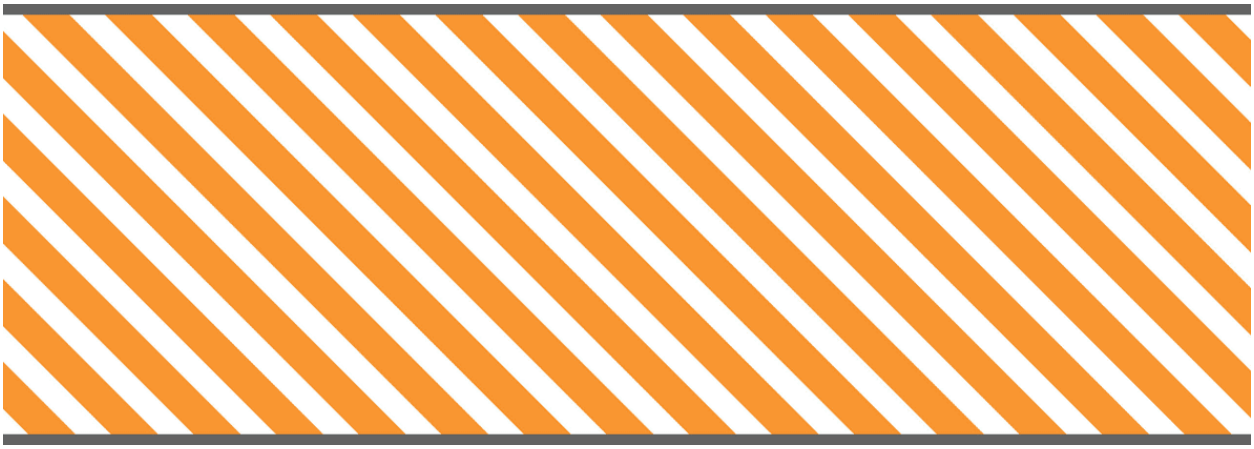
WorkSafePredictor



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WorkSafe Predictor

Introduction

Safety has become a major issue as the financial and human costs of imperfect safety performance increase. Regardless of the amount of energy and money a company spends on safety procedures and equipment, incidents continue to occur. Research clearly indicates that the attitudes and behaviors of individual workers hold the key to safety improvement and the highest levels of safety performance. Organizations are now seeking to achieve an incident free workplace.

The WorkSafe Predictor was created to assess patterns of thinking and acting that predict safe behavior and the likelihood of remaining free from workplace safety incidents. It is intended to provide insight into safety behaviours that can be used in a developmental, needs assessment or selection context.

The Predictor is designed for testing adults in business and industrial settings where safety is important. No industry specific language or technical jargon is used so that the Predictor can be administered in any industry and with any position. Predictor results can identify “low safety risk” individuals or identify employees who are a “high safety risk.” It can help determine what aspect of the candidate’s behavior contributes to higher risk, providing opportunities to address those areas hindering safety. When administered to current employees, the WorkSafe Predictor can help determine the focus of needed training and development to enhance a positive safety culture.

Conceptualization of the WorkSafe Predictor Model

The construction of an effective psychological measurement tool stems from an empirical and/or theoretical foundation. The empirical basis involves the use of statistical procedures in analyzing measurement data to identify factors which account for the variance in safety behavior. The theoretical approach draws upon published literature to establish relevant constructs leading to a method of measurement. The WorkSafe Predictor was developed using a theoretical basis. This approach involved extensive research on safety psychology to create a match between the content of the assessment and the content of the domain of interest. This establishes external validity, allowing the Predictor to measure constructs relevant to the domain of interest in the external environment.

The large human and financial costs of workplace accidents and injuries have motivated a great deal of research interest. Additionally, it is recognized that strong safety rules and procedures or a strong safety culture, while important, do not eliminate workplace incidents. The question for researchers is to investigate and identify the individual human factors that predict safe behavior. Such factors include personality variables, attitudes, values, thinking patterns and behaviors. The robust theoretical foundation behind workplace safety psychology provides insight into those factors that increase an individual's susceptibility to workplace incidents and to quantify those facets into a concise and accurate measure of predicted safety attitudes, values, and performance.

After conducting an extensive literature review and examination of current safety behaviour measures and research, eight scales were identified that assess the domain of interest. The scales include: Attentional Focus, Harm Avoidance, Personal Work Standards, Operating Care, Responsible Care, Safety Ownership, Safety Trust, and Stress Response. A description of the theoretical underpinnings of each scale is outlined below.

Table1: 8 scales in the WorkSafe Predictor Model

Attentional Focus
Harm Avoidance
Personal Work Standards
Operating Care
Responsible Care
Safety Ownership
Safety Trust
Stress Response

Attentional Focus

The ability of an individual to keep their attention focused on a task has also been demonstrated to correlate with occupational safety incident involvement. Hansen (1989) illustrated that distractibility was a direct predictor of workplace incidents. It has also been shown that those who are prone to more cognitive failures (mistakes or errors that an individual makes during a task that he or she would normally be able to carry out) are more likely to be involved in safety incidents, especially in people with lower levels of conscientiousness (Wallace & Vodanovich, 2003). Research in the railway industry illustrated that the most influential factor leading to incidents was inattention (Edkins & Polluck, 1997).

Harm Avoidance

Research has identified that the ability to avoid and manage harmful energies predicts workplace safety incidents. Paul and Maiti (2007) found that increased risk-taking behaviors led to higher numbers of injuries as well as negative emotionality and job dissatisfaction in underground coal miners. Ulleberg and Rundmo (2003) revealed that thrill-seeking individuals perceived risk to be lower, had more negative safety attitudes, and participated in more risky behaviors.

Operating Care

Research has shown that the acknowledgement of proper and careful use of equipment and procedures is an influential factor in predicting workplace safety incidents. Feyer, Williamson, & Cairns (1997) found that the majority of industrial fatalities in their study involved unsafe operating procedures. It was found that accidents involving misuse of equipment were more common than those involving the misuse of personal protective equipment.

Personal Work Standards

The Personal Work Standards scale can be viewed as a measure of conscientious. The factor of conscientiousness has been studied extensively with regard to occupational safety. Conscientiousness relates to an individual's tendency to strive for achievement, seek improvement, and be deliberate and reliable. A statistical procedure combining the results of many studies (meta-analysis) illustrated that low conscientiousness predicted accident involvement (Clarke & Robertson, 2005). Arthur and Graziano (2005) discovered that those with low conscientiousness were involved in more traffic accidents and also had more traffic violations.

Responsible Care

Those who show an active concern for others' safety contribute to an overall decrease in workplace safety incidents. Research indicates that those who are altruistic have positive attitudes towards safety and participate in less risky behaviors (Ulleberg & Rundmo, 2003). Low agreeableness, characterized by a lack of trust, low altruism, and poor group relationships has been demonstrated to predict occupational accidents.

Safety Ownership

The extent to which an individual takes ownership of his or her own safety has been shown to influence the occurrence of workplace safety incidents. Reason, Parker and Lawton (1998) reported that hazardous energies in the environment cannot simply be controlled by rules and regulations alone. A study involving hospital staff indicated that those with an internal locus of control (perceiving events in their life to be caused by their own actions and decisions) were involved in fewer incidents than those with an external locus of control (believing that their life is guided by factors outside of themselves).

Stress Response

One of the most researched factors relating to occupational safety incidents has been reaction to and management of stress. Underground miners experiencing high psychological distress were found to be involved in more workplace accidents (Sui, Phillips & Leung, 2004). Hansen (1989) found that general social maladjustment and involvement in counselling predicted involvement in accidents. The trait of neuroticism, which is characterized by anxiety, depression, hostility, and vulnerability, was also determined to be a strong predictor in workplace accidents by Clarke and Robertson (2005).

Safety Trust

Safety climate, as defined as, "open-door policy for hazard and accident reporting, sincere concern for employee well-being, and fairness in accident investigations," (p. 459) has been shown to create dispositions towards individual safety performance (Brown, Willis & Prussia, 2000). Neal, Griffen, and Hart (2000) found that safety climate influenced safety knowledge and motivation and that it had a direct link to safety participation. The safety attitudes of managers have also been shown to influence accident rates of employees (Bentley & Haslam, 2001).

Administration & Scoring

The Predictor is largely self-administered online through a web application, and can be completed individually or in groups. The administrator should ensure that the assessment environment is relatively free from distractions, is quiet, and well lit. It is important to create an environment that makes the individuals taking the Predictor as comfortable as possible. A reading comprehension level at the eighth grade level is sufficient. The test is 109 questions long and, while it is not timed, most responses are completed in less than 30 minutes. Those who take longer may be encouraged to work more rapidly and not study the items at length. Responses are downloaded on the secure web server and scored. The responses are also run through a validity algorithm to determine the presence of any motivational distortion.

No rigorous controls are required to establish dependable, reliable results. The Predictor has been used in a variety of conditions, including formal testing, individual administrations, and take home administrations. While a standard, supervised administration is ideal, the reliability and validity of individuals' results have not been negatively affected through less stringent administration conditions.

Interpreting the WorkSafe Predictor

The WorkSafe Predictor is designed for testing adults in business and industrial settings where safety is important. No industry specific language or technical jargon is used so the WorkSafe Predictor can be administered in any industry and with any position. The most popular application for the Predictor is in personnel selection. It will help determine what aspect of the candidate's behavior contributes to higher risk, providing opportunities to address those areas hindering safety. When administered to current employees, the WorkSafe Predictor will help determine the focus of training and development to enhance a positive safety culture.

After the responses have been scored and the reports have been generated, the results can be interpreted. This chapter outlines the steps for appropriately interpreting WorkSafe Predictor results, and provides in-depth information on the meaning of the 8 scales.

Steps for Interpreting the WorkSafe Predictor

The following four steps outline the recommended process for interpreting an individual's results.

Step One: Assess the validity of the Predictor results. The validity of the WorkSafe Predictor results must be evaluated before proceeding with the interpretation of an individual's profile. Assessing the validity involves examining the Profile Validity Score. This is presented on the first page of the WorkSafe Predictor Profile. The Profile Validity Score assesses the extent to which the questionnaire was answered accurately rather than an overtly positive or unusual way. Persons with low Validity scores respond in an unrealistically positive way, or obtained a profile which does not fit normal patterns. Persons with high Validity scores answered the questions in a candid and realistic way. A low Validity score indicates a high level of uncertainty in the accuracy of the profile. Profiles with many high or low scale scores should be interpreted with caution.

Step Two: Interpret the Scale Scores. The next level of interpretation is at the scale level which pinpoints specific strengths, challenges, preferences, and tendencies. This allows you to identify differences among people that play an important role in effectively matching candidates to a job, or identifying areas where attention can be focused for training and development. Individuals' highest and lowest scale scores are important to examine closely since their pattern closely relates to the work tasks they will be successful at, the work environment in which they will perform effectively, and the types of tasks they will enjoy.

If you are selecting personnel and have developed benchmarks for the position, it is appropriate to compare the candidate's scores with the benchmarks at this stage. Differences between the individual and the job requirements can be explored in Step Three when conducting interviews or utilizing other assessments. Specific interpretation for each of the 8 scales can be found later in this chapter.

Step Three: Compare Predictor results to other sources of information. When making decisions related to personnel selection it is recommended that the results be used to guide an interview that is designed to come to a greater understanding of the individual. Hypotheses developed about an individual's approach to work and safety environment can be examined through interviews, additional assessments, and behavioural observation. These other sources of information can provide a more meaningful interpretation of the Predictor results. The Predictor should not be used as the only source of information when making important decisions. Rather, when combined with other details gathered from different techniques, the Predictor can contribute comprehensive, powerful findings.

Step Four: Summarize the findings and make decisions. Making decisions is the crucial step in employing the WorkSafe Predictor. While the Predictor should never be used alone as a decision making tool, in conjunction with other sources of information it can enhance the selection and development of individuals. Based on the nature and strength of individuals' scale scores, hypotheses can be generated and their appropriateness for specific occupations can be determined. These hypotheses can be followed up through interviews or further assessments to better determine an individual's suitability.

Interpreting the WorkSafe Predictor Scales

The eight Predictor scales measure precise dimensions, providing a specific analysis of an individual's work safety behaviour. In order to examine the many variations among how people approach and complete their work, spending time carefully reviewing the eight scales is often necessary.

Attentional Focus

Assesses an individual's inclination to remain free from distraction and maintain focused attention on the task at hand. Additionally they will tend to be more organized and less impulsive in their actions.

- Persons with high Attentional Focus are able to concentrate on tasks despite distractions in the external or internal environment. They are less likely to cause a safety incident due to inattention or impulsive action.
- Persons with low Attentional Focus are easily distracted, have difficulty maintaining focus on tasks and working in an organized, planned manner. They are more susceptible to safety incidents.

Harm Avoidance

Assesses the extent to which an individual will risk exposure to potentially hazardous energies in the environment. Also assessed is the extent to which safety procedures, regulations or precautions are utilized to control personal safety risks.

- Persons with high Harm Avoidance will either avoid exposing themselves to hazardous energies, or when they do expose themselves, will minimize risk through the use of safety procedures and precautions.
- Persons with low Harm Avoidance will expose themselves to harmful energies without seeing the risks, or without utilizing safety procedures or precautions to the extent possible.

Operating Care

Assesses the extent to which an individual is at ease with operating equipment and vehicles safely, follows operating procedures and the overall level of regard for proper operation.

- Persons with high Operating Care operate in a safe, focused and diligent manner, respecting equipment limitations, and having a "sense" of the machine.
- Persons with low Operating Care are less concerned with safe operation and lack the same vigilance and ease in their operating actions.

Personal Work Standards

Assesses the extent to which an individual will focus on work tasks and their successful completion to a level of excellence.

- Persons with high Personal Work Standards will strive to improve their work, attend to details and ensure successful completion of tasks to a satisfactory standard.
- Persons with low Personal Work Standards will overlook personal learning or growth opportunities and show little concern for improving work outcomes, miss details of the work activity and complete work tasks in the quickest and easiest way.

Responsible Care

Assesses the extent to which an individual actively attends to the safety and well-being of co-workers.

- Persons with high Responsible Care scores will look out for the personal well-being of co-workers, anticipating and acting to remove potential hazards or harmful conditions, or to address behaviours such as unsafe acts.
- Persons with low Responsible Care scores will ignore hazards, unsafe conditions and actions that have the potential to harm co-workers.

Safety Ownership

Assesses the extent to which an individual assumes personal responsibility for their own safety, irrespective of the adequacy of safety systems and procedures or the extent of potentially hazardous energies in the workplace.

- Persons with high Safety Ownership see their safety as a consequence of their own initiative and action.
- Persons with low Safety Ownership place responsibility and control over safety outside themselves, and hence will be inclined to blame incidents on luck or other factors. This can result in exposure to situations that are harmful.

Stress Response

Assesses the extent to which an individual responds constructively to internal stress or stressful situations.

- Persons with high Stress Response will recognize stressful situations and stress within themselves, but will keep their emotions in check and act effectively and deliberately.
- Persons with low Stress Response will be affected by situational stressors and will allow personal stress to interfere with effective action, thus exposing themselves to potential harm.

Safety Trust

Assesses an individual's sense of the degree of importance placed on safety by past and present employers.

- Persons with high Safety Trust bring quality safety awareness, attitude and knowledge from previous employer's safety training to their present workplace.
- Persons with low Safety Trust may bring cynical safety attitudes or poor safety practices from previous employers to their present workplace; in such cases strong safety orientation will be needed.

Validity

Assesses the extent to which the individual answered the questions accurately rather than an overly positive or unusual way.

- Persons with a low Validity score answered the questions in an unrealistically positive way, or obtained a profile which does not fit normal patterns.
- Persons with a high Validity score answered the questions in a candid and realistic way.

Development and Norming of the WorkSafe Predictor

Scale development and item writing

The WorkSafe Predictor is a result of a number of efforts over a period of 10 years. This version is the third iteration of the assessment. The previous two assessments were called the Industrial Safety Behavior Questionnaire and the Safety Behaviour Index. The development of these two assessments formed the basis for the WorkSafe Predictor. The Predictor uses eight scales. To construct a measure of the eight scales, a thorough review was conducted of research studies and current personality measures to develop objective, operational definitions for each trait. After having created definitions for each scale, items that provided behavioural evidence for the scales were developed. The items were written according to the following rules:

1. Items should relate directly to work safety behaviour. The situation presented in the item needed to examine preferences and motivations for different types of work and work environments.

2. Items were to be written in the first person (e.g. "I am… ", "At work I… ", "For me… "). Since the Predictor is a self -report measure, it was necessary to write items in the first person.

3. Items should target a single construct. It was essential for the situation outlined in each item to be related to only one of the eight work safety scales. The items were designed around behaviours that provided evidence of a specific scale.

4. Items should be short, direct, and easy to understand.

5. A six-point Likert scale was developed to allow individuals to register the extent of their agreement of disagreement with each statement. The respondents could indicate their preferences by choosing one of the six options for each item.

For example:

In places I have worked, when it was busy, safety suffered.

Strongly Disagree Moderately Disagree Slightly Disagree Slightly Agree Moderately Agree Strongly Agree

The assessment has undergone a number of iterations and modifications which have resulted in the newest 109 item version of the instrument.

Norming of the WorkSafe Predictor

Norming is a key step in test development. The norms set the baseline which all test results are measured against, which allows the comparison of different individual's scores. Norms identify below average, average, and above average performance on the test, and help the test user appropriately interpret a person's results and make decisions. The more people included in the norm sample helps ensure that the test norms represent the actual distribution of work safety behaviours of the people in the population. This in turn allows the test results to be more accurate and informative when comparing different individuals.

The WorkSafe Predictor was standardized on a large sample of 1967 people, 1641 males and 326 females. The majority of the sample were applicants for occupations in resource, manufacturing, and extraction industries. They represent all levels of jobs: entry level job seekers, operators, administrative personnel, trades persons, engineers, human resource staff, business managers and supervisors.

Sten Scores

A person's results on the Predictor are reported in a standard score format known as Sten Scores. Standard scores are converted raw scores that help with the interpretation test results by allowing the comparison of an individual's results with the norm group. Standard scores also help compare a person's primary scale scores against each other. This allows us, for example, to determine if the person scores higher on Attentional Focus than Stress Response. There are many different types of standard scores. Sten scores are one of the most popular types of standard scores when reporting personality assessment results. Sten scores range from 1 to 10, have a Mean of 5.5, and a Standard Deviation of 2. This means, that an individual with a Sten score of 5.5 falls exactly on the average score of the norm population. As a result, 50 percent of the norm sample would score above and below the individual.

Means and Standard Deviations

Table 2 provides a detailed description of the Predictor raw scale scores for the sample. The means and standard deviations shown provide the norms which individuals who complete the Predictor are compared against. The mean raw score for each scale represents the "average" score of people in North America. The standard deviation indicates the spread of scores found among people in the normative sample. Approximately 68% of the population will obtain scores within one standard deviation above and below the mean, while 95% of the population will score within two standard deviations of the mean.

Sample characteristics

This technical supplement contains normative data for the WorkSafe Predictor, derived from a reference sample of job applicants. The WorkSafe Predictor is a 109 item questionnaire created to assess patterns of thinking and acting that predict safe behavior and the likelihood of remaining free from workplace safety incidents. The reference sample comprised 1967 job applicants across a large number of North American companies. The sample consisted of 1641 males and 326 females.

Table 2: Applicant performance on the WorkSafe Predictor (n=1967)

	Total Sample (n=1967)		Males (n=1641)		Females (n=326)	
	Mean	SD	Mean	SD	Mean	SD
Attentional Focus	50.13	7.94	50.06	7.99	50.53	7.68
Harm Avoidance	62.39	9.15	62.28	9.25	62.92	8.64
Operating Care	71.82	7.53	71.98	7.60	71.03	7.14
Personal Work Standards	53.12	6.34	52.96	6.40	53.95	5.97
Responsible Care	52.67	6.29	52.69	6.35	52.62	5.97
Safety Ownership	60.48	6.95	60.42	7.04	60.79	6.51
Stress Response	49.71	8.98	49.66	9.03	49.96	8.72
Safety Trust	70.45	12.27	70.64	12.16	69.46	12.81
Profile Validity	26.37	7.10	26.33	7.18	26.58	6.68
Overall Score	377.85	38.35	377.63	38.90	378.97	35.52

Gender Differences

Since the WorkSafe Predictor is used to compare people, including both males and females, it is important to have an understanding of the gender differences found on the 8 scales. A number of minor gender effects were discovered when comparing the mean scores of males and females. While most of the differences are quite small in magnitude, some are statistically significant. In general, females tended to receive higher scores on Personal Work Standards. Males tended to receive higher scores on Safety Trust. Since the differences between the scales were minimal they should not influence test interpretation.

Ethnic Differences

The norm sample for the WorkSafe Predictor contains a significant number of minorities, allowing for the examination of ethnic differences. A test which finds significantly large differences between members of minority groups and a majority group can result in adverse impact. These types of differences are commonly when using cognitive ability tests. However these variations tend to be less frequent and less pronounced for measures of behaviour or personality such as the WorkSafe Predictor. Table 3 lists the mean score for the WorkSafe Predictor dimensions for a group of recognized ethnic minorities and a Caucasian group. T-tests found significant differences on all scales except Harm

Avoidance and Operating Care. In all cases (except Safety Ownership) the minority group scored higher than the majority group. The assessment shows no adverse impact on minority populations. While minor differences can be observed between the groups, their effect on test interpretation is minimal.

Table 3: Applicant performance on the WorkSafe Predictor by Ethnicity (n=1967)

	Total Sample (n=1967)		Caucasian (n=1780)		Minority (n=187)	
	Mean	SD	Mean	SD	Mean	SD
Attentional Focus	50.13	7.86	49.89	7.99	52.66	8.25
Harm Avoidance	62.39	9.15	62.01	9.12	65.94	8.12
Operating Care	71.82	7.53	71.77	7.49	72.36	7.92
Personal Work Standards	53.12	6.34	52.89	6.30	55.32	6.37
Responsible Care	52.67	6.29	52.56	6.20	53.79	6.94
Safety Ownership	60.48	6.95	60.63	6.88	59.00	7.48
Stress Response	49.71	8.98	49.60	8.91	50.69	9.55
Safety Trust	70.45	12.27	69.87	12.16	75.95	11.96
Overall Score	377.85	38.35	376.93	38.10	386.65	39.74

Reliability

Reliability is concerned with the consistency of test scores, and how free test results are from external, confounding influences. The higher the reliability of a test, the more likely it is consistently measuring differences between people. More reliable tests provide results that remain unaffected by irrelevant variations, or what is commonly called random errors. Reliability is measured using correlation coefficients. A reliability coefficient is denoted by the letter "r", and is expressed as a number ranging between 0 and 1.00 with r=0 indicating no reliability, and r=1.00 indicating perfect reliability.

It is important to recognize that tests are never 100% accurate, so you will not find a test with a correlation coefficient of r=1.00. In general you will see the reliability of a test expressed as a decimal, for example, r=.80 or r=.93. There are a number of reasons and/or conditions that lead to unreliable test results. Some of the possible reasons include the following.

1. Candidate related: Test performance can be influenced by a person's psychological or physical state at the time of testing. For example, differing levels of anxiety, fatigue, or motivation may affect the individual's test results.

2. Test-related: Item design, instructions, examples and the design of the response procedure can influence an individual's test results. For example, confusing items or complicated instructions which make understanding the test difficult can negatively affect a person's results.

3. Procedural: Differences in the testing environment, such as room temperature, lighting, noise, or even the test administrator and scoring procedures can influence an individual's test performance.

These three factors are sources of chance or random measurement error in the assessment process. If there were no random errors of measurement, the individual would get the same test score, their "true" score, each time. The degree to which test scores are unaffected by measurement errors is an indication of the reliability of the test.

One of the main approaches used to assess reliability is through measures of internal consistency. A sophisticated form of internal consistency reliability is Cronbach's alpha. It effectively splits the test items in every possible way and computes the average of all combinations. Consistency should be achieved such that all the items are measuring the same thing to the same degree, and, therefore, the items for each test scale should have a high degree of correlation. Most professionals agree that test scales with correlation coefficients above .70 are useful for most applications. The internal consistency reliability coefficients for each of the WorkSafe Predictor scales are shown in Table 4. As shown in the table, the reliability coefficients range from .70 to .87 for the whole sample, for males and females and for groups with different educational levels. This exceeds the .70 level for every group, indicating the consistency of the Predictor test scores is high. The strength of the reliability coefficients indicates that the Predictor is relatively free from external errors that could negatively impact the measurement of safety behaviour.

Table 4: Reliability Coefficients for various samples of the WorkSafe Predictor

		Total Sample (n=1967)	**Males (n=1641)**	**Females (n=326)**
	Number of Items	Cronbach's Alpha	Cronbach's Alpha	Cronbach's Alpha
Attentional Focus	12	0.78	0.78	0.76
Harm Avoidance	13	0.82	0.82	0.82
Operating Care	15	0.71	0.72	0.69
Personal Work Standards	12	0.70	0.70	0.70
Responsible Care	12	0.70	0.70	0.70
Safety Ownership	13	0.72	0.72	0.70
Stress Response	14	0.80	0.80	0.79
Safety Trust	15	0.90	0.90	0.89
Profile Validity	8	0.82	0.83	0.81
Overall Score	86	0.93	0.93	0.92

The correlations in Table 5 show the relationships between the 10 WorkSafe Predictor scales. Reviewing the table shows there are significant relationships among the scales. Results indicate that the content scales are moderately and positively correlated with one another, and strongly correlated with the Overall Score as would be expected.

Table 5: Correlation Coefficients for WorkSafe Predictor Scales (n=1967)

		2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00
1	Attentional Focus	0.53	0.55	0.67	0.48	0.57	0.63	0.37	0.51	0.83
2	Harm Avoidance		0.62	0.63	0.46	0.50	0.33	0.44	0.35	0.76
3	Operating Care			0.59	0.46	0.55	0.38	0.37	0.30	0.77
4	Personal Work Standards				0.54	0.60	0.53	0.42	0.48	0.83
5	Responsible Care					0.57	0.55	0.31	0.15	0.72
6	Safety Ownership						0.57	0.29	0.20	0.79
7	Stress Response							0.26	0.40	0.74
8	Safety Trust								0.37	0.46
9	Profile Validity									0.45
10	Overall Score									

Validity of the WorkSafe Predictor Assessment

The validity of an assessment refers to the accuracy of the inferences that may be made based on the results of the assessment. An instrument is said to be valid when it measures what it has been designed to measure (Ghiselli, Campbell, & Zedeck, 1981; Murphy & Davidshofer, 2005). Additionally, a valid assessment maintains the same relationships with other assessments over time. Validity of personality assessments is often established through construct validity by showing that results of the assessment relate in a predictable manner to results of other similar measures they should be related to (known as convergent validity) and are not related to results of measures they should not be related to (known as divergent validity). Convergent validity can be demonstrated when results of an assessment are related to results of other similar measures, observations, or other information that assesses the same or a similar concept. Similarly, divergent validity can be demonstrated when results of an assessment fail to relate to other measures, observations, or information they should not be related to.

Correlations with Other Personality Assessments

To further demonstrate convergent and divergent validity of the WorkSafe Predictor the assessment was correlated with scales of several other assessments, namely the Employment Values Inventory, the Occupational Type Profile, and the Occupational Relationships Profile. Descriptions of the relationships between the WorkSafe Predictor assessment and the other assessments follow.

The Employment Values Inventory

The Employment Values Inventory (EVI) contains 14 work related values that a person holds. The EVI scales are divided into six categories, and are described by category below. Correlations between the two instruments are displayed in Table 6.

Table 6: Employment Values Inventory Scales

JOB VALUES	
Work Ethic	A belief in the virtue of hard work
Task Orientation	Value given to the needs of the task itself
Need to Achieve	The value of drive, determination and ambition
PEOPLE VALUES	
Social Outgoingness	Placing a high value on being with others in a social environment
Inclusion	Values placed on being a part of close knit team and to make the team work as harmoniously as possible
MANAGEMENT VALUES	
Responsibility	Value taking on many responsibilities in their work
Leadership	Value taking charge of people and events in a dominant fashion
PROFESSIONAL VALUES	
Innovation	Value tasks that allow for experimentation and creativity
Intellectual Stimulus	Value using their intellect beyond the ordinary demands of daily living
Risk-taking	Value taking chances that seem to have excitement or an element of danger
ORGANISATION VALUES	
Stability	Value place on having a generally stable workplace
Structure	Value following rules and regulations
Status	Value work that allows them to feel, important and respected
PERSONAL VALUES	
Training	Values gaining knowledge from training on the job

(Personality Course Manual, Selby MillSmith, 2001)

Table 7: Work Values and WorkSafe Predictor Correlations (n=179)

JOB VALUES	Attentional	Standards	Responsible	Ownership	Trust	Stress	Harm	Care	Total
Ethic	0.19	**0.20**	0.15	**0.29**	-0.04	0.14	0.09	**0.33**	**0.26**
Task Orientation	0.02	0.01	-0.16	0.02	-0.08	-0.16	0.03	0.06	-0.03
Need to Achieve	0.11	0.09	0.08	**0.21**	0.03	0.06	0.06	0.14	0.14
PEOPLE VALUES									
Social Outgoingness	**0.20**	0.17	**0.26**	0.12	**0.21**	**0.22**	**0.35**	**0.25**	**0.30**
Inclusion	0.14	0.16	0.18	0.09	**0.23**	0.11	**0.28**	0.17	**0.21**
MANAGEMENT VALUES									
Responsibility	**0.26**	**0.27**	**0.27**	**0.35**	0.16	**0.21**	**0.24**	**0.45**	**0.38**
Leadership	-0.07	-0.02	-0.01	0.16	0.01	-0.06	0.04	0.04	0.01
PROFESSIONAL VALUES									
Innovation	0.10	0.09	0.09	0.05	0.11	0.08	0.08	0.11	0.11
Intellectual Stimulus	**0.25**	0.10	0.11	0.14	0.14	0.17	0.12	**0.23**	**0.22**
Risk-taking	-0.12	-0.09	-0.04	0.06	-0.13	-0.01	**-0.25**	-0.05	-0.10
ORGANISATION VALUES									
Stability	-0.03	-0.08	-0.09	-0.07	0.09	**-0.21**	0.16	0.04	-0.05
Structure	0.09	0.05	-0.02	-0.06	0.15	-0.02	**0.26**	0.07	0.07
Status	-0.02	-0.01	-0.13	0.01	-0.01	-0.08	0.03	-0.04	-0.04
PERSONAL VALUES									
Training	0.14	0.08	0.04	0.01	0.06	0.02	0.09	0.11	0.09

Bold correlations are significant at the 0.01 level

The Occupational Relationships Profile

The Occupational Relationships Profile (ORP) contains 6 scales that relate to the quality of social interactions and personal relationships that occur in a typical work environment.. The OTP scales are described below. Correlations between the two instruments are displayed in Table 8.

Table 8: The Scales of the Occupational Relationships Profile

Scale	Description Of Scale First Six Scales	Theory Used To Develop Scale
Contact At Work	The degree to which an individual makes themselves known to others and involve themselves in the social environment	Schutz
Membership	The degree to which an individual wants others to involve them in the social environment	Schutz
Power	The degree of influence and responsibility an individual displays in their relationships with others	Schutz
Responsiveness	The degree to which an individual wants others to display influence and responsibility over them	Schutz
Openness	The degree of intimacy, affection and trust that an individual shares with others	Schutz
Shyness	The degree of intimacy, affection and trust that an individual wishes to receive from others	Schutz

Scale	Description Of Composite and Leadership Scales	Theory Used To Develop Scale
Sociability	A general measure of sociability	Schutz
Proactivity	The general level of confidence an individual displays in their dealings with others	Schutz

(Personality Course Manual, Selby MillSmith, 2001)

Table 9: Occupational Relationships Profile and WorkSafe Predictor Correlations (n=179)

CORE SCALES	Attentional	Standards	Responsible	Ownership	Trust	Stress	Harm	Care	Total
Contact	0.08	0.07	**0.27**	-0.01	**0.20**	0.16	0.14	0.10	0.15
Membership	0.04	-0.05	0.15	0.06	0.03	0.09	0.07	0.13	0.09
Power	-0.08	-0.07	-0.04	0.04	-0.03	-0.11	-0.14	-0.03	-0.08
Responsiveness	-0.19	-0.16	0.04	-0.10	0.04	-0.05	-0.06	-0.03	-0.11
Openness	0.05	-0.01	**0.26**	0.03	0.08	0.10	0.10	0.16	0.13
Shyness	0.07	0.00	**0.27**	0.08	-0.03	0.14	0.09	**0.21**	0.16
COMPOSITE SCALES									
Sociability	-0.01	-0.06	**0.20**	0.04	0.05	0.06	0.03	0.12	0.07
Proactivity	0.03	0.09	-0.04	0.01	0.07	-0.08	-0.06	-0.08	-0.03

Bold correlations are significant at the 0.01 level

The Occupational Type Profile

The Occupational Relationships Profile (OTP) is based on Jung's theory of psychological type. It contains 4 scales – Extraversion-Introversion or EI, Sensing-Intuition or SN, Thinking-Feeling or TF and Judgment-Perception or JP. Correlations between the two instruments are displayed in Table 10.

Table 10: Occupational Type Profile and WorkSafe Predictor Correlations (n=179)

	Attentional	Standards	Responsible	Ownership	Trust	Stress	Harm	Care	Total
EI	**-0.30**	-0.19	**-0.30**	**-0.28**	-0.09	**-0.31**	-0.09	**-0.22**	**-0.32**
SN	0.08	0.10	0.00	0.05	-0.01	0.08	-0.06	-0.04	0.04
TF	0.02	0.08	0.13	-0.07	0.00	0.03	0.12	0.11	0.08
JP	**-0.41**	**-0.26**	**-0.20**	-0.14	**-0.21**	-0.14	**-0.36**	**-0.34**	**-0.35**

Bold correlations are significant at the 0.01 level

Concurrent Validity

The Total Safety Score measures the likelihood an individual will assume responsibility for his or her safety practices and avoid accidents. The purpose of this study was to establish that the Total Safety Score successfully distinguishes work-related accident rates among employees.

The WorkSafe Predictor was administered to 30 current employees of a mining company. On the basis of company safety records, employee accidents were recorded as well as supervisor rating of employee safety. The results showed that there is a significant correlation between supervisor ratings and the Predictor score ($r=0.51$, $P<.01$). 81% of employees with above average Predictor safety scores had had no work-place accidents. 29% of employees with below average Predictor safety scores had no work-place accidents (71% had work-place accidents). Employees with no on-the-job accidents scored significantly higher on the Predictor Safety score than did employees with the poorer safety histories ($t = 2.349$, $p =0.02$). A significant correlation was obtained between accident history and the Predictor Safety score ($r = .41$, $p = .02$).

References

Arthur, W., & Graziano, W. (1996) The five-factor model, conscientiousness and driving accident involvement. Journal of Personality, 64 (3).

Bentley, T., & Haslam, R. (2001). A comparison of safety practices used by managers of high and low accident rate postal delivery offices. Safety Science, 3, 19-37.

Brown, K., Willis, G., & Prussia, G. (2000) Predicting safe employee behavior in the steel industry: Development and test of a sociotechnical model. Journal of Operations Management, 18, 445-465.

Clarke, S. & Robertson, I. (2005). A meta-analytic review of the Big Five personality factors and accident involvement in occupational and non-occupational settings. Journal of Occupational and Organizational Psychology, 78, 355-376.

Edkins, G., & Polluck, C. (1997). The influence of sustained attention on railway accidents. Accident Analysis and Prevention, 4, 533-539.

Feyer, A., Williamson, A., & Cairns, D. (1997). The involvement of human behavior in occupational accidents: Errors in context. Safety Science, 25, 55-65.

Ghiselli, E. E., Campbell, J. P., & Zedeck, S. Measurement theory for the behavioral sciences. San Francisco: W.H. Freeman. 1981.

Hansen, C. (1989). A causal model of the relationship among accidents, bio data, personality, and cognitive factors. Journal of Applied Psychology, 74 (1), 81-90.

Jones, J. & Wuebker, L. (1993). Safety Locus of Control and Employees' Accidents. Journal of Business Psychology, 7 (4), 449-457.

Murphy, K. R. & Davidshofer, C. O. Psychological testing: Principles and Applications (6th Ed). Upper Saddle River, NJ: Prentice Hall, 2005.

Neal, A., Griffin, M., & Hart, P. (2000). The impact of organizational climate on safety climate and individual behavior. Safety Science, 34, 99-109.

Paul, P. & Maiti, J. (2007). The role of behavioral factors on safety management in underground mines. Safety Science, 45, 449-471.

Ulleberg, P. & Rundmo, T. (2003). Personality, attitudes and risk perception as predictors of risky driving behaviour among young drivers. Safety Science, 41, 427-443.

Siu, O., Phillips, D., & Leung, T. (2004). Safety climate and safety performance among construction workers in Hong Kong, The role of psychological strains as mediators. Accident Analysis and Prevention, 36, 359-366.

Wallace, J. & Vodanovich, S. (2003). Workplace safety performance: conscientiousness, cognitive failure, and their interaction. Journal of Occupational Health Psychology, 8 (4), 316-327.

APPENDIX 1

Sample WorkSafe Predictor Profile Report