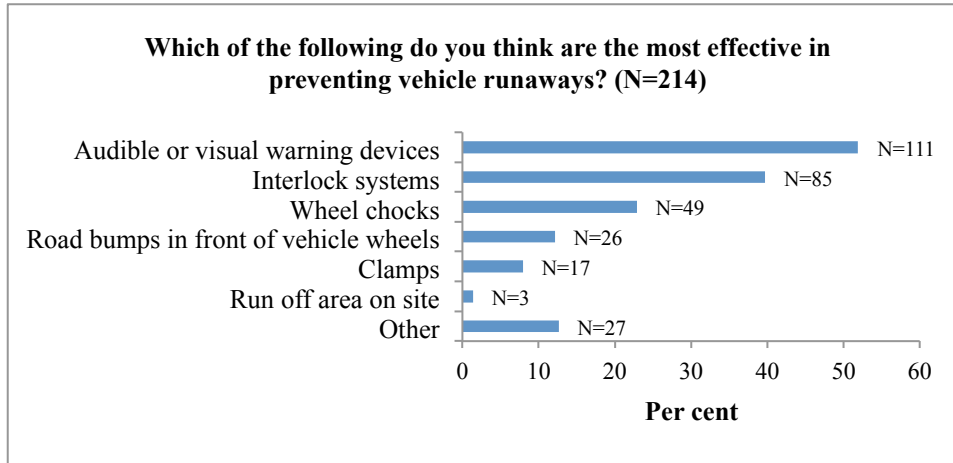


Figure 5 Summary of responses on most effective systems for preventing vehicle runaways

3.2.2 Interview findings

Cab alarms and interlocks were the most frequently adopted system for preventing vehicle runaways across the organisations that took part in the study. Views regarding the perceived effectiveness of these, as well as other systems are summarised below.

Cab alarms

All four companies that took part in the study had vehicle cab alarms. It was explained that the cab alarms would be ‘triggered’ as soon as the driver opened the cab door and had not applied the handbrake. They typically involved an audible sound (or in some cases a voice telling the driver to apply the cab handbrake), which was sometimes accompanied by a visual display warning. The prevalent view among the drivers and supervisors was that cab alarms were a helpful reminder for drivers to apply the cab handbrake. Specific cab alarm features that some drivers and supervisors highlighted as particularly useful included:

- Having a ‘human voice’ telling the driver to apply the cab handbrake, rather than just a ‘beeping’ sound, as this helped grab drivers’ attention even when tired, and
- Using different warning sounds to alert the driver to different functions he may need to attend to in the cab (e.g. lights are on, handbrake off); for instance, one driver explained that the same sound was produced to indicate that he had not applied the handbrake and that the lights were on, which made it difficult to distinguish from the sound alone what he needed to attend to.

One disadvantage of cab alarms that was highlighted was that they could be ignored by drivers because the alarm would stop sounding as soon as the driver closed the cab door (irrespective of whether he had applied the handbrake or not). Indeed, one supervisor acknowledged that drivers sometimes ignored the alarms. It was therefore suggested that the use of cab alarms needs to be accompanied by appropriate levels of supervision to ensure that they are not ignored.

Interlocks

Two of the companies that took part in the study had interlocks fitted in some of their newer trailers. These systems ensured that the trailer parking brake was automatically applied as soon as the driver disconnected the red airlines (and thus do not rely on the driver to manually apply the brake). The trailer parking brake could then be manually released after the red airlines had been reconnected.

Drivers that operated trailers with interlocks generally felt that the automatic application of the trailer parking brake was useful and offered them ‘peace of mind’, particularly because they could get distracted during coupling/uncoupling and thus forget to apply it. Consistent with this, there was a perception that the system was effective because it removed the possibility of human error. The manufacturers also expressed a positive view regarding the effectiveness of interlocks highlighting that they are practical systems that are easy to use. Two manufacturers, however, suggested that the effectiveness of interlocks may be ‘compromised’ by drivers’ bad practices. For example, it was explained that even though the interlock ensures that the trailer parking brake is applied the driver can still manually release it and unless the cab handbrake is also applied then there is the potential of the cab and/or trailer running away. Interlocks that are designed to ensure that a trailer’s braking system is applied throughout the coupling/uncoupling process until the driver returns to his cab were perceived to be particularly effective in preventing vehicle runaways.

Other site systems

Participants mentioned a number of systems for controlling vehicle runaways that were available either at their sites or the sites that they visited, which included: wheel chocks, road bumps, clamps that are used to lock the trailer wheels, and loading bays with a downhill slope. One driver noted that one of the sites that he visits has an automatic system that locks the wheels; this system was perceived to be particularly effective because it was operated by site personnel (rather than the driver) so that the vehicle/trailer could not move until the wheels were released. Loading bays that slope downwards toward the loading ramp were also highlighted as an effective way of preventing vehicle runaways.

Systems that relied on drivers to manually fit them, such as wheel chocks, were perceived to be useful when used. For instance, one supervisor noted that although there are wheel chocks available on site drivers do not always use them. This was attributed to driver complacency but also poor site enforcement. For instance, a driver explained that many sites often have systems, like wheel chocks available, but drivers will ignore them if their use is not enforced by the sites.

3.3 H&S ARRANGEMENTS

The survey and qualitative interviews examined participants’ views regarding specific aspects of H&S arrangements or management, namely reporting, training provision and monitoring/supervision (the latter was explored only through the interviews). These are organisational factors that may either encourage or discourage individual safety behaviours.

3.3.1 Survey results

Reporting of vehicle runaway incidents/near misses

Drivers were asked to indicate if they had ever experienced a vehicle runaway and if so, whether they had reported it. Of the 48 drivers that responded to this question, 48% (N=23) indicated that they had personally experienced a vehicle runaway whilst only 8.7% (N=2)

reported that they had experienced one in the last 12 months. Among those that had experienced a vehicle runaway, 43.5% (N=10) said that they had reported it. Two thirds of drivers (60.9%, N=14) indicated that the incident resulted in neither injury nor damage, and 30.4% (N=7) reported that it had resulted in damage (see Figure 9 in Appendix 5).

Driver training on the use of parking brakes

Drivers were asked to indicate the extent to which they had received training in the use of trailer parking brakes. Of the 39 drivers that responded to this question, 64% (N=25) reported that they had received training and 26% (N=14) that they had not (see Figure 10 in Appendix 5).

3.3.2 Interview findings

Reporting of vehicle runaway incidents/near misses

The interviews with drivers and supervisors explored in more depth the extent to which vehicle runaway near misses are reported, and the reasons for reporting and/or non-reporting.

There were mixed views across the participants as to the extent to which they would report a vehicle runaway. On one hand, it appeared that surveillance or site monitoring facilitated the reporting of vehicle runaways or near misses. The prevalent view among drivers and supervisors who worked on sites that were described as 'secure' and/or 'constantly monitored' was that it would be difficult not to report a vehicle runaway or near miss because it would be 'found out' anyway due to the extensive CCTV monitoring on site and/or supervision (e.g. supervisors and staff always on site so they would be able to spot if a vehicle moved).

On the other hand, an opposing view was also expressed according to which vehicle runaway near misses are not reported. The main reason appeared to be that drivers would not be willing to admit to making a mistake (such as forgetting to apply the parking brake) particularly for fear of the potential repercussions of doing so (e.g. going through a disciplinary). The consequences of not reporting a vehicle runaway appeared to vary across the sites that took part ranging from potential dismissal to perceptions that the organisation would fail to take any action in response to the incident or near miss.

Driver training on use of parking brakes

The interviews with drivers and supervisors explored the extent to which drivers received training and/or refreshers on the use of trailer parking brakes. Three of the four companies had annual driver refreshers in place. These were conducted by 'driver coaches' or assessors who would observe the drivers carry out different activities on the job, including the extent to which they followed the correct coupling/uncoupling procedures. During these observations driver coaches would point out to drivers any incorrect practices, such as failing to apply the cab handbrake and trailer parking brake. Similar annual refreshers did not appear to take place in the fourth company. Some drivers mentioned that they had received training on the use of trailer parking brakes as part of their Driver Certificate of Professional Competence (CPC) but the company did not appear to provide any related training or refreshers.

Drivers and supervisors from two companies that had introduced new trailers in their fleet also mentioned that drivers had been given training on how to use the automatic trailer parking system (i.e. interlock) on these trailers. Additionally, one company had provided drivers with an information sheet on the specific type of interlock that operated on their new trailers and how it worked.

H&S communication

A number of different types of H&S communications were identified across the four companies. These included H&S meetings or team meetings, which would cover H&S issues as part of the agenda, newsletters, and toolbox talks. The interviews specifically explored the types of communications that drivers received on vehicle runaways. These appeared to be reactive often in response to a related incident in the organisation. For instance, participants from two companies mentioned that following a vehicle runaway incident in their respective organisations, drivers were sent a bulletin reminding them to apply the cab handbrake and trailer parking brake during coupling/uncoupling. In one case, the bulletins were accompanied by posters and television screen messages relating to the accident however these had since been removed from the site. In one company, drivers were also asked to put stickers inside and at the back of their cab reminding them to check that the cab handbrake and trailer parking brake was applied.

In addition to communications in response to vehicle runaway incidents, the annual refreshers conducted by driver coaches in three companies were often used as opportunities to remind drivers of the need to follow safe coupling/uncoupling procedures. In one company, it was also mentioned that older trailers that do not have interlocks contain signs advising drivers what to do in the case of a vehicle runaway (which is to remove the red airlines as it was suggested that doing so would automatically stop/brake the trailer).

Monitoring / supervision

The interviews examined the extent to which there were specific systems in place whereby companies monitored the extent to which drivers applied the trailer parking brake during coupling/uncoupling. In 3 of the 4 companies, it was discussed that frequent spot checks are carried out on trailers as a means of monitoring whether drivers apply the parking brakes. For instance, in one company it was mentioned that supervisors carry out spot checks once a day on a daily basis, and that additionally shift managers carry out weekly spot checks on 'unsafe acts' including whether trailer parking brakes have been applied. In another company, supervisors were responsible for carrying out weekly checks, which were documented (i.e. through completion of weekly sheets).

In one company, however, there did not appear to be a formal system in place for monitoring drivers' practices regarding the use of trailer parking brakes; instead drivers would be challenged if they were spotted not applying the parking brake. The supervisor from the company in question mentioned that the use of parking brakes should be monitored, for instance, through safety walkabouts. However, the same supervisor also highlighted that it was difficult to enforce the use of trailer parking brakes among foreign drivers in particular due to language barriers as well as different expectations regarding safety standards (i.e. there was a perception that safety standards in the UK were higher compared to some other European countries). It was also suggested that there are different expectations regarding the use of trailer parking brakes when 'dropping' trailers in yards as opposed to the quay (where in the latter case it is expected that trailer parking brakes will not be used for safety reasons), which makes it harder to enforce the use of parking brakes among foreign drivers.

There were mixed findings regarding the consequences of failing to apply trailer parking brakes. In some cases, it was suggested that drivers who had been identified, for instance through spot checks, as not having applied the trailer parking brake, would have an 'informal' chat with the supervisor or manager to remind them of the importance of following safe coupling/uncoupling procedures. For repeated 'offences' a more formal route could be followed, such as being

banned off site. In other cases, it was suggested that managers or supervisors would apply the parking brake themselves during spot checks rather than talk to the drivers responsible.

3.4 SUGGESTIONS FOR IMPROVEMENT

The interviews explored participants' views regarding what more could be done to prevent vehicle runaways. The prevalent view among the drivers and supervisors was that there had been significant vehicle technological improvements, for instance, in terms of cab alarm warning systems and interlocks, which were perceived to have helped prevent vehicle runaways.

Two manufacturers suggested that it would be better if the trailer parking brake was located towards the front of the trailer near where the airlines are located. This would make the parking brake more easily accessible to drivers as they could easily reach it when attending to the air and electrical connections. This was also confirmed by the supervisor from one organisation. Specifically the supervisor mentioned that some of their new trailers had the parking brake located next to the airlines, which was perceived to be more convenient for the drivers. However, one manufacturer noted that each fleet has different operations and therefore it would be difficult to legislate that the trailer parking brake needs to be in a certain location.

In terms of additional engineering solutions, one manufacturer suggested that having a system that would automatically apply the cab handbrake, for instance, as soon as the driver opens the vehicle door would be useful (rather than relying on the driver to manually apply it). However, it was acknowledged that although the industry has provided a number of good engineering solutions, new developments will, to a certain extent, be constrained by the patents that companies hold (i.e. so it may not be possible to develop a product with all the desired features).

Participants made specific suggestions regarding what companies can do to prevent vehicle runaways. More specifically, it was acknowledged that organisations need to enforce the use of trailer parking brakes, for instance through spot checks and more site surveillance. However, it was also acknowledged that 'policing' driver practices would be challenging as it would not be possible to "look over drivers' shoulders" at all times. Finally, driver education and improving awareness of the risks associated with failure to use safe coupling/uncoupling procedures, for instance through the provision of regular training and refreshers was considered important.

4. IMPLICATIONS

This study sought to identify the direct and contributory factors to incidents occurring to HGV and shunter drivers during the coupling/uncoupling of the tractor and the trailer unit, and to suggest the most appropriate way to tackle this issue. The findings suggest that failure to apply the cab handbrake and/or trailer parking brakes are primary factors contributing to vehicle runaways.

Before discussing the implications of the findings for the management of vehicle runaways, the strengths and limitations of the present research need to be considered. One of the strengths of the current research is that it adopted a mixed methods approach, combining different methods (e.g. RIDDOR data, survey, interviews) and different sources (e.g. drivers, supervisors, manufacturers). This approach enables evidence to be triangulated, and provides a richer picture regarding the factors that contribute to vehicle runaways than if either method had been used in isolation. Consistent with this, the survey served a consultative purpose and was considered as part of a multi-method approach. Therefore, the survey sample and findings may not be representative of the wider population of drivers, managers and supervisors in the haulage industry. Further, the primary aim of the RIDDOR analysis was to investigate the key contributory factors to vehicle runaway accidents. A relatively strict set of eligibility criteria was used to ensure that the majority of records identified were eligible for consideration (and therefore minimise the ‘false positive’ rate). Therefore, it is likely that the absolute number of records identified by the search provides an underestimate of the scale of vehicle runaway incidents. Overall, we consider the findings to be sufficiently robust to support conclusions concerning the factors that are likely to contribute to vehicle runaways.

A number of factors relating to the individual, job and organisation emerged as factors that could influence drivers’ behaviours. Specifically, distractions and rushing/time pressures were commonly reported reasons for why drivers may omit a step in the coupling/uncoupling procedure, such as forgetting to apply the trailer parking brake. Lapses in concentration have been documented previously as causes of vehicle runaway incidents (IRTE, 2007¹¹; www.safervehicles.co.uk¹²). These lapses are often associated with frequently performed, routine tasks that have become automatic (i.e. require little conscious attention) (RSSB, 2008¹³; HSE, 2009). Control measures that can be used to help alleviate this type of human error include:

- Human-centred design that focuses on intuitive layout of controls, for instance, locating the trailer parking brake near the airlines where it could be easily accessed by the driver as suggested by the findings from this study.
- Automatic physical safety solutions, such as interlocks, to minimise the possibility of human error; interlocks were generally perceived as an effective control (particularly those that ensure that a trailer’s braking system is applied throughout the coupling/uncoupling process until the driver returns to his cab).
- Warnings and alarms to help detect errors; cab alarms were perceived as a useful reminder to ensure that the cab handbrake has been applied. Having an electronic voice box and distinct

¹¹ Institute of Road Transport Engineers (2007). Coupling or uncoupling and parking of large good vehicle trailers: Guidance for managers, supervisors and trainers. http://www.soe.org.uk/downloads/1395056774-Guide_Coupling_or_uncoupling_and_Parking_of_Large_Goods_Vehicle_Trailers.pdf. Accessed on 23/11/2014.

¹² Preventing runaway vehicles – a simple safety message. <http://www.safervehicles.co.uk/preventing%20runaway%20vehicles.html>. Accessed on 24/11/2014.

¹³ Rail Safety Standards Board (2008). Good practice guide on cognitive and individual risk factors. www.rgsonline.co.uk/Railway_Group_Standards/Traffic%20Operation%20and%20Management/RSSB%20Good%20Practice%20Guides/RS232%20Iss%201.pdf. Accessed on 23/11/2014.

alarm sounds to alert drivers regarding different functions to attend to (e.g. applying cab handbrake versus switching lights off) were highlighted as particularly useful. Electronic voice boxes and distinct alarm sounds have been previously acknowledged as an effective means of ensuring that drivers apply the cab handbrake (IRTE, 2007; www.safevehicles.co.uk).

- Providing additional reminders, in the form of cab stickers, posters or signs, for drivers to apply the handbrake before exiting the cab and trailer parking brake before coupling/uncoupling.

Complacency and development of bad practices were frequently cited reasons as to why drivers may not follow safe coupling/uncoupling procedures and take shortcuts, such as relying on the emergency brake instead of applying the trailer parking brake. Driver complacency has been previously acknowledged as a contributory factor to vehicle runaway incidents (IRTE, 2007). Control measures that can help guard against complacency include:

- Effective supervision and monitoring, for instance through safety walkabouts and spot checks to ensure that trailer parking brakes have been applied and/or cab alarms are not ignored. Monitoring is crucial to ensure that safe systems of work, including coupling/uncoupling procedures are followed (HSE, 2013).¹⁴
- Improve risk perception; promote understanding and raise awareness of the risks and consequences associated with failing to apply the trailer parking brake and/or cab handbrake.
- Improve attitudes and promote a positive safety culture for instance through encouraging the reporting of violations, proactive and regular communication of the need to use cab handbrakes/trailer parking brakes and ensuring that non-compliance with coupling/uncoupling procedures is not ignored.

In addition, the findings from this study suggest that there is a perception that driver awareness and understanding of the risks involved when coupling and uncoupling trailers may be lacking, such as beliefs that relying on the emergency brake is sufficient or that applying the trailer parking brake is not required when on flat ground. Provision of driver training as well as regular refreshers to promote understanding of the correct coupling/uncoupling procedures is crucial (e.g. IRTE, 2007).

Finally, the findings suggest that the physical design of the workplace may make it difficult and potentially dangerous for drivers to access the trailer parking brake, for instance in distribution centres and ports where trailers are parked very closely together. It is therefore important to have other controls in place. These may include loading bays with a downward incline, which were perceived to be effective in preventing vehicle runaways.

¹⁴ Health and Safety Executive (2013), *Workplace transport safety: A brief guide (INDG199)*.
<http://www.hse.gov.uk/pubns/indg199.pdf>

5. APPENDICES

5.1 APPENDIX 1: SURVEY DEVELOPMENT AND DATA COLLECTION

The survey questions were developed using an iterative process, with input from the HSL research team, the HSE customer, HSE's Economic and Social Analysis Unit (ESAU) and the industry working group, which was set up as part of this project. It should be noted that a number of questions were applicable to drivers only. These are indicated with an asterisk in Appendix 2 below.

The online survey was piloted with 3 drivers to ascertain the ease of navigating through and responding to the questions. The results of the pilot suggested that the areas covered in the survey were comprehensive, and the questions were easy to understand.

The survey ran between September and October 2014. RHA, FTA, URTU and SMMT members were invited to take part in the survey through their respective Association/Society's newsletters. In the cases where the newsletters were sent out to members electronically, a short piece detailing the purpose of the survey and how the data would be used was included in the newsletter along with the survey link. In order to maximise the survey response rate, a Quick Response code was included in newsletters that were sent out to members in paper form. This allowed potential respondents to scan the code on their smartphone device and complete the survey online. The URTU also included the survey link on its website. Additionally, a reminder was sent out two weeks prior to the deadline of survey completion.

Participants were assured that their responses would be anonymous, and that the analysis would be carried out collectively (i.e. for groups of people), and therefore it would not be possible to identify individual responses.

5.2 APPENDIX 2: SURVEY QUESTION SET

BACKGROUND INFORMATION

- 1) Are you currently employed in the road haulage industry? (ASK ALL)
- | | |
|-----|---|
| Yes | 1 |
| No | 2 |
- 2) Which of the following best describes your job role? (ASK ALL)
- | | |
|----------------------------|---|
| Heavy Goods Vehicle driver | 1 |
| Shunter driver | 2 |
| Manager | 3 |
| Supervisor | 4 |
- *3) How do you get the majority of your work? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q5a)
- | | |
|---|---|
| Employed by one company | 1 |
| Work for an agency | 2 |
| Work for two or more companies as and when needed | 3 |
- *4) Are you self-employed? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q5a)
- | | |
|-----|---|
| Yes | 1 |
| No | 2 |

5a) How long have you been in your current role? ____years ____ months (ASK ALL)

*5b) How many years of experience do you have as a heavy goods vehicle or shunter driver?
____years ____ months (ONLY ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q6)

6) How many people does your organisation employ? (ASK ALL)

1-9	1
10-49	2
50 – 249	3
Over 250	4
Don't know	5
Not applicable	6

*7) Do you drop off or pick up from ports? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q9)

Yes	1
No	2

*8) Are you required to use the trailer parking brake at the ports where you drop off or pick up? (ONLY ASK IF RESPONSE TO Q7 is 1; OTHERS GO TO Q9)

Yes	1
No	2

9) In your experience, which types of sites control vehicle runaways the best? (Please choose all that apply) (ASK ALL)

Ports	1
Distribution centres	2
Retail units	3
Manufacturing sites	4
Steel stockyards/builder merchants etc.	5
None of the above	6
Don't know	7

VIEWS ABOUT RISKS FROM VEHICLE RUNAWAYS

10) Are vehicle runaways a risk at the sites that you visit or work at? (ASK ALL)

Yes	1
No	2
Don't know	3

11) Are the risks from vehicle runaways managed effectively at the sites that you visit or work at? (ASK ALL)

Yes	1
No	2
Don't know	3

12) In your opinion, which of the following is most likely to contribute to vehicle runaways? (Choose one option only) (ASK ALL)

Forgetting to apply vehicle/cabin parking brake	1
Forgetting to apply trailer parking brake	2
Distractions (e.g. talking to colleagues, thinking about something else)	3

Time pressures	4
Tiredness	5
Believing that applying parking brakes is not necessary	6

EXPERIENCE OF VEHICLE RUNAWAYS

*13) Have you ever personally experienced a vehicle runaway? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q24)

Yes	1
No	2

*14) Have you experienced a vehicle runaway in the last 12 months? (ASK IF ANSWER TO Q13 IS 1)

Yes	1
No	2
Prefer not to say	3

*15) Did the vehicle runaway result in: (ASK IF ANSWER TO Q13 IS 1)

Injury to self and/or others	1
Damage	2
Both injury and damage	3
Neither injury nor damage	4
Prefer not to say	5

*16) Did you report the vehicle runaway? (ASK IF YES TO Q13)

Yes	1
No	2

DRIVER SYSTEMS

*17) Is there a warning system (e.g. audible or visual) in your cab to indicate if you have applied the handbrake when you leave the cab? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q24)

Yes	1
No	2

*18) Are you distracted by the warning device in the cabin of your vehicle? (ASK IF YES TO Q17; OTHERS GO TO Q19)

Yes	1
No	2

*19) Does the tractor unit that you drive have an interlock system to automatically apply the trailer parking brake? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q24)

Yes	1
No	2

*20) Do the trailers that you normally carry have an interlock system to automatically apply the trailer parking brake? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q24)

Yes	1
No	2

*21) Do you have access to wheel chocks at the sites that you visit? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q24)

Yes	1
No	2

*22) Are you able to use the wheel chocks at the sites that you visit? (ASK IF RESPONSE TO Q21 IS 1; IF RESPONSE IS 2 GO TO Q24)

Yes	1
No	2

*23) How often do you use wheel chocks? (ASK IF RESPONSE TO Q22 IS 1)

Always	1
Sometimes	2
Rarely	3
Never	4

AVAILABILITY OF SYSTEMS AT THE SITES YOU VISIT/WORK AT

24) Do the sites that you visit or work at have any of the following? (select all that apply) (ASK ALL)

Run off areas	1
Loading bay clamps	2
Road bumps	3
Other: please specify [ADD TEXT BOX]	4
None – No specific arrangements in place to prevent vehicle runaways	5

*25) Have you had training on what to do if the vehicle runs away? (ASK ONLY IF RESPONSE TO Q24 IS 1)

Yes	1
No	2
Not applicable	3

*26) Have you had any training in the use of parking brakes? (ASK IF RESPONSE TO Q2 IS 1 OR 2; OTHERS GO TO Q27)

Yes	1
No	2

27) Which of the following do you think are the most effective in preventing vehicle runaways? (Choose all that apply) (ASK ALL)

Audible or visual warning devices	1
Interlock systems	2
Wheel chocks	3
Road bumps in front of vehicle wheels	4
Clamps	5
Run off area on site	6
Other: please specify _____	7

5.3 APPENDIX 3: INTERVIEW QUESTION SET FOR DRIVERS AND SUPERVISORS

Background

- Are you currently a shunter driver or an HGV driver? (Drivers only)
- How many years of experience do you have as an HGV/shunter driver? (**Drivers only**)
- Where do you get most of your work from? (e.g. direct from companies, via an agency or other means; self-employed, work for one organisation or more than 2 organisations as and when needed) (**Drivers only**)
- Can you tell me a little bit about your job role? (**supervisors only**)
- Can you tell me a little bit about the organisation (e.g. are drivers employed by the company who own the site, is there 1 primary haulier and then subcontractors) (**supervisors only**)
- How long have you worked for this organisation? (**supervisors only**)

Experience/ familiarity with vehicle use

- What type of vehicle do you drive? (e.g. rigid, articulated; including trailer body type e.g. curtain-siders, boxes, and flatbeds, and double-deck variants) (**drivers only**)
- How long have you been driving this vehicle? (**drivers only**)

Current practice around use of parking brakes

- When you ‘drop a trailer’ what do you do to ensure that the trailer will not run away when someone else picks it up? (**drivers only**) / When your drivers ‘drop the trailer’ (i.e. uncouple the tractor and trailer unit), what procedure are they expected to follow to ensure that the vehicle does not run away? (**supervisors only**)
- When you pick up a trailer, what do you do to ensure that it will not run away when you couple up? (e.g. apply parking brake, use wheel chocks) (**drivers only**)
- Are there any disadvantages to using the parking brake when coupling the tractor and trailer unit? If yes, what are they? (**supervisors only**)
- Under what circumstances would your drivers use the emergency brake and why? (**supervisors only**)

Experience of vehicle runaways

- Why do you think runaway incidents occur? (**drivers and supervisors**)
- Have you or your colleagues ever experienced a vehicle runaway? If yes, what contributed to the runaway? (e.g. distractions, complacency, time pressures) (**drivers only**) / Have you had instances of vehicle runaways in your organisation? If yes, what contributed to the vehicle runaway? (e.g. driver distracted, complacency, not following procedure) (**supervisors only**)

Systems to prevent vehicle runaways

- What systems are in place on the vehicle that you drive to prevent the vehicle/tractor unit from running away (e.g. cab alarms, interlocks)? **(drivers only)** / What types of vehicle systems are in place to prevent the vehicle/tractor unit from running away? (e.g. cab alarms, interlock systems) **(supervisors only)**
- What systems are in place for preventing vehicle runaways at the sites that you visit? (e.g. clamps, wheel chocks, run-off area) **(drivers only)** /What types of site systems are in place to prevent vehicle runaways? (e.g. clamps, wheel chocks, run-off area) **(supervisors only)**

H&S arrangements

- Where do you receive H&S information from? **(drivers only)**
- Do you have H&S discussions in the organisation (e.g. types, frequency)? **(supervisors only)**
- When you experience a near miss, what happens next? (e.g. do you mention it to anyone?) **(drivers only)** /When your drivers experience a near miss, what is the procedure for reporting it? **(supervisors only)**
- In the event of a runaway where nobody was injured or there was no damage would you report the incident? Why/Why not? **(drivers only)**
- Do you receive any training on how to use parking brakes? If yes, what does the training involve? **(drivers only)** /Do your drivers receive any training on how to use parking brakes? If yes, what does the training involve? **(supervisors only)**
- What happens when drivers violate/ fail to comply with safety procedures? **(supervisors only)**

Suggestions for improvement

- What could be done to prevent vehicle runaways from happening? (e.g. improvements in vehicle and site systems) (drivers and supervisors)

5.4 APPENDIX 4: QUESTION SET FOR MANUFACTURERS

Background

- Can you tell me a little bit about what the organisation does?
- What does your job role involve?

Factors contributing to vehicle runaways

- As far as you are aware, what are the main reasons that contribute to vehicle runaways?
- Do you think that there are specific vehicle design features that discourage drivers from applying the parking brake during coupling/uncoupling? If yes, what are they?

- As far as you are aware, are there any specific site operations that may discourage drivers from using the parking brake when coupling/uncoupling the tractor and trailer unit? If yes, what are they?

Effectiveness of existing safety systems to prevent vehicle runaways

- What types of safety systems are available for preventing vehicle runaways?
- In your opinion, how effective are these systems in preventing vehicle runaways?
- Could drivers circumvent/ignore these systems? If so, how?

Suggestions for improvement

- Is there anything that could be done to encourage drivers to apply the parking brake when coupling/uncoupling?
- What additional systems/engineering solutions could be introduced to prevent vehicle runaways?

5.5 APPENDIX 5: GRAPHS

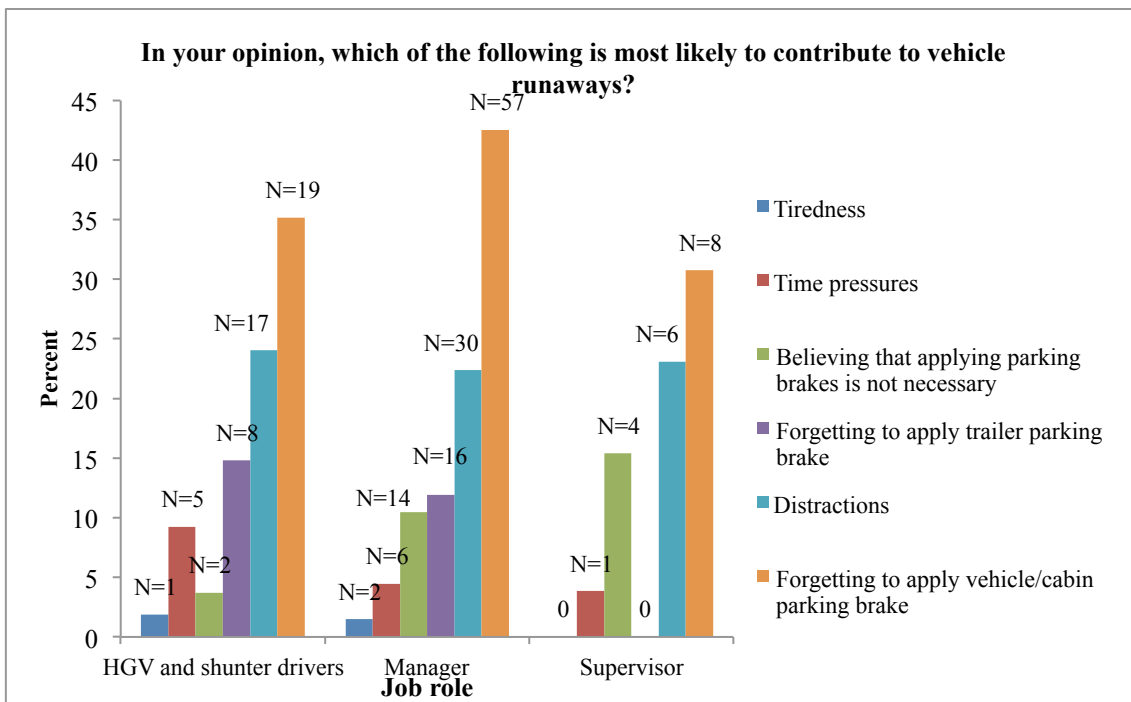


Figure 6 Summary of responses on factors contributing to vehicle runaways across job role

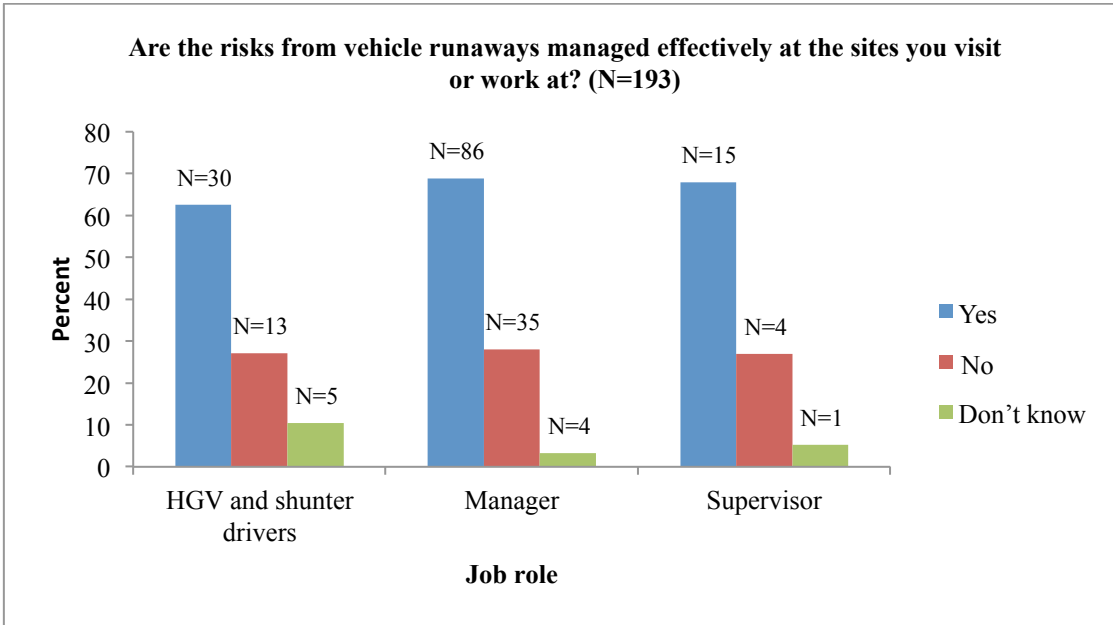


Figure 7 Summary of responses on extent to which risks from vehicle runaways are managed effectively by job role

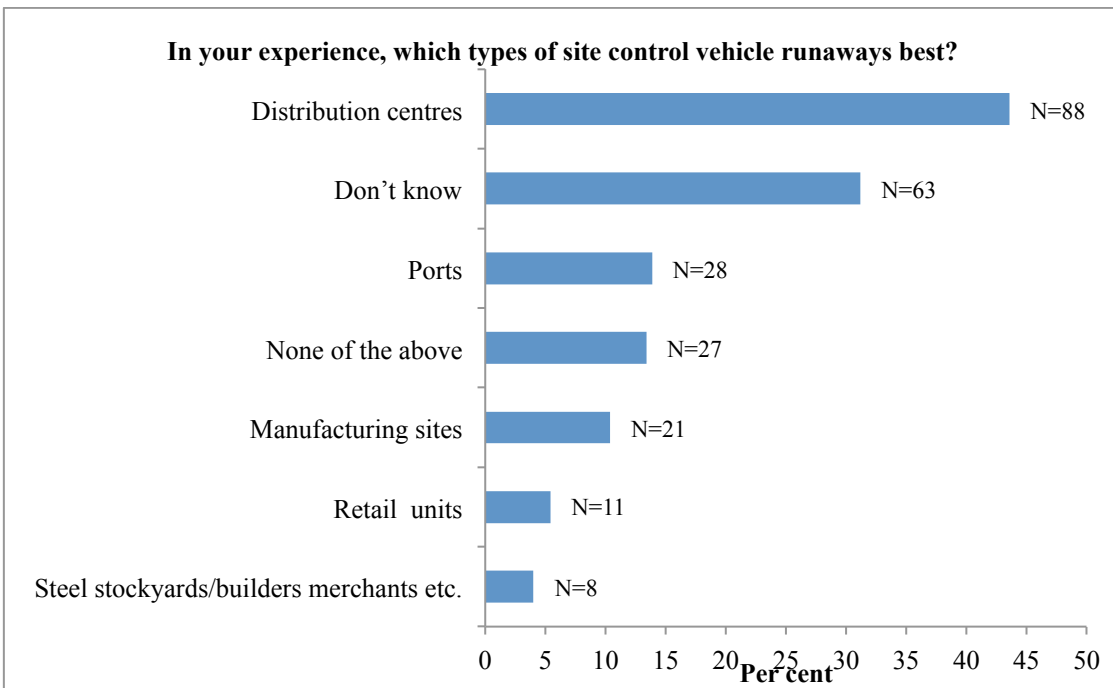


Figure 8 Summary of responses on sites that control vehicle runaways the best

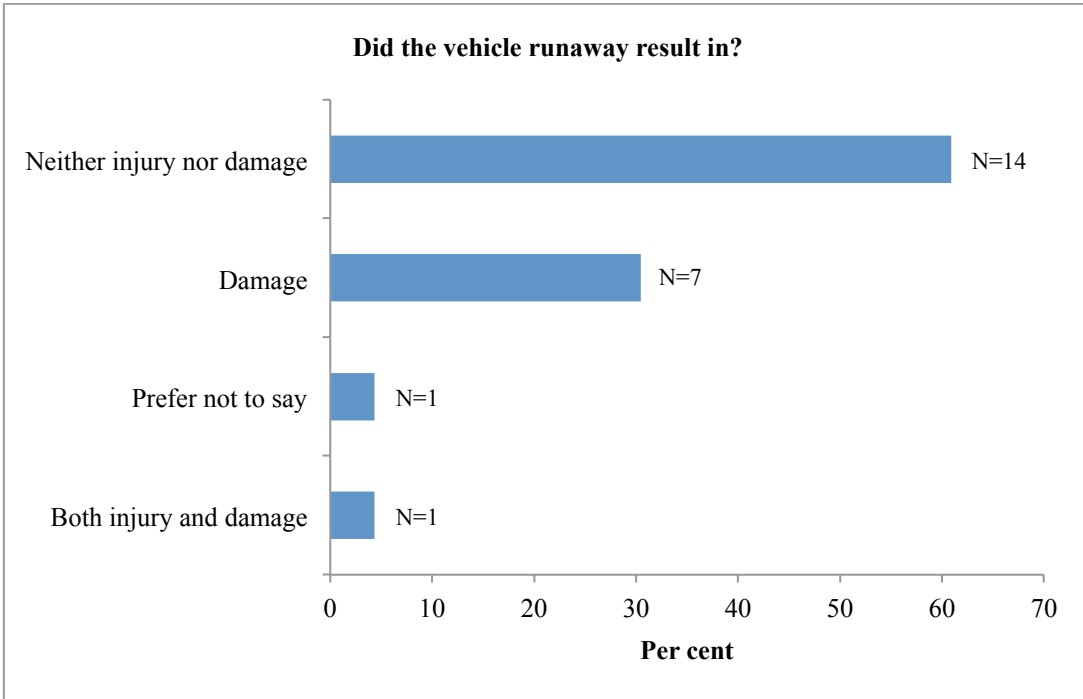


Figure 9 Summary of driver responses on the outcomes of the vehicle runaway reported

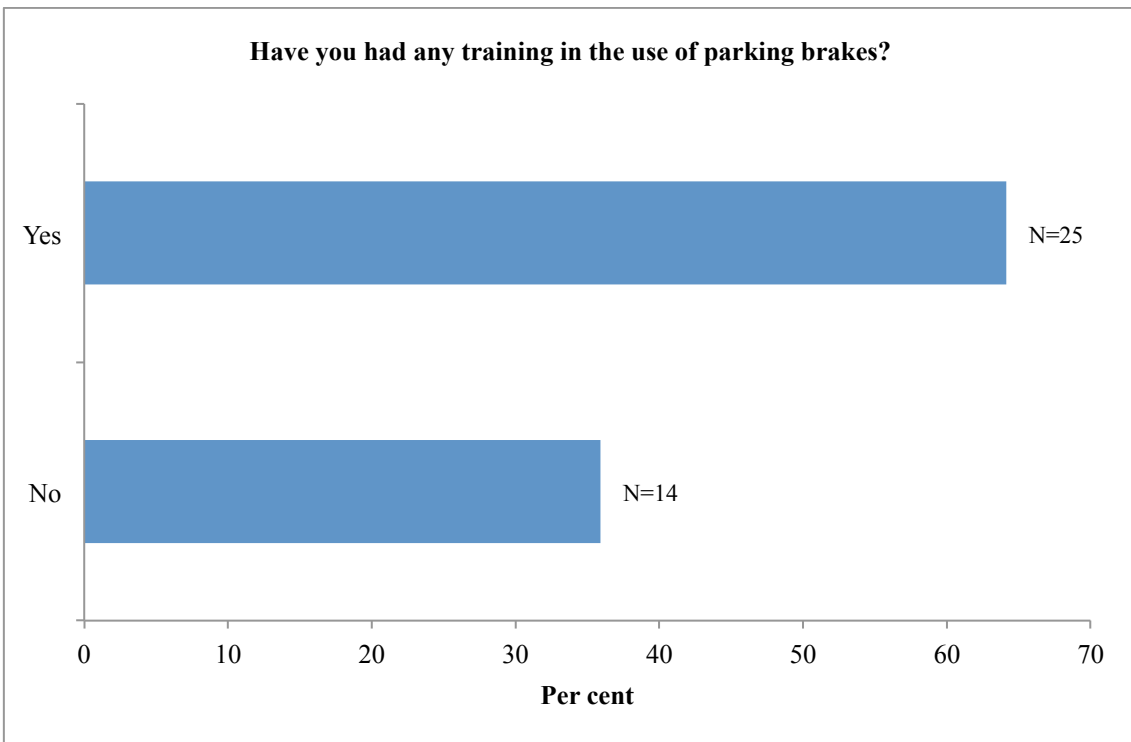


Figure 10 Summary of driver responses on training in the use of parking brakes

Establishing direct and contributory factors to the uncontrolled movement of Heavy Goods Vehicles (HGVs) during coupling and uncoupling

A number of fatal or major vehicle incidents are reported to the Health and Safety Executive and local authorities every year where heavy good vehicle drivers have been injured during the coupling and/or uncoupling of the tractor and the trailer unit. When coupling and uncoupling the trailer to and from the tractor unit, the parking brakes on both units should be applied to ensure that neither unit is able to move in an uncontrolled manner. Unintended movement is known as a vehicle runaway.

The study explored the factors that contribute to vehicle runaways using a multi-method approach, which included: i) conducting a literature search, ii) reviewing relevant incidents reported under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, iii) carrying out an online consultation survey of trade association members, and iv) conducting interviews with drivers, supervisors and manufacturers.

Failure to apply the cab handbrake and/or trailer parking brake was identified as the primary reason contributing to vehicle runaways. A combination of individual, job and organisational factors were identified as affecting drivers' behaviours, and particularly the extent to which the cab handbrake and/or trailer parking brake would be applied. Provision of easily accessible controls, physical solutions (e.g. interlocks, cab alarms), supervision and raising risk awareness were control measures identified that could help prevent vehicle runaways.

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