

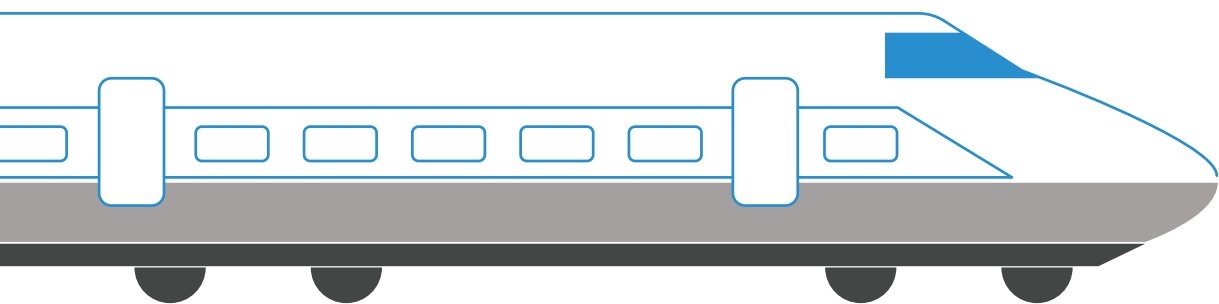
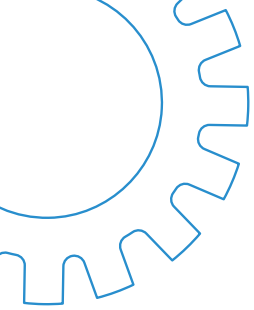


**Talegent**  
*Technology meets Psychology*

**Talegent Whitepaper** | January 2017

## **Railway Assessment Solution**

Efficacy of Assessment-Based Hiring  
for Improving Railway Performance



## EXECUTIVE SUMMARY

Talegent's Assessment Solution for the railway industry measures candidates across three key areas— Safety Behavior, Psychomotor skills and Cognitive Abilities. Comparing candidate scores with on-the-job safety metrics shows significant correlation. Therefore, for those railway companies who have set safer operation as a primary objective, this type of multi-dimensional assessment can help identify hires whose performance will result in improving metrics for safe operation by lowering the incidence of accidents and injuries.



## INTRODUCTION: Thinking beyond the office

The most predictive means available for predicting future job performance, psychometrically-based assessments of core competencies now enjoy widespread use across many leading corporations. But many business people tend to associate these new online assessments only with office jobs. Sales people, call center agents, financial managers, hospitality staff and so on are the types of jobs one thinks of as the norm for assessment screening.

But why should this be so?

Many more manual roles for industries such as agricultural, mining, and transportation also rely on workers who possess traits and cognitive abilities appropriate to the job at hand. These can easily be tested through an online assessment. But given that many of these workers must operate heavy machinery and there is considerable risk at stake, they also need to possess a certain level of psychomotor skills as well... and that is something less easily tested online.

## THE CHALLENGE: Developing a solution for Railways

Approached by a number of leading railways, we were tasked with creating an assessment that would help them identify and select the best candidates for railway positions. To do so, required a broad, multi-pronged approach to assess the range of capabilities railway workers are required to possess.

The purpose of this whitepaper is to explain the logic behind the creation of a railway-specific assessment solution, and look at real world, on-the-job data to gauge its validity, i.e. its ability to predict job performance against industry-relevant metrics.

## BACKGROUND:

### What kind of people does the Railway industry need?

The key functions that railways need their people to do can be distilled down into two key objectives. One, they must possess the intellectual and manual skills to get trains, whether carrying passengers or freight, from point A to point B reliably and on time. Two they must do it safely, without damaging or destroying equipment, staff or cargo. In fact, given the enormity of the calamities that can result from mishaps, safety tends to overshadow all else. Therefore, the reduction of accidents and injuries was the core objective for our railway clients use of assessment in hiring.

It is well established that safety is something that can be controlled through hiring. For, as Richard Morris, former Executive Director of the London Railway put it:

In our previous, December 2013 Whitepaper “The Human Factor in Workplace Safety” we demonstrated that “accidents cluster around individuals rather than occurring randomly and uniformly across a population of workers,” and provided data validation that these individuals could be identified and separated out from others. You can download the whitepaper here: <http://talegent.com/resources/insights/download-info/safety-whitepaper/>

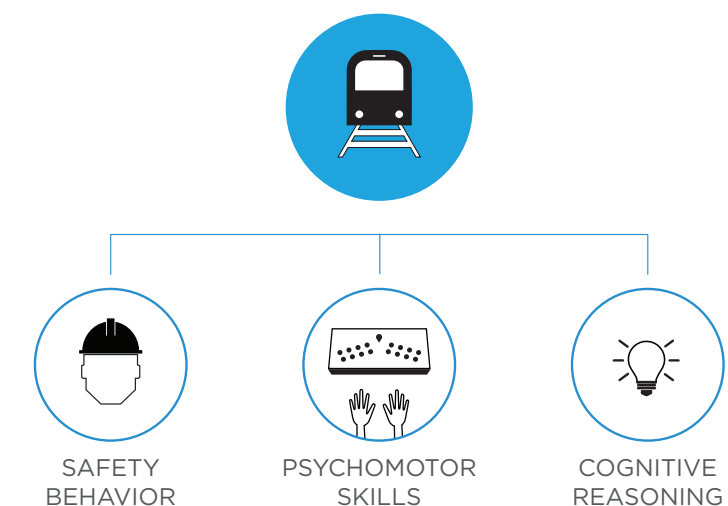
Working with our railway clients’ management teams and looking at data for top performers across a variety of job roles, we identified core cognitive competencies we expected would be predictive in combination with our proven Safety Behavior Assessment and Psychomotor test.

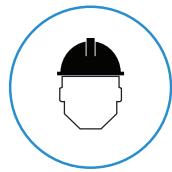
*“It is generally acknowledged that **80%** of accidents can be attributable to human factors and this is the driving force behind trying to remove the interference of human factors into every level of operation.”*

## OBJECTIVE:

### Evaluate a new, Railway-specific assessment

The assessment solution we developed for our railway clients consists of a suite of assessments, falling under 3 key groupings:

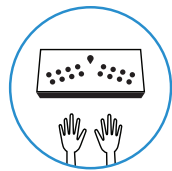




## SAFETY ASSESSMENT

The Safety Assessment measures the key personality traits and abilities that accurately predict safe behavior. Specific modules are used to assess each of the following:

- UNDERSTANDS SAFETY INSTRUCTIONS
- ZERO HARM ATTITUDE
- COMPLIANCE
- STRESS TOLERANCE
- RULE FOLLOWING
- RISK CONSCIOUSNESS



## PSYCHOMOTOR ASSESSMENT

As evident from its name, the psychomotor assessment measures psychomotor abilities plus cognitive competencies that affect psychomotor performance. Important to note, the assessment of psychomotor abilities requires the use of a device with which candidates can hands-on interact.

Employing a proprietary test module developed specifically for this purpose, we are able obtain consistent and objective measures of a wide range of perceptual, reaction, coordination and other abilities. Through our process of discovery, the competencies we selected for the railway assessment solution were:

- REACTION TIME AND STRESS RECOVERY
- ATTENTION AND CONCENTRATION
- SPEED AND TRAJECTORY JUDGMENT
- VISUAL COORDINATION



## COGNITIVE ASSESSMENT

The Cognitive Assessment portion of the Railway Assessment solution tests for a specific range of competencies that railway managers and performance data indicated was most closely associated with successful, accident-free performance in railway job roles. These competencies are:

- **SITUATIONAL AWARENESS**  
The ability to accurately and quickly assess an environment and make decisions about that environment
- **VISUAL SHORT TERM MEMORY**  
The ability to accurately and quickly assess and retain a memory of an environment and to use this to make decisions about that environment
- **FAULT FINDING**  
The ability to perceive order and detect elements that are out of place
- **MECHANICAL REASONING**  
The ability to quickly understand mechanical systems and how they operate
- **SPATIAL REASONING**  
The ability to imagine objects in three dimensions and therefore make conclusions based on this
- **LOGICAL REASONING**  
The ability to predict or decipher outcomes by constructing a causal rationale
- **VERBAL REASONING**  
The ability to understand written material, such as research information, reports and correspondence
- **NUMERICAL REASONING**  
The ability to understand numerical information presented in tables, figures, and graphs

It should be noted that that the exact mix of competencies that served as a basis for selection varied by specific job role, as indicated in the following chart (Table 1.0):

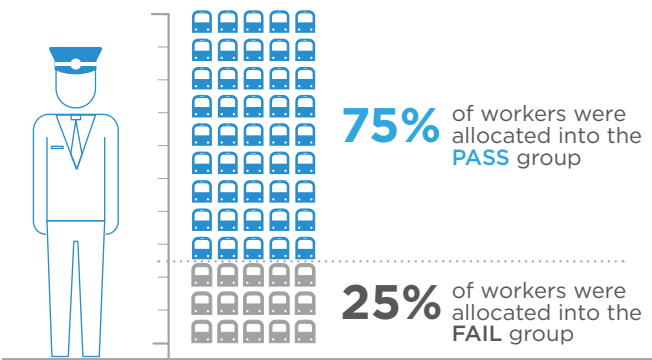
Table 1.0 : ASSESSMENTS FOR RAIL OPERATIONS, NETWORK AND CUSTOMER ROLES

|                                      | Safety Tool | Cognitive Tests |             |              |                 |        |               |                      | Psychomotor Testing |                           |                       |                              |                                 | Personality Testing  |    |
|--------------------------------------|-------------|-----------------|-------------|--------------|-----------------|--------|---------------|----------------------|---------------------|---------------------------|-----------------------|------------------------------|---------------------------------|----------------------|----|
|                                      |             | Op Verbal       | Prof Verbal | Op Numerical | Express Logical | Memory | Fault Finding | Mechanical Reasoning | Spatial Reasoning   | Attention & Concentration | Situational Awareness | Speed & Trajectory Judgement | Reaction Time & Stress Recovery | Visual Co-ordination |    |
|                                      |             | 20              | 20          | 25           | 10              | 30     | 25            | 20                   | 20                  | 20                        | 15                    | ?                            | 10                              | 10                   | 20 |
| Average Timings for each test (mins) |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Train Driver                         |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Guard                                |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Track Machine Operator(TMO)          |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Tutor Train Driver                   |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Tutor Guard                          |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Train Controller                     |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Electrical                           |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Mechanical                           |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Shunters                             |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Electrical- Apprentice               |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Mechanical- Apprentice               |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Hand Signalling                      |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Protection Officer                   |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Electrical- Apprentice               |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Mechanical- Apprentice               |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Station Master                       |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Casual Staff                         |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |
| Station Employees                    |             |                 |             |              |                 |        |               |                      |                     |                           |                       |                              |                                 |                      |    |



METHODOLOGY

We sought to validate the Railway Assessment under real-life work conditions, using job performance data. Working in partnership with a major railway client, we administered the assessment to a pool of job applicants. Scores for each of the various components of the Railway Assessment were evaluated against a comparison group of applicants for roles in the rail industry with a sample size of N= 222 respondents.



As quality of work is difficult to objectively measure, we used safety metrics as our proxy for job performance. Our goal was to determine which test scores were most closely associated with job performance and thus would be most accurate for identifying candidates with the highest potential to perform.

Workers were allocated into “fail” and “pass” groups for a given assessment based on their score with the lower 25% being allocated into the “fail” group and the upper 75% into the “pass” group. Following an extended period of working at the partner organization, employee accident and injury data was matched to their assessment results.

FINDINGS

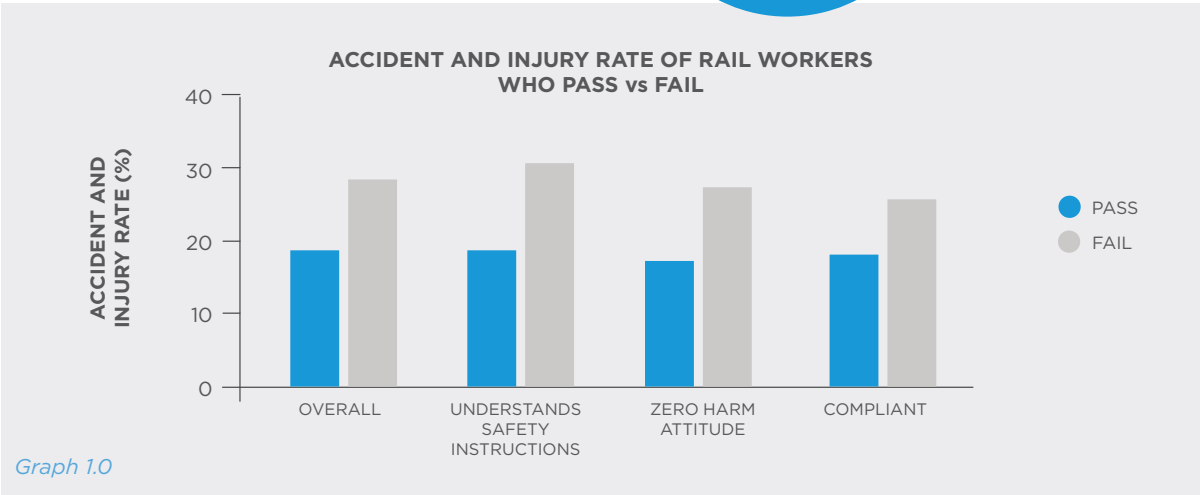
Overall, we found that scores for all three component assessments of the Railway Assessments Solution – SAFETY BEHAVIOR, PSYCHOMOTOR AND COGNITIVE ABILITY – positively correlated with actual job performance as measured across a range of safety metrics.

SAFETY BEHAVIOR ASSESSMENT FINDINGS

Not surprisingly, the Safety Assessment showed a strong correlation with safe and error-free job performance (Graph 1.0).



Rail workers who pass the Safety solution identify 6x as many workplace hazards as those who fail.



Graph 1.0



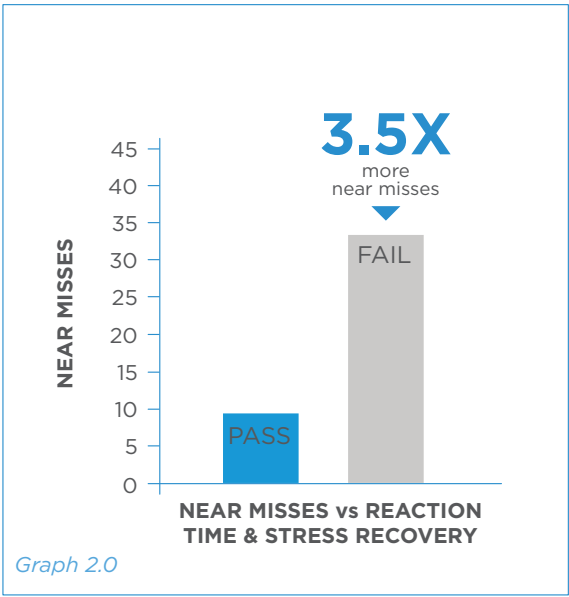
PSYCHOMOTOR ASSESSMENT FINDINGS



Three out of the four psychomotor tests administered turned out to be accurately predictive of job performance.

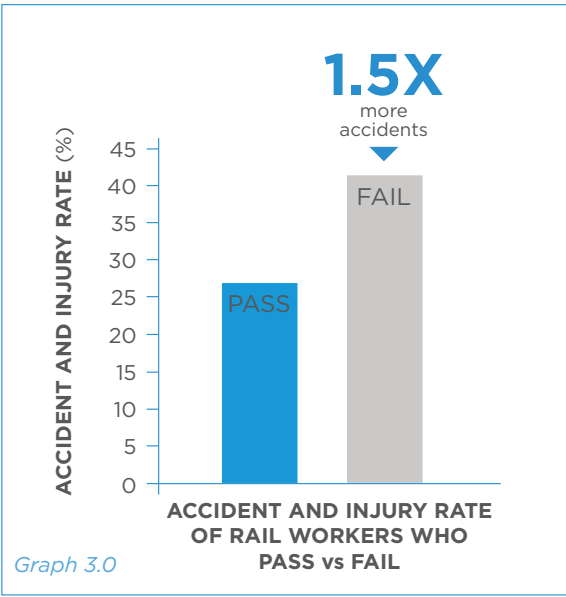
Talagent Control Unit

**Reaction Time and Stress Recovery:** Those who failed this measure had 3.5x more near misses (Graph 2.0).



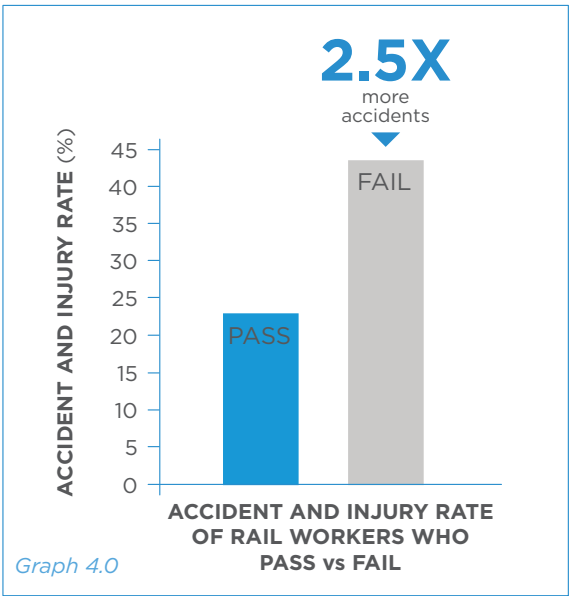
Graph 2.0

**Attention and Concentration:** Those who failed had 1.5x more accidents and injuries; those who passed had less than half as many lost time injuries (Graph 3.0).



Graph 3.0

**Visual Coordination:** Candidates who scored low here had 2.5x more accidents & injuries than those who achieved a passing score; conversely those who passed had half as many near-miss accidents (Graph 4.0).



Graph 4.0

“Many more manual roles for industries such as agricultural, mining, and transportation also rely on workers who possess traits and cognitive abilities appropriate to the job at hand. These can easily be tested through an online assessment. But given that many of these workers must operate heavy machinery and there is considerable risk at stake, they also need to possess a certain level of psychomotor skills as well...”

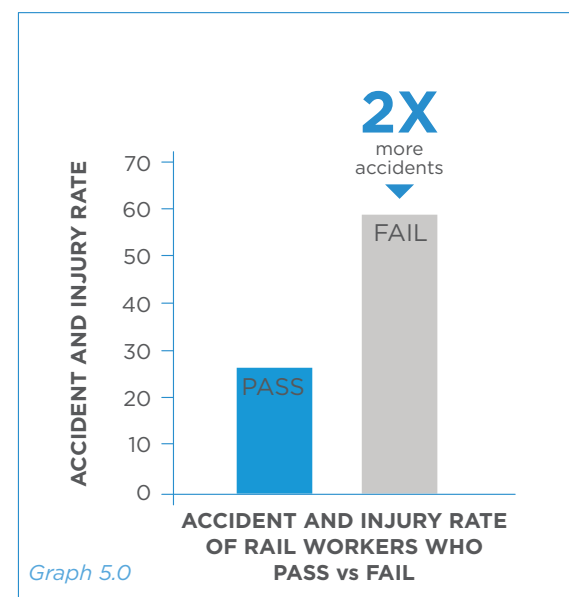


## COGNITIVE ASSESSMENT FINDINGS

Four out of the total seven cognitive competencies that were tested showed high correlation with the key safety metrics tracked for this study, as listed below:

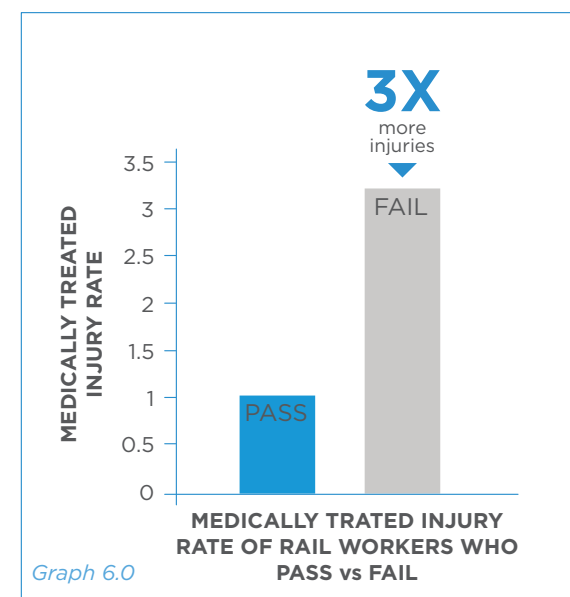
### Situational Awareness

Those who failed had **2X** more accidents and injuries ([Graph 5.0](#)).



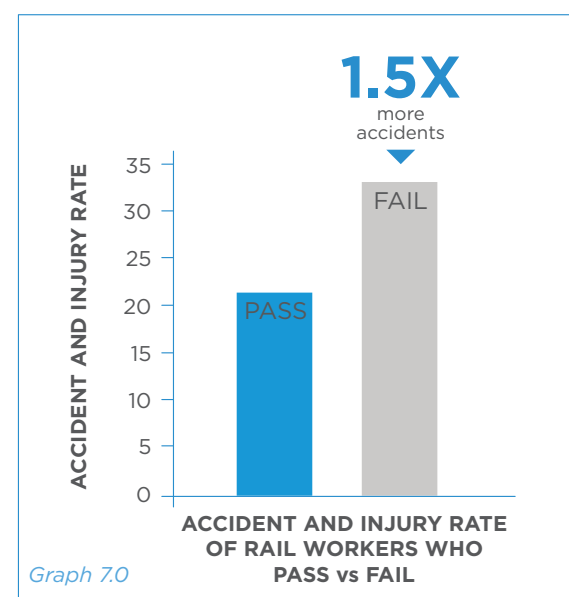
### Visual Short-Term Memory

Those who failed had **3X** more injuries which require medical treatment ([Graph 6.0](#)).



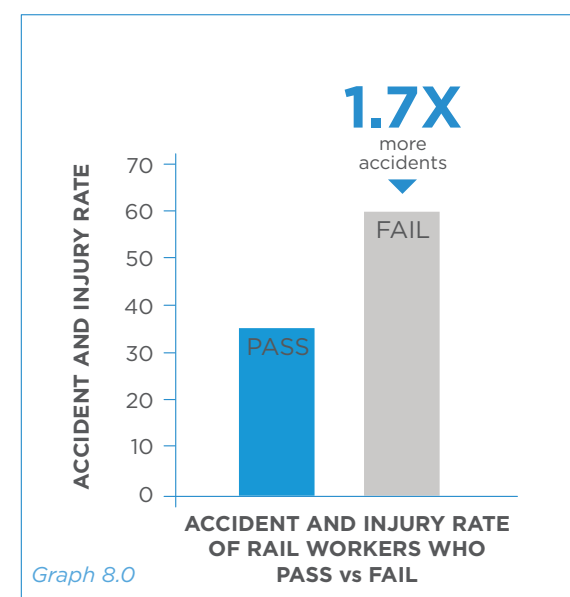
### Verbal Reasoning

Those who failed had **1.5X** more accidents and injuries; those who passed had half as many near-misses ([Graph 7.0](#)).



### Numerical Reasoning

Those who failed had **1.7X** more accidents and injuries; those who passed identified **2X** the number of workplace hazards ([Graph 8.0](#)).



On the other hand, Fault Finding, Mechanical Reasoning and Logical Reasoning assessment scores did not show a significant correlation with the safety metrics being measured in this study. It is important to note, however, that they very well could positively correlate with other aspects of railway job performance not measured in this study.



## CONCLUSION

While measuring candidates in substantially different areas, the Safety, Psychomotor, and Cognitive assessments comprising the Railway Talent Assessment Solution each demonstrated significant correlations between candidate scores and on-the-job performance as measured across a range of accident and safety metrics.

Given that hiring safer employees is the key objective for the railway company participating not just in this survey but also across the entire industry, we conclude that the multi-dimensional assessment does provide an objective and predictively accurate gauge of eventual job performance.

While no single overwhelmingly dominant “predictor” emerged, factored together as a whole, scores for the three subject areas in the Railway Assessment we tested can provide hiring managers with numerous data points on which to base sound and effective hiring decisions.

*Talegent's multi-dimensional Railway assessment solution provides hiring managers an objective and predictively accurate gauge of eventual job performance.*

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