



SAFESYSTEM | WHITEPAPER SERIES



IMPROVING SAFETY-RELATED BEHAVIOR IN THE WORKPLACE

HOW PERSONALITY INFLUENCES SAFETY-RELATED WORK BEHAVIOR

HOGAN RESEARCH DIVISION



HOW PERSONALITY INFLUENCES SAFETY-RELATED WORK BEHAVIOR

The Hogan Research Division (HRD) at Hogan Assessment Systems is responsible for developing and maintaining predictive personality profiles for thousands of jobs across the globe. HRD also plays a vital role in creating new products designed to meet the expanding and evolving needs of personality assessment users.

HRD members are actively engaged in introducing several new products related to a variety of selection needs organizations face. In this paper, we will describe a line of research investigating relationships between personality and safety. To examine these relationships, we first identified clusters of behaviors associated with safe performance. Next, we created personality-based scales to predict these behaviors. Finally, we validated these scales using safety data from multiple organizations.

PREDICTING SAFETY USING PERSONALITY

Researchers fall into different camps concerning the role personality plays in predicting workplace safety. For example, Reason (2008) concluded that there are only "...error-prone situations rather than error-prone people..." (p. 107). In contrast, one recent and extensive analysis (Christian, Bradley, Wallace & Burke, 2009) found that organizational, situational, and individual characteristics all predict safety performance.

Personality effectively predicts a variety of workplace behaviors. For example, individuals who are high on Extraversion are likely to engage others in conversation, seek attention, and compete with coworkers. Although these characteristics prove beneficial in some work contexts, they may also lead to unsafe behaviors. Over long periods of time, regular unsafe behaviors are likely to result in safety incidents. This rationale led HRD to investigate personality correlates with safety.

We started by identifying antecedents of safety behavior. We reviewed existing research, evidence provided by experts in personality and safety, and examples of safe and unsafe behaviors to develop a Safety Competency Model. The model presented in Table 1 contains six components that represent critical antecedents of safety behaviors across jobs.

When constructing personality predictor scales, we followed two well established research findings. The first is that combinations of personality facets are often more predictive than individual factor-level scales (e.g., Hogan & Roberts, 1996; Ones, Dilchert, Viswesvaran, & Judge, 2007). The second is that scales are more predictive of conceptually aligned work outcomes than overall performance factors (e.g., Hogan & Holland, 2003).

As such, we developed personality scales to predict each component of our Safety Competency Model. To create these scales, we (a) clearly defined each component in the model, (b) identified studies with aligned criterion ratings, (c) computed meta-analyses to examine relationships between individual personality facets and aligned criteria, and (d) combined predictive facets to create personality-based scales aligned with each component of the model.

HOW PERSONALITY INFLUENCES SAFETY-RELATED WORK BEHAVIOR

We validated the personality-based predictor scales using three methods. First, we examined relationships between each predictor scale and aligned supervisory ratings (i.e., behaviors reflecting each component of the model). Second, using multiple cross-validation samples, we examined relationships between each scale and supervisory ratings of overall safety performance. Finally, because the ultimate measure of effectiveness for any safety related endeavor is its impact on accidents and injuries, we examined the potential impact of using safety-related personality scales to reduce safety incidents.

Aligned Criteria. We examined results from over 100 criterion-related validity studies containing Hogan Personality Inventory (HPI; Hogan & Hogan, 2007) data and supervisory performance ratings aligned with at least one component of the Safety Competency Model. We identified between 17 and 46 studies containing results that aligned with each component. Using meta-analysis to aggregate results across studies, we found that each safety-related personality predictor scale significantly correlated with aligned performance ratings. As shown in Table 2, after correcting for unreliability in performance ratings, correlations ranged from .21 to .29.

Overall Safety Ratings. Next, we used meta-analysis to examine relationships between each personality scale and overall safety ratings. We examined these relationships using five new studies that contained both HPI data and overall safety ratings. As shown in Table 3, each scale positively associated with overall safety ratings, with corrected correlations ranging from .15 to .28. These results indicate that individuals likely to follow organizational rules, effectively handle stress, avoid emotional outbursts, remain attentive while performing mundane tasks, avoid risks, and respond well to training are likely to exhibit safe job behaviors.

Accidents and Injuries. Finally, we examined the impact of combining results across scales on predicting accidents and injuries. We identified five datasets containing both HPI data and recorded accidents and injuries across at least three years. As presented in Figure 1, we found that individuals with below average safety scores across the six components of the Safety Competency Model were nearly twice as likely (42%) to have multiple accidents and injuries as those with above average scores (22%). As seen in Figure 2, we also found that individuals with zero (30%) or one (31%) extremely low safety predictor scores were less likely to have multiple accidents and injuries than those with two or more such scores (48%).

SUMMARY

Our research shows that individual differences in personality predict both safety related behaviors (as indicated by supervisory ratings) and on-the-job accidents and injuries. This research stands in contrast to previous findings showing little to no relationships between individual personality measures and safety incidents.

By identifying critical antecedents to safety behaviors and combining results across multiple personality facets, organizations can identify individual differences likely to lead to – or prevent – accidents and injuries across industries, organizations, and jobs.

REFERENCES

- Christian, M. S., Bradley, J. C., Wallace, J. C., & Burke, M. J. (2009). Workplace safety: A meta-analysis of the roles of person and situation factors. *Journal of Applied Psychology, 94*, 1103-1127.
- Hogan, R., & Hogan, J. (2007). *Hogan Personality Inventory manual* (3rd ed.). Tulsa, OK: Hogan Assessment Systems.
- Hogan, J., & Holland, B. (2003). Using theory to evaluate personality and job-performance relations: A socioanalytic perspective. *Journal of Applied Psychology, 88*, 100-112.
- Hogan, J., & Roberts, B. (1996). Issues and non-issues in the fidelity/bandwidth tradeoff. *Journal of Organizational Behavior, 17*, 627-637.
- Ones, D. S., Dilchert, S., Viswesvaran, C., & Judge, T. (2007). In support of personality assessment in organizational settings. *Personnel Psychology, 60*, 995-1027.
- Reason, J. (2008). *The human contribution: Unsafe acts, accidents and heroic recoveries*. Burlington, VT: Ashgate.

Table 1: Safety Competency Model with Descriptions

Competency	Description
Compliant	A person's tendency to follow rules. Poor performers ignore authority and company rules. Exceptional performers willingly follow rules and guidelines.
Strong	Ability to handle stress with confidence. Poor performers tend to panic under pressure and make mistakes. Exceptional performers are steady under pressure.
Emotionally Stable	Ability to handle pressure without emotional outbursts. Poor performers easily lose their temper and then make mistakes. Exceptional performers control their tempers.
Vigilant	Ability to stay focused when performing monotonous tasks. Poor performers are easily distracted and then make mistakes. Exceptional performers stay focused on the task at hand.
Cautious	A person's tendency to avoid risk. Poor performers tend to take unnecessary risks. Exceptional performers evaluate their options before making risky decisions.
Trainable	A person's tendency to respond favorably to training. Poor performers overestimate their competence and are hard to train. Exceptional performers listen to advice and like to learn.

Table 2: Meta-Analysis Estimates of Safety Scales for Predicting Aligned Safety Competence Ratings

Safety Scale	k	N	R_{sw}	SD_{sw}	ρ	SD_p	% Var	80% CV	95% CI
Compliant	42	3,782	.16	.09	.22	.13	100%	.16	.12
Strong	23	2,305	.20	.08	.29	.11	100%	.20	.16
Emotionally Stable	46	4,689	.19	.10	.26	.15	84%	.14	.16
Vigilant	17	1,674	.15	.10	.22	.14	98%	.15	.11
Cautious	32	3,814	.16	.09	.23	.12	100%	.16	.13
Trainable	23	1,710	.15	.06	.21	.09	100%	.15	.11

Note. Results corrected for criterion unreliability. k = Number of correlations; N = Sample size; R_{sw} = Sample-weighted mean correlation; SD_{sw} = Sample-weighted standard deviation; ρ = Operational Validity; SD_p = Standard deviation of the corrected population correlation; % Var = Percent of variance accounted for by sampling error and artifact corrections'; 80% CV = lower 10% boundary of 80% Credibility Interval; 95% CI = lower 2.5% boundary of 95% Confidence Interval.

Table 3: Meta-Analysis Estimates for Facet-based Safety Competence Scales and Broad HPI Scales for Predicting Overall Safety Performance Ratings

Competency Scale	<i>k</i>	N	R_{sw}	SD_{sw}	ρ	% Var	80% CV	95% CI
Compliant	5	322	.20	.12	.28	100%	.20	.09
Strong	5	319	.11	.08	.16	100%	.11	.04
Emotionally Stable	5	320	.14	.09	.20	100%	.14	.06
Vigilant	5	319	.14	.18	.20	44%	.00	-.02
Cautious	5	319	.11	.17	.15	50%	-.01	-.05
Trainable	5	317	.17	.07	.24	100%	.17	.11

Figure 1: Accident and Injury Rates by Average Predictor Score

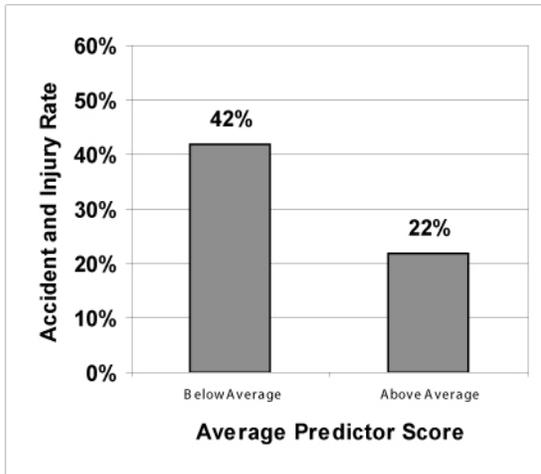


Figure 2: Accident and Injury Rates by Number of Critical Facet-Level Safety Scores

