

The Predictive Power of Non-Technical Skills

Dr Stephen Fletcher, Director and Occupational Psychologist at the Occupational Psychology Centre (OPC), shares dynamic research on how drivers' NTS ratings could be a Leading Indicator to help predict safety incidents

Our collective, foremost priority in the rail industry is ensuring safety – keeping customers, members of the public and employees safe, and protecting our infrastructure. A critical aspect of this is ensuring train driver competence and performance. Before drivers are deemed safe to operate trains, they undergo extensive assessments. Regular assessments check the validity of their competence, and a wealth of safety data, such as SPADs, TPWS activations, and station overruns, is recorded to monitor their performance.

Dr Fletcher said: 'Identifying drivers at a higher risk of safety incidents enables earlier, more effective interventions. Rail companies can leverage their existing data and knowledge about employees, to provide more tailored support. This approach is crucial for driver managers in their time-constrained environment, enabling more efficient use of their resource and focus on drivers who need it most. Additionally, the costs of covering an incident can be significant. Targeted support would also deliver bottom line savings.'

The Importance of Non-Technical Skills (NTS)

We know that NTS play a key role ensuring the safety of rail employees, including train drivers. In 2010, the Rail Safety and Standards Board (RSSB) identified 26 NTS required for a safe and effective train driver, such as concentration, risk anticipation, and assertiveness. With the introduction of NTS, a driver's performance including their safety is not only based on technical ability but also the propensity to demonstrate these key NTS.

Our industry has made good progress in understanding, applying and implementing NTS into key safety-critical roles including train driver and signallers. Over the past two decades, OPC psychologists have undertaken Post-Incident Assessments with over 600 employees involved in safety incidents.



Our findings show, conclusively that NTS shortfalls, such as the failure to stay focused, not anticipating risk, acting on the wrong priority or insufficient checking, are often the root cause of incidents.

Furthermore, we often find common NTS shortfalls across different employees and incidents. For example, if 'driver A' has both a SPAD and a fail-to-call incident, it's highly likely that the same NTS shortfalls are involved. Similarly, a signaller with a line blockage irregularity can often have the same NTS shortfalls that may have led to other incidents such as level crossing irregularities or a wrong routing.

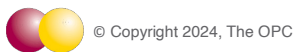
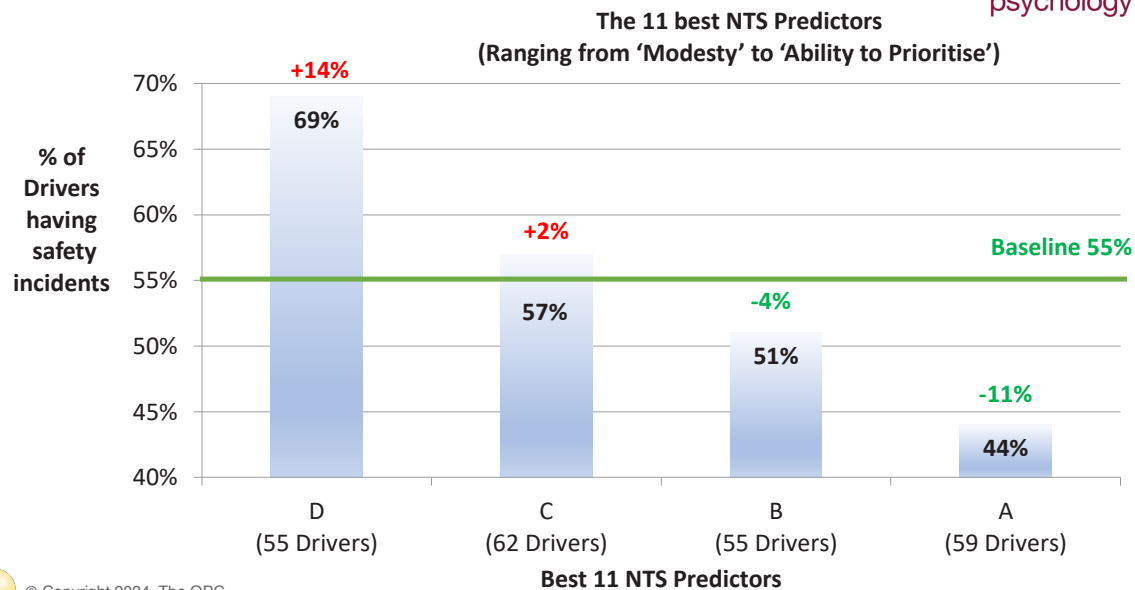
Dr Fletcher said: 'While the OPC's Post-Incident Assessment work is vital for understanding the causes of incidents and how to prevent future occurrences, it's inherently reactive—addressing issues after they occur. Ideally, we should take a proactive approach, and use NTS data to predict an employee's likely future risk of an incident. Leveraging NTS intelligence could

be much more powerful and effective. We could identify high-risk drivers early and forward-load the necessary preventative support, potentially reducing the likelihood of safety incidents.'

Leading and lagging measures in safety performance

In safety circles, Leading and Lagging indicators are two types of measure we can use to assess performance. Lagging Indicators measure past events. It's already happened. It's an output measure of a previous performance. For example, the number of safety incidents, sickness days, or lost time accidents. They show past performance. Leading Indicators are predictive measures. They are forward-looking and can influence future success. For example, the percentage of rail workers who are not fatigued before they commence their shift or the proportion of train drivers trained in key non-technical skills (NTS) could reduce safety incidents.

Summary of NTS predictors vs baseline performance of drivers



A shift in focus

While lag indicators may often be prioritised due to their availability, leading indicators, though sometimes requiring more time or cost investment, can lead to significant performance improvements.

Based on these principles and the Post-Incident NTS insights, the OPC conducted thorough research into how NTS could predict train drivers at risk of safety incidents and therefore, potentially use them as Leading Indicators to improve safety performance.

Dr Fletcher said: 'OPC psychologists wanted to see if historical NTS data could help predict which drivers were more likely to have a safety incident. We were trying to determine if an NTS performance rating could be a 'Leading Safety-Critical Factor' in identifying those drivers most at risk of an incident.'

Researching the predictive power of NTS

OPC Psychologists conducted an extensive study with over 200 train drivers from a UK Train Operating Company (TOC). They collected foundational data for each driver on their safety incidents, sickness record, competence assessment performance, and importantly their NTS performance.

For the competence and NTS assessments, Driver Managers compared each driver to their peers, rating their performance as better, worse, or typical compared to others. The OPC psychologists then translated these ratings into an A-D grading for each driver:

A	B	C	D
Well above average	Above average	Below average	Well below average

After two years, OPC psychologists asked the Train Operator to provide the number and types of safety incidents involving the same group of drivers for that period. They found that 55 per cent of the drivers had been involved in at least one safety incident, for which they were either wholly or partially responsible. This 55 per cent served as the benchmark.

Key findings

Of those driver's rated D and C for their sickness record, more had safety incidents vs the baseline average of 55 per cent of drivers having an incident. Category D and C drivers had, on average 61 per cent of the incidents i.e., six per cent more incidents above the baseline. However, category B and A had less incidents than the baseline with B and A drivers having 52 per cent (-3 per cent vs the baseline) and 46 per cent (-9 per cent vs the baseline) of the incidents respectively. These findings suggest that there is a link between a driver's past sickness record and their propensity to have a safety incident in the future.

Driver Competence Predictors – For the competence ratings nearly a third more Category D rated drivers had incidents vs the baseline average. However, 15 per cent fewer Category A drivers had a safety incident. So, a manager's rating of a driver's competence can help predict those drivers who are more likely to have a safety incident in the future. Those drivers with lower competence ratings could be prone to more incidents than those drivers rated as category 'A' or the best on their driving competence.

Eleven best NTS Predictors – OPC psychologists analysed all the NTS and identified which were the most predictive

of future safety performance. They found eleven which had the highest correlation for the particular TOC involved in the research.

For these eleven NTS there was a direct and trending link between a driver's NTS grading and the likelihood of them having an incident. For example:

- Category D drivers had the highest number of incidents – 69 per cent, equating to 14 per cent above the baseline.
- Category C drivers had 57 per cent of incidents i.e., two per cent above the baseline.
- In contrast 51 per cent of Category B drivers had incidents i.e., 4 per cent below the baseline; and,
- Category A drivers were eleven per cent below the baseline with 44 per cent of drivers having an incident.

The NTS results emerged as the strongest predictor and trend of future safety performance, surpassing other predictors, such as competence.

Dr Fletcher summarised the findings saying: 'Although Driver Managers often tell us they feel uncomfortable grading their drivers, this research study indicates their experienced ratings were valid and accurate predictors of future safety incidents. Their expertise has helped identify key intelligence for predicting incidents. We were really surprised but very encouraged with these findings. The data analysis showed that drivers rated 'A' for their NTS had the fewest incidents, followed by 'B', 'C', and 'D'. These findings translate into real safety predictions that could significantly enhance driver safety and help rail company performance.' So, how should we respond to these findings?



‘Leveraging NTS intelligence could be much more powerful and effective. We could identify high-risk drivers early and forward-load the necessary preventative support, potentially reducing the likelihood of safety incidents.’

Proactive leading indicators ratings as preventative measures

The OPC recommends that Train and Freight Operators should actively consider collecting, rating and using this pre-emptive NTS rating intelligence to implement preventative measures. This proactive approach could help identify ‘at-risk’ drivers earlier, allowing for timely interventions.

Targeted training and support

Given limited resources, the OPC strongly recommends that Train and Freight Operators use this predictive intelligence strategically. They should consider focusing on drivers with lower NTS gradings, as these drivers could be more incident prone. Driver Managers could prioritise targeted training and support to enhance a driver’s safety and reduce potential risks.

Enhancing NTS assessment and development

The OPC recognises the key role that NTS play alongside technical competence. The OPC would encourage investing more time and effort into assessing and developing key NTS amongst all drivers to help maximise safety performance.

Targeted development for drivers with lower NTS performance

Drivers who are rated lower on their NTS could be highlighted for additional NTS development. This might include improving concentration techniques, employing enhanced checking methods, and creating personal strategies around risk management.

Leading the way

The rail operator that initiated this leading-edge piece of research is advancing their efforts to further enhance safety performance. OPC psychologists will be conducting follow-up research to test the robustness of the original predictions over a further extended time period. This work aims to confirm the continued accuracy of predicting incidents using NTS and identify any potential refinements.

How can the OPC help?

The OPC provides safety-tailored solutions with rail employees in mind and a keen focus on Non-Technical Skills (NTS). Recognising that different train and freight companies may prioritise different NTS, the OPC’s approach is customisable to meet the specific needs of each operator, including providing various levels of NTS training for drivers and driver managers. These include:

- Training on key NTS skills.
- Support for driver managers to effectively rate their drivers.

‘Identifying drivers at a higher risk of safety incidents enables earlier, more effective interventions. Rail companies can leverage their existing data and knowledge about employees, to provide more tailored support.’

- Helping investigators to pick up NTS shortfalls as part of a safety incident investigation.
- Helping interpret individual NTS ratings to maximise the benefits for the employee, and team; helping to enhance overall safety culture.
- Personalised Development Plans – they offer targeted training for train drivers with NTS shortfalls, providing specific development plans to help improve their skills, with the aim of avoiding future safety incidents.
- Expert Insights – OPC psychologists are available to interpret findings and ratings, and provide valuable insights to help improve safety performance.

Dr Fletcher summed up by saying: ‘In conclusion, this research indicates that NTS can be used as a Leading Safety-Critical Indicator to help predict a train driver’s future safety performance. This paradigm shift from using historical measures to a NTS predictive tool could greatly enhance driver safety. We strongly recommend train and freight companies consider these findings to help improve safety performance. They can share the insights with drivers and managers; undertake NTS assessments in addition to technical competence measurements, and provide targeted support to those most at risk of a safety incident.’

Get in touch with the friendly OPC team if you think they could help you employ the predictive power of NTS to enhance driver safety performance. [RP](#)



the occupational
psychology centre

Tel: +44 (0)1923 234646
Email: admin@theopc.co.uk
Visit: www.theopc.oc.uk