EXPLORING A MODEL OF PSYCHOLOGICAL FITNESS FOR WORK: Are individual difference variables relevant in a model of safety performance?

Thesis submitted by

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Abstract

This research investigated the psychological factors that moderate the impact of psychological health and significant life events upon workplace safety behaviour and performance. Through the process of this research, the following key questions were addressed;

1. What is the relationship of individual difference variables to safety performance?
2. Can models of job performance be applied to the specific condition of individual differences and safety performance?

The research brings together individual difference theories including: cognitive models of emotion, personality and workplace performance in a framework that incorporates psychological theories of employee workplace performance and work/home interface. Subsequently, these were considered in the safety performance context. This research will make a significant contribution to current workplace health and safety practice, specifically enabling workplaces to target psychological fitness for work factors to enhance workplace safety performance.

A cross sectional survey design was employed to investigate the phenomena in the proposed models. The sample consisted of 172 males and 7 females, ranging in age from 18 to 65 years. The sample represented a cross section of a large Australian mining operation. Structural equation modeling was applied in the development of three structural models, exploring relationships amongst hypothesized latent variables. A

sequential approach was taken to the covariance modeling. Subsequent assessment of the respecified measurement model revealed an adequate fit to the data ($\chi 2$ (200) = 415.28, $p \leq 0.001$, comparative fit index (CFI) = 0.95, root-mean-square error of approximation (RMSEA) = 0.08). Multivariate testing of the structural relationships revealed support for the application of the model of job performance to the specific context of safety. The structural models investigated the effects of psychological ill health on safety determinants, ($\chi 2$ (223) = 541.25, $p \leq 0.001$, comparative fit index (CFI) = 0.93, root-mean-square error of approximation (RMSEA) = 0.09) and safety outcomes ($\chi 2$ (183) = 477.12, $p \leq 0.001$, comparative fit index (CFI) = 0.93, root-mean-square error of approximation (RMSEA) = 0.10) in the context of moderation. The final model tested the moderation hypothesis in a mediation model, the impact of psychological ill health on safety outcomes was not mediated by safety determinants, ($\chi 2$ (244) = 566.88, $p \leq 0.001$, comparative fit index (CFI) = 0.93, root-mean-square error of approximation (RMSEA) = 0.08). Cumulatively, the results were not supportive of the hypothesized relationships. The results were discussed in terms of their relevance for models of job performance and the subsequent application of these findings in the development of a model of psychological fitness for work.

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CHAPTER 1

Evolution of Employee Fitness for Work in Industry

The safety literature emphasizes the importance of organizational and individual factors in maintaining a safe work environment (Hofman & Stetzer, 1996). Australian National Occupational Health and Safety legislation places certain legal responsibilities upon employers to ensure workplaces are healthy and safe for employees. Severe personal and legal consequences exist for organizational directors who are found to be negligent in their provision of a safe and healthy work environment. This has ensured regulation of employers' compliance with identification of workplace hazards, making them safe, controlling work procedures and providing supervision and training to employees so that they know how to work safely (Industry Commission, Work Health and Safety, 1995).

Similarly, this legislation has implications for employees' behaviour impacting upon work safety. It is the obligation of the employee to present to work in a state fit to complete the responsibilities and duties of their normal work position. Fitness for work is the core component of individual factors that can impact upon safety behaviour at work. Fitness for work covers a broad range of individual and occupational health issues including the impact of alcohol and drug use, psychological issues, fatigue and physical impairment. Within heavy industry, in particular the mining industry in Australia, these issues are of high priority.

Fitness for work management systems in Australian heavy industry are evolving in a litigious and proactive unionist culture. This has guided the focus on tangible individual behavioural processes that are quantifiable such as alcohol and drug usage, physical impairment and fatigue. The management and monitoring of physical fitness has occurred in heavy industry most often incorporating a medical and functional assessment in the recruitment process and in the return to work process after an injury. Functional capacity assessments are also being utilized within the mining industry to match an employee's ability with the job requirements and to identify the potential for injury risk. Evidence from the literature of work/home interface suggests that the psychological aspects are equally important to safety but appear to be less defined due to the difficulty in operationalising and measuring relevant aspects (Van Der Heijden, Demerouti, Barker & Hasselhorn, 2008; Van Der Linden, Keijsers, Eling & Van Schaijk, 2005).

ACARP (Australian Coal Association Research Program) Underground and Open Cut Research Subcommittees have identified the need for clarification of the fitness for work issue, particularly in the mining industry. ACARP commissioned a report in September 2000 to identify a number of issues in relation to fitness for work including industry practice and future research requirements for the effective development and management of fitness for work systems specifically in the mining industry (Cliff, Bofinger, Mahon & Heiler, 2001).

The findings of the ACARP study highlight the lack of understanding and absence of common definition for the term 'psychological fitness for work'. As stated in Cliff et al.,

(2001) “there is general uncertainty about what constitutes psychological impairment” (Cliff et al., 2001, p.18). Much of the safety literature has focused largely on the organizational and technical factors involved in safety performance and accidents. Consequently, the discussion and analysis of workplace accidents is restrictive (Blockley, 1980). Individuals are involved in the design, construction, and operation and monitoring of work processes (Pidgeon, 1991). However, the contribution of individual differences has only been minimally examined. As a result, traditional approaches to accident analysis and prevention, considering engineering processes and monitoring of work procedures and sites have not seen an improvement in workers’ safety beyond a certain level (Zohar, 2000).

In the workplace accident literature that has considered individual factors contributing to unsafe behaviour and accidents, the term ‘human error’ has been used to encompass all potential individual contributions. This term has significance attached to it from an engineering perspective; referring to random, unpredictable variables (Hofman, Jacobs & Landy, 1995; Turner, Pidgeon, Blockley & Toft, 1989). It is not attached to a framework that guides or directs assessment and investigation of the individual variability in employee attitudes and behaviour that influences organisational safety outcomes.

The Theoretical Great Divide

To date, the development of fitness for work management systems within industry has been directed by vague legislative guidelines and strategic corporate visions of improving workplace health and safety records. However, theoretical and methodological

traditions of psychology have great relevance to understanding the causes and prevention of occupational injuries (Barling & Frone, 2004). A methodical application of these relevant psychological theories and research to an obvious psychological phenomenon is not apparent.

This may be the case for a number of reasons. However, two appear obvious: firstly, the difficulties in isolating the psychological factors of relevance to the individual's performance in the workplace have rendered this area difficult to research. Minimal research has examined the mechanisms responsible for the relationship between individual difference variables and accident involvement (Griffin & Neal, 2000).

Secondly, the organizational psychology literature has thus far not linked theories relating to individual differences in workplace performance (including personality, emotion and other psychological factors) to the body of literature on work/home interface and differences in ability to manage the impact of this on performance. Bridging the gap in the psychological literature would provide the solution to the first point, identifying psychological factors of relevance to performance management in the workplace. The result would be the formation of a framework allowing the analysis of individual difference factors that affect an employees' ability to manage the impact of home, external environment and other significant life events on work behaviours and performance outcomes.

Theories of Individual Differences in Workplace Performance

Human capital is a factor increasingly recognised as critical to the success of any organization. The management of employees is more effective if organizations are more aware of the behaviour expected from individuals. Selection and development processes are more effective if based on accurate assessment of an employee's personality and ability.

The expansion of research in Industrial/ Organisational Psychology to include the broader context within which work occurs has necessitated the focus on the individual attributes an employee brings with them to the work environment. Consequently, a substantial body of literature supports the link between personality attributes, cognitive and affective differences and workplace performance and behaviour (Barrick & Mount, 1991; Hansen, 1989; Vagg, Spielberger and Wasala, 2002). Three main areas of the existing research on individual differences and work performance could be of relevance to the current study. When considering the impact of individual differences on the management of psychological states and workplace performance, the relevance of emotion, coping style and personality are apparent. A brief overview of these and their relevance will be given in the final sections of this chapter.

Emotional Intelligence

Emotional Intelligence (EI) relates back to Thorndike's concept of social intelligence proposed in 1920. Salovey and Mayer (1990) were among the early researchers who proposed the concept of emotional intelligence. They defined it as a subset of social

intelligence incorporating the ability to regulate and be aware of one's own and others' emotions and to utilize this information to guide thoughts and behaviours (Law, Wong & Song, 2004). There has been ongoing debate regarding the exact definition of this construct. Davies, Stankov and Roberts (1998) developed a definition of Emotional Intelligence that Law, Wong & Song (2004) suggest is representative of the entire EI literature. Davies et al., (1998) defined EI as having four dimensions: appraisal and expression of emotion in oneself, appraisal and recognition of emotion in others, regulation of emotion in oneself, and use of emotion to facilitate performance (Law et al., 2004).

In an organizational psychology context, the ability to understand and regulate one's own emotions and understand others' emotions is essential to intrapersonal wellbeing and interpersonal interaction. It therefore seems likely that EI is going to affect individual as well as organisational job performance. From the social exchange framework in which organizations utilise different exchanges to facilitate employee performance, social interaction is one such exchange and anything that facilitates social interaction in the workplace will facilitate employee performance.

This link has been demonstrated between EI factors, social interaction and performance. It has been demonstrated that EI explains individual cognitive based performance above that attributable to general intelligence (Law & Kirby, 2002). The current study will extend on this research, integrating the construct of emotional intelligence into a framework of psychological fitness for work and subsequently

considering the moderating effect, and its relationship with behaviour and workplace safety outcomes.

Coping Style

Coping is viewed as a stabilizing factor that helps individuals maintain psychological health during periods of significant life stress (Holahan & Moos, 1987). Coping strategies are generally divided into two categories: strategies that are active in approach by confronting (problem focused) the problem and those that are focused on reducing tension by avoiding dealing with the problem (emotion and avoidance focused). Lazarus and Folkman (1984) proposed a typology of coping strategies that defines problem focused coping, (any effort to modify or influence the situation) and emotion focused coping, (efforts made to regulate the emotional distress).

More recent work indicates that individuals who cope with stress most effectively are able to objectively determine what is under their control and what is not, and subsequently select an appropriate coping strategy (Quillan-Wolever & Wolever, 2003). Hence, the individual is able to determine from the situation whether the stressor can be influenced by active problem solving, or whether little or no control is possible and emotion focused and cognitive based strategies need to be utilised.

Specifically, the application of the literature on individual coping responses to maintain psychosocial adaptation during significant life stress may provide insight into the individual differences in workplace behaviour and safety (Holahan & Moos, 1987).

The costs and consequences of stress on work performance for both individuals and the organization have been clearly demonstrated through: decreased productivity and job satisfaction, employee burnout, health related problems, psychological strain and high absenteeism (Vagg, Spielberger & Wasala, 2002). The importance of employees having effective coping strategies to enable them to adapt and cope is obvious. Similarly, the potential impact of ineffective coping strategies on safety performance could be inferred. Clearly, the individual has a definitive role in managing the impact of psychological stress on workplace behaviour and safety performance.

Strahan (2002) reported results from nine Queensland industrial sites that linked coping response with fatigue risk at work. A more deliberate coping style was related to increased safety at work. The results of this study also suggest that more rigorous work conditions elicit deliberate coping responses (problem focused coping). This suggests that when individuals are exposed to roles with greater and more consistent physical and mental demand they will utilise more problem focused coping. The coping style of the individual in response to fatigue and psychological stimulus appears to have moderating effects on workplace safety which are ultimately important to understanding psychological fitness for work. The current study will consider the impact of coping style as a moderator between psychological health and safety determinants and outcomes.

Personality Attributes

There is a long history of research on the extent to which personality and individual differences affect work place behaviour and performance. Personality has been related to

training proficiency and employee turnover (Schmitt, Gooding, Noe & Kirsh, 1984). Barrick and Mount (1991) demonstrated conscientiousness was linked to performance across all job types and that extraversion increased performance proficiency in sales and managerial jobs. More generally, the organizational psychology literature investigating personality traits assessed under the five factor taxonomy suggest that they are a good predictor of job performance in many areas (Barrick & Mount, 1991; Fallon, Avis, Kudisch, Gornet & Frost, 2000).

Despite this, the explication of this literature to the study of personality in relation to unintentional occupational injuries has remained relatively underdeveloped (Barling & Frone, 2004). The relationship among workplace accidents, personality attributes and cognitive characteristics has been considered since the 1900s.

In a factor analysis of personality data, two main personality clusters were identified that were suggested to encompass the majority of individuals involved in workplace accidents (Shaw & Sichel, 1971). The primary factor was described as extreme extraversion with sociopathic features (self-centred, overconfident, aggressive, irresponsible, resentful, intolerant, impulsive, antisocial) and the secondary factor as neurotic anxious (anxious, tension ridden, panicky, unduly sensitive to criticism, indecisive, unable to concentrate, easily fatigued).

Hansen (1989) proposed that characteristics that could lead to distractibility would be related to accident proneness and that the relevance of the two factors identified by Shaw

and Sichel (1971) was not clear. The results of Hansen's (1989) study suggested independent causal effects of distractibility and the primary and secondary factors of Shaw and Sichel (1971) upon accident proneness with high correlations between them. This highlights the factor structure proposed by Shaw and Sichel (1971).

Wallace and Vodanovich (2003a) investigated the individual concepts of cognitive failure and conscientiousness and their impact on workplace safety. They defined cognitive failure as a 'breakdown in cognitive functioning' that can lead to a cognitive error that would not normally occur for that person. Further to this, Reason (1988) stated that individuals more prone to cognitive failure may have a rigid attentional focus and thus have difficulty dealing with competing stimuli. Similarly, it has been demonstrated that cognitive failure is more likely to occur in familiar situations with highly automated tasks and when a person's attention is internally or externally distracted (Reason, 1988).

Wallace and Vodanovich (2003b) found that conscientiousness moderated the effects of cognitive failure on workplace safety behaviour. Cognitive failure was more predictive of workplace accidents and unsafe behaviours with individuals who had low conscientiousness scores. These results suggest the involvement of personality traits such as conscientiousness in workplace safety behaviour and accidents. A rigorous investigation of personality and workplace safety performance is important to the further development and application of what is known in theories of personality. This would allow for the identification of relevant personality traits to psychological fitness for work.

Application of Individual Difference Theories to Workplace Safety Performance

The application of organisational psychology theory to the study of workplace accidents and safety behaviour of employees has been limited by a number of pertinent factors. These include the Workplace Health and Safety Legislation focusing on job specific behaviours rather than the systemic approach considering the person within their reciprocally interacting environment. Legislation has also focused organizations on the task of managing risky situations: this has hampered the consideration of preventative measures that may be outside the immediate circle of reference (accident process, injury statistics and machine/work design faults).

Similarly, the lack of clarification of the psychological factors that can impact safety performance in the workplace has led to methodological issues bringing into question the results reported and highlighting the difficulty in drawing any firm conclusions at this point. As discussed in Iverson and Erwin (1997), the early studies were troubled by common method variance, retrospective designs and no control for the effects of workplace factors. Until more recent efforts, an overwhelming devotion of resources to the study of human error overgeneralises the human factors to an all or nothing approach (Wallace & Vodanovich, 2003b; Neal & Griffin, 2006; Neal, Griffin & Hart, 2000). This has inhibited the isolation of specific factors that may be relevant.

Building the Framework

In order to understand and make predictions about safety behaviour it is paramount that the behaviour is conceptualised with the relevant theoretical and conceptual

framework. Clearly, efforts to determine fitness for work of all employees, under risk management obligations and goals of improving safety outcomes, would benefit from the application of sound psychological theories on: individual work performance and variability in the management of the work/home interface. This application is not possible until the relevant psychological theories are woven together forming a framework for investigation of the phenomena 'psychological fitness for work'. Current theories on individual factors affecting workplace performance can contribute significantly to the area of psychological fitness for work when considered in the context of how they determine individual differences in the management of home / work interface.

Research Contribution and Significance

The current research is significant for several theoretical and industry-relevant reasons. To date, there is practically no substantial empirical analysis of the phenomenon of 'psychological fitness for work'. The preceding discussion covering three content domains indicate the essential reasons why this may be so. The consideration of safety performance in the work performance literature is limited and has only recently been considered in models linking safety climate and safety behaviour (Neal & Griffin, 2006). The current research will extend on this by considering the psychological factors that form part of the antecedents and determinants in this model in the context of current theories of job performance.

The existing research relating to home/work interface has substantially validated the bidirectional path of this process and the stressor strain relationship that develops as an outcome. Analysis of work performance is evolving in this body of literature (Van Der Heijden et.al 2008). However, safety performance is not included. The development of the model proposed in this thesis will mesh together what is known in the home/work interface literature with safety performance. This will essentially lead to the application of psychological theories of relevance to the vast amount of safety literature.

The outcomes of this thesis have some potentially significant contributions for heavy industry. Specifically it will lead to the development of a risk assessment protocol for individuals at greater risk of workplace safety incidents and a methodology for training and employee development strategies that decrease the psychological risk factors of poor safety performance.

This will address one more dimension of the management of employees, with potential direct and indirect improvements in health and safety for all employees. The sustainability of current health and safety management systems will be significantly enhanced by considering the psychological aspects of fitness for work.

CHAPTER 2

Background

Individual and Organisational Contributions to Workplace Safety

Workplace Safety Determinants

Within workplaces, it is possible to look at both individual and organisational influences on safety performance. Employees bring to the workplace inherent human characteristics that equally prepare them for the duties of their position and make them susceptible to workplace incidents and accidents. These human characteristics include both physical and psychological fitness, susceptibility to stress, and knowledge, skills and abilities. The work environment similarly provides facilities and processes that are important for the achievement of work related goals and that can affect workplace safety. These include the workplace design, equipment maintenance and reliability, management systems including commitment to safety, safety climate and culture, risk assessment, personnel selection and training (Hughes & Kornowa-Weichel, 2004).

Organisational effects upon safety are a major concern for organisations to consider, as accidents are a substantial source of direct and indirect cost. In 2005/06 the Australian Safety and Compensation Council (ASCC) reported 139 630 cases for work related fatality, permanent disability or serious temporary disability in Australia (the reported cases were absent from work for one week or more). This represents an incidence rate of 16 claims per 1000 employees working in Australia (Fisher, 2008). The indirect costs are considered to be substantially higher and highlight the importance for organisations to isolate potential influences on workplace safety.

Reviews of the safety literature reveal the implication of organisational factors in workplace accidents and safety behaviour (Hofman et al., 1995). The qualitative differences in accident causes and correlates are apparent when accidents have been analysed at several interrelated levels (Turner et al., 1989). From the perspective of the individual, they may be error, cognitive failure, slips, or more complex factors involving inter and intra group communication failures. More globally at an organisational level, such individual factors may include; inappropriate safety attitudes, application of the legislation, inadequate safety programs and safety climate.

Organisational Factors

Workplace Health and Safety Legislation

The ASCC estimates a direct cost of 1.35 billion dollars, which does not encompass indirect costs incurred by both employees and organizations. These statistics highlight the economic importance for organizations to fulfill their obligation to provide safe and healthy working conditions for employees. Safety management strategies are representative of an organization’s commitment to providing a safe and healthy work environment for employees.

History of Safety Management

Safety management approaches within organisations have passed through several defined periods since the early 1900s. The first of these being the inspection era, which was identified by safety approaches that focused on monitoring and correcting physical conditions within the work environment. It was recognized that the physical employment conditions were of a poor standard and attempts to manage safety by improving these conditions were validated by a significant decrease in work related fatalities (Petersen, 1975).

In 1931 HW Heinrich published 'Industrial Accident Prevention', that subsequently directed the safety focus towards individual behaviour and unsafe acts as a major contributing factor to workplace accidents. Previous safety management approaches had not considered the impact of individual employee behaviour in workplace safety. The combination of strategies from the inspection era and management of employee safety behaviour emerged in the second era of safety management.

The third era of safety management was shaped by the acceptance of a compensation claim for hearing loss. Prior to 1950, hearing loss due to work conditions was not accepted as a compensable claim. In 1951 the first claim was accepted and inadvertently led safety management strategies to focus more broadly on the impact of the workplace on the individual and safety behaviours. Between 1950 and 1960 safety management approaches began to utilize techniques applied in other areas of the organization. Statistical techniques were utilized to monitor safety performance, human resource

processes were improved to match employees more effectively to positions and engineering techniques were utilized in risk analysis, following workplace incidents. Safety managers were establishing policies and procedures and defining safety responsibilities for individuals within the work environment (Sarkus, 2001).

During the 1960s safety managers continued to focus on information learnt from previous eras (Sarkus, 2001). An integration of psychological perspectives into safety management practice was also evident. During this time each Australian state had adopted most of the requirements of the 19th century British health and safety legislation. This began to lead safety management back to the era of documentation, inspection and control of the work environment. It was based on minimum standards compliance, i.e, the workplace is required to meet minimum standards prescribed in the relevant State's legislation (Sarkus, 2001). These aspects of safety management remain important but in isolation are inadequate because they do not consider the other important contributors to safety from the organizational environment.

Workplaces reported difficulties understanding and maintaining the detailed and technical rules imposed by the legislation. The specificity of the rules resulted in irrelevant requirements for many workplaces and they did not support the view that many workplace accidents do not arise from the static features of the work environment alone. The weaknesses in this prescriptive approach led to a reform of Occupational Health and Safety Legislation in Australian beginning in 1972 with the recommendations of the British Robens Report. Robens was commissioned in 1970 to review occupational health

and safety requirements and make recommendations through the British Committee of Inquiry in Safety and Health at Work. The recommendations made form the basis of modern occupational health and safety legislation in Australia (National Occupational Health & Safety Commission, [NOHSC], 2002).

Following the recommendations of the Robens' Report, a self regulating system was proposed. Robens (1970) criticized the detailed prescriptive approach as employees and employers were conditioned to rules being imposed by external agencies. The purpose of the new system was to move away from prescriptive standards and allow management and employees to collaborate at the workplace level to achieve and improve upon the standards specified by the relative state guidelines. Workplace health and safety representatives were to be the vehicle for employees to participate in and influence the management of workplace safety. Employee representatives were also included on work place health and safety committees (NOHSC, 2002; Sarkus, 2001). Organisational safety performance is guided by the Workplace Health and Safety Act 1995. This Act provides guidance to organisations to prevent or minimize exposure to risk. There are industry benchmarks, a workplace health and safety board (to allow consultation in improving workplace health and safety strategies) and industry developed codes of practice (Queensland Workplace Health and Safety, [QWHS], 2003).

Obligations under the Act

All employers and employees have legal obligations under the Workplace Health and Safety Act 1995. The law has determined the common law duty to mean that employers

are to take responsibility for the safety of their employees at work. This identifies the greater control that the employer has over workplace conditions, which can be defined in terms of safe work practices, safe place of work and a safe system of work provided by employers for all employees throughout the workplace. The primary objective is to prevent the death, injury or illness of employees in the workplace caused by workplace activities.

Employers are obliged to follow the correct industry standards and specifications for the management of safety for all employees within a workplace, including providing guidelines for safe work procedures. They are also required to provide an environment where workplace health and safety issues can be monitored, measured and addressed as they arise. An employee of a workplace is obliged to: comply with the instructions relating to workplace health and safety, wear correct protective equipment as required and if trained in its use, not interfere with anything provided by the employer for the purpose of health and safety in the workplace, and to be aware of the health and safety of others whilst engaging in their everyday work processes.

Duty of Care

More recently, the issue of ‘duty of care’ has shifted the focus of workplace health and safety management to the individual’s behaviour both inside and outside of work that may impact upon workplace safety behaviour, particularly in heavy industry (Cliff et al., 2001). This has forced the issue of alcohol and drug testing policy in many organizations,

along with the implementation of fatigue management systems, roster monitoring and fitness for work management systems at a nominal level.

Employers face the delicate task of balancing their legal obligations and the basic rights of employees. If employers are too forceful from the perspective of their legal obligation, history suggests industrial relation issues in the workplace. Current workplace health and safety legislation does not clearly define the rights and responsibilities of employees and employers in the specific areas of fitness for work, for example drug testing of the workforce.

The measure utilised by any employer currently comes into question generally after the fact (i.e. in the process of a workplace health and safety investigation). Duty of care obliges employers to take preventative measures but the Act does not currently specify what these need to be. Employers need to make all reasonable attempts to provide a safe and healthy workplace inclusive of minimising psychological risks to the safety of employees.

Organisational Climate

Organisational culture and organisational climate are often not defined as separate concepts throughout the literature, with many researchers using the terms interchangeably. Ashkanasy and Dasborough (2004) distinguish between the two concepts suggesting that organisational culture is in essence intrinsic beliefs and attitudes about the nature of the organisation and the function of the managers and employees

within it. Culture refers to unspoken communication, demonstrated values and beliefs and highlights reinforcement contingencies for reward within the organisation.

Organisational climate is representative of the perceptions of employees towards their roles, the organisation and employers (Ashkanasy & Dasborough, 2004). Organisational climate is a 'socially constructed' and combined interpretation of important aspects of the organisational environment that direct behaviour and performance within the organisation (Zohar & Luria, 2004). The culture and climate within an organisation is what influences people's behaviour and further promote the core values of the cultural system. It is how members of the organisation learn to solve problems related to both the external environment and to assist internal assimilation (Schein, 1990).

The concepts of organisational culture and climate surfaced in the 1950s when efforts focussed on understanding organisations and organisational relationships, and notions from sociology and anthropology infiltrated industrial and organisational psychologists' thinking. At this time organisational psychology began to identify itself independently of industrial psychology concentrating on work groups and the whole organisation in addition to individual employees. With this came the necessity to analyse and describe the reciprocal interaction between individuals, work groups and organisations (Schein, 1990). The phenomena of organisational climate and culture provided a medium for this analysis to take place.

Types of climate that have been identified and experienced by individuals in organisations include; climate for customer service, climate for innovation, psychological climate and safety climate (Griffin & Neal, 2000). Schein (1990) reported that all types of climate share the following common factors; employees' perceptions of the practices, procedures and benefits within an organisation.

Safety Climate

Safety climate as a specific subset of organisational climate has been defined as 'a set of beliefs, norms, attitudes, roles, and social technical practices that are concerned with minimizing the exposure of employees, managers, customers and members of the public to conditions considered dangerous or injurious' (Pidgeon, 1991, p.134). The concept of safety culture provides a system of shared understanding and meaning for the hazards and risks relevant within any particular organization. Employees adapt attitudes and behaviours to contribute and participate in the collective norms regarding safety whilst at work.

> We are tribal animals; we are hard-wired to fit within our tribe. We read the signals about what it takes to fit in, and we adapt our behaviour accordingly. If we absolutely cannot do this we either leave the tribe, or the tribe throws us out (Taylor, 2004, p.6).

The research considering safety culture begins to provide a framework and potential link between the psychological aspects of fitness for work and workplace safety. The isolation of individual psychological factors such as coping skills, personality attributes

and emotional intelligence within the context of the antecedents described by Neal and Griffin (2002) in their model of safety performance could provide important information for organizations, in their attempts to manage the individual factors that affect workplace safety.

The study of safety climate in organisations couples theories of individual performance with theories of organisational culture to enable analysis of safety perceptions and systems in organisations (Griffin & Neal, 2000). It has been assumed in the research of safety climate in organisations that individual safety behaviour is a mediator between safety climate and safety outcomes. Safety climate can be considered as a subset of organisational climate. Coyle, Sleeman and Adams (1995) reported that the measurement of safety climate to determine the efficacy of safety programs has been overlooked for more traditional measures of lost time injuries, frequency and severity of accident rate.

Accident analysis has therefore focused on the outcome rather than the potential precursors and mediating factors to accidents such as perceptions and attitudes among employees that may affect safety behaviour. It has been suggested that many safety related accidents have a number of precursors including attitude of the organisation and the employees' attitude towards safety (Turner et al., 1989). Safety climate is said to impact work practices, work style, safety training and participation in safety behaviours.

Griffin and Neal (2000) consider safety climate to be a higher order factor comprising a number of specific first order factors. They suggested that the higher order factor of safety climate would reflect the degree to which individuals perceive safety to be valued within the relevant organisation. The first order factors were outlined as employees' perceptions of safety related policies, procedures and rewards.

Hofmann and Stetzer (1996) suggest that employees attach meaning to certain actions that they see management engage in, which reciprocally influences safety climate. 'A supervisor who never mentions safety may be perceived by the employees as being much more concerned with production as opposed to safety' (Hofmann & Stetzer,1996, p.4). Therefore safety climate is perceived to influence safety behaviour in organisations by influencing the environment within which employees and teams work.

In an investigation of safety climate, Zohar (2000) found that the employees' perception of management's commitment to safety was a major factor affecting the benefits experienced from safety programs. Employees attach meaning to and interpret the environment within which they work. These perceptions then affect individuals' behaviour within the organisation through their attitudes, norms, and perceptions of behaviour consequence contingencies (Hofman & Stetzer, 1996). With no formal organisational procedures for the management of safety or at risk situations, workers will develop their own methods in relation to safety climate, which can equate to doing what everyone else has always done or what is perceived as normal work methods, rather than work processes that are most ergonomic in terms of safety (Wright, 1986).

It is also apparent that safety climate is representative of the unspoken rules of performance, particularly in relation to production versus safety performance, performance pressure to meet timelines and communication about safety concerns or issues (Hofman & Stetzer, 1996). If employees perceive strong rewards within the organisational climate to perform tasks in short time periods they may assume that short-cutting processes of the task is expected. This will then impact safety climate by suggesting to employees that safety performance is secondary to production performance. Similarly within work groups, communication about safety performance confirms for employees the importance of safety behaviours. If it is accepted as part of the safety climate to approach and report unsafe acts of fellow employees then most employees will engage in this behaviour hence decreasing risk of unsafe behaviours.

Companies differentiated by their incident rate, can also be distinguished by their safety climate; represented in safety policies and procedures. Organisations that consider safety as first priority in work processes and those with other opposing goals such as production speed and cost reduction have distinctly different safety performance (Zohar & Luria, 2004). In oil exploration companies with a high incident of workplace accidents the following aspects were obvious: emphasis of speed over safety, disregarding safety as long as there was no incident, reduced inspection, maintenance and training program (Pate-Cornell, 1990). The impact of safety climate upon safety outcomes is clear in this research.

The characteristics of safety climate that are conducive to minimising harm to employees have to include a repertoire for managing risky situations, interventions to manage attitudes toward safety and the ability to review actual safety performance. The organisational guidelines for action in risky situations will guide the behaviour of employees, sending a message about what is important and what is not. It will also aid in the development of preventative strategies as employees become more efficient at identifying significant risks and following that up with appropriate management (Neal, Griffin & Hart, 2000).

Employees' attitudes towards safety are a product of the organisational safety climate inclusive of employer attitudes. Management of this aspect of safety climate will be aided by a sense of ownership of the climate by employees, as though they have created the attitudes of central importance rather than having had them handed to them from employers (Pidgeon, 1991). An ability to analytically review actual safety performance in conjunction with the above mentioned measures is an essential process to assist in developing 'good' safety climate (Neal et al., 2000; Pidgeon, 1991).

Research in organisational and safety climate suggests that more positive and intentionally focused climates promote more of the desired behaviours in individuals as they seek to reach a homeostasis with their environmental climate. Smith-Crowe, Burke and Landis (2003) reported that in an organisation that was intentionally focussed on the transfer of safety knowledge and training, the dynamic between safety knowledge and safety performance was strengthened.

Bridging Organisational and Individual Factors : Safety Climate and Safety Behaviour – Neal and Griffin (2002)

Neal and Griffin (2002) have proposed a model of safety climate and safety behaviour that utilises current organisational psychology models of employee performance in organisations. Similar to the models of employee work performance, their model makes a distinction between the individual and organisational historical factors (or antecedents), the specific individual factors (or determinants) and the mechanism by which a safe workplace is achieved (or components).

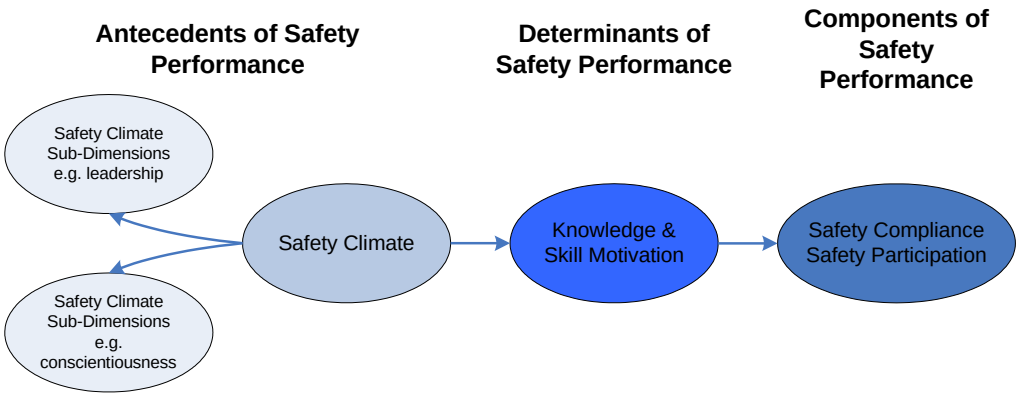

Figure 1. Summary of Relationship among Antecedents, Determinants and Components of Safety Performance (source: Neal and Griffin, 2002, p.70)

The components referred to by Neal and Griffin (2002) are representative of employees' safety performance at work, divided into two types: safety compliance and safety participation (refer Figure 1). Safety compliance is described in the model as core activities that need to be carried out by employees to maintain workplace safety, for

example following safety procedures for task completion, work set up and wearing appropriate protective safety equipment. Neal and Griffin (2002) describe safety participation as an employee's involvement in behaviours that are not specific to individual safety, yet they are supportive of a safe environment, for example participating in voluntary safety activities and attending safety meetings.

The determinants of safety performance in this model are the individual differences in ability to perform work safely due to skill, knowledge and motivation. Neal and Griffin (2002) propose that if an employee does not have sufficient knowledge, skill and motivation then they will not be able to comply with expected safety protocols and participate in safety activities. The antecedents are those factors that will come to effect behaviour through their impact on determinants of knowledge, motivation and skills. In the model two sub categories of antecedents are presented, leadership and conscientiousness, essentially these are examples from the two sub categories that refer to environmental and individual facets.

Neal and Griffin's model in Figure 1 has been tested (Neal, 2000; Newnam, Griffin & Mason, 2008). These studies have found support for the differentiation of perceptions of safety climate from individual variables of knowledge and motivation and similarly from the outcome variables of safety compliance and involvement in safety behaviour.

Neal et al., (2000) found that employee perceptions of safety climate were related to perceptions of general psychological climate. This research has advanced the

understanding of the link between safety climate and organisational outcomes in safety behaviour and workplace accidents. The determinants of safety behaviour have previously been viewed as benevolent safety attitudes evidenced in low compliance with safety protocols. The model represented (Figure 1) suggests that safety programs need to focus on antecedents and determinants that are sustaining the problem of poor safety attitudes. If the issue can be isolated to knowledge or skill this identifies a selection and training problem. If the issue is motivation, it may be more beneficial to consider a broad range of individual and organisational issues including organisational climate, attitudes and personality (Neal & Griffin, 2002).

The importance of individual factors and their interaction with organisational factors including safety climate to determine safety outcomes is apparent. Essentially, a model that encompasses a greater consideration of the individual factors beyond skills, knowledge and motivation (including personality, attitudes, coping skills and emotional intelligence) in the context of the antecedents, determinants and components discussed in Neal and Griffin's (2002) model could provide a comprehensive representation of workplace safety outcomes.

CHAPTER 3

Background

Individual Factors Considered in Safety Research

Psychological Impairment and Safety Performance

Psychological impairment in the workplace is a sensitive and complex issue, which in light of other workplace health and safety issues has been largely overlooked by both industry and research. Employers face a double edged sword in the management of psychological issues within the workplace. They must make reasonable adjustments to facilitate integration of employees with psychological health issues in the workplace, whilst also managing the risk posed to safety.

Lawton and Parker (1998) identified two broad mechanisms that may be responsible for the relationship between individual difference variables and accident involvement: cognitive and motivational. Cognitive mechanisms are related to failures in information processing or skills that result in reduced safety compliance. Psychological health issues including personality traits such as neuroticism and Type A behaviour are reported to increase an individual's vulnerability to these cognitive failures when exposed to stressors.

Stress research suggests that individuals who report psychological health issues focus narrowly on a few specific aspects of their environment to cope with competing stimuli. Safety research suggests that acquisition or maintenance of safety knowledge and motivation may be compromised in such circumstances. Dunbar (1993) found individuals

with high levels of negative affect, anxiety and depression were less likely to utilise personal protective equipment appropriately. Sanders and Baron (1975) reported that arousal and anxiety can lead employees to relegate workplace safety and management of safety risks to the background. This research coupled with employers' legislative responsibilities highlights the relevance of understanding the impact of psychological impairment to workplace safety outcomes.

Management of stress issues in industry has been globally considered to encompass the full array of psychological issues that can impact upon a person's work performance. This has in effect narrowed the focus of attention to the exclusion of the full array of potential psychological issues that can impair an employee's performance at work.

The resultant symptoms of employee stress that have been discussed in the stress research include increased absenteeism, substance abuse, anxiety, depression and interpersonal difficulties. The causes of workplace stress from the organisation's perspective have also been clearly defined including fatigue, lack of job satisfaction, uncertain employment, poor interpersonal relationships, lack of autonomy and poor work design (Zapf, Dormann & Frese, 1996).

Rouy (2000) summarised the results of a survey of 819 managers who were members of the Institute of Managers and they found that over three quarters of them reported tiredness, disturbed sleep and loss of temper. Similarly, half of them reported lowered sex drive and one quarter admitted to taking time off work due to their symptoms.

Even with this high symptom reporting, fewer than 10 % of the organisations that employed these individuals had conducted an assessment of stress levels in their staff and less than one quarter had an employee assistance program. The employees reported utilising self-management strategies such as talking with family and friends, engaging in physical exercise and using alternative therapies (Cliff et al., 2001).

In addition, the Western Australia WorkSafe statistics support an increase in reporting of psychological and stress related disorders that was twofold the reporting of physical injuries for the same period. This highlights the importance of identifying the facets and potential measures for psychological fitness for work (Shakespeare, 2000).

Cliff et.al (2001) in the ACARP Fitness for Duty Scoping Study identified that it was difficult to isolate measures that sites were using for the management of psychological impairment. They identified that some Queensland mine sites were utilising computer based assessment systems (including OSPAT and FIT 2000), all were utilising some level of peer, self and supervisor evaluation, training and education was limited and Employee Assistance Programs (EAP) appeared to be universally available.

An all-encompassing system necessarily has to include many other aspects of the psychological experience of employees. Therefore a clear definition of psychological fitness for work is required, and isolating the individual from the organisational factors in fitness for work needs to occur.

The Historical Perspective on Individual Factors in Safety Research

The individual's work role is influenced by their own skills, abilities and knowledge that allow them to complete their job efficiently. Equally though, they bring with them individual differences that may facilitate and/or impede their ability to complete tasks. Employees' life outside the work environment interfaces with work in a reciprocal relationship; difficulties experienced in either domain will affect performance in the other. The need for recovery and interface from strain will affect cognition and work performance (Demerouti, Taris & Bakker, 2007). From the workplace perspective, the management of the impact of this relationship is important in managing employee performance and occupational health issues.

To manage employee fitness for work these individual factors need to be considered from both a physical and psychological perspective. The physical aspects have been managed generally, through a combination of medical assessments, functional capacity evaluations and the application of rehabilitation policies. The psychological factors impacting upon workplace performance and specifically safety performance have been largely overlooked and dealt with only in extreme cases following diminished

performance requiring external intervention. In addition, these factors have also been gathered under all encompassing non descriptive categories, such as human error and accident proneness.

For approximately 60 years the individual factors have been considered largely in terms of 'human error', cognitive failure and accident proneness (Cameron, 1975; McKenna, 1983; Reason, 1988). Human error and behaviour has been estimated to be involved in 58% of medical accidents, 70% of aircraft accidents and up to 80% of shipping accidents (Hobbs & Williamson, 2002). This level of contribution to workplace accidents and injury clearly highlights the importance of understanding individual elements of human behaviour that affect workplace safety. The complexity of studying human behaviour in the workplace has contributed to a paucity of research that would assist in further understanding this phenomenon from a psychological perspective (Feyer, Williamson, & Cairns, 1997).

Accident proneness emerged as another human factor to be considered for its contribution to workplace safety earlier than human error. It has not been considered as extensively, possibly due to methodological difficulties. McKenna (1983) reported that the concept of accident proneness originated in the work of Greenwood and Woods (1919) utilising an analogy applied to mathematical problems of this time period.

Accident proneness was viewed as some individuals having certain attributes that meant they were more likely to become involved in accidents than others (Cameron,

1975). This level of analysis of work related incidents was still considered essential in risk management practices for decades following the work of Greenwood and Woods (1919). 'Within process environments, risk and accident analysis is focused on avoidance of low probability events with large consequences to the plant and its environment' (Leplat & Rasmussen, 1984, p. 77).

Cognitive errors or failures have been described as a breakdown in cognitive function that would not normally occur for that person. Although the ability to complete the task is assumed to be present, something interferes with this ability, for example memory, distractibility, psychological factors or physical mistakes. Reason (1988) distinguished between two types of cognitive error; execution failures and planning failures. Reason (1988) suggested that those with a rigid attentional focus may be more likely to experience cognitive failures due to an inflexible management style in dealing with unfamiliar situations. It has been shown to be negatively related to vigilance, memory performance and positively related to physical mistakes, absentmindedness, boredom and attentional problems (Wallace & Vodanovich 2003a).

Human Error

Human error or behaviour is touted as contributing to the majority of workplace accidents and incidents across industry (Hale, 1990; Hobbs & Williamson 2002; Hughes & Kornowa-Weichel 2004). Research from multiple industries (airline, manufacturing, medical and processing) confirms that there are many similar human behaviours and

attributions that can lead to catastrophic circumstances (Broadbent, Reason, & Baddeley, 1990; Westfall-Lake, 2000).

Often though, the term human error has been utilised in causal analysis of workplace accidents as a category to pull together all possible individual factors that affect safety in organisations (Hofman et al., 1995). Thus human error is not being discussed as a unitary phenomenon, rather as a complex category with interwoven relationships. This presents a problem for understanding and ratifying its impact on workplace safety (Feyer et al., 1997). In the process of accident analysis and investigation, the category of human error is potentially prone to subjective bias more than other factors which also increase the difficulty in researching this phenomenon (Williamson & Feyer, 1990).

Psychologists did not begin to consider human errors in the workplace to be of psychological interest until the late 1970s (Hobbs & Williamson, 2002). It was at this time that an investigation into everyday domestic actions that were not as planned was conducted; these were later noted as being relevant to the slips of pilots within the aviation industry (Reason, 1977). Following this, Rasmussen (1982) began to highlight the importance of a ‘generic psychological classification of human errors’ to be applied in the analysis of accidents in the workplace. The resultant skill-rule-knowledge (SRK) error framework distinguished between three levels of error: skill based, rule based and knowledge based.

Skill based errors were defined by the involvement of absentmindedness. The individual has the ability and skills to perform the task but on a particular occasion has failed to, maybe due to not detecting sensory input or some anomaly in motor coordination. Rule based errors are obviously due to the wrong rule selection for the circumstance. Errors due to knowledge base are related to insufficient problem solving or inadequate system knowledge to perform the task at hand (Hobbs & Williamson, 2002).

Other definitions of human error have included a distinction between slips and mistakes. According to Norman (1988) slips are the results of automatic behaviour or subconscious actions that are intended to satisfy the goal but are somehow distracted. Mistakes are defined as an overgeneralisation of previously used knowledge to new situations that are not appropriate for completion of the task (Norman, 1988). The most widely used accident framework in the study of errors in the workplace has been Reason's Generic Error Modelling System 1987 (GEMS) (Hobbs & Williamson, 2002). GEMS developed the SRK model further taking into account error correcting mechanisms on the three levels proposed in the SRK model (Groenweg, 1997).

Reason's model assumes that our everyday behaviour is 'routine' and that we monitor our 'routine behaviour' regularly but we also slip into automatic behaviour that goes unchecked unless something goes wrong. According to GEMS, there are three levels of error: slips, mistakes and violations. In a familiar situation (where we engage in automatic behaviour) the behaviour is thought to be skill based and any errors are referred to as slips. When a novel situation is presented, knowledge based rules are

applied, and errors are referred to as mistakes. The third level of error, violations, is executed when a rule is applied to a situation, when it is known to be inappropriate However, that rule is applied because it will be quicker or seems to be best in the exceptional situation (Groenweg, 1997; Hobbs & Williamson, 2002).

The development of these error classification systems arose from the need to separate analysis of the task from the analysis of the human performing the task (Rasmussen, 1982). This separation was required in human factors engineering to enable prediction of human performance with new technology requiring human machine interface. From a psychological perspective the first step in reducing human error was to identify causes correctly, which was made easier by the development of classification systems to break down the types of human error involved in specific accidents (Miller & Swain, 1987). The application of error classification systems is difficult on a practical level due to the level of information available at the site of the accident. The type of error analysis possible will be determined by the type of information available. Many classification systems require detailed information and interviews with the employees directly involved with the incident presenting reliability and validity issues (Williamson & Feyer, 1990).

The study of human error from a psychological perspective dating back 30 years has led to an improved understanding of human involvement in workplace accidents. As Leplat and Rasmussen (1984) reported, the analysis of human error in work related accidents is essential to the management of industrial reliability and risk prediction. The

research thus far does not reveal an extensive application of this data in strategies for improvement in accident prevention.

Reducing human error requires the acknowledgement that errors are an integral part of human behaviour and cannot always be designed out of the system (Pani & Chariker, 2004). The solution to this is to acknowledge elements of the system that increase the likelihood of error and create work environments that are flexible enough to allow intervention or recovery before human error leads to intolerable consequences (Cacciabue, 2004). For example, competing tasks, excessive workload, time and performance pressure are counterproductive to attention, memory and complex thought processes. Although under familiar circumstances, the impact of this will likely go unnoticed; in novel situations they will not (Leplat & Rasmussen, 1984).

Further from the analysis of human error and its contribution to workplace accidents, variations in human behaviour have been considered a product of 'internal human properties', such as accident proneness and cognitive failure. Internal psychological characteristics and mental functioning were considered as potential contributors to the random and unpredictable nature of human behaviour in the workplace (Leplat & Rasmussen, 1984).

Accident Proneness

During World War I the British Government established the Industrial Fatigue Research Board (IFRB) due to concern over the number of accidental injuries and deaths

in British War production industries (Haight, 2001). Accident proneness emerged as a concept that proved to be more of a nominal category than a proven psychological theory. The difficulty to determine in advance the presence/absence of accident proneness in any particular individual was identified as the initial difficulty in this concept (Haight, 2001; McKenna, 1983).

Consequently, psychologists were challenged to find a way to measure accident proneness. Farmer and Chambers in 1926 utilised factory data from the work of Greenwood and Woods (1919) and demonstrated that 10.5% of the workers were involved in 56% of the incidents and accidents. From this they suggested that there was a group of individuals who possessed a high degree of accident proneness predisposing them to a high accident rate (Wazana, 1997). A number of methodological flaws were isolated in this study leading to the demise of the accident proneness concept. McKenna (1983) claimed that it was the interpretation and not the data produced to explore accident proneness that was controversial.

The search for a reliable measure of accident proneness continued for approximately 30 years and even today interests' researchers. At the time that the concept of accident proneness was discussed, it leaked into the popular press, infiltrated public opinion and then into politics. In 1938 it became an accepted term in the analysis of road accidents, not because of its proven existence through methodological rigour, but due to the popularity of the term in political reviews and the ability to 'point the finger' at a small

group of people said to be causing more than 2/3 of the road accidents and fatalities (Haight, 2001).

By the 1950s accident proneness had reached its highest level of disrepute, as there had never been a clear cut way to measure it. However, this was largely due to the use of the term being preceded by any detailed sound methodological approach that isolated it as a true psychological phenomenon. Although reviewers have concluded that the predisposition to accident involvement does vary from one individual to another, this approach to accident prevention and reduction has not been effective. Focussing on the human machine interface and job design has proven to be of considerably more value (Cameron, 1975).

Cognitive Failure

Cognitive failures tend to occur under familiar conditions in which tasks are automated and attention is distracted internally or externally. It has been defined as a mistake or inability in the completion of a task that the same person would normally be capable of completing (Wallace & Vodanovich, 2003a). Accident and safety research has begun to observe cognitive processes that may predispose any particular individual to be involved in an accident (Hansen, 1989). In a study investigating the impact of cognitive failure on motor vehicle accidents, it was demonstrated that a positive relationship existed between cognitive failure and accident involvement (Wallace & Vodanovich, 2003a). Similarly, it has been demonstrated that there is a positive relationship between

cognitive failure and periods of hospitalisation and fall injuries (Larson, Alderton, Neideffer & Underhill 1997).

The construct of cognitive failure has also been examined in relation to performance on sustained attention tasks, absentminded shoplifting and pilots plotting their flight course by the wrong end of the compass needle (Broadbent et al., 1990; Wallace & Vodanovich, 2003b). Research conducted by Broadbent, Cooper, Fitzgerald and Parkes (1982), considered the predictive ability of an individual's proneness for cognitive failure utilising the Cognitive Failures Questionnaire (CFQ). The results of this research allowed investigation of the correlation of cognitive failure and several concepts (Wallace & Vodanovich, 2003b).

Conversely the correlation of proneness to cognitive failure and work place accidents has been minimally examined. Wallace and Vodanovich (2003a) considered the relationship between scores on the CFQ and self-reports of work related accidents. They found that those with higher scores on the CFQ (high proneness to cognitive failure) reported higher incidence of involvement in workplace accidents. Further to this, they considered the interaction of cognitive failure with conscientiousness (Wallace & Vodanovich, 2003b). They drew a sample from production workers in the United States and found support for the moderating effect of cognitive failure on the relationship between conscientiousness and unsafe work practices and accidents. Specifically, employees who had low conscientiousness scores had a higher impact of cognitive failure on unsafe work practices. They concluded that cognitive failure scores are more

predictive of workplace safety performance when the individual has low conscientiousness.

The analysis of accident data suggests a link between cognitive failure and accidents. Many accidents appear to result from distractibility, poor selective attention and mental error (Larson et al., 1997). With research linking this construct specifically to workplace accidents being in its infancy, it appears future research is required to provide a more thorough understanding of cognitive failure and to consider organisational and individual prevention strategies.

In considering human factors contributions to workplace accidents, a new view is emerging to replace the view based on human failure (in terms of error, proneness and cognitive failure) as the sole contribution (Dekker, 2002). The characteristics of the old view were human factors are the cause of the majority of accidents, systems in which people work are designed to be safe and improving safety can be achieved by guarding the systems from the unreliability of humans. Conversely the new view considers human factors more in the context of organisational safety. This recognises the contribution of other factors that may have been hidden behind the term ‘human factors’. The underlying principle of the new view is that human factors are not a justification for failure but actually require justification (Dekker, 2002).

It is assumed that safety must be created by the people within the organisational environment and that human factors are part of an interconnected system of safety

(procedures, tools, and the individual and organisational environment) that must be considered mutually.

CHAPTER 4

Background

The Relevance of Psychological Distress in a Model of Work Performance

The broad aim of the current research, albeit exploratory in nature, is to describe the relationships between psychological distress and workplace safety performance. The outcomes of this analysis relate directly to a definition of psychological fitness for work. After years of research considering role conflict, it is now both logical and empirically validated to consider that an employees' time spent outside of work will have an impact on work performance. Many general factors in non-work life have been considered for the ability to interfere with work including; household obligations, child care, role conflicts and interpersonal difficulties (Demerouti et al., 2007; Frone, Yardley, & Markel, 1997). More recently, attention has turned to the effects of non work time on work performance. The need for recovery from work and the resultant strain from home to work interface has been linked to cognitive and work role performance deficits (Demerouti et al., 2007; Jansen, Kant, & Brandt, 2002).

Conservation of resources theory (COR) proposes that an individual aims to preserve, protect and build resources. Consequently, anticipated or actual loss, or failure to gain resources after investment to do so, will result in psychological stress to the individual (Hobfall, 1989). COR has been applied to models of work family conflict. It has been demonstrated that the draining of resources over time by chronic work and family stressors leads to decreased job and family satisfaction, increased life distress and

decreased physical health (Grandey & Cropanzano, 1999). Coupled with the evidence from more traditional cognitive appraisal models of stress and strain (proposed by Lazarus & Folkman, 1984), this suggests that stress/strain for the individual will potentially lead to performance decrements in the work domain.

Further evidence is provided in a model of work/family interface, as outlined in Figure 3. Frone et al., (1997) identified a number of affective and behavioural outcomes for both family to work and work to family conflict. The model consists of both proximal and distal predictors of work to family conflict and family to work conflict. Of specific interest in the current thesis are the effects of non-work on work time. Frone et al., (1997) found support for the hypothesis that there are reciprocal paths between work-family and family-work conflict. It was also determined that family distress is a predictor of work-family conflict and work distress is an outcome of this conflict. Further to this, behaviorally it was indicated that family to work conflict was negatively related to work performance, (refer to highlighted variables in Figure 3). A few salient aspects of this model have relevance in the current research, namely the consideration that dissatisfaction and distress from non-work life will impact upon work performance.

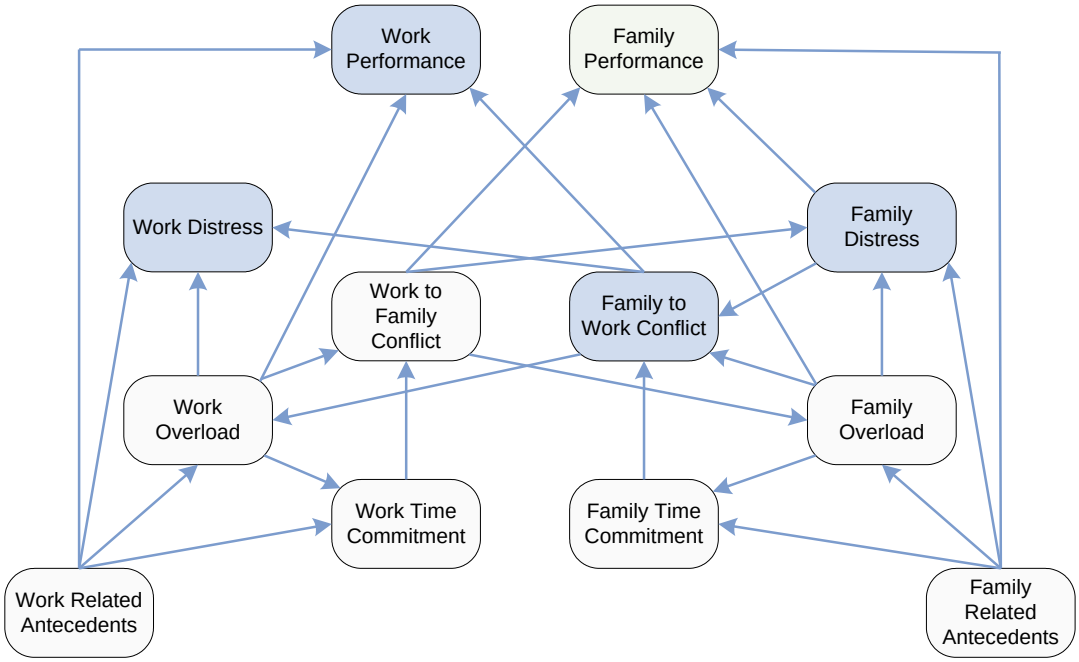

Figure 2. Model of Work Family Interface (Source: Frone et al., 1997, p. 161)

Specifically, individual levels of psychological health will be considered in relation to work safety performance. This extends one aspect of the Frone et.al. (1997) model as individual distress and dissatisfaction and safety performance have not been investigated comprehensively within the context of a moderator model considering both mediated and direct paths. One of the main aims of this research is to explore this model inclusive of what is known from the work home interface literature, applying theories of stress and resource conservation and overlaying this on recently developed models of safety performance in the context of the model of job performance (Greenhaus & Parasuraman, 1986; Motowidlo et al., 1997; Neal & Griffin, 2002).

Individual Differences : Performance Antecedents

Up until this point, safety research has analysed human contributions to accidents from an engineering, breakdown of process perspective. The new view opens up the field of safety research to encompass relevant current psychological theories of human performance. The task now is to provide a comprehensive framework integrating relevant areas of psychological research that are applicable to determining individual differences in employee psychological fitness for work and the impact of this on workplace safety performance. Organisational psychology has a developing but already convincing field of evidence on the individual factors that are involved in workplace behaviour, which if integrated with the work-family literature on work/home interface; a comprehensive model of psychological fitness for work could be developed.

Current Psychological Theories

Current research indicates the need to look at the antecedents and determinants that impact upon individual behavioural differences in workplace behaviour and more specifically safety behaviour and attitudes. In addition, considering safety behaviour within the current theories of job performance allows consideration of factors that have demonstrated an influence on occupational behaviour. These issues are proposed within Neal and Griffin's model (2002) but have been largely overlooked in the literature thus far The current study would add these individual factors of personality, coping skills and emotional intelligence within the same context as the model proposed by Neal and Griffin (2002). Within the organisational psychology literature there has been extensive focus on very specific individual differences that affect behaviour, including cognitive

and psychomotor abilities, vocational interest and personality traits specific to vocational roles and general work performance. There has been less focus on individual differences relating to personality traits that may affect specific workplace behaviours, interests, values and affective states or emotion at work.

Personality

Personality has been defined as a 'relatively stable organisation of a person's characteristics, attributes and (attitudes) that define the individual' (Tosi & Mero, 2003, p. 23). Behaviour is driven by personality and can show consistency across situations and theorists generally agree that personality has both genetic and environmental components. Furthermore personality attributes have been successfully demonstrated as valid predictors of workplace performance (Wallace & Vodanovich, 2003b).

Models of Personality

In the past ten years, research on personality has derived a five factor model, which serves as a meaningful categorization for classifying personality attributes (Barrick, Stewart & Piotrowski, 2002). This model has pervaded the field of industrial and organisational psychology in relation to work performance and personnel selection studies. The relevance of the Big Five classification of personality has been demonstrated across diverse samples, cultures, instruments and theoretical approaches (Barrick & Mount, 1991). It is the most empirically studied personality approach in personality research. Several meta-analyses of the model's criterion related validity have

demonstrated its relationship to supervisory training, deviant behaviours, turnover, job performance and training success (Salgado, 2002)

This model groups personality traits into 5 higher level factors; extroversion, emotional stability, agreeableness, conscientiousness and openness to experience (Costa & McCrae, 1992). Costa and McCrae (1992) defined each of the factors in their measurement of the Five Factor Model called the NEO Personality Inventory. The construct of neuroticism assesses adjustment as opposed to emotional instability. High scorers will identify with the following traits: worried, nervous, insecure and emotional. Extraversion assesses amount and level of interpersonal interaction, activity and stimulation required. High scorers have the following traits: sociable, person oriented, optimistic and talkative. Openness encompasses people who have the following traits; curious, creative, imaginative and non-traditional. Agreeableness assesses an individual's interpersonal orientation; high scorers are tender, trusting, helpful and forgiving. Finally, conscientiousness considers an individual's level of organisation and persistence with goal-directed behaviour. High scorers identify with the following traits: organised, reliable, self-disciplined, persevering and hardworking (Costa & McCrae, 1992).

Despite criticisms of the Five-Factor Model it continues to be one of the most researched taxonomies of personality. Through extensive theoretical discussion and research there appears to have been a consensus reached on the identity, interpretation and its contribution to the analysis of personality (McAdams, 1992). The five factors that comprise the five factor model offer a sound taxonomy in personality.

Personality and Performance

The construct of conscientiousness has been the most predictive of job performance (Hurtz & Donovan, 2000). In particular the constructs of conscientiousness and emotional stability have shown a significant relationship with job performance across varied occupations and employment levels. These relationships are not surprising given that conscientiousness is a measure of personal characteristics that are important for achieving work tasks and emotional stability is a measure of attitudes or characteristics that may hinder successful performance (Barrick & Mount, 1991).

Wallace andVodanovich (2003) found that conscientiousness mediated the relationship between cognitive failure and unsafe workplace behaviour and/or accidents. Individuals scoring high on conscientiousness scales reported less involvement in unsafe workplace behaviours and accidents. Individuals scoring highly on conscientiousness scales have the following characteristics; organised, exacting, disciplined, diligent and dependable (Witt, Burke, Barrick & Mount, 2002). In the presence of high levels of agreeableness they found that conscientious employees had the attributes necessary to be effective in the workplace.

The construct of conscientiousness has also been found to be a good predictor of specific aspects of job performance including level of productiveness and ability to follow procedural tasks. Other studies have found that conscientiousness and emotional stability predicted turnover and deviant behaviour whilst agreeableness predicted

turnover. Salgado (2002) found a lack of significant findings in relation to absenteeism and accident rate in a study of counterproductive work behaviours (CWB) and personality.

This would suggest that there is not a simple relationship between personality traits and these counterproductive work behaviours. Salgado (2002) suggests however, that accident rate and absenteeism are two specific forms of CWB that may occur as a result of many other work and non work factors. Therefore the relationship may be attenuated by other factors such as personal illness, family issues, hazardous working conditions and inadequate workplace health and safety procedures.

This study also highlighted that negative affect mediates the relationship between counterproductive work behaviours and stressors. That is, individuals who experience negative emotions more consistently and strongly than others will be more likely to engage in counterproductive work behaviours. Also pertinent to the consideration of these results is the use of student samples and non-occupational accidents. Clearly, the analysis needs to be extended in future research to consider full time employees and measures of specific occupational accidents.

Personality traits may come to predict workplace safety behaviour and accidents via affective mechanisms (Wallace & Vodanovich, 2003b). Individuals are different in their tendency to respond to classes of stimuli in a predefined manner, based on affect, mood and perception. In addition, affect experienced in a situation will partially determine

future decisions to enter or avoid the situation. Approaches to workplace safety and psychological fitness for work that do not consider personality constructs, coping style and affect are ignoring a growing body of empirical data linking personality and emotion to workplace performance. Current models of job performance provide the context for this to occur.

Individual Differences and a Model of Performance

A century of research on the job performance construct would suggest that it is a hierarchy with one representative general factor and a group of factors underneath (Gilboa, Shirom, Fried, & Cooper, 2008). Two factors that have received much attention include task and contextual performance factors (Borman & Motowidlo, 1993). The assumptions of this model of job performance describe it to be behavioural, episodic, evaluative and multidimensional. All performance is assumed to either contribute or detract from the achievement of organisational goals, either directly through the task or indirectly through the maintenance of the broader organisational context. Furthermore the two aspects of performance are perceived to have different antecedents and consequences (Motowidlo, Borman, & Schmit, 1997). A specific conceptualisation of individual differences in task and contextual performance was proposed by Motowidlo et al., (1997), refer to Figure 2.

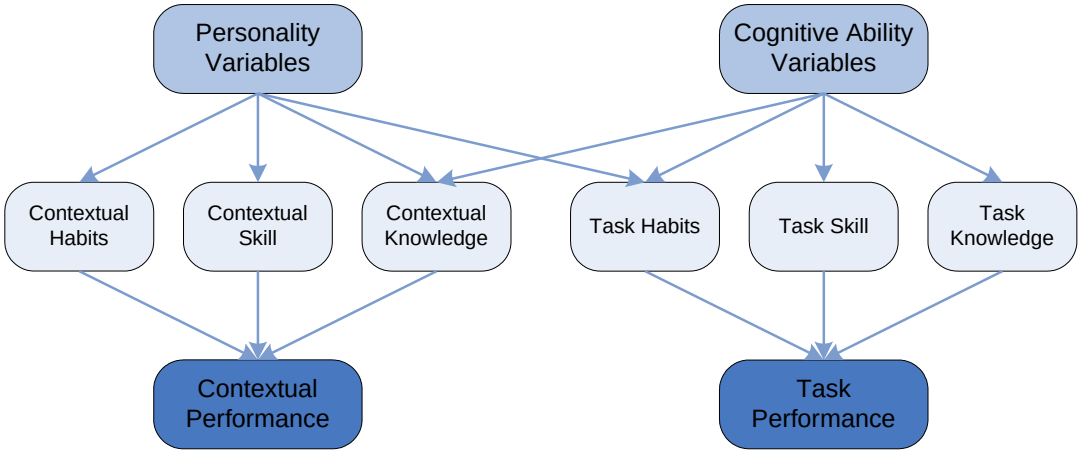

Figure 3. A theory of individual differences in task and contextual performance (Source: Motowidlo et al., 1997,p.79)

From the model it can be seen that personality variables are hypothesised to have a stronger effect on contextual performance than task performance and cognitive variables are believed to have stronger influence on task than contextual performance. Personality variables are believed to have some influence on task performance via its impact on task habits and similarly cognitive variables are perceived to have some impact on contextual performance via contextual knowledge.

There have been a number of studies that support the distinctions proposed in this model. In a study of 421 USA Air Force mechanics, personality variables were found to be highly correlated with contextual performance and mechanic experience was found to be correlated with task performance, also task and contextual performance contributed independently to overall performance (Motowidlo & Van Scotter, 1994). A measure of cognitive ability added to the prediction of sales performance, after controlling for the effects of conscientiousness. However, the cognitive measure was not a good predictor of tardiness, absenteeism and organisational citizenship (Hattrup, O'Connell, & Wingate,

1998). Befort and Hattrup (2003) found that amongst a group of managers, experience predicted the rated importance of contextual and task behaviours in employees. As managers gained more experience, they were more likely to focus on contextual as opposed to task performance. This highlights that not only will antecedents vary for task and contextual performance, but individual differences in demonstration of these two aspects will lead to different outcomes as judged by their managers.

Two aspects of this model are of significant importance in the development of a model of psychological fitness for work. Firstly, the distinction of contextual and task components of performance can be applied to safety as demonstrated in Neal and Griffin's (2002) model. They have identified that contextual aspects of safety determinants, such as safety motivation and task aspects of safety determinants, such as safety participation are relevant in distinguishing aspects of safety performance. Their model has shown that determinants (knowledge, skill and motivation) and components (safety participation) are differentially determined by conscientiousness (Neal & Griffin, 2002).

In addition to this, aspects of the model can be applied to an investigation of safety outcomes for individuals outside the safety climate context implicit in Neal and Griffin's (2002) model. Based on outcomes from both Neal and Griffin's (2002) model and Motowidlo et al.,'s (1997) model, it can be seen that the antecedents for task and contextual performance differ and that these in turn determine individual differences that come to predict performance outcomes. As can be seen from the preceding discussion on

individual difference variables from the psychological literature, the current thesis will expand on the antecedents from the job performance model to include personality, trait EI and coping skills. Specifically the direct and mediated effects of these antecedents on contextual performance; safety motivation and safety knowledge and task performance; safety participation will be investigated. Additionally, the current research will investigate contextual performance as a moderator of the relationship between antecedents and safety outcomes.

Emotion

As is relevant in all aspects of human life, emotions may facilitate, motivate, organise, direct and activate workplace behaviour (Weiss & Brief, 2001). Emotions have the capacity to interfere with or enhance performance. In the workplace, they may motivate striving towards success and achievement. Conversely, emotions may also cause disruptions by interfering with cognitive processes and behaviour, making information processing and complex behaviour difficult to engage in successfully. Medium term negative emotions can lead to dysfunctional coping mechanisms including the misuse of alcohol and other drugs.

The experience of emotions (such as sadness, pleasure, jealousy and guilt) in the work environment has remained relatively hidden in organisational psychology. There appears to be a belief that organisational order and efficient employees are necessarily rational and non-emotional. Given this focus, emotional issues within the workplace have been collapsed into all encompassing categories such as stress or job satisfaction (Weiss

& Brief, 2001). Organisational psychology has been slow to appreciate the importance of emotion in organisational behaviour.

Emotions and Work: Historical Overview

Weiss and Brief (2001) report the work of Rexford Hersey in the 1930s as a snapshot of what research on emotions in organisational psychology could have become but did not. Hersey studied a small group of skilled workers in a railroad repair yard for 10 to 13 weeks at a time, monitoring their emotions four times a day. He indicated that individual daily affect varied significantly over time, displayed specific cycles and the period of the cycle was individualised. From this Hersey also found that daily affect level was related to daily performance level. In contrast to the Hawthorne studies, he suggested that factors other than influences in the workplace alone were responsible for any individual's emotional display at work (Weiss & Brief, 2001). Hersey's work stands out in the time period and still today for a number of reasons: his focus on emotions rather than attitudes and behaviour, studying changes in individuals over time, linking emotions to job performance and focusing research attention on the impact of life outside the work environment on work outcomes and emotions.

When the focus was turned to affect in organisational research in the 1930s there were a wide variety of ideas that surfaced. These included the Hawthorne investigators who emphasised the importance of the workplace's social organisation and the individuals' interaction with it, Rexford Hersey's focus on emotions and their relationship with performance and Robert Hoppock's study of job satisfaction. As the

attention was narrowed, it would appear that some of these pivotal concepts were overlooked and job satisfaction became the focus of studies on organisational affect until most recently (Briner, 1999). Stress research took over from job satisfaction and still strongly dominates organisational research and similarly has limited the focus on the experience of emotion as is relevant to organisational behaviour.

Revisiting Emotions at Work

In the past decade, emotions in the workplace have become a topical focus again, popularised by coaching and organisational development consultants (Briner, 1999). A large proportion of employees are expected, as part of their employment responsibilities, to display appropriate and adequate emotions to customers. The impact of this sometimes incongruent display on the individual has surfaced as an important area of research referred to as emotional labour' (Fisher & Ashkanasy, 2000). The emergence of emotional intelligence (EI) in popular media was synonymous with the renewed focus on affect in organisational psychology. Emotional intelligence has become widely known within organisations due to marketing by organisational coaches and consultants. Researchers purport to have made important inroads to understanding its nature, components, determinants and effects since this time (Matthews, Zeidner, & Roberts, 2004).

There still remains much debate within the scientific community as to whether the concept of emotional intelligence can be scientifically validated. Much of the work of Daniel Goleman in popularising this concept in the lay community provides support for the antagonists. Goleman's definition of emotional intelligence has been criticised for

being over inclusive, a definition by exclusion: ‘all positive qualities that are not IQ’ (Matthews et al., 2004). The effect of this broad definition is that it is almost totally inclusive of all aspects of personality (Bar-On & Parker, 2002). It has been referred to as a model that captures various psychological phenomena including both cognitive and non-cognitive processes, some of which have been developed and discussed previously.

Many critics of Goleman’s conceptualisation of emotional intelligence suggest it is too non-specific to constitute good scientific theory. Due to the sensationalism and power of the popular press, this conceptualisation is probably the most recognisable within the lay community and the unsuspecting scientific community. Unfortunately, in the wake of the popularisation a number of quickly developed measures emerged. Newspapers and magazine articles gave ad-hoc scales of optimism, relabelling already existing tests of other established psychological constructs.

There are many different conceptualizations of the term EI, as with every developing psychological construct. There are however, two main approaches presented throughout the literature. In an attempt to restore scientific credibility to the concept of EI, models have been conceptualized into the following two types: (1) Emotional intelligence as a form of cognitive intelligence, also referred to as ability EI and (2) as an affect laden personality trait, referred to as trait EI (Pertrides & Furnham, 2001).

A Model of Emotional Intelligence

The scientific origin of Emotional Intelligence is largely attributable to Jack Mayer, Peter Salovey and their colleagues. They were the first to publish in peer reviewed psychological journals and remain one of the biggest proponents of the ability based conceptualisation of emotional intelligence, focusing on an intelligence that processes and benefits from emotions (Barchard & Hakstian, 2004; Matthews et al., 2004). Emotional intelligence as they define it is 'the subset of social intelligence that involves the ability to monitor one's own and others feelings and emotions, to discriminate among them and to use this information to guide one's thinking and actions (Salovey & Mayer, 1990, p.189).

Both trait and ability EI are based on the conception that emotional competencies are contributing alongside cognitive competencies to overall life satisfaction and successful adaptation. Ability EI as a form of intelligence is assessed by performance based tests, capturing maximal performance. Trait EI is defined as a set of emotion-related dispositions and is assessed as a lower order personality factor with self assessment instruments, capturing typical performance.

The operationalisation of ability EI has been difficult due to the subjectivity of emotional life, which inhibits the development of maximal performance measures. Test responses are usually rated as approximately correct according to consensus norms from the general population (Gannon & Ranzijn, 2005; Keele & Bell, 2008). This has been assumed to measure knowledge of emotions and not emotional management abilities.

Salovey and Mayer's (1990) ability model of emotional intelligence operates across both cognitive and emotional systems, comprising four divisions. The first of the divisions is emotional perception, which relates to the ability to perceive and express feelings. The second division is emotional integration where emotions enter and interact with the cognitive system. Thirdly, emotions need to be recognised, labelled and understood. Finally, the fourth division is emotional management which is the assimilation and integration of all skills and abilities utilised in the prior three divisions to operate as an emotionally intelligent person (Salovey & Mayer, 1990).

The research based on Salovey and Mayer's (1990) model is inconclusive to date. There is an indication that an emotional perception factor has evolved consistently independently of other cognitive abilities and previously identified personality dimensions (Davies et al., 1998; Mayer, Caruso & Salovey, 2000). Similarly, a factor of social perceptiveness has demonstrated moderate correlation with both verbal ability and inductive reasoning (Barchard & Hakstian, 2004).

The operationalisation of trait EI is made easier as the construct includes self perceptions and dispositions. Criticism of trait EI relates to its incremental predictive validity over standard personality traits. In a number of studies, trait EI has demonstrated incremental validity over the Big 3 and Big 5 personality factors (Petrides & Perez-Gonzalez, 2007). Trait EI has proven to be a reliable predictor of life satisfaction, coping adaptively and has shown a negative association with rumination and maladaptive coping styles and deviant behaviour in schools (Mikolajczak, Luminet, Leroy, & Roy, 2007)

Petrides (2001) trait model of EI conceptualises it in terms of personality. This model organises all affect-laden aspects of personality in a unified framework (Mikolajczak et al., 2007). It has consistently shown a distinctive and amalgamated construct that is posited at the lower levels of personality hierarchies. Trait EI has been articulated as a 'compound personality construct' because it is partly determined by several dimensions of personality (Petrides, Pita, & Kokkinaki, 2007). In a principle components analysis of a measure of the Big Five personality dimensions, the giant three and trait emotional intelligence, trait EI defined a distinct factor and did not scatter across the other dimensions of personality. Clearly, trait EI is contributing some unique aspect to personality variance (Petrides et al., 2007).

The construct of emotional intelligence has been identified as an important area for further research. The empirical division between ability and trait based theory and measurement of the construct however, remains contentious (Mayer, Salovey & Caruso, 2008). Both approaches still demonstrate difficulties in measuring the construct; ability based measures have scoring concerns and self report measures have demonstrated poor discriminant validity (Conte, 2005). Ability based proponents suggest models and measurement based on the Mayer and Salovey model hold the strongest theoretical and empirical support (Conte, 2005; Mayer, Salovey & Caruso, 2008). The two main criticisms of the trait based or mixed models include the discrimination from other personality factors already proposed under the big five personality model and referencing these traits/personality factors as an intelligence when not defining or assessing an ability (Conte, 2005;Ashkanasy & Daus, 2005). Trait EI is defined specifically as a distinctive,

compound personality construct which appears to address one of the recommendations made by Salovey, Mayer and Caruso (2008), 'widely studied personality traits be identified specifically and not generically as emotional intelligence'. In addition, as previously discussed trait emotional intelligence as measured with the TEIQue has demonstrated discriminant validity across a number of studies (Petrides & Perez-Gonzalez, 2007;Mikolajczak et al.,2007;Petrides et al., 2007).

Emotional Intelligence and Performance

The primary focus of the EI literature has been on its proposed ability to affect individual performance and success across a vast range of experiences. A positive association between EI and work performance has now been identified throughout a number of studies (Donaldson-Feilder & Bond, 2004). Higher levels of EI account for better psychological and physical wellbeing and psychophysiological coping (Mayer & Salovey, 1995).

From the metacognitive literature, people's abilities to perceive their own thoughts and feelings have been associated with better mental health outcomes and behavioural effectiveness and EI has been conceptualised as one of these meta-mood constructs (Donaldson-Feilder & Bond, 2004). Better mental health, performance and less involvement in workplace errors was reported for a group of English and Scottish financial institution employees who scored highly on EI measures, recorded at two time points over a one year period (Bond & Bunce, 2003). Taylor (2004) found EI was an indicator of how well an individual reacts to stress. Decreased EI ability was found

amongst individuals who are frequently overwhelmed and act out in unhealthy ways. Those with higher levels of EI ability are able to effectively contain and balance their emotional response and thereby protect themselves from severe adverse effects of stress (Ciarrochi, Forgas, & Mayer, 2001). Similarly, Law, Wong and Song (2004) demonstrated that peer rated EI is predictive of supervisors' ratings of in role and extrarole performance for employees.

Emotional intelligence has been suggested as a long term predictor of job performance. Employees who are leaders in their area have abilities above and beyond cognitive intelligence; they have traits of resilience and optimism. The ability to recognise and restrain negative feelings such as anger and self-doubt within the workplace has been correlated with career success (Hurtz & Donovan, 2000). Emotional intelligence in the research thus far has demonstrated positive correlations with happiness at work, life success, and career remuneration.

How any individual manages a difficult situation depends on an interaction between their normal coping response and the situation itself. Current research into the transactional model of stress and coping suggests that the response of an individual is an active process, interacting with other factors such as personality, stress management and coping strategies (Matthews et al., 2004).

This perspective would also suggest that a person's level of EI ability and coping style could indicate a predisposition to experience stress in a particular manner. The

current research will extend on this perspective considering the role of trait EI, coping and personality factors in improving safety performance or providing a repertoire for handling the impact of psychological stress on workplace performance.

Coping Response

An individual's response in times of psychological ill health has been related to a number of factors including coping style (Bond & Bunce, 2003; Holahan & Moos, 1987). According to Lazarus and Folkman (1984), psychological health is an interaction between the individual and their environment, which at the dysfunctional end of the continuum, the individual views as beyond their ability to manage. The experience of affect elicited by difficult emotional situations can elicit functional or dysfunctional responses. Coping includes any attempts by the individual through their thoughts and behaviour to manage the distressing situation.

Lazarus and Folkman (1984) have identified two main types of coping response: emotion-focussed and problem-focused. Emotion-focussed coping involves attempts to manage emotions, self-blaming, wishing for the problem to go away, avoiding or denying the problem and / or detaching from the immediate stressor and environment. Problem-focused coping is identified as more active, including attempting to change the situation, eliciting social support, reconsidering one's thoughts and behaviour, attempting to change the situation and developing alternative responses to the situation (Bond & Bunce, 2003).

Research on coping response in difficult situations suggests that most people utilise some combination of both problem-focused and emotional-focussed coping (Gohm & Clore, 2002; Holahan & Moos, 1987). Gohm and Clore (2002) found that how a person perceives and experiences affect determines how they react in stressful situations. Individuals who were able to identify their feeling state utilised more adaptive coping styles than others, who were unclear or unable to identify how they were feeling. Further to this, they found that psychological well-being was associated with being able to identify and express one's emotions. Conversely, negative psychological well-being was associated with not being clear about one's own emotions and intense negative emotional experiences.

Coping processes have been clearly identified in the literature as a stabilising factor that assists individuals to maintain psychosocial adaptation during stressful life events (Holahan & Moos, 1987). The proportion of problem-focussed coping to total coping efforts has been associated with reduced depression and emotion focussed coping has shown positive association with psychological health. Coping responses for both psychologically healthy individuals and those experiencing psychological health appear to be highly situation-specific.

However, individuals scoring highly on measures of self confidence appear to utilise more active coping strategies and are less likely to report avoidant coping strategies. The negative aspects of emotional focussed coping appear to be elicited more consistently in threatening situations when personal and contextual resources are scarce. Furthermore,

active coping strategies are strongly related to positive events and emotion focussed coping is associated with negative (Holahan & Moos, 1987; O'Connor & O'Connor, 2003;Folkman & Moskowitz, 2004).

To date, there has been minimal research conducted to investigate the impact of coping style on workplace safety performance. Clearly, the employee has a crucial role in managing the impact of psychological health on workplace safety behaviour. A comprehensive consideration of individual differences in coping response under stressful life events will potentially give insight into individual differences in workplace safety. In the current study coping will be considered as an antecedent of safety determinants and safety outcomes.

CHAPTER 5

Conclusions, Hypothesised Model and Hypotheses Justification

Conclusions: The Common Thread

The study of individual differences in workplace performance now has a substantial body of evidence supporting the relevance to industrial and organisational psychology. Consideration of performance as a unitary construct is in contention with theories of task and contextual performance (Motowidlo et al., 1997). The application of this literature to specific workplace performance, in terms of workplace safety behaviour and outcomes, is limited thus far.

If viewed in the context of current psychological knowledge of individual differences, human vulnerability and/or accident proneness could be viewed as an outcome of other factors rather than a cause. The factors require justification, rather than being the justification for failure (Dekker, 2002). It is time to bring the study of individual differences in workplace safety performance into the organisational psychology arena and align it with current findings from the safety research literature.

Individual factors have been implicated, but not explored extensively in safety research. They are viewed as mediating variables between safety climate and actual safety outcomes (Neal & Griffin, 2002; Johnson, 2007; Zohar, 2000). Determinants of safety outcomes in the safety climate research have been viewed as benevolent safety attitudes. Further investigation of this has suggested that individual factors are at the core of understanding poor safety attitudes, motivation and skill acquisition. Further to this,

safety research suggests that the acquisition, maintenance and attendance to safety knowledge and safety behaviours is compromised by psychological stress that narrows the focus of attention and provides competing stimuli for the employee to contend with.

For both men and women, work and family represent two of the most central realms of adult life with bi-directional permeable boundaries. Unequivocally it has been demonstrated that the competing demands of these domains is a significant cause of psychological stress. Significant life events at work or at home can spill over and interfere with obligations in the other domain. An employee can be physically located in one domain but psychologically and/or behaviourally involved in another. The employee can be dissatisfied or distressed with an aspect of their life which may lead to cognitive preoccupation with the source of the distress and hence decrease physical and psychological availability to their current role (work or home based). The resulting increase in cognitive preoccupation can undermine an individual's ability or motivation to meet the obligation of other roles.

From the perspective of individual differences, there are some well demonstrated protective factors that capture a tendency for an individual to cope and manage significant life events at work and home and the cross boundary interface. This has been most clearly illustrated in the research on stress, identifying the individual factors of: personality, coping style and more recently, emotional intelligence as protective from the physical, social and psychological fallout of stress from significant life events.

The current study aims to highlight the common thread amongst the organisational psychology literature on: individual differences in workplace performance and management of stress, and the safety research on determinants of workplace safety performance and outcomes to provide a model of psychological fitness for work. It is exploratory in nature and, as such, the analysis of the relationships between the individual difference variables, psychological distress and the specific safety determinants and outcomes aim to contribute to a more comprehensive definition of psychological fitness for work. The analysis will consider three multivariate structural models (refer to Figures 4, 5 and 6), two looking at direct effects and one at the indirect effects of the exogenous variables (psychological health, personality, emotional intelligence and coping skills) on the endogenous variables (safety determinants and safety outcomes).

This dissertation aims to provide an answer to the following broad research questions:

1. What is the relationship of individual difference variables to safety performance?
2. Can models of job performance be applied to the specific condition of individual differences and safety performance?

Models, Hypotheses Rationale and Justification

As discussed throughout the preceding review, this thesis will present an integrative multivariate model of work safety performance and psychological fitness for work. It entails the integration of theories and research from three distinct theoretical areas; occupational and organisational psychology, the work/home interface and occupational safety.

Hypothesised Models

Due to the exploratory nature of the current research and the fact that no empirical study has previously demonstrated the relationships in the specific context hypothesised, two direct effect models were proposed to ensure that relationships were explored fully without the mediation. The model depicted in Figure 4 is the first of the direct effects models. It is a test of the individual differences model of job performance in the absence of mediation. This model proposes a consideration of the task and contextual determinants direct relationship with the broader conceptualization of individual differences, as it is addressing the direct relation with safety determinants in the absence of safety outcomes. It also considers the relevance of what is demonstrated in the empirical models of home work interface and evidence from occupational health psychology, i.e., distress or dissatisfaction can lead to decreased ability to attend to aspects of performance in particular safety determinants. Finally the moderation (by coping, personality and EI) of the impact of psychological health in the context of the task and contextual job determinants is considered.

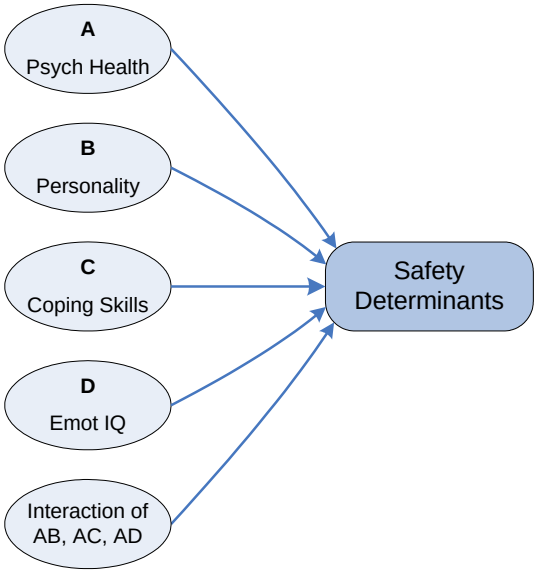

Figure 4. Proposed Direct Effects Model of Psychological Fitness for Work: Safety Determinants

The model depicted in Figure 5 represents much of the literature of individual differences in job performance. As discussed throughout the preceding review it extends on this literature in two ways. Firstly, it is a specific not global case of performance, safety performance. Secondly, it considers the interaction of individual difference variables within this specific context.

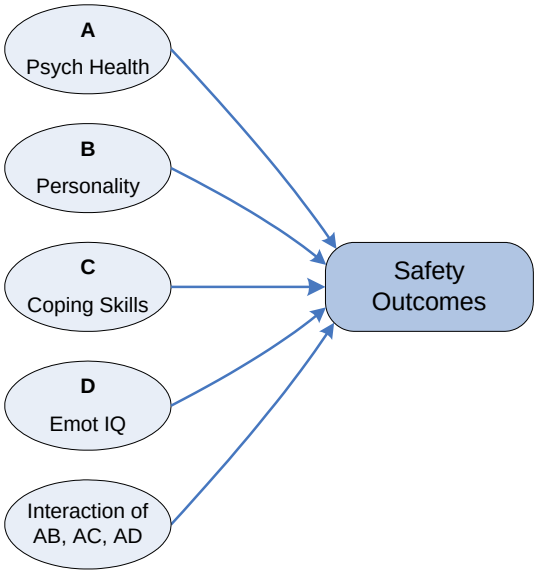

Figure 5. Proposed Direct Effects Model of Psychological Fitness for Work:Safety Outcomes

The model depicted in Figure 6 is a test of the mediator hypothesis i.e., safety determinants will mediate the relationship between antecedents and safety outcomes and further to this that the effects of psychological health on safety outcomes as mediated by safety determinants will be moderated by the antecedents.

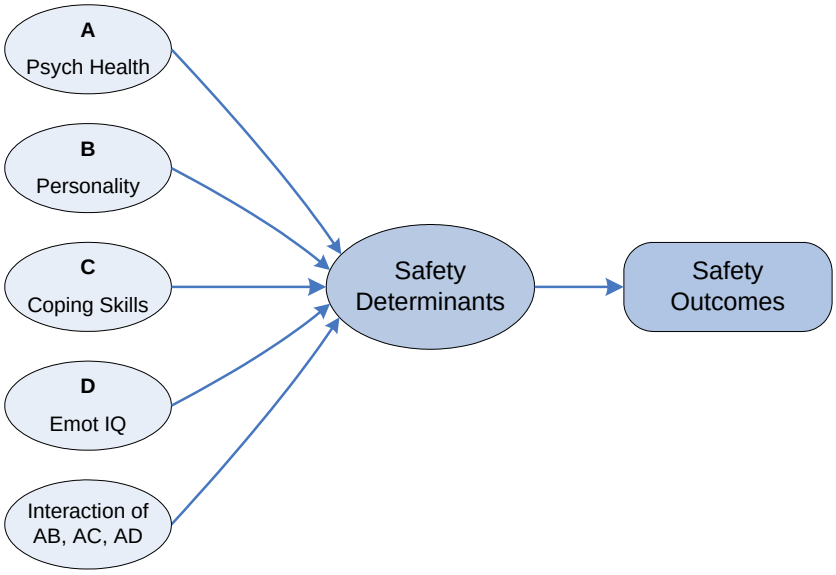

Figure 6. Proposed Mediated Model of Psychological Fitness for Work

The hypothesised relationships in both the mediated and direct effects models will now be discussed. Given that the latent constructs are the same across the three models, the hypothesized relationships will be discussed in relation to each variable in turn. The hypotheses are embedded in the multivariate models and will be presented at the conclusion of this section.

Psychological health and workplace safety

Research of work performance has focused heavily on what is referred to in the model of job performance as 'task performance' (Motowidlo et al., 1997). It is described as those aspects of job performance that have direct effects on the organisation's core production, are associated with a key performance indicator and, more traditionally, included in formal job descriptions.

Throughout the occupational health literature, measures of job stress and burnout have been considered almost exclusively in terms of their impact on ‘task performance’ as a unitary construct. High levels of exhaustion are associated with lower levels of objectively measured role task performance (Van Der Heijden, Demerouti, Bakker, & Hasselhorn, 2008). In situations where individuals are experiencing fatigue and low concentration, symptoms of burnout and work related stress, they will prefer work tasks that are more automated, allowing a simplification of the responses required from them (Demerouti et al., 2007).

In a longitudinal study 286 employed individuals were divided into one of three groups, those with major depressive disorder, rheumatoid arthritis and a group of controls. Over the span of four years the individuals were observed and interviewed. The group diagnosed with depression had greater deficits in job performance in comparison to the two other groups. The individuals with depression showed a decreased ability to inhibit responses which lead to more instances of inappropriate behaviour and failures in attention. Again, this study measured job performance in terms of task performance (output, physical tasks and time management). The study demonstrated a significant correlation between depression severity and job performance (Adler et al., 2006).

Similarly, negative affect and decreased mental and physical fitness have been associated with impaired information processing in studies of work stress and burnout (Van Der Linden, Keijsers, Eling, & Van Schaijk, 2005). The main effects of

psychological health on job performance and specifically task performance have been empirically validated.

Another important aspect of studying the relationship between psychological stress and workplace performance is home to work interface. Work interface with family and family interface with work are considered as a main contributing factor to psychological stress. Within the early literature regarding family to work interface there was a greater focus on the work to home antecedents and consequences (Frone et al., 1997). More recently the bi-directional relationship has been considered and supported by a number of studies. Williams and Alliger (1994), using a longitudinal design found that high levels of family distress was a significant positive predictor of family to work conflict. Furthermore, they isolated family to work conflict as a negative predictor of work performance. Similarly, in a study of 372 employed adults, family to work conflict was found to be a significant negative predictor of job performance (Netemeyer, Boles, & McMurian, 1996).

Further to this, the research on individual performance within the safety literature is largely considered in terms of human / cognitive error and accident proneness. Many studies have confirmed that in times of high mental demand (due to fatigue, burnout and work stress) decreased attention is focused on safety performance. These include in-role safety tasks and processes, and motivation for participation in safety antecedents, which leads to lapses, slips and mistakes (Dunbar, 1993; McKenna, 1983; Norman, 1988; Sanders & Baron, 1975).

The current multivariate models apply the outcomes found across these three domains and extends upon them. Research looking at the relative antecedents of both task and contextual job performance in the context of safety performance is rare. Work safety performance is conceptualised as a specific aspect of job performance, which covers both task (participation behaviour) and contextual aspects (motivation to participate) of performance along with the application of safety knowledge. These determinants are considered as mediators of the antecedents to components relationship as in Neal and Griffin's (2002) model. As distinct from their model, a direct self reported measure of safety outcomes is considered. Considered together with the impact of work/home interface and resultant psychological health, it is predicted that individuals who are experiencing symptoms of psychological health will have decreased mental ability to attend to work safety determinants and outcomes.

Safety Determinants

Safety determinants have been defined by Neal and Griffin (2002) as the individual factors that are responsible for the observed differences in behaviour across employee populations. Traditionally, knowledge, skills and motivation have been considered as the main determinants of performance. Within the safety climate and safety behaviour model proposed by Neal and Griffin (2002) these determinants were demonstrated to have a mediating relationship between safety climate and the components of safety performance.

More specifically, in a study of work related driving incidents; safety motivation was demonstrated as a determinant of self reported crashes. Individuals with low motivation

to drive safely reported a higher number of crashes (Newnam, Griffin & Mason, 2008). Similarly, safety knowledge has shown a positive relationship with safety participation, supporting the fact that without the correct safety knowledge individuals will find it difficult to perform safety tasks (Griffin & Neal, 2000).

While the importance of determinants has been considered in relation to components of safety performance, they have not been considered in relation to measures of safety outcomes. In the proposed mediated model (Fig 4) safety behaviour (participation as defined in Griffin & Neal, 2002) is hypothesised as a determinant along with safety motivation and safety knowledge. It is considered an individual difference that will lead to different outcomes in performance, hence a determinant. Gaining an insight into the psychological aspects of safety performance and outcomes requires a consideration of the impact determinants have on workplace accidents (Motowidlo et al., 1997).

Trait EI

As previously defined, trait emotional intelligence is the emotionally laden aspects of personality. The main focus within the emotional intelligence literature has been on its relationship to individual performance and associated success. Consideration of emotional intelligence and its direct effects on psychological health, physical health and general life satisfaction have also been dealt with extensively. A number of studies have found that individuals who score highly on trait measures of emotional intelligence have high levels of general health and psychological well being. Individuals with lower emotional intelligence have demonstrated higher levels of alexithymia and poorer

impulse control. Similarly, a meta-analysis revealed that individuals with higher emotional intelligence scores had reported better health and psychosocial functioning (Lyons & Schneider, 2005; Schutte, Malouff, Thorsteinsson, Bhullar, & Rooke, 2007; Slaski & Cartwright, 2003).

Analysis of direct effects of emotional intelligence and interpersonal skills including coping reveal a similar pattern. High trait emotional intelligence has a positive relationship with peer rated sociability (Petrides, Sangareau, Furnham & Frederickson 2006), social network size and fulfilling interpersonal relationships (Schutte et al., 2007). Individuals with higher levels of emotional intelligence have a stronger social support network and report greater satisfaction with this support. Emotional intelligence has also been demonstrated as a predictor of coping (Kluemper, 2007). After controlling for the Big Five and IQ, 26 per cent of the variance in coping was predicted by emotional intelligence. Individuals who are able to manage and understand emotions appear to be better able to alter and maintain emotions as needed to promote coping. In addition, emotional intelligence has also been associated with lower perceived stress and individuals with better emotional regulation have lower depression ratings (Ciarrochi et al., 2002; Day, Therrien, & Carrol, 2005).

The role of EI in moderating the impact of psychological health on performance and elements of family to work interface has had less attention. It was considered as early as 10 -15 years ago in the context of the stressor/strain model. A number of individual difference variables are considered to conclusively isolate the difference between

adaptive and maladaptive responses to stress, most significantly coping style and personality. Ciarrochi et al. (2002) failed to identify emotional intelligence as a moderator between stress and mental health. In their study, mental health was operationalised as depression, hopelessness and suicidal ideation which could be considered to fall within the range of a clinical diagnosis of major depressive disorder, representing a more extreme stress presentation than considered in many of the studies that have isolated personality and coping as moderators. In the current study the moderating role will be explored utilising measures of psychological health that are considered appropriate for the general population. Understanding and managing emotions should decrease unproductive emotional focus, leading to more adaptive problem solving. Individuals who can manage their emotions will be able to alter or maintain emotions under situations of distress to function adaptively (Slaski & Cartwright, 2003).

The moderating effect of emotional intelligence has been demonstrated in the relationship between home interface with work and employee satisfaction and performance. Individuals with higher emotional intelligence displayed more ability to manage the interface from home on their work commitment and they were better equipped to deal with the conflict (Carmeli, 2003).

Within this thesis the moderator relationship in the model of work safety performance and psychological fitness for work will be explored both in a mediated and direct effects model.

Personality

General job performance (as measured by task performance) and the relevance of personality have been considered extensively in the organisational psychology literature. Meta analytic analysis of these studies reveal a consistent pattern of results, with personality measured under the Big Five taxonomy being a reliable predictor of job performance (Barrick et al., 2002; Salgado, 2002). More specifically, a pattern of evidence for safety performance and the direct relationship with personality traits has emerged. Empirical support has been demonstrated for work safety performance and six personality factors: external locus of control, extraversion, aggression, social maladjustment, neuroticism and impulsivity. Among a sample of production and military personnel, low conscientiousness had a significant inverse relationship with workplace accidents (Wallace & Vodanovich, 2003a).

The literature specifically considering personality and safety performance is not as developed as the general job performance literature. Clarke and Robertson (2008) suggest this is due to the inconsistent application of a framework for personality. A meta-analysis utilising 24 studies demonstrated that openness, low agreeableness, low conscientiousness and neuroticism were correlated positively with negative safety outcomes. Extraversion did not demonstrate a consistent strong pattern of relationships across the studies. Overall low agreeableness was found to be a valid and consistent predictor of accidents across industry and occupation (Clarke & Robertson, 2008).

Different aspects of personality may relate differentially to the aspects of safety performance i.e. safety determinants, antecedents and outcomes as discussed in Griffin and Neal (2002) and proposed in the current model. This thesis employs this recommendation from previous research extending on it further with an exploration of the interaction effects.

The study of personality as a moderator has been demonstrated in the stressor strain relationship. Conscientiousness has been shown to moderate the relationship between stress and psychological health (Korotov, 2008). Similarly, this research reported extraversion and neuroticism moderated effects of life events and distress on self reported health behaviours. Personality has also been considered as a moderator in the relationship between work conflict and well being (Harvey, Blouin & Stout, 2006). Preliminary support has been shown for personality as a moderator of occupational stress on life satisfaction (De La Rasa & Cunningham, 2008). Personality has been demonstrated as a moderator between stress and health outcomes and between conflict and sense of wellbeing, the current research considers the specific role of personality as a moderator between psychological health and performance.

Coping

Theories of stress and coping suggest that individual differences in coping style lead to a different experience of stress and associated psychological sequelae (Lazarus & Folkman, 1984; Quillian-Wolever & Wolever, 2003). The basic premise of the transactional model of Lazarus and Folkman (1984) is the individual appraisal of the

stressor and perceived resources for coping. Different styles may influence an individual's ability to overcome, tolerate or reduce a source of stress.

In the coping research literature there exists significant support for the interaction of stress, coping and the related physiological and psychological health outcomes (Bond & Bunce, 2003; Holahan & Moos, 1987). In studies considering avoidant coping strategies to deal with chronic health disorders (including Irritable Bowel Syndrome), individuals had significantly high levels of psychological distress (Markow, 2006). Similarly, coping style was a predictor of depressive symptoms in lung cancer patients. Lung cancer patients using adaptive coping methods had lower reported levels of distress (Walker, Zona & Fisher, 2005).

Convincingly and consistently, positive adaptive problem focused coping reduced the impact of stress on psychological and physiological outcomes. There has been limited investigation of the moderator relationship with work performance.

Nonetheless, a handful of studies have considered this in relation to sporting, academic and military performance. O'Connor and O'Connor (2003) found that aspects of perfectionism are predictive of hopelessness and psychological health and that this relationship is moderated by coping style in undergraduate students. Similarly, students who value achievement utilise more task oriented coping styles which has the effect of reducing negative outcomes from stress (Santiago, Bernstein & Gard, 1995).

Davis (2006) demonstrated that the choice of coping style for soldiers in combat training moderated their perception of stress and their stress experience. He also found that this led to two performance outcomes for these individuals a) less disciplinary action and b) more confidence in successful completion of the training program. The utilisation of coping style as a moderator in in the stress/performance relationship is not new and will be considered in the specific context of workplace safety performance.

The three hypothesized models will provide answers to the two research questions and in a multivariate approach consider the following hypothesized relationships amongst the variables. The specific interaction under investigation has been referred to as a buffering interaction (Frazier, Barron & Tix, 2004). The buffering interaction indicates the hypothesised weakening of the effect of psychological health on workplace safety determinants and outcomes caused by the moderators of: personality, coping style and emotional intelligence.

The following hypotheses are proposed given the preceding discussion:

1. The effects of psychological health on safety determinants will be moderated by the individual antecedents of personality, coping skills and EI (Figure 4).
2. The impact of psychological health on safety outcomes will be moderated by the individual antecedents of personality, coping skills, and EI (Figure 5).

3. Safety determinants will mediate the exogenous variables of personality, psychological health and coping skills on safety outcomes (Figure 6).

CHAPTER 6

Method

The Design

A cross sectional survey design was employed to understand the phenomena in the proposed models. This method was chosen to further investigate the relationships amongst the latent constructs. As the research proceeds from the stance that the psychological issues involved in workplace safety performance are complex phenomena, and the aim is to gain a more in depth understanding of the relationships and conditions that determine psychological fitness for work in the context of workplace safety performance, it was important to take account of this through the cross sectional survey design. The survey design is a useful approach to obtain quantitative data for the variables of interest and will allow a full description and analysis of the processes and inherent relationships in this new phenomenon.

Understandably, a longitudinal design would allow for a more intensive investigation of causal relationships. This study aims to develop a model to explore the impact of moderator variables on safety performance. A meditational model is also hypothesised to test the application of a task and contextual model of job performance in the context of safety. The conceptual models (Figure 4, 5 & 6) are proposed on the basis of the proximal relationships identified throughout the three relevant empirical domains. This model is important, as it will provide a link between current models of job performance, home-work interface models and safety performance. To this end it was determined that

the cross sectional design would allow a thorough investigation of the pattern of relationships and interactions in the context of mediation.

A difficulty with the measurement of variables through the self report survey is the potential confounding caused by common method variance. A number of factors were employed to minimize these effects. Firstly, a pilot of the questionnaire was conducted, following which items were reworded to reduce ambiguity and removed from the scale as required. Secondly, at the time of data collection the researcher was able to reduce evaluation apprehension by assuring respondents that there were no right or wrong answers and to answer as quickly as possible without in-depth introspection.

Thirdly, anonymity of respondents was maintained and made explicitly clear to them at the time of completing the questionnaire. Temporal separation of the variables was considered but not possible due to logistical requirements of the mining operation. The collection of predictor and criterion variables from different sources was also considered but dismissed as a multidimensional archival measure of safety performance as conceptualised in the work performance literature was not available in the organisation's database (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003).

Sample Selection: Why Maintainers and Operators?

The sample population chosen consisted of all maintainers and operators within a heavy industry in Australia. Maintainers and operators are individuals on shift rosters

who perform tasks on a daily basis involving risk due to some combination of the following factors: a) physical environment, b) hitting objects with part of the body c) being hit by moving objects, d) manual tasks requiring considerable and consistent force and repetition, e) heat, electrical and other environmental factors, f) chemicals and other hazardous substances, g) biological factors and mental fatigue.

Across any mining operation the operators and maintainers roles are equal in the challenge presented by these factors, as opposed to office based personnel. Office based personnel are traditionally on a standard 5/2 roster and access the plant, workshop and underground on an infrequent basis for the purpose of observation and review. Therefore, operators and maintainers represent the target group due to the high cost potential for the interface of psychological stress on workplace safety performance. This is supported by Worker's Compensation and Rehabilitation statistics nationally.

Development, Variable Definition and Measure Selection

Adopting the recommendation of Thompson & Vacha-Haase (2000), reliability analysis was conducted on all measures based on the sample under consideration. The reliability of scores will fluctuate depending on how and to whom the instrument is administered. Therefore it is of utmost importance to estimate score reliability for this study's data. Scores that represent poor internal consistency will be discussed further in the relevant section, with regard to generalizability and attenuation of effect sizes.

Psychological Health

As chronic work and family stressors drain resources over time, individuals experience increased stress reactions, job and family dissatisfaction, life distress and decreased physical well being (Demerouti et al., 2007). Psychological health is defined for the purpose of this study as the presence or absence of general psychological health. This is measured by the cumulative scores on the three scales of the Depression Anxiety Stress Scales short form (DASS 21) as the general factor of psychological health and their score on the Satisfaction with Life Scale (SWSL).

Psychological Health will be assessed using the DASS 21 which contains 21 items. The DASS 21 has three subscales: DASS Depression, which is a measure of dysphoric mood, the DASS Anxiety Scale which is a measure of autonomic arousal and the DASS Stress scale which is a measure of general nervousness and agitation. The DASS 21 has demonstrated utility and acceptable psychometric properties for use in an occupational health setting (Henry & Crawford, 2005). The DASS 21 has been utilised in both clinical and non-clinical populations and is a suitable screening instrument with these populations. It measures the tripartite model of anxiety and depression. The DASS 21 is rated on a 4 point scale ranging from zero (did not apply to me at all) to three applied to me very much or most of the time). This version covers the domains with seven depression items (eg. I felt downhearted and blue), seven anxiety items (eg I felt scared without any good reason) and seven stress items (eg I found it difficult to relax). High scorers on each of the subscales are predicted to have high levels of depression, stress and anxiety.

The DASS 21 has demonstrated acceptable internal consistency. Lovibond and Lovibond (1995) reported alpha values for the short form (with α ranging from 0.73 to 0.81 for the anxiety, depression and stress scales respectively). The scores in the current sample also demonstrated good internal consistency, with α ranging from 0.78 to 0.84 for anxiety, stress and depression respectively. The temporal stability of the DASS has been evaluated in two studies (Brown, Chorpita, Korotitsch & Barlow, 1996; Lovibond & Lovibond, 1995). All three of the DASS scales evidenced good temporal stability r = 0.71 to 0.83. The concurrent validity of the DASS has been assessed utilising the Beck Depression (BDI) and Beck Anxiety Inventories (BAI) (Lovibond & Lovibond, 1995). All three scales correlate moderately with the BDI and BAI ranging from r = 0.74 to 0.81.

Lovibond and Lovibond (1995) demonstrated that all items loaded as hypothesised on three scales except for one anxiety scale item. Confirmatory factor analysis revealed that the 3 factor solution provided a good fit to the data. Predictive validity of the DASS has been demonstrated in two studies with large clinical samples (N= 437 and N=241) previously diagnosed with mood and anxiety disorders (Brown et al., 1996). The DASS scores distinguished between diagnosed groups in the predicted direction.

The DASS 21 has been credited with a cleaner factor structure than its full 42 parent item form. The short form has omitted items from the full scale that have demonstrated some inconsistency in factor loadings. The three subscales of the DASS 21 summarise a substantial shared factor of general psychological health as well as delineating a specific

three factor solution (Antony, Bieling, Cox, Enns, & Swinson, 1998; Henry & Crawford, 2005).

The SWLS is a brief 5 item measure of global life satisfaction. Life satisfaction forms a unique factor in psychological health and correlates with predictor variables in different ways. As assessed by the SWLS, life satisfaction is a global cognitive judgement based on individual criteria. It forms a factor separate of affective psychological health, reflecting a longer term perspective as opposed to other measures such as the DASS which assess more current and immediate aspects of psychological health (Pavot & Diener, 1993).

Higher scores on the SWLS indicate higher levels of satisfaction. The SWLS has demonstrated a negative relationship with depression, negative affect, anxiety and general psychological health. In contrast it has demonstrated positive correlations with positive affect and high self esteem (Vassar, 2008). A score of 20 represents the neutral point on the SWLS, a score of 26-30 represents satisfied, 21-25 slightly satisfied, 15-19 slightly dissatisfied and 5-9 extremely dissatisfied. The SWLS has strong internal reliability and moderate temporal stability, $\alpha = 0.87$ and test retest reliability of $r = 0.82$ (Diener, Emmons, Larsen, & Griffin, 1985). Within the current study, the scores demonstrated good internal consistency also ($\alpha = 0.84$). It includes item such as 'The conditions of my life are excellent', which participants answer on a five point scale ranging from one Disagree to five Agree.

Personality

Under the Five Factor Model (FFM) the NEO –PI-R is the most utilised instrument for the measurement of Neuroticism, Extraversion, Openness, Agreeableness and Conscientiousness. Despite criticism of the FFM, it still remains the most researched model of personality and numerous studies have used it as a criterion to validate other personality and clinical constructs. The current study will define personality under the five factor taxonomy with participant's scores across the five factors of the shortened version of the NEO PIR, the NEO Five Factor Inventory (NEO FFI).

The NEO FFI was developed to allow a shortened administration time making it particularly amenable to the occupational health setting. As with the full version it provides a concise measure of the FFM. The abbreviated inventory was constructed by the selection of 12 items from each of the five domains within the NEO – PIR. Item selection was based on the positive and negative loading on the corresponding factor (Costa & McCrae, 1992). Test retest reliability has been reported as high, $r = 0.86$ to $r = 0.90$ and internal consistency has ranged from, $\alpha = 0.68$ to $\alpha = 0.86$. Internal consistency of test scores within the current sample ranged from moderate to good (Openness subscale $\alpha = 0.60$ to Neuroticism $\alpha = 0.85$). Item analysis has demonstrated variable results with Openness and Agreeableness proving most consistently problematic. Some researchers have reported factor loadings of less than 0.30 on their intended factor for these two domains (Egan, Deary & Austin, 2000). The problematic items have also correlated with items assessed as difficult to understand in a study of 1,973 school

students (McCrae et al., 2002). This information was utilised to substitute 14 of the items and replace them with remaining available items from the NEO –PI-R.

In an Australian community sample conducted over 30 months, the psychometric properties of the NEO FFI have proven internally and temporally reliable. Test retest reliability was robust over 30 months (alpha coefficients ranging from 0.73 to 0.86.) The NEO FFI shows correlations from r = 0.75 to r = 0.89 with the NEO PI-R varimax factors and internal consistency values ranging from $\alpha = 0.74$ to $\alpha = 0.89$ (Murray, Rawlings, Allen, & Trinder, 2003).

Coping

Coping style was operationalised as the participants chosen coping response to problem situations. A number of scales deemed relevant from the BriefCOPE will be used to measure this. This is an abbreviated version of the COPE developed by Carver, Scheier and Weintraub (1989), measuring active coping efforts as well as coping responses that may impede or impair active coping. Participants will respond to statements regarding ways of coping on a four point scale, from one (I haven't been doing this at all) through to four (I have been doing this a lot).

This scale distinguishes amongst theoretically distinct aspects of active coping. These include: planning, active coping, suppression of attention to competing activities and exercise of restraint, behavioural disengagement, mental disengagement, use of substances and venting of one's emotions. It has demonstrated adequate convergent and

discriminant validity. The constructs of active coping and planning, denial and behavioural disengagement have correlated with conceptually related personality qualities. The dispositional version of the instrument was administered in this study, whereby individuals report the amount that they usually will engage in the behaviour when stressed. Higher scores on each of the subscales indicate more frequent use of the identified coping method and lower scores less frequent use.

Functional coping responses have correlated with personality elements regarded as beneficial to physical and psychological well being. The correlations were moderate, indicating some unshared variance. The scale is unique amongst coping measures as it is based on specific theoretical arguments about functional and less functional properties of coping strategies (Carver, 1997).

Emotional Intelligence

The measurement of EI remains a contentious issue in the academic literature. There are two distinct areas of test development and validation. One is the ability perspective which purports EI to be a construct not unlike cognitive intelligence measured in a performance test. The second area views emotional intelligence as a group of emotion related dispositions measurable through self report means. Self report measures of EI capture typical performance (Mikolajczak et al., 2007). The Trait Emotional Intelligence Questionnaire (TEIQue) will be utilised in this study based on Petrides' (2001) conceptualisation of EI, defining it as "affect related aspects of personality, emotion related self perceptions and dispositions located at lower levels of personality

hierarchies" (Petrides & Perez-Gonzalez, 2007, p. 28). The TEIQue covers the content domain of the Trait EI model.

The TEIQue short form has 30 items including 'expressing my emotions with words is not a problem for me' and 'I usually find it difficult to regulate my emotions'. These items are answered by participants on a seven point scale ranging from completely disagree to completely agree. The TEIQue has demonstrated good internal consistency and correlates meaningfully with alexithymia, optimism and personality factors. Within this study, test scores demonstrated good internal consistency, with $\alpha = 0.88$. Characteristics of individuals with high scores on the TEIQue include; fluent emotional communication, skilful in conversation and negotiation with others, internally driven to produce high quality work, experience more stable pleasant emotional states, good social skills and sensitivity, low impulsivity, ability to decode their own emotions and others, confident and positive, forthright, ability to influence other's feelings, flexible and able to maintain fulfilling relationships (Petrides & Furnham, 2001).

The TEIQue has demonstrated incremental validity over the FFM in prediction of a number of constructs and conversely, has predictive validity with variables not predicted by the FFM (Mikolajczak et al., 2007; Petrides & Perez-Gonzalez, 2007). The TEIQue is unrelated to non-verbal reasoning, which is consistent with the theory that EI is a personality trait rather than a form of cognitive intelligence. EI as measured by the TEIQue is unrelated to indicators of IQ, has predicted substantial variance of depression,

anxiety, perceived quality and quantity of social support and emotional reactivity in stressful conditions.

Safety Knowledge, Safety Motivation, Safety Behaviour and Safety Outcomes

The integration of work performance models and theory into traditional models of safety outcomes is required to bridge the gap between safety research and the vast literature that exists on organisational behaviour. Many years have been devoted to the study of job performance. Specific individual variables of personality, skills and knowledge have demonstrated consistent predictor relationships with the construct of job performance across countries, industries and roles (Burke, Sarpy, Tesluk & Smith-Crowe, 2002).

More recently, the investigation has turned to the multidimensional nature of the work performance construct (Hunt, 1996). A vast majority of safety research has treated safety behaviour as a one-dimensional construct. Safety performance is one part of the work performance content domain and must also be conceptualised and measured from a multidimensional perspective. Applying theories of job performance, Neal and Griffin (2002) have proposed a multidimensional model of safety performance. Aspects of this conceptualisation of the safety performance construct were applied in the current research. Inherently, the study of safety performance must focus on behaviour and not just results. A performance model is much more effective in determining what variables are of interest and what methods can be employed to improve performance when factors outside the control of the individual are considered and a psychological understanding is

gained such that psychological principles can be applied to the issue of prediction (Motowidlo et al., 1997).

A set of 14 questions developed specifically for this research will cover the variables of Safety Knowledge, Safety Motivation and Safety Behaviour. The main part of these questions were to be answered on a five point scale ranging from one (disagree) through to five (agree). Based on Neal and Griffin's (2002) theory of safety performance, the safety measures for this study are the individual factors that form aspects of both the determinants and components of safety performance. Neal et al., (2000) did not find support for the relationship between motivation and safety participation. They suggested potential issues with the measurement of motivation as the value an individual places on workplace safety. Their recommendation of measuring individual's value placed on participation in safety was adopted in the motivation measure for this thesis.

A number of items across all four variables have been adapted from the General Safety Performance Scale (GSS). This scale was developed and tested by confirmatory factor analytic studies, utilising 550 co-worker appraisals. A general four factor model of safety was supported identifying the following factors; Using Personal Protective Equipment, Engaging in Work Practices to Reduce Risk, Communicating Health and Safety Information and Exercising Employee Rights and Responsibilities (Burke et al., 2002).

Safety Knowledge is an assessment of the individuals' understanding of and acceptance of the importance of safety procedures. It also assesses the individual's application of safety knowledge in work practices. Item content includes; 'I know how to perform my job in a safe manner', 'I know how to improve safety in my job'. High scores indicate a high level of self reported safety knowledge. The scores in the current study demonstrated good internal consistency, $\alpha = 0.75$.

Safety Motivation was assessed with five items assessing both compliance and participation motivation. Item content includes 'I believe it is important to maintain safety at all times' and 'What percentage of effort do you dedicate to the following tasks; production, work set up, personal protective equipment (PPE) usage and maintenance and following safety procedures'. High scores indicate high motivation through participation and compliance for safety. The scores on this measure within the current sample demonstrated poor internal consistency, $\alpha = 0.42$. The items correlated poorly with the total scale, further supporting the poor reliability of the scale.

Safety Behaviour is assessed by five items looking at individual performance of behaviours related to safety. The items ask the participants to quantify the time spent performing tasks related to safety in the last 12 months. Example items include; 'In the last year I have checked and maintained my PPE; everyday, weekly, monthly, only when there is a problem with it. Safety behaviour scores within the current sample demonstrated poor internal consistency, $\alpha = 0.55$.

Safety Outcomes is an indication of the individual's safety outcomes in relation to safety incidents and/or safety near misses. The variable gives an indication of severity of incidents based on time taken from work, time taken for recovery, treatment required and ability to return to substantive role. Six questions cover the item content for this variable, including 'Have you received any first aid treatment at work?' and 'Have you ever had days absent from work due to a work related injury or incident?

Procedure

A letter of support from the participant organisations was necessary in order to gain ethics approval for this research. An initial invitation to participate in the research was sent to the Asset Leader of a mining company in South Australia. The potential for the conduct of the research on the South Australian site was further discussed with the Manager for Human Resources and Health, Safety, Environment and Community. Approval was granted to access the site for the purpose of the research with the approval letter containing two conditions (refer to Appendix A for an excerpt from the letter). The two conditions were (a) to ensure that the data collected was de-identified and (b) the company and the site were not referenced in any publication as a result of the research. With these conditions assured, final ethics approval was granted.

A number of other mine sites within Queensland, Western Australia and New South Wales were contacted to request participation. These sites provided approval in principal, later citing operational pressure, industrial sensitivity and the demands of other research participation as prohibitive at this stage.

Refining the Measures

Following the compilation of the measures for Psychological health, Emotional Intelligence, Coping, Safety Motivation, Safety Knowledge, Safety Behaviour and Safety Outcomes, a small pilot study was conducted. The researcher approached 16 employees from a mining operation within South Australia, who agreed to complete the questionnaire. Following the researcher's explanation of informed consent and their agreement to participate, they completed the questionnaire. In addition to the questionnaire, the researcher asked for information regarding item clarity, ease of interpretation and the approximate time taken to complete. This information was provided by the supervisors for these employees. The information gained was used to refine the questionnaire's wording. Some items of the questionnaire were also changed from categorical to continuous variables.

Pursuing the Sample

Further contact was made with the Occupational Health and Safety Manager (OHS Manager) of the South Australian site (refer to Appendix B for correspondence). A strategy for the collection of the data was proposed and discussed. The OHS Manager advised that it would be more difficult to gain the sample if the questionnaire was computer based, as many of the operators and maintainers did not have computer access within their work areas and were not equally computer literate. An amendment was made to the process for data collection such that the questionnaires could be completed with paper and pencil.

The OHS Manager made contact with several processing and operational managers regarding data collection, and the response was initially discouraging. Due to time demands, the coordination of access was then handed over to two representatives in the Medical Services Team. The nature of their roles meant they had well developed relationships with key site personnel, allowing access to a wider group with more promising results. An email was sent to all Managers across the mine site, providing an overview of the research intent and advising that the researcher would be on site from the 29 September until the 4th of October 2008 (refer to Appendix C).

Upon reaching the site further phone contact and face to face meetings were completed with Managers and Superintendents. The data was collected over the five days with the exception of 36 questionnaires that were completed in one session three weeks later. A total of 15 sessions were conducted by the researcher and health coordinator. Sessions were conducted at shift pre-start meetings, mine clearance sessions, shift handover and shift breaks.

General Procedure

All sessions were conducted in the same manner. The Health Coordinator observed the researcher over 3 sessions and then conducted a further three without the researcher. Employees were collected by their supervisors and superintendents and then left with the researcher to explain the purpose of the research and administer the questionnaire.

The participants were informed of the researcher's background, the general purpose of the research and the requirements for informed consent (see Appendix D). It was clearly articulated that anonymity would be maintained and that the individual could withdraw their consent for participation at any stage. The questionnaires were shown to the participants and it was explained where and how to answer the questions (see Appendix E). The participants were asked if they had any further questions before starting. Participants completed the questionnaires with the researcher or Health Coordinator present. At completion the participants were informed of the specific purpose of the data collection and given an information sheet with contact details (refer to Appendix F).

Participant Characteristics

The sample consisted of 176 males and 7 females, ranging in age from 18 to 65. The average age of the sample was 36.70 yrs with a SD of 9.86 yrs. There were 160 operators and 23 maintainers. The average years of experience in their role were 5.28 years with a SD of 7.00 years. The sample represented a cross section of the mining operation, inclusive of refinery, mining and processing personnel. A final sample of 179 participants

was included in data analysis. Due to one or more scales being incomplete, four participants were removed from the sample. In addition there were three cases of missing data on the NEO FFI. As recommended by Costa and McCrae (1992), when there are fewer than nine missing responses, the blank items were scored as neutral and these individuals were maintained in the data sample.

CHAPTER 7

Results

Preliminary Analyses

The following sections will detail the preliminary analyses performed and the assessment of the statistical assumptions related to the main analysis. Due to the complexity of relationships under investigation and the exploratory nature of the research a multivariate approach to hypothesis testing has been applied. The main analysis will examine multivariate models of hypothesised relationships using structural equation modelling (SEM). Therefore this section will also outline the process of the two step approach to structural equation modelling, along with the results from the exploratory factor analysis of the hypothesised measurement model (Anderson & Gerbing, 1988).

Assessment of Normality

All of the dependent measures were examined for outliers, skew and kurtosis. There were no extreme outliers on the dependent measures with the exception of 'Total Safety Knowledge' (which contained two outliers more than 3 standard deviations below the mean) and 'Total Safety Behaviour' (which contained one outlier more than 3 standard deviations below the mean.

The three extreme outliers were investigated to ensure that they were not caused by data entry error and they were valid responses on each of the scales. The three scores

were subsequently transformed to reduce the effect on the analyses but the position of the score was retained within the dataset (Tabachnick & Fidell, 2001).

The assumption of normality was found to be violated for all dependent measures (all Shapiro-Wilk p values <.01). In addition, assumptions of normality were found to be violated for all independent variables, with the exception of 'Agreeableness', 'Conscientiousness', 'Neuroticism' and 'Emotional Intelligence' (all Shapiro Wilk p values >.05). As stipulated by Pallant (2005), however, multivariate analysis is typically a robust analysis even with modest violations of normality. Further analysis of skew and kurtosis statistics reveal that although violated, they were within recommended range of +/- 1.5 for all variables, except for the DASS 21 anxiety subscale and the measure of Safety Knowledge (Tabachnick & Fidell, 2001). These variables fell just outside the recommended range and were not considered extreme violations in the current sample (Kline, 2005). Additionally, the estimation method utilised within structural equation modelling can account for non normal data (McIntosh, 2007).

Structural equation modelling (SEM) was determined to be the most efficient multivariate technique to address the research questions posed. Due to the exploratory nature of the research it was essential to apply a multivariate framework allowing the relationships and interactions between individual antecedents, safety determinants (both task and contextual) and safety outcomes to be identified.

There are a number of advantages to SEM including a reduction in measurement error due to having multiple indicators of a latent variable, ability to test overall models and individual parameters, ability to test models with multiple dependent variables, and to investigate moderator and mediator processes (Bentler & Yuan, 1999; Loehlin, 2004). One of the major disadvantages of SEM is the requirement of large sample sizes, due to the greater number of variables and parameters to be estimated, posing a corresponding restriction on the degrees of freedom. A small sample size for SEM and exploratory factor analysis (EFA) has serious implications.

There are many rules of thumb throughout the literature regarding two general approaches; total sample size and cases to parameter estimates or variables. In relation to total sample size, a sample below 100 cases is believed to be untenable in both SEM and EFA (Kline, 1998; Loehlin, 2004). In general, a total sample of at least 100 is required with 200 and over being more acceptable (Hoyle, 1995; Loehlin, 2004). In relation to the ratio argument, some researchers contend that with data that does not violate assumptions of normality as little as 5 cases per parameter estimate or observed variable is sufficient (Bentler & Yuan, 1999). Generally a ratio of 10 to 15 cases per predictor variable is considered adequate in the case of non-normal data (Bentler & Yuan, 1999; Hoyle, 1995; Kline, 1998). Due to the greater number of measured variables that can be utilised in an SEM model the number of parameters to be estimated requires large samples. The sample of 179 was considered to be adequate after considering the following; moderate violation of normality within recommended range, use of an SEM estimation method that accounts

for non-normal distributions and adequate number of cases per parameter estimate (Kline, 2005;Schreiber, Nora, Stage, Barlow, & King, 2006).

The current research used a restricted sample to focus specifically on high risk roles within the mining industry in Australia. This is a limitation imposed by the researcher, subsequently obtaining a sample from this population given the nature of their roles, industrial conditions and the importance of production targets in the industry is extremely difficult. However, these roles from an ergonomic perspective pose a significant risk to the safety of workers on a consistent basis and where chosen for this reason.

Therefore a sample of 179 participants was considered substantial in this context. This sample size is considered adequate also in relation to the rules of thumb for SEM and EFA. Any other limitations will be considered within the discussion.

Two Step Approach to Structural Equation Modelling

Given the primary purpose of the current dissertation is to develop a model that integrates the theoretical and empirical data from the relevant areas of organisational psychology, work/home interface and safety literature, a sequential approach to model analysis was undertaken. This approach was taken to determine a valid measurement model that could then be used as the basis for exploration of the structural models evaluating relationships amongst the latent variables (refer Figures 4, 5 & 6).

In addition, an exploratory factor analysis of the measurement model underlying the hypothesised structural model was utilised to determine the measurement structure before

verifying the factor structure in the measurement model. The results of this analysis will be reported in the next section. Subsequent to this, the separate estimation and any required respecification of the measurement model was completed prior to simultaneous estimation of the measurement and structural models (Anderson & Gerbing, 1988).

Exploring Measurement Structure of the Hypothesised Model

Exploratory Factor Analysis (EFA) was used to determine the factor structure of the indicator and latent constructs based on the hypothesised model (refer to Fig.2). A principle components analysis with oblimin rotation was conducted to explore the factors. The correlation matrix of the subscales was examined and revealed many coefficients greater than 0.4 (Table 2). The indicators of factorability were sound. The Kaiser Meyer Olkin value was 0.87, exceeding the recommended value of 0.60 and Bartlett's test of Sphericity reached statistical significance. The scree plot supports five factors, Table 1. Cumulatively, the five factors account for 62.46 % of the variance. Table 3 shows the indicators loading on each of the factors (latent constructs), and that reliability for each of the latent constructs was good, ranging from $\alpha = 0.75$ to $\alpha = 0.94$.

Table 1

Eigenvalues

Component	Eigenvalues		
	Total	% of Variance	Cumulative %
1	7.871	31.483	31.483
2	3.613	14.452	45.935
3	1.704	6.816	52.751
4	1.302	5.208	57.959
5	1.126	4.504	62.463
6	.973	3.894	66.356
7	.897	3.587	69.944
8	.831	3.325	73.269
9	.713	2.851	76.120
10	.672	2.688	78.808

Table 2

Correlations Between Indicators of Latent Constructs

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
(1) SWLS	1.00	0.19*	0.29^	0.26^	-0.16	-0.31	0.36^	-0.01	0.21^	0.40^	-0.48^	0.53^	-0.40^	-0.20*	-0.25^	-0.34^	-0.08	-0.10	-0.36^	-0.32^	-0.20^	-0.11	-0.30^	-0.40^
(2) Safety Knowledge		1.00	0.35^	0.37^	0.06	-0.07	0.28^	0.23^	0.07	0.27^	-0.20^	0.31^	-0.22^	-0.07	-0.34^	-0.24^	-0.04	-0.07	-0.32^	-0.11	-0.05	-0.07	-0.15	-0.30*
(3) Safety Motivation			1.00	0.62^	-0.11	-0.08	0.18*	0.12	0.15*	0.20^	-0.05	0.16*	-0.18*	-0.08	-0.06	-0.08	0.07	-0.02	-0.16*	-0.03	-0.05	-0.03	-0.11	-0.20*
(4) Safety Behaviour				1.00	-0.09	-0.09	0.16*	-0.02	0.17*	0.22^	-0.09	0.24^	-0.14	-0.04	-0.10	-0.09	0.03	-0.02	-0.11	-0.11	-0.03	-0.09	-0.06	-0.14
(5) Safety Outcomes					1.00	0.05	-0.25	0.01	-0.19	-0.15	0.17*	-0.15*	0.10	-0.05	0.06	0.01	-0.03	-0.07	0.08	0.04	0.08	0.03	0.06	0.07
(6) Planning						1.00	-0.05	0.33^	0.11	-0.08	0.32^	-0.15*	0.40^	0.65^	0.40^	0.25^	0.51^	0.53^	0.35^	0.55^	0.72^	0.51^	0.64^	0.60^
(7) FFI Extrav							1.00	0.14	0.34^	0.45^	-0.55^	0.56^	-0.45^	0.04	-0.30^	-0.23^	-0.02	0.03	-0.40^	-0.22^	0.02	-0.07	-0.16*	-0.15
(8) FFI Openess								1.00	0.15*	0.03	0.01	0.14	0.08	0.27^	0.07	-0.05	0.20^	0.21^	0.07	0.15*	0.25^	0.23^	0.24^	0.20*
(9) FFI Agreeable									1.00	0.28^	-0.26^	0.35^	-0.30^	0.10	-0.23^	-0.25^	-0.02	0.08	-0.23^	-0.21^	0.10	-0.09	0.05	-0.08
(10) FFI Conscient										1.00	-0.42^	0.52^	-0.35^	0.00	-0.20^	-0.24^	-0.20^	-0.10	-0.32^	-0.28^	-0.07	-0.17*	-0.09	-0.30^
(11) FFI Neurot											1.00	-0.70^	0.70^	0.16*	0.47^	0.30^	0.30^	0.20^	0.50^	0.40^	0.22^	0.22^	0.32^	0.44^
(12) EI												1.00	-0.60^	-0.03	-0.44^	-0.41^	-0.15*	0.02	-0.50^	-0.30^	-0.05	-0.15	-0.18*	-0.42^
(13) DASS 21													1.00	0.24^	0.63^	0.50^	0.25^	0.17^	0.64^	0.44^	0.31^	0.37^	0.40^	0.53^
(14) Active Coping														1.00	0.33^	0.20*	0.47^	0.48^	0.28^	0.37^	0.60^	0.31^	0.50^	0.41^
(15) Denial															1.00	.489^	.262^	.179*	.636^	.414^	.295^	.310^	.395^	0.58^
(16) Subst Use																1.00	0.10	0.07	0.50^	0.31^	0.22^	0.27^	0.35^	0.44^
(17) Use Emot Supp																	1.00	0.72^	0.30^	0.44^	0.53^	0.50^	0.42^	0.42^
(18) Use Instrument Sup																		1.00	0.21^	0.50^	0.52^	0.40^	0.50^	0.44^
(19) Beh Disengage																			1.00	0.40^	0.35^	0.34^	0.42^	0.46^
(20) Venting																				1.00	0.43^	0.52^	0.50^	0.53^
(21) Positive Reframing																					1.00	0.55^	0.70^	0.41^
(22) Humor																						1.00	0.52^	0.44^
(23) Accept																							1.00	0.50^
(24) Self Blame																								1.00

* $p \leq .05$ ^ $p \leq .01$

Table 3

Factor Loadings of Indicators on Components, Variance Explained and Reliability Estimates

Indicator	Component				
	Coping Skills 1 (31.50%) α = 0.92	Positive Affect 2 (14.45%) α = 0.87	Psychological Ill Health 3 (6.92%) α = 0.94	Safety Determinants 4 (5.21%) α = 0.75	Safety Outcomes 5 (4.50%) α = 0.81
SWLS	-0.19	**0.46**	-0.26	0.31	-0.30
FFI Agreeableness	0.12	**0.56**	-0.11	0.04	-0.10
FFI Extraversion	0.04	**0.71**	-0.21	0.11	-0.15
FFI Conscientiousness	-0.13	**0.74**	0.01	0.20	0.11
FFI Neuroticism	0.25	**-0.69**	0.36	0.05	0.09
Emotional Intelligence	-0.03	**0.74**	-0.40	0.13	-0.01
Safety Motivation	-0.02	0.08	-0.04	**0.90**	-0.12
Safety Knowledge	-0.01	0.20	-0.32	**0.56**	0.40
Safety Behaviour	-0.04	0.16	0.02	**0.84**	-0.02
Safety Outcomes	0.01	-0.27	-0.07	-0.05	**0.80**
FFI Openness	0.36	0.20	0.02	0.08	0.39
DASS 21	0.27	-0.49	**0.61**	-0.04	0.04
Denial	0.27	-0.24	**0.75**	-0.02	-0.08
Behav Disengagement	0.29	-0.35	**0.66**	-0.10	-0.02
Substance Use	0.12	-0.17	**0.73**	-0.05	-0.01
Active Coping	**0.69**	0.18	0.24	-0.10	0.06
Use of Emot Support	**0.80**	-0.21	-0.10	0.12	-0.24
Use of Instrum Support	**0.82**	-0.07	-0.14	-0.00	-0.22
Venting	**0.63**	-0.34	0.21	0.01	-0.03
Positive Reframing	**0.80**	0.11	0.21	-0.04	0.20
Humor	**0.66**	-0.12	0.17	0.01	-0.02
Acceptance	**0.70**	0.02	0.37	-0.08	0.18
Planning	**0.81**	0.04	0.30	-0.08	0.20
Self Blame	**0.55**	-0.24	**0.44**	-0.14	-0.05

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.

Discussion of EFA and Interpretation of Components

Five components were revealed in the EFA, which all had eigenvalues greater than one. Given the size of the sample, loadings above 0.40 were considered substantive (Tabachnick & Fidell, 2001).

The first component had all subscales of the BriefCOPE related to adaptive mechanisms, load with strong loadings of .6 or greater. The highest loadings were 'use of instrumental support', use of emotional support', 'positive reframing' and 'planning'. The subscales of 'humor', 'venting', 'active coping' and 'acceptance' all had slightly lower loadings on component one. With the exception of 'venting', these subscales cumulatively relate to theoretically adaptive strategies for managing difficult situations (Carver, Scheier & Weintraub, 1989).

Venting forms an interesting dynamic amongst the other subscales that loaded on this component. As described by Carver (1997) the venting subscale entails 'a focusing on the stress' which is theorised as a less adaptive coping mechanism. The items within this subscale ('I've been saying things to let my unpleasant feelings escape' and 'I've been expressing my negative feelings') when asked contextually, as in relation to a specific recently occurring event, could be deemed as functional adaptive coping methods. In fact, the concept of venting underscores many psychological therapy approaches aimed at assisting individuals to cope. For the current sample 'venting' was viewed as an adaptive coping mechanism and will be retained with its moderate loading on component one.

Self blame, (which entails focusing away from the stressor) loaded above what would be considered a minimum loading on component one. This subscale loaded almost equally on component one and three. Due to the strong loadings of the eight other subscales, indicating a solid factor and the cross loading of this subscale, it will be removed from future analysis (Tabachnick & Fidell, 2001).

Component one will be called Coping Skills and as can be seen from Table 3, this component accounts for 31.50% of the variance in all of the original indicators.

The second component had all of the subscales from the NEO FFI with exception of the openness subscale, along with the trait EI and SWLS scales. This represents a departure from the measurement model underlying the hypothesised structural model, which will now be discussed. With exception of the SWLS and the Openness subscale, all indicators loaded significantly on component two, ranging from 0.56 to 0.74.

The conceptual definition of trait EI as captured by the TEIQue is ‘a compound personality construct located at lower levels of the personality taxonomy’. It has however demonstrated incremental and predictive validity over and above the Big Five personality factors, in relation to a number of variables (life satisfaction, rumination, rational coping, detached coping and emotional coping (Petrides & Perez-Gonzalez, 2007). In a study with the Big Five and giant three personality factors trait EI defined a distinct factor that captured unique personality variance (De Raad, 2005). Therefore, it will be

conceptualised as a distinct personality factor contributing to the overall assessment of personality in the current study.

The NEO FFI Openness subscale failed to load above 0.40 on component two with the other NEO FFI scales. Its highest loading of 0.39 was on component five. This will be discussed in relation to that factor. Suffice to say that this subscale demonstrated poor reliability in the current sample in relation to all other NEO FFI subscales ($\alpha = .58$). Consistent with this, a review of Table 2 correlations reveals that it has its strongest correlations with many of the coping skill indicators of component one. This subscale did not perform as anticipated amongst the current sample which will be considered in the discussion. Several analyses of the item structure and content of the NEO FFI subscales have demonstrated that there are a number of consistently problematic items on the openness and agreeableness subscales (McCrae et al., 2002). Due to this and the performance of the openness subscale in the current sample, it will be dropped from future analysis.

The SWLS loaded with a moderate loading on component two (0.46). From the hypothetical model (see Figure 2) it was conceptualised as an indicator of psychological health. At first look it would appear to be the least descriptive of the indicators loading on component two. The SWLS is tapping both cognitive and affective evaluations of life satisfaction (the content domain of subjective well being), which is considered a relatively stable trait over time (Diener, Lucas, & Oishi, 2005). It correlated most significantly with the indicator of EI, as can be seen in Table 2. A consideration of the

adult sampling domain of trait EI reveals the potential basis of this relationship. Trait EI, as measured by the TEIQue, taps trait happiness; how cheerful and satisfied individuals are with their lives and trait optimism; how confident people are and how likely it is that they will look on the bright side of life (Petrides et al., 2007). With items on the SWLS, such as 'the conditions of my life are excellent', 'I am satisfied with my life' and 'In most ways my life is close to ideal', it is obvious why there is a strong correlation. Personality factors as measured under the Big Five taxonomy have also consistently been demonstrated to correlate with the conceptual construct of subjective well being (Librán, 2006). Analysis of the discriminant validity of the SWLS has demonstrated that it is measuring some aspect independent of trait EI and the personality factors (Pavot & Diener, 1993). For a scale with only five items, it demonstrated good reliability in the current sample (α =.84). Therefore, although it has not loaded on the hypothesised latent construct, it appears to be contributing something unique to the measure of personality trait in the current study.

Given the common theme of the indicators loading on the second component, this component will be labelled 'positive affect', bearing in mind it refers to a more comprehensive measure of positive personality elements than originally conceptualised under the five factor taxonomy. As can be seen in Table 3 this component accounts for 14.45% of the variance in the original indicators.

Component three is more complex to interpret; it contains both indicators hypothesised as belonging to the latent construct of coping and the indicator of

psychological health. Subscales of the BriefCOPE relating to maladaptive coping had moderate to strong correlation with this factor (ranging from 0.66 to 0.75), with the exception of self blame (0.44). As discussed in the interpretation of component one, self blame cross loaded almost equally on component one and component three, and is the least correlated of all interpretable indicators on component three. A review of Table 2 demonstrates its highest significant correlations with the indicators of planning (0.60) and venting (0.53) from component one and similarly high significant correlations with the indicators of denial (0.58) and DASS 21 (0.53) from component three.

As discussed previously, the 'dispositional' or trait like version of the BriefCOPE instrument was administered, asking individuals to indicate how they typically cope in response to stress. This is different to the time limited versions of administration that may indicate how an individual is specifically coping with a recent event now or in the past. The items of this subscale ('I've been criticising myself' and 'I've been blaming myself for things that have happened') when answered from a dispositional perspective, may be considered to be dysfunctional and expected to correlate with a key symptom of depression; helplessness. One explanation for the current strong correlation with the adaptive coping indicators may be that for a time limited response to stress; self blame may be the first step in isolating issues that can be resolved to assist next time facing a similar stressor. However, this does not assist with the current results, as the dispositional administration was followed. Due to this and the fact that this study is exploratory, the self blame subscale will not be utilised in further analysis.

The indicators of substance use, denial and behavioural disengagement fit theoretically as described by Carver et al., (1989) under a grouping of maladaptive coping strategies. Maladaptive approaches to coping have been associated with decreased psychological and physical well being across different populations and cultures (Holahan & Moos, 1987; Folkman & Moskowitz, 2004; Meyer, 2001; Spilken & Jacobs, 1971). It has been efficient in predicting negative outcomes including depression, substance use, psychological trauma symptoms, social functioning and energy levels in the terminally ill and has demonstrated strong positive correlations with depression (Meyer, 2001; Spilken & Jacobs, 1971; Stanton et al., 2000). Spilken and Jacobs (1971) demonstrated that psychological health, life change and maladaptive coping precede the development of physical illness necessitating medical intervention in the following twelve months. In adolescents, psychological health has been predicted by coping style. Specifically, maladaptive coping has predicted higher levels of psychological health (Campbell & Ntobedzi, 2007).

In the current study, three of the BriefCOPE subscales indicative of maladaptive coping have loaded strongly with the hypothesised indicator of psychological health; DASS21. A review of the items in these subscales would suggest that they may be tapping empirically similar concepts to the DASS21 from an emotional, behavioural and cognitive perspective. For example, on the BriefCOPE the behavioural disengagement subscale items of 'I've been giving up trying to deal with it' and 'I've been giving up the attempt to cope' may be seen to relate to the concepts of worthlessness and hopelessness. It would appear that these subscales are positively correlated with the DASS 21 and

strongly correlated with this component; the respecified measurement model will incorporate these indicators on the latent construct of psychological ill health. This component will be called psychological ill health, cumulatively this component accounts for 6.92% of the variance in the indicators.

Component four represents the hypothesised latent construct of safety determinants. The indicators of this construct are safety knowledge, safety motivation and safety behaviours. Each of these indicators loaded strongly on this component, with safety knowledge being the least correlated with the overall factor (0.56). Cumulatively, this component accounts for 5.21% of the variance in all of the indicators.

Finally, component five represents the hypothesised latent construct of safety outcomes. The indicator item for this construct of the same name had a high factor loading (0.80) and contributes 4.50% of the variance in the indicators.

The five components and related indicators represented in the EFA will form the respecified measurement model. As per the sequential approach to SEM, the measurement model will be assessed using confirmatory factor analysis (CFA).

CFA: Measurement Model

Analyses of the measurement model and the subsequent structural models were carried out using SEM techniques implemented in LISREL 8.80 (Jöreskog & Sörbom, 2006). The measurement model is an estimation of the relationships between indicators

(measured variables) and the latent constructs that are hypothesised to explain them. CFA can be used to evaluate two aspects of construct validity: discriminant and convergent. Following the use of EFA to determine the factor structure, CFA allowed verification of this factor structure, ensuring identification and reliability of the observed indicators. Following the assessment of fit for the measurement model, the three structural models were estimated. Anderson and Gerbing (1988) suggest that in determining the adequacy of model fit, indices would demonstrate all of the following characteristics;

1. ‘indicate degree of fit along a continuum bounded by values such as zero and one,
2. (be) independent of sample size,
3. (have) a known distribution, qualities to assist interpretation and allow construction of a confidence interval ‘ (Anderson & Gerbing, 1988, p.134)

With the exception of the root mean square error of approximation (RMSEA), none of the fit indices that are commonly reported satisfy Anderson and Gerbing’s (1988) criteria. Instead, researchers generally agree to report a number of fit indices which reflect absolute, comparative and parsimonious fit. The goodness of fit of any particular model is assessed by considering all of these aspects.

The goodness of fit is an indication, of how well the a priori model approximates the data covariance matrix. For a good model fit, Chi-square should be non-significant. In terms of absolute fit values of less than .05 for the RMSEA and values greater than .95

for the Goodness-of-Fit index (GFI) represent good fit, however, values between .90 and .95 for the GFI may be considered satisfactory fit (Kelloway,1998). In terms of comparative fit, the comparative fit index (CFI) is a representative measure, if the CFI value is greater than .95 it is an indication of good fit, however, values between .90 and .95 may indicate satisfactory fit. It is also important to examine the parameter estimates in the structural model; they are interpreted in the same way as correlation coefficients, values between -1 and +1. The amount of variance explained by the specified relationship is determined by squaring the parameter estimate (Kelloway, 1998).

Confirmatory factor analysis showed the respecified five-factor model was an acceptable fit to the data, $\chi 2\ (200) = 415.28$, $\rho \leq .001$, comparative fit index (CFI) = .95, root-mean-square error of approximation (RMSEA) = .08. Table four presents both global and comparative fit indices along with reliability and variance extracted. The estimates of construct reliability for the latent variables were computed using the parameter estimates and error terms from the measurement model.

It can be seen that the construct reliability for all of the latent variables, with the exception of personality, was good (≥ 0.70), thus achieving convergent validity. In addition, variance extracted estimates (with the exception of personality and safety determinants) were at least 0.50 (Schumacker & Lomax, 1996). The standardised and unstandardised estimates are presented in Table 5, along with significance levels. All parameter estimates are significant at the, $\rho \leq .001$ and ranged from 0.48 to 0.87 (refer to Table 5). Construct reliability refers to the internal consistency of a set of items in

measuring a latent construct. In SEM the reliability coefficients are drawn from the standardised loadings and each individual items measurement error (Schumacker & Lomax, 1996). Construct reliability scores ranged from 0.63 to 0.90.

Table 4

Measurement Model Fit Indices

Model Fit		Construct	Construct Reliability	Variance Extracted
χ^2	415.28	Safety Outcomes	-	-
df	200	Safety Determinants	0.73	0.48
p	0.00	Psychological Ill Health	0.84	0.57
GFI	0.83	Positive Affect	0.63	0.46
AGFI	0.78	Coping Skills	0.90	0.53
SRMR	0.08			
RMSEA	0.08			
NNFI	0.94			
CFI	0.95			
χ^2/df	2.08			

Table 5

Measurement Model Standardised and Unstandardised Parameter Estimates

Construct	Item	Estimate	t	Std Estimate	Std Estimate Squared
Safety Outcomes	Safety Outcomes	*1.00*	-	*1.00*	*1.00*
Safety Determinants	Safety Knowledge	0.85*	5.96	0.48	0.23
	Safety Motivation	1.70*	9.18	0.76	0.58
	Safety Behaviour	2.01*	9.59	0.80	0.64
Psychological Ill Health	Denial	0.77*	11.36	0.76	0.57
	Substance Use	0.86*	8.34	0.60	0.56
	Beh Disengage	0.75*	12.09	0.79	0.63
	DASS 21	14.80*	13.26	0.84	0.71
Positve Affect	FFI Neurotic	6.28*	12.34	0.80	0.64
	FFI Extraversion	3.67*	9.73	0.67	0.45
	Emotional Intelligence	19.58*	13.89	0.87	0.75
	FFI Agreeableness	2.38*	5.50	0.42	0.17
	SWLS	3.04*	8.42	0.60	0.36
	FFI Conscient	3.36*	8.21	0.59	0.35
Coping Skills	Active Coping	1.12*	10.27	0.70	0.48
	Emotional Supp	0.89*	9.74	0.67	0.45
	Instrumental Supp	0.97*	9.83	0.67	0.45
	Positive Reframing	1.39*	13.27	0.83	0.69
	Humor	1.03*	9.36	0.65	0.42
	Acceptance	1.31*	11.80	0.77	0.59
	Planning	1.47*	13.56	0.84	0.71
	Venting	0.78*	9.17	0.64	0.41

* $p \leq .001$, one tailed

Structural Models

Following the respecification of the measurement model, the hypothesised a priori models depicted in Figures 4 – 6 required minimal modifications to represent the five latent constructs underpinned by the 22 observed indicators. The models comprise five latent variables: psychological ill health, coping skills safety determinants and safety outcomes. Therefore, the only change from the hypothesized models was the combination of personality and emotional intelligence measures to depict the one latent construct of positive affect which is a broader interpretation of personality than the original one based only on the five factor model. The structural models represented in Figures seven to nine, contain interaction terms. These terms were calculated to test the hypothesized

interaction effect of the individual antecedents: positive affect and coping, on the psychological health and safety determinants/outcomes relationship. They were constructed by centering the scores in the covariance matrix, as cross multiplying raw scores would result in the covariance matrix being linearly dependent (Kline, 1998). These centered scores represent the moderation hypothesis, ie., the manner in which one latent variable directly changes or influences the value and relationship between two other latent variables in the model (Kline & Dunn, 2000). Hence their inclusion is only relevant in the subsequent structural models investigating underlying effects and amount of explained variance in each of the latent constructs.

Direct Effects Model – Safety Determinants

The direct effects model (safety determinants) is a test of model fit in the absence of the mediation. It is also a test of the moderator hypothesis i.e., the effects of psychological ill health on safety determinants will be moderated by the antecedents. Structural analysis showed the resulting chi-square was significant, but the fit indices demonstrated satisfactory fit to the data, given the complexity of the model, $\chi 2$ (223) = 541.25, $\rho \leq .001$, comparative fit index (CFI) = .93, root-mean-square error of approximation (RMSEA) = .09, see Table 6. The model with standardised estimated parameters is illustrated in Figure 7.

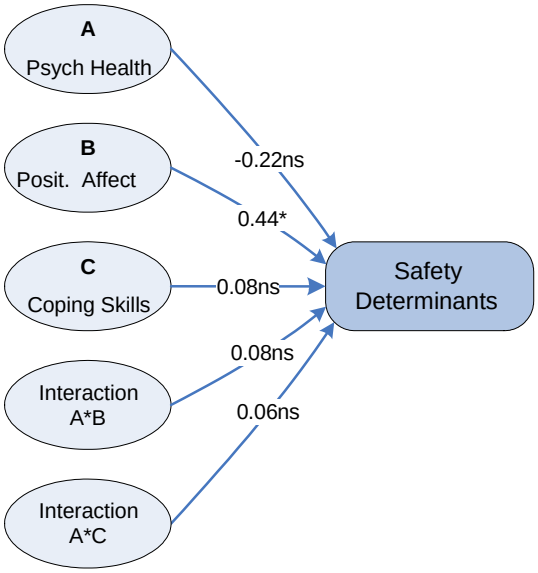

Figure 7. Structural Moderated Direct Effects Model – Safety Determinants

* ρ ≤ .001, ns = non-significant.

Table 6

Model Fit Indices Structural Direct Effects Model – Safety Determinants

	Model Fit
χ^2	541.25
df	223
p	0.00
GFI	0.79
AGFI	0.74
SRMR	0.12
RMSEA	0.09
NNFI	0.92
CFI	0.93
χ^2/df	2.43

The moderator hypotheses were not supported. Positive affect does not moderate the effects of psychological health on safety determinants (β = 0.08). Coping does not moderate the impact of psychological ill health on safety determinants (β = 0.06). The direct effects of psychological health (β = -0.22) and coping (β = 0.08) did not predict a significant amount of variance in safety determinants. It was found that the direct effects

of positive affect on safety determinants was significant ($\beta = 0.44$, $\rho \leq .001$). The latent construct of positive affect explains a significant amount of the variance in safety determinants ($R^2 = 11.60\%$).

Direct Effects Model – Safety Outcomes

The direct effects model (safety outcomes) is representative of much of the job performance literature only considered from a specific context of safety performance. It is a test of the moderator effects i.e., the effects of psychological ill health on safety outcomes will be moderated by the antecedents. The direct effects of the individual antecedents on safety outcomes are also considered. Structural analysis showed the resulting chi-square was significant, but the fit indices demonstrated adequate fit to the data, given the complexity of the model, $\chi 2\ (183) = 477.12$, $\rho \leq .001$, comparative fit index (CFI) = .93, root-mean-square error of approximation (RMSEA) = .10, see Table 7. The model with standardised estimated parameters is illustrated in Figure 8.

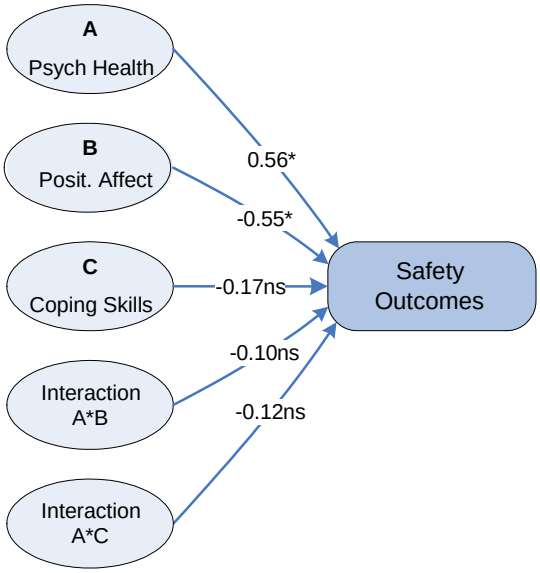

Figure 8. Structural Moderated Direct Effects Model – Safety Outcomes

* $\rho \leq .001$, ns = non-significant.

The moderator hypotheses were not supported. Positive affect does not moderate the effects of psychological ill health on safety outcomes ($\beta = -0.10$). Coping does not moderate the impact of psychological health on safety outcomes ($\beta = -0.12$). The direct effects of psychological ill health (a measure of psychological distress) on safety outcomes (self-reported accidents and severity) was significant ($\beta = 0.56$, $\rho \leq .001$). Similarly the direct effects of positive affect (positive aspects of personality) on safety outcomes was also significant ($\beta = -0.55$, $\rho \leq .001$). In contrast, coping was not a significant predictor of safety outcomes ($\beta = -0.17$, $\rho \leq .001$). Positive affect and psychological ill health account for a significant amount of the variance in safety outcomes ($R^2 = 15.60\%$).

Table 7

Model Fit Indices Structural Direct Effects Model – Safety Outcomes

Model Fit	
χ^2	477.12
df	183
p	0.00
GFI	0.80
AGFI	0.74
SRMR	0.13
RMSEA	0.10
NNFI	0.92
CFI	0.93
χ^2/df	2.61

Mediated Model

The mediated model is a test of the mediator hypothesis i.e., safety determinants will mediate the relationship between antecedents and safety outcomes. It is also a test of the mediated moderator hypothesis i.e., the effects of psychological ill health on safety outcomes as mediated by safety determinants will be moderated by the antecedents. Structural analysis showed the resulting chi-square was significant, but the fit indices demonstrated adequate fit to the data, given the complexity of the model, $\chi 2\ (244) = 566.88$, $\rho \leq 0.001$, comparative fit index (CFI) = 0.93, root-mean-square error of approximation (RMSEA) = 0.08, see Table 8. The model with standardised estimated parameters is illustrated in Figure 9.

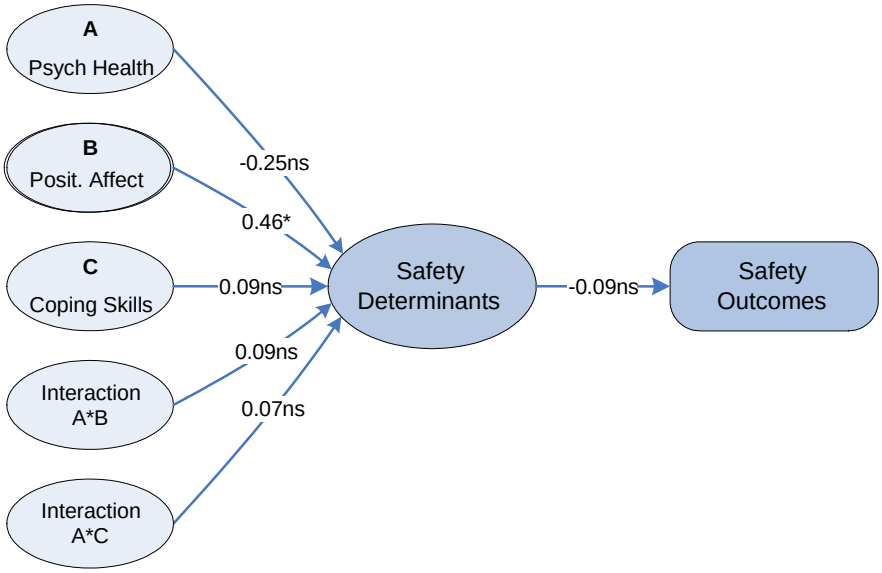

Figure 9. Structural Model Testing Mediation

* $\rho \leq .001$, ns = non-significant.

None of the hypothesised paths were supported by the parameter estimates. Psychological ill health was not a significant predictor of safety outcomes and even though the relationship between psychological health (psychological distress) and safety determinants was in the hypothesised direction, it was not a significant predictor ($\beta = -0.25$).

Safety determinants did not mediate the relationship between the antecedents (positive affect, coping skills and psychological health) and safety outcomes ($\beta = -0.09$). Product terms were calculated for the interaction of positive affect, coping skills and psychological health based on deviation scores. The path estimates for the interaction terms were not significant: psychological health by positive affect ($\beta = 0.09$) and psychological health by coping skills ($\beta = 0.07$). It was found however that the relationship between the latent construct of positive affect (which encompasses high trait

emotional intelligence, high conscientiousness, high agreeableness, low neuroticism, high extraversion and high satisfaction with life) and safety determinants was positive and significant ($\beta = 0.46$, $\rho \leq .001$). The positive affect construct explains a significant amount of the variance in safety determinants ($R^2 = 12.20\%$).

Table 8

Model Fit Indices Structural Mediated Model

Model Fit	
χ^2	566.88
df	244
p	0.00
GFI	0.79
AGFI	0.74
SRMR	0.11
RMSEA	0.08
NNFI	0.92
CFI	0.93
χ^2/df	2.32

Positive Affect and Safety Determinants and Outcomes - Post Hoc Analysis

Due to the significant findings in relation to the construct of positive affect and both safety determinants and safety outcomes and the aim of determining if a model of job performance can be applied to safety performance, further post hoc analyses were conducted. Given the substantial empirical evidence supporting the predictive utility of individual indicators of personality (Barrick et al., 2002; Witt et al., 2002) and emotional intelligence (Bond & Bunce, 2003; Donaldson-Feilder & Bond, 2004; Law et al., 2004) to job performance it was determined appropriate to apply these findings in four

hierarchical regression analyses (considering each indicator of safety determinants and safety outcomes as a dependent variable).

A growing body of literature is considering specific aspects of personality as relative to general safety outcomes and determinants. Clarke and Robertson (2008) provide a meta-analytic review of the literature considering specific contributions of personality under the five factor taxonomy, the outcomes of this review will be utilised to formulate the regression models. They identified low agreeableness specifically as a valid predictor of work accidents generalisable across roles and industries (Clarke & Robertson, 2008). In addition, Wallace and Vodanovich (2003b) found employees who had low conscientiousness scores had a higher impact of cognitive failure on unsafe work practices. Similarly, the literature in relation to trait emotional intelligence suggests its predictive ability over and above the five factor taxonomy in relation to a number of subjective well-being and psychological health variables (De Raad, 2005; Petrides & Perez-Gonzalez, 2007). This will be considered in the hierarchical regression analysis also.

Based on this, trait emotional intelligence was considered for its predictive utility over and above the contribution of agreeableness and conscientiousness in relation to the dependent variables of safety knowledge, safety motivation, safety behaviour and safety outcomes the results are presented in Tables 9 through 12.

Table 9

Regression of Safety Knowledge on Positive affect Indicators

	β	t	R^2	Δ R^2	F
Block 1					
Conscientiousness	0.30	3.61			
Agreeableness	-0.04	-0.05	0.07	0.07	7.02**
Block 2					
Conscientiousness	0.16	1.87			
Agreeableness	-0.06	-0.88			
Trait Emotional Intelligence	0.25	2.90	0.11	0.04	7.76**

* $\rho \leq .05$, ** $\rho \leq .001$

Four hierarchical regressions were conducted one with each of the three safety determinants, (knowledge, motivation and behaviour) and one with safety outcomes. In the first regression at block one, conscientiousness and agreeableness were entered as predictors of safety knowledge, these predictors were found to be significant, *F* (2,176) =7.02, $\rho \leq .001$. The basic model was found to explain seven percent of the variance in safety knowledge.

In the second block, emotional intelligence was entered as a predictor to determine the unique contribution of this predictor over the variables entered in block one. Adding this variable increased the overall significance of the model in predicting safety knowledge, *F*(3,175) =7.76, $\rho \leq .001$. The final model accounted for 11 per cent of the variance in safety knowledge. Further to this, trait emotional intelligence contributed uniquely to the variance in safety motivation, R^2 change = .04, considering the individual t values it was also a significant predictor, ($t = 2.90$, $p \leq .01$) (refer to Table 9).

The second regression considers the predictors in relation to safety motivation. Conscientiousness and agreeableness were entered in the first block as predictors of safety motivation, the model was found to be significant, *F*(2,176) =4.47, $\rho \leq .05$. The

model with two predictors accounted for five percent of the variance in safety motivation. In the second block emotional intelligence was entered as a predictor, the model remained significant, $F(3,175) = 3.11$, $\rho \leq .05$. The final model accounted for 10 per cent of the variance in safety motivation. Further to this trait emotional intelligence uniquely accounted for four per cent of the variance in safety motivation, R^2 change = .04 (see Table 10). Investigation of the individual standardised coefficients and corresponding t value, trait emotional intelligence was not a significant predictor ($t = 0.64$, $p \geq .05$).

Table 10

Regression of Safety Motivation on Personality Indicators

	β	t	R^2	ΔR^2	F
Block 1					
Conscientiousness	0.17	2.21			
Agreeableness	0.10	1.32	0.05	0.05	4.47*
Block 2					
Conscientiousness	0.14	1.64			
Agreeableness	0.09	1.11			
Trait Emotional Intelligence	0.60	0.64	0.10	0.04	3.11*

* $\rho \leq .05$, ** $\rho \leq .01$

The third regression investigated the relationship between the predictors and safety behaviour. Conscientiousness and agreeableness were again entered in the first block, the model was found to be significant, $F(2,176) = 5.81$, $\rho \leq .01$. The model accounted for six percent of the variance in safety behaviour (see Table 11). In the second block emotional intelligence was entered to determine the unique contribution of it as a predictor of safety behaviour, the model remained significant, $F(3,175) = 4.90$, $\rho \leq .01$. The final model accounted for eight percent of the variance in safety behaviour. Emotional intelligence uniquely accounted for two per cent of the variance in safety behaviour, R^2 change = .02, (see Table 11).

Table 11

Regression of Safety Behaviour on Personality Indicators

	β	t	R^2	ΔR^2	F
Block 1					
Conscientiousness	0.20	2.45			
Agreeableness	0.12	1.60	0.06	0.06	5.81**
Block 2					
Conscientiousness	0.12	1.35			
Agreeableness	0.10	1.12			
Trait Emotional Intelligence	0.15	1.71	0.08	0.02	4.90**

* $\rho \leq .05$, ** $\rho \leq .01$

The final regression considered the two personality predictors in relation to safety outcomes. In block one, conscientiousness and agreeableness were entered as predictors, and the model was found to be significant, $F(2,176) = 4.32$, $\rho \leq .05$. The model with two predictors accounted for five percent of the variance in safety outcomes. In the second block, trait emotional intelligence was entered to determine the unique contribution of this predictor, the model remained significant, $F(3,175) = 3.02$, $\rho \leq .05$. The final model accounted for just over five percent of the variance in safety outcomes. Trait emotional intelligence failed to uniquely contribute to the variance in safety outcomes above one percent, R^2 change = .002 (see Table 12).

Table 12

Regression of Safety Outcomes on Personality Indicators

	β	t	R^2	ΔR^2	F
Block 1					
Conscientiousness	-0.10	-1.28			
Agreeableness	-0.17	-2.20	0.05	0.05	4.32*
Block 2					
Conscientiousness	-0.10	-0.81			
Agreeableness	-0.15	-1.94			
Trait Emotional Intelligence	-0.10	-0.77	0.52	0.002	3.02*

* $\rho \leq .05$, ** $\rho \leq .01$

Cumulatively the results of the four hierarchical regressions suggest that conscientiousness, agreeableness and trait emotional intelligence contribute to both safety determinants (knowledge, motivation and behaviour) and safety outcomes. Combined with the results from the correlation analyses (see Table 2) it appears that individuals with higher levels of conscientiousness ($r = 0.27$, $\rho \leq .01$) and emotional intelligence ($r = 0.31$, $\rho \leq .01$) have more knowledge of the safety policies related to their roles. Individuals with high levels of agreeableness ($r = 0.15$, $\rho \leq .05$), conscientiousness ($r = 0.20$, $\rho \leq .01$), and emotional intelligence ($r = 0.16$, $\rho \leq .05$) show greater levels of motivation for safety. Participation in safety behaviour is greater for individuals with higher levels of agreeableness ($r = 0.15$, $\rho \leq .05$), conscientiousness ($r = 0.22$, $\rho \leq .01$) and emotional intelligence ($r = 0.24$, $\rho \leq .01$). Finally individuals with higher self reported conscientiousness and agreeableness have less negative safety outcomes ($r = 0.52$, $\rho \leq .01$ and $r = 0.35$, $\rho \leq .01$, respectively). The implications of this will be explored fully in the discussion.

Without further studies to guide the analysis of the individual indicators of psychological health on safety outcomes it was not considered appropriate to conduct

further post hoc analysis within the context of the current study. Furthermore the indicators of this latent construct are highly correlated, giving rise to multicollinearity issues making the regression coefficients unstable (Lomax, 2001).

Validation

Preferably, the measure of 'Safety Outcome' would have been an objective count of injuries reported to the site medical centre, as there is concern that self report measures give a poor indication due to socially desirable responding. Confidentiality and privacy requirements prohibited the collection of these data. As some indication of the validity of responses to this measure, an assessment of reported first aid cases as a proportion of the total employee population was estimated from archival data relating to the twelve months prior to data collection. This can be evaluated in relation to the proportion of reported first aid cases amongst the current sample (see Table 13). In both cases, first aid is a measure of medical intervention to address a work related injury, not other medical issues of a personal or ongoing nature. Comparatively, it would appear that the current sample has not underreported attendance for first aid due to work related injury.

Table 13

Percentage of First Aid Cases Report in Archival and Survey Data

	Archival Data N = 2800	Survey Data N = 179
First Aid Cases	35 %	55 %

CHAPTER 8

Discussion

This chapter will discuss the meaning of the results and their relevance to current knowledge and research in the three domains synthesised to formulate the model of psychological fitness for work and safety performance. To reiterate, two broad research questions were proposed:

1. What is the relationship of individual difference variables to safety performance?
2. Can models of job performance be applied to the specific condition of individual differences and safety performance?

Respecified Measurement Model

The sequential approach to SEM led to a respecification of the implied measurement model that underlies the model of psychological fitness for work and performance. This model was adequately represented by the data and a number of comments in relation to this are pertinent to answering the second research question. This will be discussed in relation to each latent construct that formed part of the respecification.

Positive Affect

The loading of the Trait EI indicator on the positive affect construct aligns with current theories of Trait EI. In hindsight it could have been conceptualised as an indicator of the latent construct (Petrides et al., 2007). The incremental predictive validity of trait EI over the big five factors was tested in the current dissertation, and the results are

supportive of previous studies (De Raad, 2005; Shulman & Hemenover, 2006). Trait EI is considered an important predictor of psychological well-being, physical health and general performance in the work domain. Therefore, its relevance to the model was not overstated initially, as was indicated in the CFA results. Trait EI was found to have the largest parameter estimate and also demonstrated the least amount of variance unexplained by the latent construct. When considering the relationships that exist from structural analysis of the conceptualised model, the contribution of trait EI is critical.

An interesting and unpredicted outcome of the EFA was that the SWLS indicator loaded with the personality and trait EI indicators. This indicator is within the subjective well being (SWB) content domain, which makes this outcome more difficult to interpret. However, the result is not counterintuitive. Many theories of SWB consider the construct to have two components, cognitive and affective. Further to this, both components have demonstrated a complex relationship with personality (DeNeve & Cooper, 1998; Steel, Schmidt & Shultz, 2008). The top down theory of SWB proposes a global tendency to experience life in either a positive or negative way (Diener et al., 1985). This global tendency is derived from stable personality traits. Extraversion predisposes individuals to experience life events more positively. In contrast, neuroticism predisposes people to experience life events more negatively.

Furthermore SWB has been shown to be relatively stable over time; momentary changes in SWB are not going to be targeted by a global measure of life satisfaction. In a recent meta-analysis of SWB and personality, Steel et al., (2008) found that 39 % of the

variance in SWB was accounted for by personality traits. It is believed that long term SWB is stable, furthermore, that this stability is due largely to heritable factors, inclusive of personality traits (Frone et al., 1997). The current findings appear to fit with this theory of SWB. Although it was initially conceptualised as a separate aspect of psychological health capturing a longer term global cognitive aspect of affect, it would appear that the indicator of life satisfaction is more descriptive of the personality construct. SWLS is not assessing psychological health from a global perspective rather; it is assessing a dispositional trait. Interestingly, this now allows for consideration of this indicator and its relationship with safety determinants and outcomes and more specifically, any patterns of moderation that may exist (Brand & Kennedy, 2009a). This will add to the SWB literature which has previously considered most extensively the direct effects of SWB on health and global life outcomes.

Psychological Ill Health

In contrast to the hypothesised indicators, the latent construct of psychological ill health was indicated by three aspects of maladaptive coping (substance abuse, denial and behavioural disengagement). As hypothesised, the DASS 21 was also an indicator of this latent construct. These maladaptive indicators could be seen to fit conceptually with the behavioural and cognitive mechanisms of general psychological ill health.

From the problem solving model of stress, the analysis of psychopathology and poor psychological health can be understood as ineffective and maladaptive coping behaviour that will subsequently lead to further personal and social consequences (Nezu & Ronan,

1985). From Lazaurus's model of stress, coping is defined as both cognitive and behavioural activities in which a person may engage to attain a better outcome (Lazarus & Folkman, 1984). Integration of these two models would suggest that poor behavioural or cognitive reactions when facing stressful situations will lead to a more significant experience of negative affect (Meyer, 2001; Spilken & Jacobs, 1971; Stanton et al., 2000). This reciprocal feedback process reduces motivation and can inhibit future attempts to rectify the situation, leaving the individual feeling helpless to change their circumstance, exacerbating negative affect. Therefore, as supported by the CFA, it could be suggested that maladaptive cognitive and behavioural reactions are determinants of psychological health, complementing the tripartite model of negative affective states. This outcome presents an interesting perspective for the current model, as it allowed for the assessment of the predictive utility of these factors in relation to safety performance. As discussed previously, of primary interest to the organisation is the impact of non work on work for all employees. Behavioural and cognitive processes that are rarely available for analysis can now be considered for their specific impact.

Structural Models

One of the main aims of the current dissertation was to explore a model that integrated theories and empirical evidence from the home/work interface literature, occupational psychology models of job performance and individual differences and safety performance. Three specific models were isolated and presented due to their theoretical orientation and demonstrated empirical support. To reiterate, they were the model of home work interface (Frone et al., 1997) model of safety climate and safety

behaviour (Neal & Griffin, 2002) and individual differences in task and contextual performance (Motowidlo et al., 1997).

Salient aspects from each model were combined in the development of the main mediated model of psychological fitness for work. Specifically the influence of distress and dissatisfaction on work performance determinants and outcomes in the context of a job performance model of contextual and task performance. The results of each of the three structural models tested will be discussed in the order assessed. Although the research was exploratory, a number of specific hypotheses were proposed based on proximal relationships within the literature.

Individual Antecedents and Safety Determinants

Consideration of the effects of individual antecedents in relation to safety determinants was given in the first of the direct effects models. The model was an acceptable fit to the data in the absence of the path to safety outcomes. Individual antecedents do not reduce the impact of psychological health on safety determinants. Psychological health and coping do not affect an individuals' safety motivation, safety behaviour or safety knowledge. The hypothesis relating psychological health to safety determinants was based on proximal indicators from both the safety and occupational stress literature. A more thorough analysis utilizing more specific indicators may be relevant.

As discussed previously, much of the literature has considered the impact of psychological health on task performance. Whilst the safety determinants in the tested model do include aspects of task performance such as task habits (safety behaviour) they may not have been as specific as previous studies. For example Adler et al., (2006) considered specific aspects such as, task output and the performance of physical tasks. In relation to safety, it is more difficult to isolate and measure task habits and outputs, peer rating of task habits may be more meaningful in this context. As defined by Motowidlo et al., (1997), task habits include characteristic ways of using technical information and performing technical procedures. In the mining and heavy industry the use of technical information is applied in task hazard analysis and the performance of the procedure in many situations requires the individual to apply this technical information in a specific manner due to safeguards in the system. This was the aspect of task habits (behaviour) that was measured in the current study and needs to be considered in relation to the outcome.

Positive Affect does determine an individuals' safety motivation, safety behaviour and safety knowledge directly. Research in the determinants of safety, needs to consider the relevance of what is suggested in the job performance literature. Personality is relevant to both task and contextual determinants of safety (Motowidlo et al., 1997). Further research to test the boundaries of this finding is definitely required. If substantiated, the result would be further development of the model of psychological fitness for work, which could guide organisations in the management of safety, more specifically in the assessment and training for employees.

The outcome in relation to coping was not significant and did not support earlier empirical findings relating coping to sporting, academic and military performance (Davis, 2006; O'Connor & O'Connor, 2003). It would appear that in relation to safety determinants, coping does not impact on a person's ability to participate in safety behaviours, be motivated for safety and demonstrate knowledge of their safety procedures. As the relationships were based on proximal indicators in the literature, the outcome of the direct effects were not unexpected. The lack of moderation does, however, suggest that the relationship of coping and performance demonstrated in other areas is not specific to safety determinants, as mentioned in the discussion of the mediated model. Further consideration will be given to this in relation to actual performance outcomes in the next model, which is a closer approximation to the stress and coping literature.

Individual Antecedents and Safety Outcomes

The second of the direct effects models represents much of the job performance literature in a safety-specific context. It provides an answer to the first research question posed: what are the relationships between individual difference variables and safety performance? The answer is that broad conceptualisations of psychological ill health and positive affect contribute to outcomes in safety, specifically accidents, incidents and severity of these. The way people cope with situations has no effect on their safety outcomes. Further to this, coping and positive affect do not determine differences in how psychological health impacts upon safety outcomes.

The outcomes from this model are important to consider in the context of their contribution to all three content domains that have been discussed throughout this dissertation. The importance of specific aspects of personality in determining job performance outcomes has been demonstrated widely (Barrick & Mount, 1991; Barrick et al., 2002; Hurtz & Donovan, 2000; Witt et al., 2002).

In particular, conscientiousness has been shown to be the most valid predictor of job performance across different occupations. The other domains of the five factor model have shown differential impact when the task specific requirements of the role are considered (Hurtz & Donovan, 2000). A growing body of literature demonstrates a link between the five factors of personality and safety outcomes also (Fallon et al., 2000; Salgado, 2002; Sutherland & Copper, 1991). More recently the problems with using student samples, occupations with low accident risk and differential risk exposure across the sample have been considered in the design (Wallace & Vodanovich, 2003a, 2003b).

The results in the current study support outcomes reported in these studies but they also extend them. The current conceptualisation of positive affect was represented by the correlated indicators of: conscientiousness, agreeableness, neuroticism, extraversion, trait emotional intelligence and satisfaction with life. This is broader than considered in previous research looking at the relationship of specific personality factors under the Big Five or giant three taxonomy and safety outcomes. This broad conceptualisation has demonstrated its effectiveness and relationship with both the determinants (seen in the

mediated and direct effects model) and negative outcomes of safety performance. It provides a step in the path that will lead to the psychological conceptualisation and empirical validation of psychological fitness for work. It also allows for consideration of what is already known about performance from the organisational behaviour literature.

Evidence from the home to work interface literature suggests that high levels of family distress are a significant predictor of conflict. In addition to this, such distress has a negative impact on work performance (Netemeyer et al., 1996; Williams & Alliger, 1994). Support was demonstrated in the current model for an extension of these findings. A global (not domain-specific) measure of individual distress demonstrated a relationship with one specific aspect of performance i.e., safety outcomes. This would suggest that the impact of an individual's psychological ill health needs to be considered in relation to their ability to perform normal aspects of their work. Given the measure of psychological distress is non domain-specific, this result is equally relevant if an individual is experiencing psychological distress due to aspects of their work and/or home domain. It supports results found in the job performance arena that considers specific aspects of psychological health and their relationship with global performance (Adler et al., 2006; Van Der Linden et al., 2005). The finding adds an important aspect for consideration in the safety literature: the consideration of the individuals' safety outcomes in isolation of other psychological phenomenon is not likely to represent the complete picture.

The fact that coping did not significantly relate to safety outcomes is not surprising in light of the previous findings in the direct effects model of safety determinants. On the

basis of the proximal relationships indicated in the academic and sporting performance literature, it was expected that the magnitude of the direct relationship for coping would be greatest in relation to outcomes rather than determinants. Whilst this is the case, it is not significant in determining safety outcomes, nor in decreasing the impact of negative psychological health on poor safety outcomes.

Additionally, positive affect did not demonstrate a buffering effect between poor psychological health and safety outcomes. As with the relationships in the direct effects model of safety determinants it can be considered that the previously demonstrated moderator relationship throughout the literature does not appear to extend to aspects of performance specifically. Even though in contrast to hypothesized relationships, given the exploratory nature of the study, this finding is important. It begins to provide some evidence of the relevance of coping in a model of psychological fitness for work.

Mediated Model with Moderator Effects

Cumulatively the results of the mediated model suggest that individual difference variables do not moderate the relationship between psychological health and safety outcomes. Safety determinants did not mediate performance antecedents and performance outcomes when specific individual difference variables are the antecedents. A model of individual differences in task and contextual performance is relevant to the specific context of safety with a broad conceptualisation of personality inclusive of trait emotional intelligence and subjective well being.

With relevance to the application of the three original empirical models, each of these outcomes will be discussed. The hypothesed relationship between psychological distress and safety outcomes as mediated by safety determinants was not supported. This is in contrast to Frone's et.al (1997) model, which found that dissatisfaction and distress from non-work life had a significant negative relationship with work performance.

Furthermore evidence from the conservation of resources theory suggests that continued draining of personal resources by family and work leads to decreased physical and psychological health, which in turn decreases performance within each role (Demerouti et al., 2007; Grandey & Cropanzano, 1999; Jansen et al., 2002). It was determined that a non-specific global measure of distress would be utilised as the latent construct in the current model based on further evidence from the occupational health literature, supporting performance decrements as an outcome of psychological health. The safety performance literature also suggests that mental preoccupation decreases an individuals' ability to attend to safety performance (Adler et al., 2006; Dunbar, 1993; Sanders & Baron, 1975).

There appear to be two obvious plausible explanations as to why the current findings do not support the relevance of this model in psychological fitness for work. Firstly, much of the evidence from the family to work interface literature has utilised domain-specific measures of performance; work and home respectively. These results have been replicated across many studies when the measure of distress has been role specific dissatisfaction and distress. Further to this, the measure of performance has been a global

assessment of performance in the relevant domain (Greenhaus & Parasuraman, 1986; Williams & Alliger, 1994). The application of this to a model incorporating a global assessment of distress and a specific measure of safety task and contextual performance and outcomes is not supported in the current model.

Similarly in longitudinal studies of psychological health and job performance the hypothesised relationship has been demonstrated with a global measure of performance. It would appear from the lack of support found in the current model that when considering a specific aspect of performance i.e., safety performance, a global indicator of distress as in psychological health is not specifically linked to the outcome domain.

A second consideration relates to the exploration of indirect and mediated effects in models of non work time interfacing with work performance outcomes. Demerouti et al., (2007) found a weak mediating mechanism between non-work distress and work performance deficits. They suggest that a direct link from stress and overload from non-work to work performance is not demonstrated; instead a linking causal mechanism of diminished concentration is evident. Again it must be considered that they are measuring performance as a global construct, but the inference for the current model and results obtained is that the determinant is outside the realm of knowledge, motivation and behaviour. However, this is in contrast to much of the work on task and contextual performance, which has its basis in the widely accepted premise that individual difference variables such as personality are mediated by common determinants that may

be labelled differently but in general refer to knowledge, habits, skill and motivation (Campbell, McCloy, Oppler & Sager, 1993; Motowidlo et al., 1997).

The current model does not suggest that individual differences in personality and coping will help an individual deal with the impact of distress on performance (Carmeli, 2003; Slaski & Cartwright, 2003). Much of the previous discussion in relation to domain-specific as opposed to global measures of distress and performance is relevant in understanding this outcome also. Currently, there is limited literature relating coping to job performance and it would appear that the relevance of academic and sporting performance is limited. Coping has been consistently demonstrated to decrease the impact of stress on the individual in terms of psychological and physical outcomes (Billings & Moos, 1981; Stanton et.al 2000; Campbell & Ntobedzi, 2007). Perhaps a consideration of this main effect would yield better results than considering it as a buffer for performance outcomes.

Similarly, personality has limited literature considering its role as a moderator between psychological health and workplace performance. Some research has found evidence for moderation effects in relation to the stress and strain, work conflict and well being literature, and occupational stress and life satisfaction (De La Rasa & Cunningham, 2008; Harvey et al., 2006; Korotov, 2008). The outcome measures in these studies relate specifically to aspects of psychological health. On the basis of the current findings, it would appear that when the outcome is performance-related, moderation is not evident.

As opposed to Neal and Griffin's (2002) finding that safety determinants mediate antecedents of safety behaviour and safety outcomes, the current model did not demonstrate this. It would appear that in the context of global individual antecedents as measured in the current model, differences in knowledge, motivation and behaviour do not explain differences in safety outcomes. There are important factors to consider in relation to this outcome. Foremost, is the consideration that the current model hypothesised that the determinants of safety performance would mediate with an evaluative measure of performance i.e., safety outcomes. This is a distinction between the current model and the components of performance as measured by Neal and Griffin (2002).

Whilst the determinants have been demonstrated as mediators in the antecedent to outcome relationship in a handful of studies, the construct definition and resultant measure is task specific. For example Newnam, Mason and Griffin (2008) reported that the determinant, specifically motivation was a mediator of the antecedent to outcome relationship, when the outcome was a specific measure of self reported driving incidents. Safety determinants (motivation, knowledge and participation behaviour depending on the study) have been demonstrated as mediators in different contexts and also longitudinally (Maiti, Chatterjee & Bangdiwala, 2004; Neal & Griffin, 2006). The evaluative outcome measure has been, in the majority of cases, a unitary measure of accident involvement (a count of whether the employee has been in a work related accident or not).

The current model utilised more descriptive measures of outcomes incorporating aspects specific to the individual and the organisation (first aid treatment, ability to return to work, time off work required and ability to return to substantive role). Given the results, it would appear within the limitations of the current study, that safety determinants do not mediate the relationship when a multi-faceted evaluative measure is considered. Perhaps further to this, considering that mediator variables are explanatory mechanisms that give insight into the relationship between two variables, it also needs to be considered that no such relationship exists between global constructs of individual difference and safety outcomes (Mathieu & Taylor, 2006). The elements of this can be seen more clearly in each of the direct effects models

The results within the mediated model provide partial support for the application of the Motowidlo et al., (1997) model of individual differences in the context of safety performance. They do not provide full support as has just been discussed in relation to the absence of mediation effects. A broad conceptualisation of personality was related to outcomes in safety determinants. These determinants represent both the task and contextual aspects of safety performance. As indicated by Motowidlo et al., (1997), the personality construct predicted both participatory safety behaviours (task behaviours/habits), and safety knowledge and motivation both represent contextual determinants.

In addition to this, the current finding elaborates on the Neal and Griffin (2002) model of safety behaviour. One of the sub dimensions of antecedents in this model is individual differences such as personality traits. Previously, conscientiousness has been

demonstrated as a strong predictor of work performance generally and has been considered again recently for its relationship with safety performance (Barrick et al., 2002; Neal & Griffin, 2002; Witt et al., 2002). The results relating to the current model suggest that the antecedents in terms of individual differences can potentially be considered in a broader context than they have previously. Moreover, trait emotional intelligence and subjective well-being form part of the personality construct for the current study and contribute to the relationship with the determinants in a meaningful way. Again, in this context a broader consideration of the individual difference variables that can be considered as safety antecedents in a model of safety performance is proposed within the limitations of the current study.

This finding is important as it indicates the potential utility of job performance theories in the safety literature. It opens the path between much of the occupational psychology theory relating to job performance and the safety literature (Brand & Kennedy, 2009b). This could be the beginning of a theoretical and empirical process that reinforces the relevance of psychology back to analysis of safety performance.

Personality and Safety Knowledge, Motivation, Behaviour and Outcomes

Further regression analysis of the relationship between personality and safety performance revealed empirical support for the specific contribution of conscientiousness, agreeableness and trait emotional intelligence. The results provide further evidence of the relevance of the job performance model in a safety specific

context. In addition, they support the results of other studies, and provide further evidence of the boundaries and application of personality in safety.

The model of individual differences in job performance contends that personality has differential effects on the task and contextual determinants of behaviour (Motowidlo et al., 1997). The contribution of cognitive ability was not assessed in the current thesis; however support was demonstrated for the relationship between personality and both the contextual and task aspects of safety performance. Conscientiousness, agreeableness and trait emotional intelligence determined an individual's safety motivation (contextual determinant) and safety knowledge and behaviour (task determinants). Within the context of the current study, these results have extended on previous findings in two ways: firstly a more thorough consideration of safety outcomes (not just accidents versus no accidents), and secondly, the application of trait emotional intelligence (Clarke & Robertson, 2008). Combined with the outcomes from the structural models, the relevance of the job performance model to safety determinants and outcomes is strengthened, within the limitations of the current study.

A number of studies have considered the relationship of conscientiousness to self reported accidents (Hansen 1989; Wallace & Vodanovich, 2003a, 2003b). This is supported by the current results; in addition to this, the results support a relationship with safety determinants, the precursors to negative or positive safety outcomes. Also agreeableness and trait emotional intelligence show differential effects on safety determinants and outcomes. It would appear that trait emotional intelligence is important

in determining an individual's safety knowledge and safety motivation, over and above the contribution of agreeableness and conscientiousness. In relation to safety behaviour and negative safety outcomes, agreeableness and conscientiousness are more important than trait emotional intelligence.

In the development of a model of psychological fitness for work, it would appear that personality is an important individual variable to be considered and the context of the job performance model provides a relevant basis to begin.

CHAPTER 9

Conclusions, Limitations and Future Directions

This final chapter aims to synthesise the findings in relation to the three theoretical models proposed in the review of the literature. The implications, limitations and future directions for further research will also be considered. A brief review of the research aims in the context of the three models will be provided. Following this, the conclusions identified will be reviewed with reference to the two research questions; what is the relationship of individual difference variables to safety performance? Can models of job performance be applied to the specific condition of individual differences in safety performance?

The main aim of this research was to develop a framework for the concept of psychological fitness for work. The framework was developed by linking variables of relevance from three theoretical areas including; safety, organisational behaviour and the home-work interface. The process was exploratory and the three specific models were applied because of their potential utility in addressing the missing links in the psychological literature. In addition, the framework contextualises safety performance in psychology and isolated the variables of relevance.

The three models were Neal and Griffin's (2002) model of individual antecedents and safety behaviour, Motowidlo et al., (1997) model of individual differences in task and contextual performance and finally Frone et al., (1997) integrative model of work–family

interface. Several salient aspects from each of these models were applied in the development of a hypothesised model of psychological fitness for work. Namely, (a) the distinction of task and contextual performance can be applied to safety behaviour (b) individual antecedents can be considered for their impact on safety determinants and safety outcomes and (c) dissatisfaction and distress from non-work life can have an impact on work performance. The conclusions that can be drawn from the results obtained will be discussed in turn with relevance to each of the original models.

Antecedents, Determinants and Safety Behaviour

The results of the current study provide support for the suggestion that individual antecedents such as personality factors relate to safety determinants. They do not support determinants as mediators in the specific context of antecedents to an evaluative measure of performance i.e., safety outcomes. Within the limitations of the current study this suggests a boundary condition for the individual antecedent to performance relationship. Neal and Griffin (2002) have defined and found support for this relationship when performance is measured in terms of components and not outcomes. It was proposed that determinants would mediate also when the measure of performance is specifically outcome based, but this proved not to be the case.

Two extensions of this model were identified and supported within the current study. Firstly, individual differences beyond traditional consideration of conscientiousness have a significant relationship with safety determinants. It was demonstrated in the structural models that a broad conceptualisation of personality including trait emotional

intelligence, neuroticism, agreeableness, conscientiousness, extraversion and satisfaction with life were related to safety determinants. In addition, the theoretically driven regression analyses demonstrated that conscientiousness, agreeableness and emotional intelligence were significant predictors of safety determinants. Secondly, safety participation or behaviour can be considered as a determinant of performance. This relates most closely to Motowidlo's et.al (1997) conceptualisation of task habits as a determinant, also in contrast to Neal and Griffin (2002) who considered it as a component.

Individual Differences and Task and Contextual Performance

The outcomes of the current study support the application of aspects of the job performance model to the specific context of safety (Motowidlo et al., 1997). It was identified that individual differences exert a direct effect on safety determinants and safety outcomes. As proposed in the job performance model, it was also confirmed that individual differences in the context of personality exert effects on both task and contextual determinants. The broad conceptualisation of personality was significantly related to safety motivation (contextual determinant) and safety knowledge and behaviour (task determinants). Personality also demonstrated a relationship with safety outcomes, which is representative of much of the organisational literature relating to performance, in the context of safety. The results bring to the fore a broader conceptualisation of personality than previously considered and suggest the importance of considering individual antecedents outside the traditional realms. Again the results did not suggest any mediation of antecedents on outcomes by determinants, further highlighting the

importance of considering the specificity of determinants in relation to outcomes as opposed to components.

Psychological Health and Home to Work Interface

The findings in relation to psychological health suggest that there are relationships to be considered between general psychological well-being and resultant performance outcomes. The outcomes are more specific than have been considered before and demonstrate an important issue for both the home to work interface literature and the global job performance literature. The issue is that both positive and negative individual antecedents are related to performance outcomes. Secondly, a more global consideration of psychological health (not home or work specific distress) is relevant in evaluating performance. It was suggested in the current model that the positive antecedents would moderate the negative ones, this was not supported. Further consideration of the specificity of measurement for both antecedents and outcomes would need to be incorporated into the model to determine the relevance of moderators.

In addition to this, the results suggest that broad conceptualisations of psychological health including aspects of maladaptive coping are related to performance. This provokes thought in relation to measurement of psychological health, specifically in the context of safety outcomes.

A Model of Psychological Fitness for Work

The development of a framework for defining and exploring the concept of psychological fitness for work constitutes the main aim of this research. Although the

proposed hypotheses were not supported, there are important outcomes that are extremely relevant to the development of this concept. First, the fact that psychological health does demonstrate a relationship with safety outcomes suggests that the model is worth pursuing. Secondly, individual antecedents, both positive and negative, demonstrate a relationship with safety outcomes. Thirdly, personality and trait emotional intelligence are related independently to all three determinants: participation, knowledge and motivation. Perhaps it was premature to consider moderation and mediation effects given the paucity of research considering these concepts even in the established performance literature. However, a good basis has been provided for further development of this model. The consideration of psychological fitness for work must include personality, emotional intelligence, determinants (both task and contextual) and outcomes.

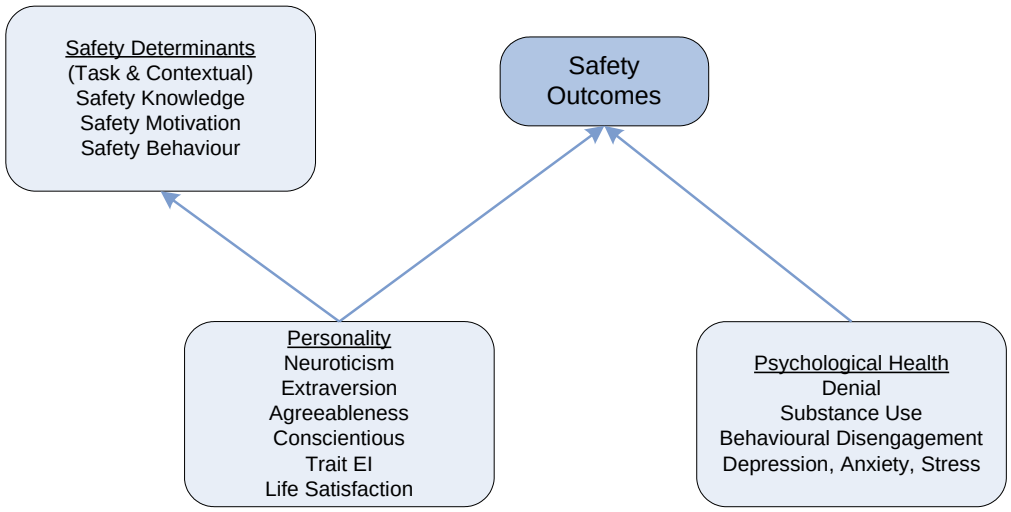

Figure 10. Psychological Fitness for Work: The Common Threads

The common thread from the organisational psychology literature has been woven considering individual differences in workplace performance and management of stress, and their link to the safety research considering determinants of workplace safety

performance and outcomes (see Figure 10). The concept of psychological fitness for work now has some demonstrated links to both theoretical and empirical traditions of psychology. Individual antecedents, which are relevant in the job performance literature, are equally important in determining safety outcomes. Furthermore, a broader conceptualisation of individual differences than has been considered previously has demonstrated validity in the model (Figure 10). To gain an understanding of psychological fitness for work, the individual experience of psychological distress must also be considered. Safety outcomes are related to an employee's level of psychological health, an aspect that has not previously been considered beyond the effects of drugs, alcohol and fatigue. The consideration of individual antecedents now must include these negative components. In addition, the broader relevance of the model can be considered. The model of psychological fitness for work is contextualised in methodological traditions of psychology, which now allows for consideration of its relevance to other aspects of work performance.

Implications

This research has a number of implications for both researchers and industry. It has made a significant contribution to theories of job performance, safety behaviour and the home work interface. Essentially, it highlights the importance of applying well established psychological theory and empirical rigour to the analysis of safety behaviour. Safety performance is in the domain of job performance, and organisational psychology has much to contribute to a more in-depth analysis and subsequently greater understanding of the most relevant antecedents and determinants. The study of individual

differences has many decades of validation within the psychology literature; these results highlight the relevance of this to safety performance. The lack of theoretical frameworks for the management of safety performance needs to be contested and this research provides a focus for the discussion. In addition to this, the work that is beginning in the work-home interface literature relating employee behaviour outside of work to work performance has gained further support in the current dissertation. More specific aspects of this relationship were demonstrated in the current study and need to be investigated further.

The research provides useful information for employers aiming to apply a holistic approach to managing employee safety. It suggests that individual differences are important to consider in safety training and development. For example, training packages and techniques will be more effective if they are targeted to the audience. Individuals with high levels of conscientiousness and agreeableness will likely learn quickly in a traditional teacher/student model approach. In contrast, individuals with low levels of conscientiousness and agreeableness may require more intensive training with smaller group size, closer monitoring of skill development and perhaps ongoing mentoring from their more conscientious and agreeable colleagues.

An employee's motivation to perform safely at work will be related to aspects of their personality. Similarly, their participation in safety behaviours and application of safety knowledge will be related to their level of conscientiousness, agreeableness and emotional intelligence. In relation to training of employees, this suggests that a 'one size

fits all' approach may not be the most efficient way of improving safety performance. Employers may need to consider training program content and delivery that will target individual differences in learning style and approach to work. Personality trait and emotional intelligence factors that have demonstrated significance in the current model suggest a natural division that occurs and can be applied to training development.

Further to this, if an employee's psychological health has declined, their negative safety outcomes are likely to be greater than when they are feeling well. Also aspects of their personality and trait emotional intelligence will be related to their safety outcomes. Employers could utilise this information to develop training for supervisors that would assist them in identifying the early warning signs for poor psychological health and strategies for managing the employee in this situation, which may include performing tasks that have a lower risk exposure. Similarly, employers may consider the relevance of developing packages aimed at improving an employee's awareness of the psychological aspects that will relate to their safety outcomes.

Limitations

There are a number of limitations in the present study that must be considered when reviewing the results. Possibly the most obvious limitation of the research is sample size relative to the statistical procedures adopted. As discussed in chapter six, whilst good for regression analysis, the sample size is considered only adequate in structural equation analysis. In addition to this, the dependent measures violated the assumptions of normality which increases the importance of the sample size. This must be considered

when assessing the ability to generalise the results. Another limitation was the potential effect of multicollinearity amongst the predictor variables. The uses of EFA to determine the factor structure of the latent constructs, and subsequent specification with a minimum of four indicators for each construct were measures employed to decrease the impact of multicollinearity (Grewal, Cote & Baumgartner, 2004).

Use of self report measures to assess all dimensions of the model is a clear limitation. Estimates of the relationships amongst the measures may therefore be confounded by common method variance. In addition to this, the cross sectional measurement was chosen as the main aim was to explore the relationships that existed, which was achieved. It is not possible to test causal relationships proposed in the research based on the cross sectional design. The implementation of a longitudinal design may be impractical with the complexity of the model. A more modest goal may be to conduct a series of longitudinal studies that test smaller but overlapping parts of the proposed model.

Finally, the use of self report measures may introduce the potential for socially desirable responding. In relation to safety outcomes, there is evidence to suggest that the relationship between self report and other more objective measures are correlated (Wallace & Vodanovich, 2003b). It has been indicated that safety climate predicts a significant proportion of the variance in safety outcomes and that this result is robustly independent of the measure; self report or objective (Johnson, 2007; Zohar, 2000). These results provide support for the use of self report measures of safety outcomes.

A parameter imposed by the researcher was to focus on a specific group of employees within the mining industry who have higher risk exposure. This makes the relevance of the findings specific, results should be treated cautiously when generalising beyond this population.

Future Directions

This research has provided an important step in the development of a framework for the study of psychological fitness for work. A number of future steps are needed to develop this further. As just discussed, it would be important to explore the relationships with components of the model in a longitudinal context. This would allow a review of the causality in relation to psychological health and safety outcomes along with personality and safety determinants and outcomes.

A more thorough analysis of the individual differences and their specific relationship with the individual safety determinants and safety outcomes is required to test the specific boundaries of the model. Doing so will also increase the utility of the model in an organisational context. A study utilising more objective measures of the variables will allow a more thorough consideration of the relationships also.

An important aspect of any future work in this area is the consideration of antecedents for psychological health. This was beyond the scope of the current study; the focus was instead on the relationship between psychological ill health and safety determinants and outcomes. For the purposes of prevention it would be essential to consider both

work/family sources of psychological ill health and factors within the organisational climate that contribute to psychological health. These may include but not be limited to; perceived control, participative decision making, perceived justice, leadership and support (Michie & Williams, 2003).

Most importantly, further theoretical work utilising the current organisational literature needs to be applied to the safety literature, provoking a review of the current propositions within it.

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Appendices

Appendix A: Approval Letter from Participating Site

Dear Ms Langford

RE: Lisa Brand PhD Research: Psychological Fitness for Work

We have reviewed a proposal for the conduct of the above mentioned research at (Confidential). We are supportive of the research proposal with consideration of the following conditions;

a) That data collected is de-identified
b) The company and site are not referenced in any publication produced as a result of this research.

Our support will include the provision of access to a sample of employees, the ability to promote the research on relevant communication medium and the utilization of computer training facilities for delivery of the research questionnaire.

Yours sincerely

(Confidential)

Appendix B: Contact Letter and Proposal

Occupational Health & Safety Manager

RE: Proposal to Conduct Research

I am currently completing my PhD in Psychology at James Cook University of North Queensland. The focus of this research is the psychological aspects of workplace safety performance in high risk industries. I am writing to request support from your organization to ascertain a random sample of consenting employees.

Attached is a detailed research proposal that defines specifically the area of study, and what would be required of employees who are willing to participate. The key findings of the study would be made available in summary format to all participant organizations. The research findings will contribute a significant piece to the workplace safety performance picture and thus improve an organization's ability to achieve zero harm.

If you have any further questions regarding the research please do not hesitate to contact myself or my supervisor ;

Lisa Brand
Principal Researcher
Phone: +65628 67769
Email: lisa.brand@bhpbilliton.com

Dr Barbara Kennedy,
Senior Lecturer
School of Psychology
James Cook University of North
Phone: 61 0747 814862
Email: Barbara.kennedy@jcu.edu.au

Yours faithfully

Lisa Brand
Principal Researcher

Dr Barbara Kennedy
Supervisor

Research Proposal

Rationale

This research will investigate the psychological factors that moderate the impact of psychological distress and significant life events upon workplace safety behaviour and performance, subsequently developing a framework for consideration and investigation of psychological fitness for work. Fitness for work practice has, to date, predominantly been guided by legislative framework alongside genuine concerns regarding the risk arising from substance abuse. Organisational psychology theories relating to employee performance, work/home interface and individual differences have much to offer in their application to workplace safety performance management. .

The study of individual differences in workplace performance now has a substantial body of evidence supporting their relevance to industrial and organisational psychology . The application of this literature to specific workplace performance in terms of workplace safety behaviour and outcomes is so far not apparent. The proposed research will provide the essential application of psychological analysis to the study of workplace accidents and safety behaviour of employees.

The Office of the Australian Safety and Compensation Council OHS Strategy aims to achieve a continual reduction in work related fatalities and injuries with a minimum reduction of 20% and 40% respectively, by 30 June 2012. In the five year period to 2002/2003 compensated fatalities had decreased by 47% and injury incident rates per 1000 employees within the mining industry had decreased from 48.3 to 21.4.

The mechanisms by which the next threshold shift will be witnessed are now required to move to the next level of analysis and application within organizations. Achieving Zero Harm requires a multifaceted approach to health and safety management systems. It is essential that individual factors contribute a significant proportion of this approach.

Objective

The proposed research will provide the essential application of psychological analysis to the study of workplace accidents and safety behaviour of employees. This would yield significant benefits for both organisations and employees in the approach and management of safety performance issues. Specifically the development of a risk assessment protocol for individuals at greater risk of workplace safety incidents and a methodology for training and employee development strategies that decrease the psychological risk factors of poor safety performance.

This will address one more dimension of the Zero Harm strategy, with potential direct and indirect improvements in health and safety for all employees. The sustainability of current health and safety management systems will be significantly enhanced by considering the psychological aspects of fitness for work.

Methodology

After giving informed consent, individuals will voluntarily participate in the research project.

The principal researcher will administer a questionnaire preferably to groups of participants at their work site. All questionnaires will be coded to maintain confidentiality. It is anticipated that it will take the participants up to 40 minutes to complete all of the measures.

Reporting

A report with the critical findings and outcomes will be provided to relevant stakeholders within the participant organisation, upon completion of the thesis.

Requirements

a) As many operators/maintainers as possible to complete questionnaire (any personnel with field time are suitable, office based personnel are not suitable)

b) A room to administer the questionnaire to a large group

c) Up to 40 minutes to complete questionnaire (This is at the worst case scenario - it will on average take 20-30 mins as it is 160 questions, and is classified as 6th grade reading level)

d) Some dates and times locked in as suitable for the operation but logistically these would need to be grouped to allow me to complete all samples in one trip.

I will provide all resources required to complete. A summary report will be given to the organisation upon completion of my PhD.

Essentially the final outcome will indicate a risk assessment protocol for individuals at greater risk and a training/development methodology that will decrease the psychological risk factors of poor safety performance.

Appendix C: Email to All Managers

From: Confidential
Sent: Friday, 26 September 2008 15:07
To: Confidential
Subject: Query

Dear Managers,

Lisa Brand is going to be on site from Monday (29th September – 3rd October) collecting data for her research project. The study is aimed at maintenance and production personnel and aims to provide more information on the relationship between normal psychological stress and workplace safety behaviour and accidents. It will provide an answer to another part of the Fitness for Work question and direction for managing it.

Lisa is after 30 minutes with operators/maintainers of your employees time to fill out some questionnaire items if possible (all materials are provided).

Lisa is willing to come in at shift start/end if this helps.

Confidential
Site

Appendix D: Informed Consent

JAMES COOK UNIVERSITY
TOWNSVILLE Queensland 4811 Australia Telephone: (07) 4781 4111

INFORMED CONSENT FORM

PRINCIPAL *Lisa Brand*

INVESTIGATOR

PROJECT TITLE: *Psychological Fitness for Work in High Risk Industry*

SCHOOL *School of Psychology*

CONTACT DETAILS **lisa.brand@jcu.edu.au** ***+65 8127 3653***

The current research is looking at the impact of psychological health and wellbeing on a number of workplace performance factors. Upon deciding to take part in the research, there are a number of questionnaire type items for you to answer. These items will focus on your current psychological health, individual factors such as coping style, emotional resources and workplace knowledge and skill. It is estimated that it could take up to 40 minutes to complete the questionnaire items. At anytime during this process you are free to withdraw your consent and not answer any further questions.

The results of this research will be utilised in the Principal Investigators PhD thesis. No identifying information will be available through this process; identifying information will be stored separately of your actual responses. All personal information will remain confidential and will be kept secure throughout the entire research process.
The aims of this study have been clearly explained to me and I understand what is wanted of me. I know that taking part in this study is voluntary and I am aware that I can stop taking part in it at any time and may refuse to answer any questions.

I understand that any information I give will be kept strictly confidential and that no names will be used to identify me with this study without my approval.

Name: *(printed)*	
Signature:	**Date:**

Appendix E: Questionnaire

Work Performance and Psychological Health Questionnaire

Principal Researcher: Lisa Brand
Supervisor : Dr Barbara Kennedy

No names, addresses or any other identifying information are recorded or linked to you at any time. Your response to questions in this questionnaire cannot be traced to you. All information will be put together and reported on at a group level only.

Gender

a - Male
b - Female

Age _____yrs

How many years have you worked in your current job?

_____yrs

Work Role _____

Please read each statement and circle a number 0, 1, 2 or 3 which indicates how much the statement applied to you ***over the past week***. There are no right or wrong answers. Do not spend too much time on any statement.

Use the following categories :

0 - Did not apply to me at all

1 - Applied to me to some degree, or some of the time

2 - Applied to me to a considerable degree, or a good part of time

3 - Applied to me very much, or most of the time

	DASS21				
1	I found it hard to wind down	0	1	2	3
2	I was aware of dryness of my mouth	0	1	2	3
3	I couldn't seem to experience any positive feeling at all	0	1	2	3
4	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion)	0	1	2	3
5	I found it difficult to work up the initiative to do things	0	1	2	3
6	I tended to over-react to situations	0	1	2	3
7	I experienced trembling (e.g., in the hands)	0	1	2	3
8	I felt that I was using a lot of nervous energy	0	1	2	3

9	I was worried about situations in which I might panic and make a fool of myself	0	1	2	3
10	I felt that I had nothing to look forward to	0	1	2	3
11	I found myself getting agitated	0	1	2	3
12	I found it difficult to relax	0	1	2	3
13	I felt down-hearted and blue	0	1	2	3
14	I was intolerant of anything that kept me from getting on with what I was doing	0	1	2	3
15	I felt I was close to panic	0	1	2	3
16	I was unable to become enthusiastic about anything	0	1	2	3
17	I felt I wasn't worth much as a person	0	1	2	3
18	I felt that I was rather touchy	0	1	2	3
19	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat)	0	1	2	3
20	I felt scared without any good reason	0	1	2	3
21	I felt that life was meaningless	0	1	2	3

There are many ways to try to deal with problems. I want to know to what extent you've been doing what the item says, how much or how frequently. Try to rate each item separately in your mind from the others. Make your answers as true FOR YOU as you c

Use the following categories :

1 = I haven't been doing this at all

2 = I've been doing this a little bit

3 = I've been doing this a medium amount

4 = I've been doing this a lot

BriefCOPE

22	I've been turning to work or other activities to take my mind off things.	1	2	3	4

23	I've been concentrating my efforts on doing something about the situation I'm in.	1	2	3	4
24	I've been saying to myself "this isn't real.".	1	2	3	4
25	I've been using alcohol or other drugs to make myself feel better.	1	2	3	4
26	I've been getting emotional support from others.	1	2	3	4
27	I've been giving up trying to deal with it.	1	2	3	4
28	I've been taking action to try to make the situation better.	1	2	3	4
29	I've been refusing to believe that it has happened.	1	2	3	4
30	I've been saying things to let my unpleasant feelings escape.	1	2	3	4
31	I've been getting help and advice from other people.	1	2	3	4
32	I've been using alcohol or other drugs to help me get through it.	1	2	3	4
33	I've been trying to see it in a different light, to make it seem more positive.	1	2	3	4
34	I've been criticizing myself.	1	2	3	4
35	I've been trying to come up with a strategy about what to do.	1	2	3	4
36	I've been getting comfort and understanding from someone.	1	2	3	4
37	I've been giving up the attempt to cope.	1	2	3	4
38	I've been looking for something good in what is happening.	1	2	3	4
39	I've been making jokes about it.	1	2	3	4
40	I've been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping or shopping.	1	2	3	4
41	I've been accepting the reality of the fact that it has happened.	1	2	3	4
42	I've been expressing my negative feelings.	1	2	3	4

43	I've been trying to get advice or help from other people about what to do.	1	2	3	4	
44	I've been learning to live with it.	1	2	3	4	
45	I've been thinking hard about what steps to take.	1	2	3	4	
46	I've been blaming myself for things that have happened.	1	2	3	4	
47	I've been making fun of the situation.	1	2	3	4	

Below are five statements with which you may agree or disagree. Circle the number that represents your level of agreement for the statement. Think about your life overall rather than at a specific time.

Use the following categories:
1 = disagree
2 = slightly disagree
3 = neither agree nor disagree
4 = slightly agree
5 = agree

	SWLS					
48	In most ways my life is close to my ideal.	1	2	3	4	5
49	The conditions of my life are excellent.	1	2	3	4	5
50	I am satisfied with my life.	1	2	3	4	5
51	So far I have gotten the important things I want in life.	1	2	3	4	5
52	If I could live my life over, I would change almost nothing.	1	2	3	4	5

Below there are 14 statements about work performance. Please indicate your level of agreement with each statement by circling the corresponding number beside each statement.

Use the following categories:
1 = disagree
2 = slightly disagree

		3 = neither agree nor disagree 4 = slightly agree 5 = agree
53	I know how to perform my job in a safe manner.	1 2 3 4 5
54	I know how to maintain or improve safety in my job.	1 2 3 4 5
55	I have the knowledge required to perform my job safely.	1 2 3 4 5
56	In the last 6 months I have given workmates direction when they were not performing a task safely.	1 2 3 4 5
57	I believe workplace health and safety is an important issue.	1 2 3 4 5
58	I feel that it is important to maintain safety at all times.	1 2 3 4 5
59	When at home I apply the same safety approach as I do at work.	1 2 3 4 5
60	This last year I have taken part in extra work tasks related to safety.	1 2 3 4 5
61	What percentage of effort do you dedicate to the following tasks (write the percentage in space provided) : Production _____ % Work Set Up _____ % PPE usage and maintenance _____ % Following procedures and safety processes _____ %	
62	I use the correct procedures for carrying out my job all of the time.	1 2 3 4 5
63	I ensure the highest levels of safety when carrying out my job, even if it takes longer to complete the work my supervisor has given me.	1 2 3 4 5
64	I have volunteered to participate in activities to improve workplace safety in the last year.	1 2 3 4 5
65	I always help my workmates when they are working under hazardous conditions.	1 2 3 4 5
66	In the last year I have checked and maintained my PPE (circle one of the following):	

	1 - Everyday 2 - Weekly 3 - Monthly 4 - Only when there is a problem with it

The following questions relate to incidents at work. Please answer as indicated by each question.

67	Have you ever received any first aid treatment at work? a - Yes b - No
68	If you answered yes to question 67 please indicate if you were able to return to : a - normal duties b - modified duties c - alternate duties d - unable to return to work
69	Have you ever had days absent from work due to a work related injury or incident? a - Yes b - No
70	If you answered Yes to question 69 please indicate how many days you had off: a : 1 - 7 days b : 8 - 14 days c : 15-21 days d : 22-31 days e : More than 32 days
71	If you answered Yes to question 69 please indicate if you returned to :

	a - normal duties b - modified duties c - alternate duties d - unable to return to work	
72	Have you had any near misses at work that had the potential to cause a workplace injury? a - Yes b - No	

Please answer each statement below by putting a circle around the number that best reflects your degree of agreement or disagreement with that statement. Do not think too long about the exact meaning of the statements. Work quickly and try to answer as

	TEIQue SF	completely disagree						completely agree
73	Expressing my emotions with words is not a problem for me.	1	2	3	4	5	6	7
74	I often find it difficult to see things from another person's viewpoint.	1	2	3	4	5	6	7
75	On the whole, I'm a highly motivated person.	1	2	3	4	5	6	7
76	I usually find it difficult to regulate my emotions.	1	2	3	4	5	6	7
77	I generally don't find life enjoyable.	1	2	3	4	5	6	7
78	I can deal effectively with people.	1	2	3	4	5	6	7
79	I tend to change my mind frequently.	1	2	3	4	5	6	7
80	Many times, I can't figure out what emotion I'm feeling.	1	2	3	4	5	6	7

81	I feel that I have a number of good qualities.	1	2	3	4	5	6	7
82	I often find it difficult to stand up for my rights.	1	2	3	4	5	6	7
83	I'm usually able to influence the way other people feel.	1	2	3	4	5	6	7
84	On the whole, I have a gloomy perspective on most things.	1	2	3	4	5	6	7
85	Those close to me often complain that I don't treat them right.	1	2	3	4	5	6	7
86	I often find it difficult to adjust my life according to the circumstances.	1	2	3	4	5	6	7
87	On the whole, I'm able to deal with stress.	1	2	3	4	5	6	7
88	I often find it difficult to show my affection to those close to me.	1	2	3	4	5	6	7
89	I'm normally able to "get into someone's shoes" and experience their emotions.	1	2	3	4	5	6	7
90	I normally find it difficult to keep myself motivated.	1	2	3	4	5	6	7
91	I'm usually able to find ways to control my emotions when I want to.	1	2	3	4	5	6	7
92	On the whole, I'm pleased with my life.	1	2	3	4	5	6	7
93	I would describe myself as a good negotiator.	1	2	3	4	5	6	7
94	I tend to get involved in things I later wish I could get out of.	1	2	3	4	5	6	7
95	I often pause and think about my feelings.	1	2	3	4	5	6	7
96	I believe I'm full of personal strengths.	1	2	3	4	5	6	7
97	I tend to "back down" even if I know I'm right.	1	2	3	4	5	6	7
98	I don't seem to have any power at all over other people's feelings.	1	2	3	4	5	6	7
99	I generally believe that things will work out fine in my life.	1	2	3	4	5	6	7
100	I find it difficult to bond well even with those close to me.	1	2	3	4	5	6	7

101	Generally, I'm able to adapt to new environments.	1	2	3	4	5	6	7
102	Others admire me for being relaxed.	1	2	3	4	5	6	7

Appendix F: Information Sheet

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PRINCIPAL *Lisa Brand*

INVESTIGATOR

PROJECT TITLE: *Psychological Fitness for Work in High Risk Industry*

SCHOOL *School of Psychology*

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I am Lisa Brand a current PhD student of James Cook University of North Queensland and this research forms the basis of my doctoral thesis. The aim of this research is to investigate the psychological factors that moderate the impact of psychological distress and significant life events upon workplace behaviour and performance. The outcome of this will be more efficient and effective training and development packages to assist employees in the management of the work/home interface.

If at anytime during your participation in this research you have further questions regarding the research you can contact the following people :

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If at anytime during your participation in this research you have concerns regarding the ethical conduct of the research project you are encouraged to contact:

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