

PERSONALITY CORRELATES WITH SAFETY SUPERVISOR RATINGS IN MULTIPLE JOB SETTINGS

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Work related injuries and accidents result in substantial costs to organizations. This study examines the use of multiple personality scales to create a safety profile to select individuals who are more likely to be safe individuals. Results showed support for previous research as well as for the proposed scoring technique.

Introduction

The last two decades have shown a steady and significant increase in the use of personality testing for employee selection and development, spawned in large part by a handful of well known meta-analytical studies revealing consistent relationships between personality and job performance (e.g., Barrack & Mount, 1991, Barrick, Mount, & Judge, 2001; Hogan & Holland, 2003; Hertz & Donovan, 2000; Tett, Jackson, & Rothstein, 1991). Although most research examining these relationships has used subjective job performance ratings as the primary outcome variables of interest, research has also found relationships between personality and a variety of objective job outcomes, such as sales (Vinchur, Schippmann, Switzer, & Roth, 1998), tenure (Salgado, 2002), and counterproductive work behaviors (Conte & Jacobs, 2003; Mount, Ilies, & Johnson, 2006; Ones, Viswesvaran, & Schmidt, 2003). In this study, we extend research examining the effectiveness of using personality to predict behaviors associated with one aspect of counter productive work behaviors: workplace safety. We not only examine relationships between individual personality measures and supervisor safety ratings, but also examine the effectiveness of a profile developed using multiple personality scales to predict safety ratings.

Efforts aimed at improving workplace safety have traditionally taken one of two approaches: 1) examining how workplace characteristics can be improved, or 2) examining the impact of individual worker differences on safety-related outcomes. The first approach has been dominated by the field of human factors while the second has been the primary method of Industrial/Organizational Psychologists concerned with identifying personal characteristics related to safety.

While the human factors approach has a long and rich history, one which has undoubtedly provided considerable contributions to worker safety, its effectiveness may be limited for two reasons. First, there is a potential for diminishing returns once significant workplace improvements have been made (Lawton & Parker, 1998). Second, controlling for all possible workplace hazards is impossible for nearly any job. This is particularly true for jobs in which a significant amount of time is spent outside of an individual's primary work area.

These limitations highlight the value of examining the impact of individual differences on organizational accidents and injuries. Much of this work has traditionally focused on physical abilities, or more specifically, selecting or training individuals having the physical attributes needed to interact with their work environment safely and effectively. Early attempts to identify “accident prone” individuals using psychological assessments often produced conflicting or inconclusive results, resulting in a decline of research in this area (Lawton & Parker, 1998). Advancements in personality research, such as the emergence of the Five Factor Model (Digman, 1990; Goldberg, 1992; John, 1990, p. 72; McCrae & Costa, 1987; Wiggins, 1996) and the publication of several studies showing relationships between psychological measures and counterproductive work behaviors (e.g., Cellar, Nelson, York, & Bauer, 2001; Hanson, 1988; Wallace and Vodanovich, 2003) have resulted in renewed interest in using personality measures to identify individuals who are more likely to display unsafe work behaviors on the job.

Previous research has shown a relationship between safety-related job outcomes and four of the Five Factor Model scales. Specifically, Conscientiousness has shown the most consistent and widely reported relationships with safety related job outcomes (Cellar, et al., 2001; Wallace & Chen, 2006; Wallace and Vodanovich, 2003), indicating that individuals who lack an attention to detail, are unreliable, and have difficulties following rules are more likely to have accidents or be injured on the job. Research has also shown that individuals who are unable to handle stress and cope with uncertain work situations (high Neuroticism; Kamp & Krause, 1997), who have difficulty getting along with others and prefer to work independently (low Agreeableness; Clarke, 2006), and who are outgoing and enjoy being the center of attention (high Extraversion; Hanson, 1988) are also more likely to engage in behaviors that result in injuries or accidents.

These results have been partially replicated using the Hogan Personality Inventory (HPI; Hogan Assessment Systems, 2007). The HPI is comprised of seven primary scales that align with the Five Factor Model and has been used in over 200 criterion related validity studies over the past thirty years for the purposes of predicting a wide variety of job related outcomes. In a recent meta-analysis examining relationships between scales on the HPI and safety related work outcomes (Foster, 2005), data were examined from 471 individuals collected from 6 criterion studies. Results showed significant positive results for the HPI scales of Adjustment (Neuroticism, reverse coded, $p = .21$), Interpersonal Sensitivity (Agreeableness, $p = .12$), and Prudence (Conscientiousness, $p = .21$). Results were not, however, significant for Sociability (Extraversion, $p = .01$); the results for this analysis were particularly skewed by one study with a high sample size showing a significant positive relationship between Sociability and supervisory ratings of safety related work behaviors. Four of the remaining five studies showed a negative relationship between Sociability and safety.

Based on the research described above, Foster and Chen (2007) correlated HPI Adjustment, Interpersonal Sensitivity, Prudence and Sociability scales with safety behaviors within a single criterion study, finding partial support for using these scales as safety predictors. All relationships were in the expected direction, providing some evidence for combining these scales into an effective safety profile.

Safety Profile. Based upon previous research examining relationships between personality scales and safety related work outcomes, four HPI scales were used to create a personality profile aimed at identifying individuals with a high likelihood of exhibiting safe work related behaviors.

Individuals meeting this profile had HPI scores reflective of being able to handle stressful situations (high Adjustment), tolerant and considerate (high Interpersonal Sensitivity), orderly and dependable (high Prudence), and quiet and reserved (low Sociability). Safety supervisor ratings of individuals meeting this profile were compared to those that did not.

A number of specific hypotheses were examined for this study. First, we wanted to replicate Foster and Chen's (2007) work across multiple datasets using supervisor safety ratings, where it was predicted that the scales used to create the profile would predict supervisor safety ratings consistent with previous research.

Hypothesis 1a: Adjustment will be correlated with supervisor safety ratings, where individuals with low Adjustment scores will be more likely to have lower supervisor safety ratings.

Hypothesis 1b: Interpersonal Sensitivity will be correlated with supervisor safety ratings, where individuals with low Interpersonal Sensitivity scores will be more likely to have lower supervisor safety ratings.

Hypothesis 1c: Prudence will be correlated with supervisor safety ratings, where individuals with low Prudence scores will be more likely to have lower supervisor safety ratings.

Hypothesis 1d: Sociability will be correlated with supervisor safety ratings, where individuals with high Sociability scores will be more likely to have lower supervisor safety ratings.

The second objective of this study was to examine the effectiveness of developing a safety profile using multiple personality measures. Although correlations provide valuable information concerning the linear relationships between individual predictor scales and measures of job performance, personality measures may be more predictive when scales are combined than when examined independently. In other words, no single personality scale can be expected to provide a detailed and comprehensive picture of an individual's characteristics.

For this reason, individual results from most well validated personality scales commonly used in business settings can only be accurately interpreted by considering an individual's scores across multiple scales. Researchers have shown that the predictability of personality measures can be improved when a number of alternatives to correlational analyses are employed, such as interactions (Burke & Witt, 2002; 2004; Foster & Macan, 2006) and configural scoring techniques (Murphy & Davies, 2006). Foster and Chen (2007) created a configural safety profile consisting of HPI Adjustment, Interpersonal Sensitivity, Prudence, and Sociability to predict safety outcomes in a single criterion dataset. We built on this research by testing the effectiveness of a similar safety profile on supervisor safety ratings across multiple datasets.

Hypothesis 2: Individuals who have higher scores on the safety predictor will have significantly higher supervisor safety ratings compared to those not meeting the profile.

Method

Inclusion Criteria. The sample consisted of 7 criterion studies. To be included in the analysis, studies must have: a) used the HPI as a predictor (to avoid errors associated with classifying scales from multiple assessments into the FFM; see Hogan & Holland, 2003), and b) included subjective measures of safety. Overall these studies included 447 individuals working in the transportation, government, manufacturing, and extermination industries. Jobs included in the study were Dock Workers, Manufacturing Workers, Exterminators, Engineer Trainees, Truck Drivers, Pilots, and Natural Resource Officers.

Predictors. The present investigation used the HPI to assess personality dimensions. The HPI was the first Five Factor Model assessment designed to measure personality in a work related context. It contains 206 items measured on a true/false scale, is written at a 4th grade reading level, and typically takes 15-20 minutes to complete. The HPI is designed for both personnel selection and development and has been given to over 1 million individuals for work related purposes.

Criterion. Criterion data consisted of subjective ratings of safety performance given to individuals by their supervisors (e.g., how often does employee follow on-the-job safety guidelines, encourages safe work behavior and works to prevent accidents). Using meta-analyses methodologies outlined in previous research (e.g., Barrick & Mount, 1991; Hogan & Holland, 2003; Tett et al., 1991), Rothstein, Schmidt, Erwin, Owens, and Spark's (1990) reliability estimate of .508 was used as the reliability of subjective performance indices. Hunter and Schmidt's (2004) meta-analytic procedures were used to correct for unreliability in the predictors and criteria as well as range restriction in the predictors. Range restriction corrections were based on an incumbent sample of 15,463 in the Hogan archive.

Analytical Approach. To test the study's hypotheses, analyses were conducted in two steps. First a meta-analysis of the HPI scales included for the safety profile by Foster and Chen (2007) was conducted. This was done to determine if the expected pattern of relationships would be consistent using meta-analytic techniques. Next an alternative safety profile metric was examined. This was done by adding the HPI scales comprising the safety profile and giving twice the weight to scales with the largest correlation values found in step one. The resulting composite variable was then correlated with the subjective measures of safety performance.

Results

Hypotheses 1a-d stated that the four HPI scales used to comprise the safety profile would all be significantly correlated with safety related outcomes. Specifically, Adjustment, Interpersonal Sensitivity, and Prudence were all expected to have significant positive correlations with safety ratings. Sociability was expected to have significant negative correlation with safety ratings. Results are presented in Table 1.

As seen in Table 1, only Prudence and Sociability had significant correlations with the subjective safety ratings. Hypotheses 1a-d were, therefore, only partially supported. Although the lack of significant results failed to provide complete support for Hypotheses 1a-d, all of the correlations examined were in the expected directions. For example, Adjustment, Prudence, and

Interpersonal Sensitivity had positive correlations with safety ratings and Sociability had a negative correlation with safety ratings.

Hypothesis 2 sought to create a new safety profile metric by adding the safety profile scales. The new profile metric was then correlated with the subjective safety ratings. As seen in Table 1, results of the meta-analysis showed a corrected correlation between the new safety profile and the subjective safety ratings of .19 ($p < .05$). These results are consistent with the hypothesis that creating this metric would significantly correlate with safety ratings.

Discussion

This study has a number of implications for research concerning the prediction of safety related work outcomes and the application of assessment instruments that are effective predictors of safety. Although incremental support for Hypothesis 1a-d was disappointing, it is important to note that the relationships examined were in the expected direction. These results help to confirm previous research examining the relationships between individual personality scales and safety behaviors. Furthermore, the effectiveness of the safety profile provides additional support for the validity of each predictor scale examined and safety related performance ratings.

The effectiveness of the safety profile was encouraging and provides a substantial contribution to work in this area. To date these results have generalized across multiple studies ($p = .08 - .30$) showing stability in measurement. These findings provide support for using a generic profile for predicting safety ratings, which could have profound implications for the use of personality testing to reduce incident rates on the job. In addition, we were able to develop a generic profile to predict safety performance because we used multiple predictors within the profile. This strengthens our ability to identify individuals rated as safe across multiple studies. While the safety profile should be validated in samples with personality measures and safety-related work outcomes, the current research provides a step in the right direction in providing a method for organizations desiring to reduce unsafe behaviors and maximize employee performance. There is clearly a need for future research to examine relationships between meeting a safety profile and other important job related outcomes.

A number of limitations with this study provide directions for future research. First, as already mentioned, it would be worthwhile to examine the effectiveness of the safety profile used in samples containing objective data. For example, a more complete argument could be made using the profile when it not only reduces supervisor negative safety ratings, but also decreases accident and injury rates. The current approach is the first step in developing a safety profile that correctly identifies “accident prone” individuals and future research with objective safety data is needed to support this claim.

Finally, before any safety profile is implemented, its potential effects on other work related outcomes should be examined. Although other types of job performance data were unavailable for examination with the samples used in this study, it is important to evaluate the effectiveness of using any safety related profile with other criterion variables, such as supervisor ratings of performance or turnover rates. If results moderate other areas of job performance, it may be necessary for organizations to evaluate alternative profiles to achieve maximal effectiveness on work related outcomes deemed most important for a particular job.

In conclusion, work related injuries and accidents can result in substantial costs to organizations in a number of ways, whether it be lost days at work, costs associated with workman's compensation claims, or damaged equipment. Identifying individuals with a propensity towards engaging in behaviors likely to result in high safety ratings helps companies avoid these costs. This study demonstrates that multiple personality scales can be used to create a safety profile that may help companies reduce unsafe work behaviors.

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Table 1 Meta-Analytic Results for the Relationship Between HPI Scales and Safety Profile with Subjective Safety Ratings

	K	N	R_{sw}	SD_{sw}	90% Conf. Int.			SD_p	% Var. Acc.	80% CV_L
					L	U	P			
Adjustment	7	447	.04	.08	-.05	.17	.06	.12	100	-
Interpersonal Sensitivity	7	447	.00	.04	-.06	.16	.05	.06	100	-
Prudence	7	447	.10	.11	.03	.25	.14*	.15	100	-
Sociability	7	447	-.13	.14	-.29	-.07	-.18*	.20	75.24	-.30
Safety Profile	7	447	.13	.10	.08	.30	.19*	.14	100	-

Note. Results are corrected for predictor and criterion unreliability and range restriction. k = number of correlations; N = number of teams; r_{sw} = sample-weighted mean correlation; SD_{sw} = sample-weighted standard deviation; 90% Conf. Int. L = lower bound of the 90% confidence interval; 90% Conf. Int. U = upper bound of the 90% confidence interval, p = corrected population correlation; SD_p = standard deviation of the corrected population correlation; % Var. Acc. = percent of variance accounted for by sampling error and artifact corrections; 80% CV_L = lower bound of the 80% credibility interval.